CITY OF SIOUX FALLS
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Appendices
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HDR

February 2018

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Sioux Falls, SD
February 2018

Executive Summary

City of Sioux Falls Wastewater Regionalization Study

Introduction

The City of Sioux Falls (City) retained HDR Engineering, Inc. (HDR) to perform a comprehensive regional wastewater study to determine the feasibility of providing regional wastewater service to local outlying communities and to determine the key policy and analytical mechanisms needed in order to effectively provide regional wastewater service. Regionalization is not a "new" concept for the City's wastewater system. The City currently has agreements with other jurisdictions to provide wastewater services. The most recent agreement with the City of Harrisburg raised the important question of regionalization as a concept, but also whether the City's current approach was equitable to the City's existing customers and the new customers connecting to the wastewater system. To help address that question, a comprehensive analysis of regionalization was undertaken with a focus on regional wastewater rates. In addition, HDR also reviewed the City's existing cost recovery fees and the potential establishment of regional system development charges (SDCs).

The City recognizes there is an opportunity to be a "good neighbor" and assist other communities in addressing the ever increasing water quality treatment requirements of the Clean Water Act. At the same time, the City's wastewater system has near term treatment capacity available. The City recognizes that regional wastewater services could lead to logical development in the Sioux Falls planning area, while providing potential benefits for itself and surrounding communities from better "economies of scale" and improved water quality and resource management enhancements that comes from regional cooperation. Complexity of the regulatory environment is challenging for all parties, but particularly for smaller systems.

Establish Guiding Regional Principles and Financial Policies

The City, with assistance from HDR, reviewed a number of guiding principles for regionalization and used them to develop the general approach for establishing regional wastewater rates and system development charges. At the same time, financial policies were developed to provide the framework for the development of regional rate methodology and system development charges. In establishing a regional system it is imperative that a rate-setting framework be established in order for all regional customers to understand the approach and methodology that will be used by the City to establish regional rates and system development charges on a fair and equitable basis. The foundation of successful regional systems is treating all parties (owners and regional customers) in a fair, equitable and transparent manner, particularly as it relates to the rate setting process.

> *"The foundation of successful regional systems is treating all parties (owners and regional customers) in a fair, equitable and transparent manner, particularly as it relates to the rate setting process."*

Some of the more important and prominent principles and policies related to the establishment of a regional wastewater system are as follows:

- The City owns and operates the regional wastewater system. Local collection systems are owned and operated by the local entity.
- The regional system is defined as the City's wastewater treatment facilities and a portion of the City's interceptor/collection system needed to serve regional customers. Extensions

required to connect a regional customer(s) to the regional interceptor shall be paid for/funded by the local agency(s) that benefits from the extension.

- The City will use "generally accepted" rate setting methods to establish the regional rates and fees. A cost of service analysis will be used to equitably allocate the City's total wastewater system costs between the Regional Wastewater System and the City's retail customers. The City, as the owner of the Regional System, shall be entitled to earn a "fair" return on their investment to serve the regional customers.
- For purposes of the regional system, the City shall be defined as a regional customer, along with all other regional customers.
- System development charges (SDCs) shall be paid by all new regional customers connecting to the regional system and any customers expanding their existing capacity. All regional SDCs shall be used for expansion-related needs of the regional system.
- Local government shall retain responsibility for local rate setting. How regional rates and SDCs are passed through to local customers shall remain a local policy decision.

Given this basic framework of principles and financial policies, the regional wastewater rates and system development charges could be developed.

Development of Regional Wastewater Rates

The development of the regional wastewater rates involved a number of different steps or components. These various steps or components are discussed in more detail below.

Defining the Regional Wastewater System

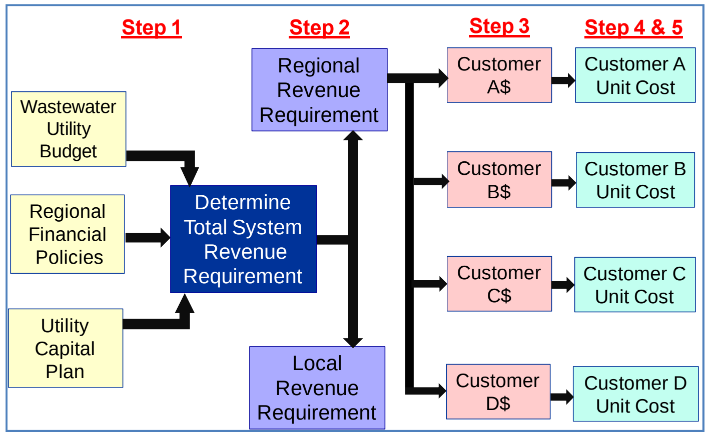
An important component of the study was clearly defining and identifying the plant facilities and assets related to the regional wastewater system. Wastewater treatment plant is considered to be 100% regional. The main focus of defining the regional system is related to the City's regional pump station and force mains (interceptor and collection system). In defining the regional sewer collection system, HDR worked closely with the City to review the various facilities that appeared to provide regional benefit. From that analysis a detailed map of the facilities was developed, along with the specific assets. The regional assets were also divided into three tiers; existing assets providing regional benefit (Tier 1), assets that will be constructed in the next 25 years that provide regional benefit (Tier 2), and assets that will be built outside of the 25 year time frame (Tier 3). At this time, only Tier 1 "used and useful" assets were included within the return on investment portion of the regional rate analysis.

As a regional provider the City of Sioux Falls will need to provide for future capacity in the system. As a part of this study, the City developed a policy statement for capacity expansion such that when the flow exceeds 75% of the permitted capacity for three consecutive months the utility should be studying/planning the next increment of expansion of the plant or the system. When the flow exceeds 90% of the capacity for three consecutive months the utility has to be in construction for the expansion of capacity. This regional rule is intended to provide a prudent rule for the expansion of wastewater treatment capacity, but to also provide regional customers with a clear understanding of the potential future need for expansion of treatment capacity. This policy was developed considering ordinary situations and as such will need to be applied based on ordinary flows with considerations for extreme weather events.

Development of the Regional Wastewater Rate Methodology

To begin the process of developing a regional wastewater rate, a “conceptual” methodology was developed. The intent was to establish a specific regional rate setting methodology which meets the following key objectives:

- Based upon “generally accepted” financial planning and rate setting principles
- Follow the regional principles and regional financial/rate setting policies
- Establish rates that are cost-based and address the issues of financial viability and long-term sustainability of the regional wastewater system
- For regional rate setting purposes, treat City and regional customers as equals[1]
- Equitably assign costs to the regional customers and reflect the unique characteristics of the different regional levels of service



As noted within the guiding principles, “regional customers” includes both the City and the other regional customers. Furthermore, the regional system is composed of the City’s wastewater treatment facilities and the regional collection system.

The graphic illustrates, in summary form, the five steps of the regional rate setting process. This methodology is designed to utilize the City’s existing wastewater accounting records and develop a regional wastewater rate. As can be seen in this figure, the five step process is summarized as follows.

- Step 1 – Determine the total revenue requirements for the City of Sioux Falls wastewater system
- Step 2 – Allocate (assign) the City’s total revenue requirement between Regional and City retail (local costs)
- Step 3 – Allocate the Regional revenue requirement between the regional customers
- Step 4 – Develop unit costs/rate designs for the various Regional customers
- Step 5 – Determine surcharges for exceeding average strength loadings

Allocation of the Revenue Requirement Between Regional and Local (Steps 1 & 2)

The first two steps determine the total revenue requirements of the wastewater utility and then equitably allocate the costs between the regional and local customers. For this study, calendar year 2011 budget information was utilized and then, in accordance with the regional financial policies, projected an additional four years (2012 – 2015).

Summary of Allocation of the Revenue Requirements ($000’s)

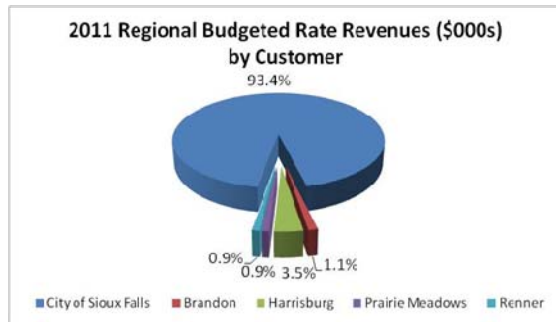
	Total	Local	Regional
Total Revenue	$18,734	$5,167	$13,567
Operation & Maintenance			
Conveyance	$ 3,436	$2,763	$673
Treatment	4,997	166	4,831
Debt Service (P+I)	5,981	1,701	4,280
Capital Improv. from Rates	4,320	765	3,555
Total Revenue Requirement.	$18,734	$5,395	$13,338
Balance/(Deficiency)	$0	($229)	$229

[1] Within the methodology, this essentially is the case. One key difference will be within the rate of return that the City earns on its investment to serve outside City or regional customers. The City as the owner of the regional system is entitled to earn a “fair” return on its investment to serve outside City regional customers.

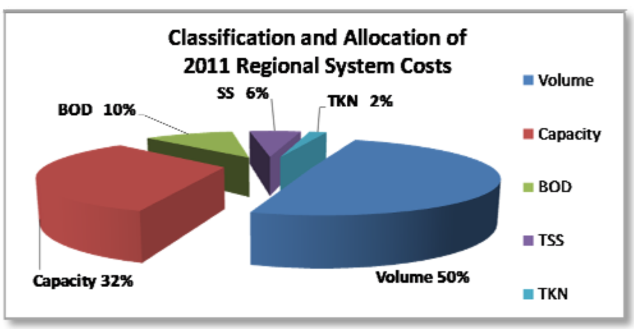
In developing the rate analysis, it was assumed that the revenue requirement would be revenue neutral (i.e. assume no adjustment to overall revenue levels) and the City's total wastewater revenue requirement was equitably allocated between regional and local. Of the City's total wastewater revenue requirement of $18.7 million, approximately $13.3 million is related to the regional system, as defined within this study. The local component of $5.4 million is the cost responsibility of the City of Sioux Falls retail (local) customers.

Allocate the Regional Revenue Requirement Between the Regional Customers (Step 3)

A cost of service compares the current revenue derived from customers to the equitably allocated regional revenue requirement. In the case of the City's system, the vast majority of revenue (93.4%) is derived from the City of Sioux Falls. While the impact of the revenues derived from the other customers has little or minimal impact upon the City's retail rates at this time, the need to establish fair and equitable regional rates is critical if the concept of regionalization is to be successful, to the point that it will attract additional regional customers. The attraction of additional regional customers will have direct benefit to the City's customers in that the existing fixed regional costs will be spread over a larger base of customers.

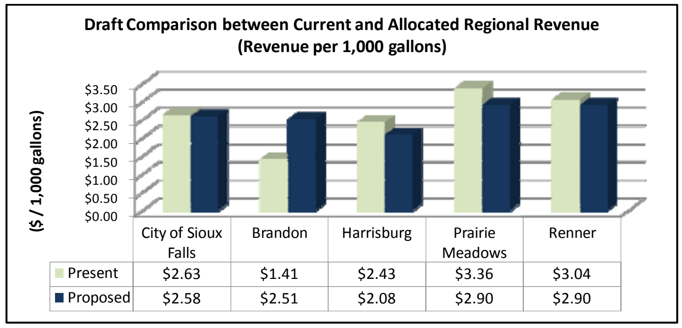


An important concept in establishing the regional rates is the use of a "postage stamp" approach. Under this approach, the regional rate methodology equitably allocates the entire regional system (treatment and collection) across all customers, regardless of the location of the customer (i.e. a postage stamp perspective). Costs were primarily assigned and allocated on the basis of a regional customer's total wastewater (volume) contribution, the strength of the wastewater as measured in biochemical oxygen demand (BOD), suspended solids (SS) and total nitrogen. In allocating the costs, consideration is given to the specific and unique characteristics of the customers. The specific and unique characteristics of each customer were related to their total flows, their peak flow capacities and the strength of the wastewater contributed by each regional customer. In the case of Brandon and Harrisburg, they both own and operate facilities which control the flow of their wastewater (i.e. equalization/capacity use), and in the case of Harrisburg, treat their wastewater to very low strength levels, before it enters the regional system. These differences in capacity use and strength levels ultimately result in different per unit cost (rates) on the regional system.

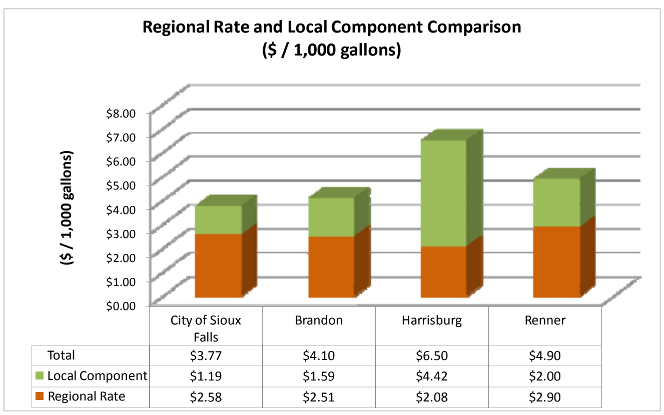


The regional rate methodology includes the City earning a fair return on their investment to serve the regional customers. Within this regional study, a specific formula has been established to have a consistent methodology to establish a fair rate of return to the City's customers. Within this regional study, the rate of return earned from the regional customers has been set at 10.83%. This rate of return includes a risk premium of 3% between the City of Sioux Falls and the outside City regional customers.

This study produced regional rates for each of the existing customers of the City, stated in $/1,000 gallons. The City of Sioux Falls is considered a regional customer under the regionalization approach and will be charged a regional rate for regional services. As can be seen in the graphic, the regional unit cost rates vary by regional customer. It should be noted that the City of Harrisburg and Brandon have calculated regional rates that are less than the City of Sioux Falls. Both Brandon and Harrisburg have facilities to equalize (levelize) their flow of wastewater to the City's treatment plant. Within the cost allocation methodology, as a result the benefit to the regional system from this equalization, Brandon and Harrisburg are allocated a smaller proportional share of the cost of regional capacity, resulting in a lower per unit cost for capacity. At the same time, Harrisburg also treats their wastewater and contributes very low strength wastewater. The cost allocation methodology fairly reflected this difference in wastewater strength levels which resulted in a lower per unit strength related cost for treating Harrisburg's wastewater.



To develop the local retail rate, each local jurisdiction will also need to add their local collection and administrative overhead costs to the regional rates noted above. The local rate setting process shall continue to be the responsibility of the local governing body. However, in order to better understand the potential relationship between regional and local components, this study attempted to place the regional rates in the context of both the local component and the current retail rates being charged by each entity. This may provide a better understanding the ultimate retail sewer rate that may be charged to each entity's customers.



Financial Benefit to the City from Regionalization of the Wastewater System

There are numerous potential benefits from regionalization. However, one important criterion for the City of Sioux Falls City Council may be the financial/economic benefit of regionalization. While earning a fair rate of return on investment to serve outside City customers is one financial benefit, it likely is not as critical as the potential "economies of scale" from a regional system. Should the regional system grow and add new regional customers, the fixed costs of the system will be spread over more customers. Another way this could be considered is, every dollar collected from a new regional customer is roughly a dollar less that needs to be collected from a City of Sioux Falls customer. For example, adding a new regional customer of approximately the size of the City of Brandon could potentially reduce the City and regional customer rates by 4¢ to 5¢ per 1,000 gallons. All customers (City and outside regional) will benefit from the addition of new customers since costs (and benefits) are equitably allocated across all customers. In addition, for each new customer connecting to the regional system, system development charges (SDCs) will be collected. This is not the case under the current cost recovery system.

Summary of the Regional Rate Analysis

The regional rate analysis has developed a fair and equitable methodology to establish regional wastewater rates, while taking into account the specific and unique characteristics of each customer.

Development of Regional System Development Charges

With the review of the regional wastewater rates, the next financial component to be considered are system development charges (SDCs). "System development charges are one-time charges paid by new development to finance construction of public facilities needed to serve them."[2] Simply stated, SDCs are a contribution of capital to either reimburse existing customers for the available capacity in the existing system, or to help finance planned future growth-related capacity improvements, or a combination of both purposes. System development charges are assessed to all new users of the regional system based upon the estimated amount of wastewater generated (capacity). The SDC considers the value of capacity for both regional collection and treatment.

System Development Charges vs. Cost Recovery Fees

The City currently has "cost recovery fees" for their wastewater system. There are similarities between cost recovery fees and SDCs, but there are also some significant differences between them. The comparison below illustrates the similarities and differences between the two.

Cost Recovery Fees	System Development Charges
• CRFs are a form of a capital contribution	• SDCs are a form of a capital contribution
• CRFs recover collection system costs for a specific area or improvement. Does not include the cost of any treatment facilities	• SDCs recover the value of both regional collection and treatment facilities
• Charge is based on specific area (facilities) where development occurs. Charge varies by area.	• SDC is "regional" based (postage stamp). Uniform SDC, regardless of area of development.
• CRFs are only applied to in-City development (note issue of Harrisburg's connection)	• SDCs would be applied to all regional customers (in-City and out-of-City).
• Fees may not reflect all of the collection facilities needed to deliver wastewater to City's treatment facilities	• SDC reflects the regional collection and treatment facilities needed to serve all regional customers
• Fee assessed based upon parcel size (area), which may not have any relationship to capacity utilization	• SDC is based upon needed capacity (capacity requirements)

As can be seen, there are significant differences between these two types of fees. Regional system development charges are more equitable in that all regional customers connecting to the system (in-City and outside City) will pay a regional SDC.

Calculation of the Regional System Development Charges

In general, the process of calculating an SDC can be broken down into the following four tasks:

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[2] Arthur C. Nelson, System Development Charges for Water, Wastewater, and Stormwater Facilities, Lewis Publishers, New York, 1995, p. 1.

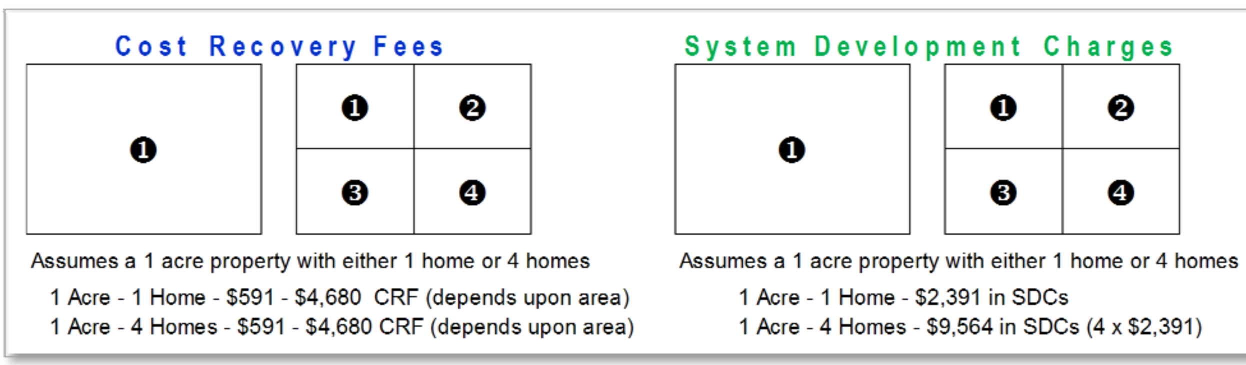
1. System Valuation. The value of the utility's existing assets used in the calculation of the reimbursement fee.
2. Multi-Purpose Project Allocation. The estimation of capital improvement costs related to growth that can be used in the calculation of an improvement fee portion of an SDC.
3. Capacity Definition. Defining the system capacities to be used in the calculation of the SDC.
4. Assessment Schedule Development. A schedule of charges or equivalent units used to determine the SDC charge per customer.

In calculating the regional SDC, the various major components of the regional system were reviewed and their per unit value determined. The SDC was further subdivided between a buy-in and an improvement component for both the regional treatment and collection system.

In summary, the system development charge for one equivalent residential unit (ERU) was calculated as $2,391. An SDC is typically assessed on the basis of capacity use. Water meter capacities are generally used as the surrogate for capacity use. The system development charge increases in direct relation to the capacity associated with the customer's meter. The system development charges are intended to replace the City's existing cost recovery fees. Regional SDCs are a more equitable method of assessing the costs related to growth and expansion.

Meter Size	Collection	Treatment	Total SDC
5/8" x 3/4"	$780	$1,611	$2,391
1"	2,761	3,217	5,978
1-1/2"	5,521	6,433	11,954
2"	8,834	10,293	19,127
3"	16,564	19,299	35,863
4"	27,607	32,165	59,772

As noted above, SDCs are assessed on the basis of capacity. The diagram below compares the assessment of cost recovery fees to the regional system development charges.



As can be seen from the above comparison, cost recovery fees are assessed on the basis of the area where develop occurs and the amount of acreage of the development and not capacity use. Under cost recovery fees, the fee would be the same for a 1 acre lot with 1 home or 4 homes. In contrast to this, the regional SDC is assessed on capacity, or the number of homes (ERUs) within that development.

At the local level, the local entity is responsible for determining how the regional SDCs are passed through to customers (direct pass-through, within rates, etc.). The local entity may also assess an SDC for their local collection system component.

Summary

System development charges provide an equitable basis for new customers connecting to the regional system. Regional SDCs would be assessed to all new development (in-City and outside City) and the SDCs may be passed through to development in any manner deemed appropriate by the local entity.

Sioux Falls Comprehensive Wastewater Regionalization Study Fact Sheet #1

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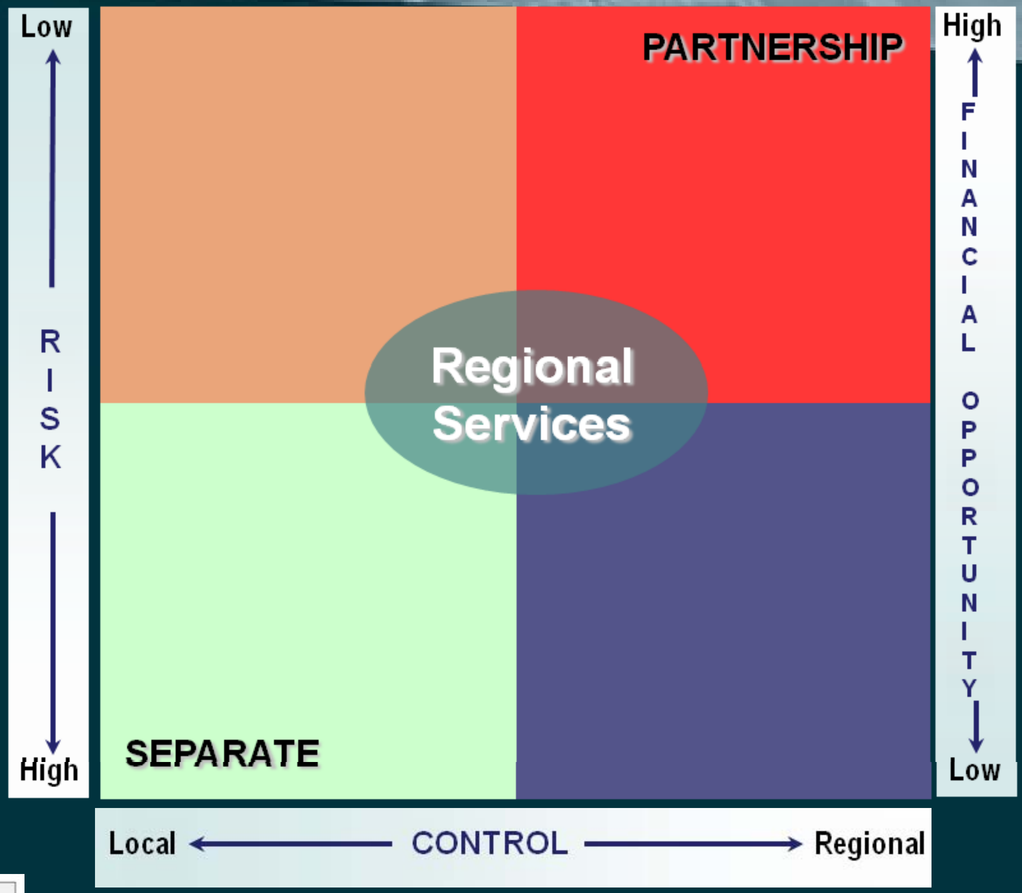
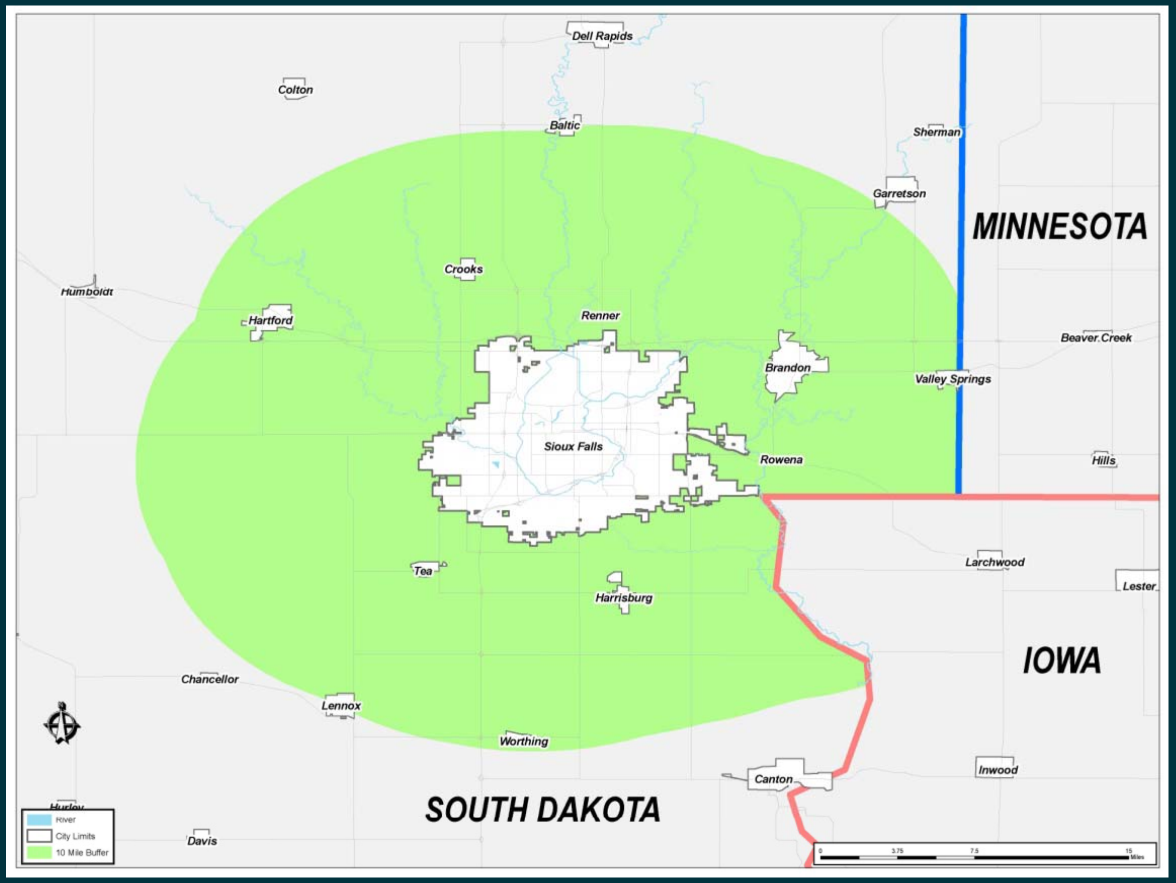
Key Issues

- Participation in the regional system will be voluntary for outside customers.
- The City currently utilizes rates and cost recovery to finance all improvements.
- No additional revenue is being considered, simply the equitable split and allocation of costs are being reviewed.
- The City is currently developing an alternative that looks at System Development Charges (SDCs) as an alternative to the current cost recovery.
- The City is currently developing a policy for facility expansions that will allow regional customers to feel comfortable that capacity will be available to support growth of the City of Sioux Falls as well as regional customers.
- Contracts will be developed for regional customers which follow the terms and policies of the regional system.





Rate Study Process

- Draft rates and SDCs were developed, using the methodology presented in the draft City financial policies
- Internal City review of draft regional rates/SDCs/financial policies.
- Move study forward based on Mayor and Council feedback.

HDR

Frequently Asked Questions

Q. Why is this study being performed?

A. The Harrisburg addition to the regional system raised questions regarding the equitability of outside customers using City infrastructure paid for with developer dollars (Cost Recovery). This study was commissioned to consider how the City of Sioux Falls can be a regional provider and provide services for retail customers and outside customers in an equitable manner.

Q. How does the City presently account for new users (residential, industrial and commercial development) added to the sewer system?

A. The City of Sioux Falls develops Cost Recoveries. These charges are assessed to developers at the time of platting based on the area impacted. No accounting is made for flow. The only costs recovered are for the collection system that is required to get the wastewater to the treatment plant.

Q. Which communities are participating in the study?

A. The initial study area considered a 10 mile ring of communities around the City (S.D. only) as illustrated in the graphic (bottom left). No interested regional communities have been excluded if they are not inside the 10 mile ring.

Q. How will the rate structure be based?

A. The City is considering a wholesale rate model that evaluates the costs of the regional system. Initial recommendations include an additional rate of return (risk premium) that will be added for outside users to compensate the City for the use of the system and provide a fair return on investment.

Q. What is a System Development Charge (SDC)?

A. A SDC is a charge that is developed for new users of the system based on the amount of wastewater generated. It considers collection and treatment asset costs.

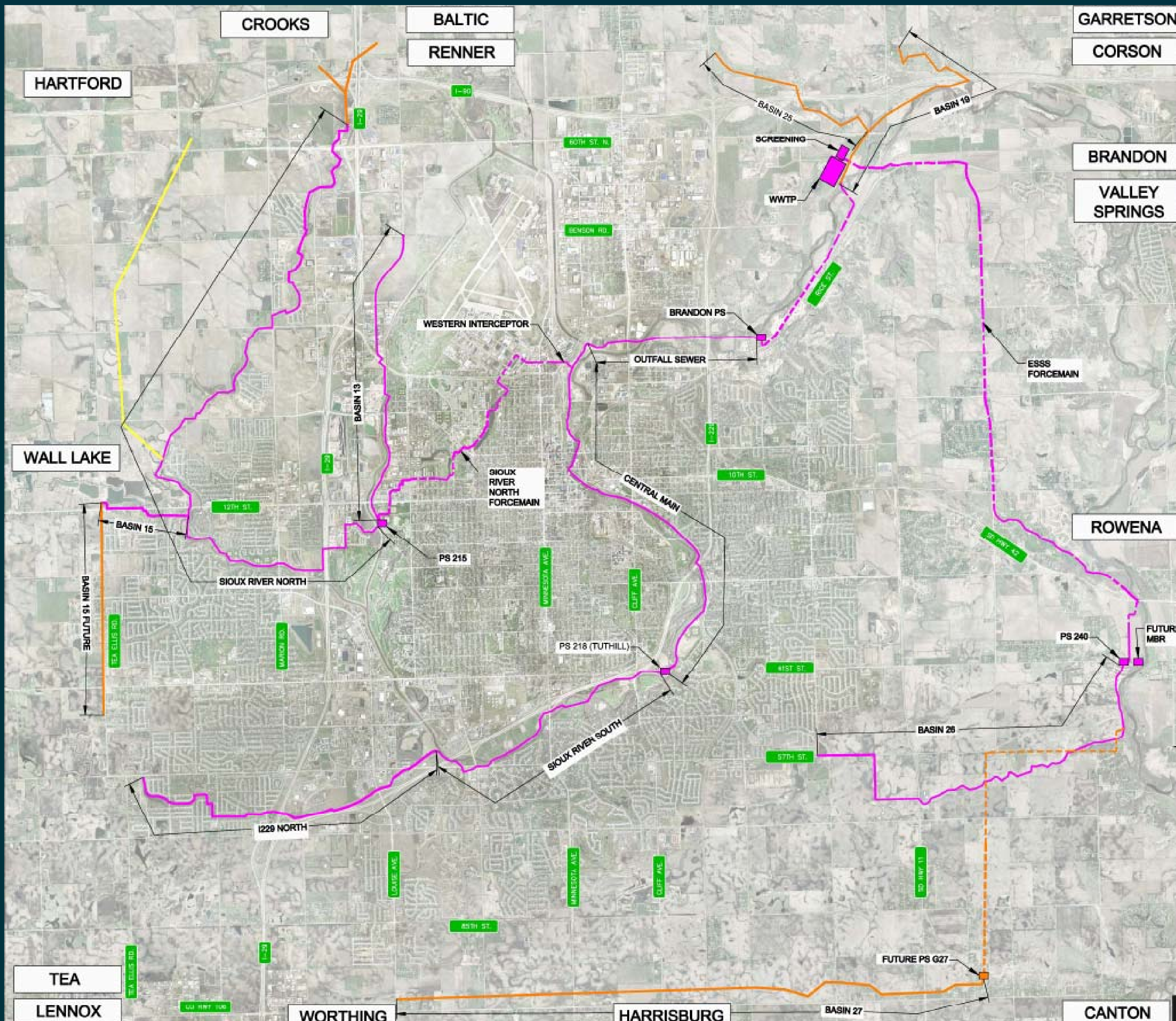
Q. How will administration of the Regional System be governed?

A. The system will be owned and operated by the City of Sioux Falls. Community participation will be by contract, with each of the regional communities being responsible for their collection system and delivering flow to the regional assets.

Q. What can be expected as an outcome?

A. No alternative has been selected to date. All options are still under consideration. The process to date has developed alternatives that consider assessing costs based on flow, and continues to evaluate the rate model for assigning costs to regional customers and city customers.

Sioux Falls Comprehensive Wastewater Regionalization Study Fact Sheet #2



LEGEND

- TIER 1 TRUNK SEWER
- TIER 1 FORCEMAIN
- TIER 2 TRUNK SEWER
- TIER 2 FORCEMAIN
- TIER 3 TRUNK SEWER
- TIER 3 FORCEMAIN

Criteria & Terminology Definitions

Regional gravity sewer criteria: Vital 12-inch or larger gravity sewer lines that will convey both City of Sioux Falls and regional customer flows. Not all trunk sewers larger than 12-inch within the City of Sioux Falls were classified as regional.

Regional pump station and force main criteria: Pump stations that pump flows from a regional gravity sewer line to a treatment facility or gravity sewer line. Force mains used to convey the flow from the regional pump station are part of regional system as well.

Regional treatment facility criteria: Any treatment facility on the regional sewer system that treats the wastewater from regional customers.

The regional system was divided into three tiers and are as follows:

- *Tier 1* - All existing City of Sioux Falls sanitary sewer system components classified as regional assets. These components are currently in the ground and will immediately be used to convey regional sewer flows.
- *Tier 2* - All proposed regional system assets that will be constructed within the next 25 year planning period based on the master plans and comprehensive plans.
- *Tier 3* - All proposed regional system assets that will be constructed outside of the 25 year planning period based on the master plans and comprehensive plans.

Regional customers will be responsible for constructing, maintaining, and operating all connecting sewer lines between their community and the regional system. These lines will not be part of the regional system and shall be maintained by the community. The connection point between the regional system and the regional customer will be determined when a community shows interest in joining the regional system.

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Sioux Falls Comprehensive Wastewater Regionalization Study Fact Sheet #3

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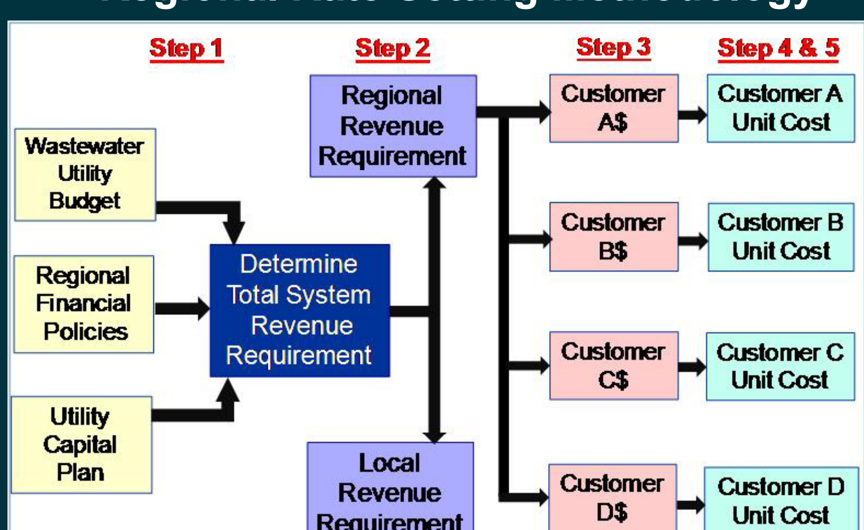
Key Issues for Regional Rates

- The City has developed a set of key financial principles and policies to guide the process of developing rates and charges for regional wastewater services.
- The methodology and draft results for the regional rates have been reviewed by City staff and Management.
- "Regional" customers include both City of Sioux Falls customers and customers outside of the City.
- Regional rate methodology is intended to equitably allocate regional wastewater costs.
- Regional rate methodology allocates the entire regional system (treatment and regional collection) across all customers, regardless of the location of the customer (i.e. a "postage stamp " perspective).
- Regional rate methodology does take into account, and the results do reflect, customers that provide flow equalization benefits to the system through use of existing lagoons.
- Results shown in this fact sheet reflect the use of the financial policies and the conceptual regional rate methodology previously developed as a part of the regionalization study.
- The results shown on this fact sheet are in draft form and intended to provide all interested parties a better understanding of the approximate level of regional rates that can be reasonably expected.
- The final regional rates will vary from these results based upon the number of participating utilities in the regional system.

Regional Rate Setting Methodology



Summary of Allocation of the Revenue Requirements ($000's)

	Total	Local	Regional
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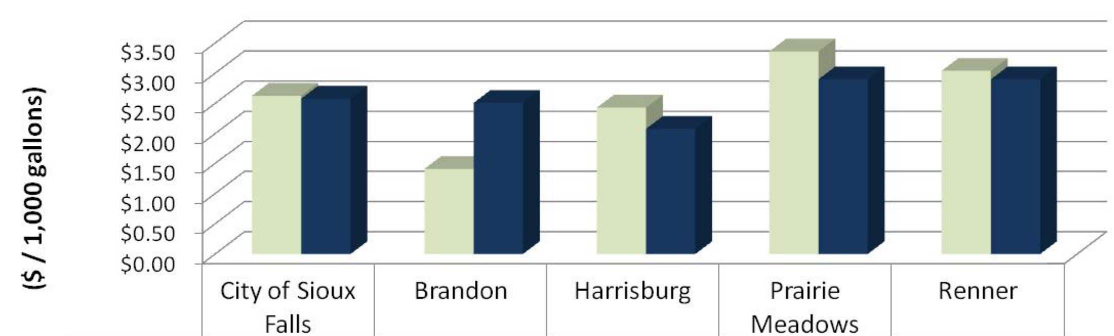
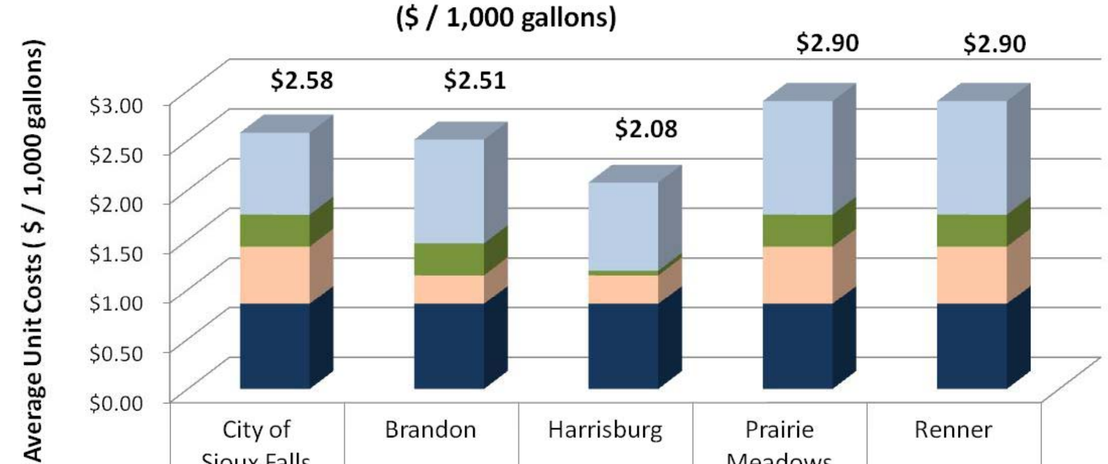
Total Revenue Requirement.	$18,734	$5,395	$13,338
Balance/(Deficiency)	$0	($229)	$229

Draft Comparison between Current and Allocated Regional Revenue (Revenue per 1,000 gallons)



	City of Sioux Falls	Brandon	Harrisburg	Prairie Meadows	Renner
Present	$2.63	$1.41	$2.43	$3.36	$3.04
Proposed	$2.58	$2.51	$2.08	$2.90	$2.90

Components of the Regional Average Unit Costs ($ / 1,000 gallons)



	City of Sioux Falls	Brandon	Harrisburg	Prairie Meadows	Renner
Return	$0.83	$1.05	$0.88	$1.14	$1.14
Strength	$0.32	$0.32	$0.05	$0.32	$0.32
Capacity	$0.58	$0.29	$0.29	$0.58	$0.58
Volume	$0.86	$0.86	$0.86	$0.86	$0.86

Frequently Asked Questions

Q. What are regional costs composed of?

A. The costs of treatment, pumping and collection within the regional collection system.

Q. How was the regional collection system determined?

A. The regional collection system was determined through a review of the City's collection system. Approximately 15% of the City's total collection system assets were defined as providing a regional benefit.

Q. Do all customers share in the regional system costs?

A. Yes, all regional customers equitably share in the regional system costs. The methodology was designed to equitably allocate costs between regional and local wastewater services.

Q. How are costs equitably allocated?

A. The analysis is very detailed, but in general, allocates costs on the basis of flow (volume), capacity, strength and customer related attributes of each customer. The final results determine a unit cost, or dollars per 1,000 gallons of treated flow.

Q. Why do customers have slightly different rates ($/1,000 gallons)?

A. Three key areas of the analysis create these cost differences. These are strength of wastewater contributions, capacity (flow equalization) and return on investment. In particular, Harrisburg and Brandon provide flow equalization that benefits the regional system and Harrisburg treats its wastewater to a lower strength level before it is sent to the regional system. This produces lower per unit costs for these particular customers.

Sioux Falls Comprehensive Wastewater Regionalization Study Fact Sheet #4

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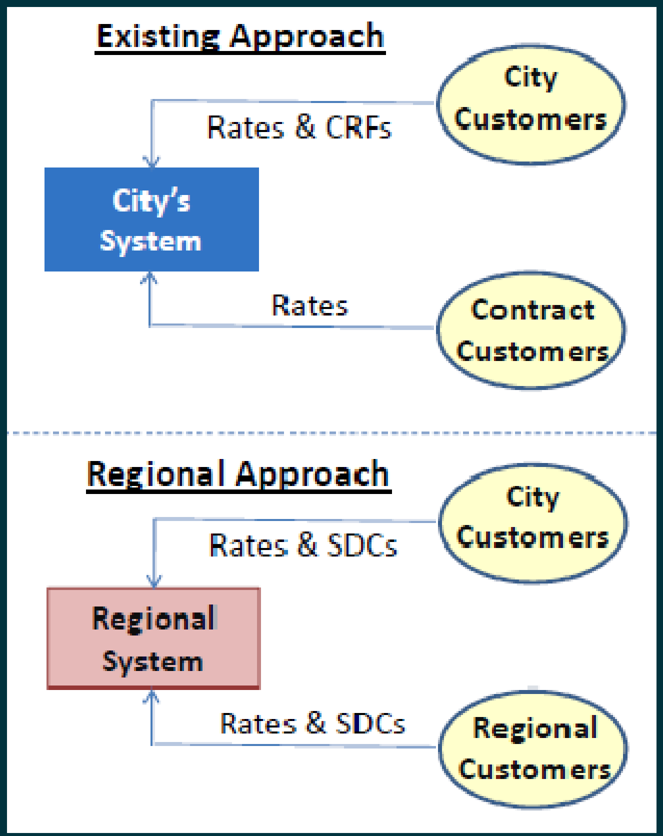
Key Issues – Regional System Development Charges (SDCs)

- Regional SDCs are a one-time charge that is assessed to new customers connecting to the regional system and existing customers expanding their capacity. The SDC is based upon the amount of wastewater generated. It considers collection and treatment asset costs.
- SDCs will be for the regional system. That is, a uniform SDC by meter size will be applied across the regional system.
- Local agencies (including Sioux Falls) will have the flexibility to decide how they will collect the regional SDC from their new connections (i.e. via a "pass-through" regional SDC or from some other funding source).
- All SDC revenue will be set aside to fund regional capital projects or regional debt service.
- All regional customers (including the City of Sioux Falls) will pay regional SDCs.
- Regional SDCs are intended to replace the current cost recovery fees.
- The decision to include a local collection system component (local SDC) will be a decision of the local governing body.

Meter Size	Collection	+	Treatment	=	Total SDC
5/8" or 3/4"	$780	+	$1,611	=	$2,391
1"	2,761	+	3,217	=	5,978
1-1/2"	5,521	+	6,433	=	11,954
2"	8,834	+	10,293	=	19,127
3"	16,564	+	19,299	=	35,863
4"	27,607	+	32,165	=	59,772

Comparison Between Existing /Regional Approach and Cost Recovery Fees and SDCs



Side-by-Side Comparison of Cost Recovery Fees and SDCs

Cost Recovery Fees	*System Development Charges*
• CRFs are a form of a capital contribution	• SDCs are a form of a capital contribution
• CRFs recover collection system costs for a specific area or improvement. Does not include the cost of any treatment facilities	• SDCs recover the value of both regional collection and treatment facilities
• Charge is based on specific area (facilities) where development occurs. Charge varies by area.	• SDC is "regional" based (postage stamp). Uniform SDC, regardless of area of development.
• CRFs are primarily applied to in-City development (note issue of Harrisburg's connection)	• SDCs would be applied to all regional customers (in-City and out-of-City).
• Fees may not reflect all of the collection facilities needed to deliver wastewater to City's treatment facilities	• SDC reflects the regional collection and treatment facilities needed to serve all regional customers
• Fee assessed based upon parcel size (area), which may not have any relationship to capacity utilization	• SDC is based upon needed capacity (capacity requirements)

Frequently Asked Questions

Q. What is a System Development Charge (SDC)?
A. An SDC is a charge that is developed for new users of the system based on the amount of wastewater generated (capacity). It considers collection and treatment assets costs.

Q. Who pays the SDC?
A. SDCs are assessed to the local utility based on increases in capacity requirements on the regional system by new customers. The local utility will determine how those fees are assessed and collected. They are generally collected at the time the building permit is issued.

Q. Are SDCs only assessed on new customers?
A. SDCs are designed to recover the costs incurred by the regional system to provide capacity to accommodate capacity expansion and growth. The SDC is assessed for new customers connecting to the regional system and existing customers that increase their capacity requirements (i.e. upsize meter) or have significant change in use (expansion of use). Expansion of existing capacity will be charged the incremental cost of upsizing.

Q. How will the regional system measure the capacity requirements of a new customer?
A. The regional system will use water meter size as the measure of the capacity requirements.

Q. Will all new water meters be assessed the same SDC?
A. Not necessarily. Some water meters do not contribute wastewater to the system (e.g., irrigation meters). These meters will not be assessed an SDC for the regional wastewater system. Likewise, some meters are sized for fire flow purposes or are otherwise not representative of the contribution of wastewater to the systems. A separate calculation can be done in those circumstances.

Q. If a customer has already paid cost recovery fees will they also be charged SDCs?
A. No, that is not currently envisioned. However, implementation of SDCs and implementation needs to be determined.

Q. Will a regional customer pay both the collection and treatment SDC?
A. Yes. The total regional SDC for a customer with a 5/8" or 3/4" meter will be $2,391. The existing cost recovery fee only reflects collection system costs and does not include any costs associated with the value of treatment capacity.

HDR

Appendix 3.A – Existing Systems Overview Map

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018

DATA SOURCE: City of Sioux Falls Utility Data (Feb. 2016)

SIOUX FALLS SANITARY COLLECTION SYSTEM OVERVIEW MAP

Existing Facilities Condition Assessment Technical Memorandum

Collection and WRF Master Plan

Water Reclamation Facility

Sioux Falls, South Dakota

November 3, 2016

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Detail Costs for Pump Station Condition Assessment Recommendations

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Detail Costs for Water Reclamation Facility Condition Assessment Recommendations

1 INTRODUCTION

HDR was retained by the City of Sioux Falls to prepare a Wastewater Master Plan to analyze and determine needed expansion and upgrade alternatives to the wastewater collection and treatment facilities. The final report will become a planning tool to guide the implementation of upgrades and expansion to the wastewater facilities to maintain service to its customers for the next 20 years.

HDR's approach to achieving this goal was to evaluate the existing systems, determine the future needs, and identify alternatives to meet future wastewater system needs. This Technical Memoranda (TM) has been prepared to allow the City and staff to be informed at a high level of detail of the condition assessment portion of the study as it progresses. The information from this TM and comments received will be included as an Appendix to Chapter 3 – Existing Wastewater Systems. The summary and recommendations will form the basis of Chapter 3 of the final report.

1.1 Facility Overview

The City of Sioux Falls has flow equalization basins that are used to address diurnal flow patterns and limit peak flow to the Water Reclamation Facility (WRF). The 12 million gallon equalization basins are located near North Cliff Avenue and Chambers Street, upstream of the Brandon Road Pump Station.

The Brandon Road Pump Station conveys the majority of the domestic and industrial wastewater from the City of Sioux Falls to the Water Reclamation Facility (WRF). Other flows, which are directed to the WRF, include the Eastside Sanitary Sewer System (ESSS) conveyed by LS 240, City of Brandon conveyed by a Brandon-Owned Lift Station and the humane society and industrial park lift stations located in close proximity to the WRF.

At the WRF, rotary fine screens installed in 2007 pre-treat the wastewater to remove large materials that could damage or plug equipment. The screenings units include integral washing and pressing functions and are conveyed to an adjacent dumpster. After screening, the wastewater enters an aerated grit chamber where materials such as sand and gravel are removed to minimize wear on equipment. Grit removed from the wastewater is washed and discharged to a dumpster before disposal in the landfill.

The facility has four (4) primary clarifiers to remove settable solids and scum from the wastewater. The primary clarifiers are 90 feet in diameter and have 8-feet of side-water depth. The clarifiers are center-feed with peripheral weirs. Settled solids (sludge) and scum are collected by a rotating arm and are pumped to the solids handling units.

Secondary treatment is accomplished by two stages of trickling filters, which have recently been updated with stainless steel rotary distributors. The four (4) first stage trickling filters are 135 feet in diameter and are 7 feet deep. The four (4) second stage trickling filters are 145 feet in diameter and are 7 feet deep. The trickling filters contain Sioux quartzite rock media, newly replaced distributor arms and an underdrain system. The microorganisms on the media of the

Trickling Filters remove pollutants in the waste stream. Each stage of trickling filters is followed by two 105-foot diameter Intermediate Clarifiers with side-water depths of 10 feet. The intermediate clarifiers remove biomass that sloughs off of the Trickling Filter media by gravity settling.

Tertiary treatment for ammonia removal is accomplished in the activated sludge system. Microorganisms or “activated sludge” in the basin is mixed with the wastewater from the secondary treatment process. Coarse bubble diffusers supply air to provide oxygen to the microorganisms and mixing. In the aerobic environment, the microorganisms nitrify ammonia to allow the facility to meet permit requirements. The effluent from the aeration basins flows into four 100-foot diameter final clarifiers with side-water depths of 14 feet. The final clarifiers settle solids from the treated wastewater. The sludge from the final clarifiers is returned to the activated sludge process or wasted and co-settled with in the primary clarifiers.

Effluent from the final clarifiers flows to the recently rehabilitated Effluent Filter Unit for final polishing. Eight mono-media gravity filters 34 feet by 17 feet by 8 feet deep further remove any pollutants remaining in the water to ensure compliance with permit requirements. Filtered water flows to the chlorine contact basin where liquid sodium hypochlorite is added at the entrance to the tank for disinfection. Residual chlorine in the wastewater at the end of the basin is removed by the addition of liquid sodium bisulfite. Finally, a cascade aeration unit increases the dissolved oxygen in the water before final discharge to the Big Sioux River.

The 2009 re-rated capacity of the facility are shown in Table 1.1 below.

Table 1.1 Re-Rated Sioux Falls WRF Capacity - 2009

Parameter	Value
Average Daily Flow	21.0 mgd
Peak Hourly Flow	35.0 mgd
$TBOD_5$	51,240 lb/d
TSS	43,900 lb/d
TKN	9,440 lb/d

2 INVENTORY AND CONDITION ASSESSMENT OF FACILITIES

In accordance with the City's scope of services, HDR performed multiple field investigations in order to determine the current condition of the City's wastewater collection and treatment facility assets. This section of the report will detail the results of those investigations and provide details such as:

- Who performed the evaluation
- What assets were evaluated
- What were the criteria that the assets were evaluated under
- How are the scoring methods defined
- How was priority assigned among the scoring criteria

In addition to the details of the condition assessments, a discussion of the each of the process components for the Wastewater Collection System and Water Reclamation Facility will be provided along with an identification of deficiencies and recommended improvements.

2.1 Site Visits and Evaluations Performed

To perform a comprehensive condition assessment at each of the City's Wastewater facilities, HDR assembled a highly experienced, multi-discipline team that has been involved in multiple WRF facility condition assessment, design and operations projects. The team consisted of the following individuals:

- Dan Graber – Project Manager
- DelRon Peters – Project Engineer/Assistant Project Manager
- Allan Erickson – Sr. Process Engineer
- Kevin Newman – Sr. Process Engineer
- Michael Johnson – Process Engineer
- Kevin Thernes – Electrical Engineer
- Wayne Wilson – Architectural Engineer
- Art Becker – Mechanical Engineer
- John Koch – Lift Station/Pumping Systems

2.2 Criteria Used During the Evaluations

During the kickoff meeting, HDR outlined the criteria under which each of the assets would be reviewed. To comprehensively assess the current condition of each asset, our field reviewers looked at the following elements and assigned a numerical value to its current status.

2.2.1 Performance Rating

This rating was developed to measure the current effective output of the asset and whether that performance met the needs of the original design intent and City's needs. The rating was determined through observation of the asset during operations as well as by discussions with

City operators and maintenance personnel. Each asset was assigned a value of 1-5 with the general scoring value being reflected below.

1 - Excellent performance – Meets every need.

2 - Very good performance – Some diminishment in throughput but generally meets needs.

3 - Good performance – Notable deviation from expected performance but manageable.

4 - Poor performance – Significant deviation from performance or expectation but operational.

5 - Unacceptable performance – Substantial problem with performance requiring workarounds.

2.2.2 Condition Rating

The condition rating was an evaluation of observable conditions of the assets to determine corrosion, apparent defects, vibration and other detectable deficiencies. The rating was also based on a value of 1-5 defined below.

1 - Excellent condition – No observable issues in operation.

2 - Very good condition – Minor deficiencies but none that impact operations.

3 - Good condition – Noteworthy deficiencies requiring additional examination to assess if they could affect operations.

4 - Poor condition – Multiple observable deficiencies that only modestly impact operations.

5 - Unsatisfactory condition – Operations are likely affected by deteriorating asset condition.

2.2.3 Reliability Rating

Assessment of the consistency of the asset based on discussions with operators and staff as well as any issues observed during the site visits. The rating is based on a value of 1-5 as defined below.

1 - Excellent reliability – No known failures in performance.

2 - Very good reliability – Few identified occasions of failure.

3 - Good reliability – Notable occasions of failures identified by operators.

4 - Poor reliability – Operators noted concern about asset reliability.

5 - Unacceptable reliability – Regularly out of service and creates burden for operations.

2.2.4 Remaining Asset Life

After the field visit, HDR collected information on the actual installed life of each key asset and compared that with its expected life, which was based on industry literature or guidance. This provided an additional rating element for the estimated remaining life of a typical asset of that classification. In order to be mathematically consistent with the other rating criteria, the remaining life values were converted to a 1-5 rating scale.

In summary, HDR's analysis of each key asset covered four different elements to develop a value-based assessment of its current condition. The relative importance or weighting of each of these elements in the final assessment of the key asset condition is key.

2.2.5 Risk Rating of Asset Failure

This rating overlay consists of two elements. The first element is the probability of a functional loss of an asset based on its condition and the second element is overall severity such a loss to the overall system service. These elements are incorporated into the evaluation as a multiplying factor to the Key Asset Rating that arises out of the weighted score of the four-condition assessment criteria of an asset (condition, performance, reliability and age) previously described. The probability of occurrence is classified based on the observed asset condition and discussions with plant staff and operations. The relevant numeric multipliers associated with this assessment include the following:

- Low Probability (1.0 multiplier) – Asset is in good working order with a positive operations history.
- Moderate Probability (1.25 multiplier) – Asset has had a few failures and the industry experience indicates this is not unusual.
- Significant Probability (1.5 multiplier) – Regular and repeated failures which have eroded confidence in asset resiliency.

2.2.6 Operational Impact

Any risk evaluation should also include an understanding of the consequences of failure. To accomplish this, a severity index has been included to measure the impact of a failure once it has happened. The blended score from these two overlays will provide the City with a Risk Rating for each of their key assets. Scoring for the classification of the consequences is provided below.

- Minimal Impact (1.0 multiplier) – low operational impact, usually localized / manageable.
- Moderate Impact (1.25 multiplier) - loss would limit/affect overall treatment operations.
- Severe Effect (1.5 multiplier) – loss would dramatically limit plant or cause shutdown.

2.2.7 Safety Rating of Asset

Much like the risk rating, the safety rating is a measure of the impact on either worker or community safety from the failure of an asset. This is intended to be seen as a definable and reasonable physical risk and is included to cover the City's commitment to employee safety in their daily operations. Like the previous overlay, this is also quantified by a multiplier to the Key Asset Rating as detailed below.

- No issue (1.0 multiplier) – Asset failure in any manner creates no safety concerns.
- Potential for Harm (1.25 multiplier) – Possibility that failure could create harm/injury.
- Harm Likely – (1.5 multiplier) – Failure would likely result in worker/community injury.

2.2.8 Priority for Improvement

The numeric values associated with each asset condition have been developed in order to provide a complete picture of the value, condition, risk and impact of its loss or failure. Considerations such as run-to-fail operations, need for redundancy, risk tolerance, worker safety, etc. all need to be recognized in their proper priority.

Priority for improvement has been rated as High, Medium and Low. Those assets with a High rating should be addressed immediately. Assets rated as Medium can continue operating, but should be upgraded and/or replaced within the next 5 – 10 years. The Low priority rated assets are assumed to be operational for the next 10 – 20 years.

2.2.9 Summary of Asset Ratings

The results of the collection system condition assessment are summarized in Table 2.1. The results of the Water Reclamation Facility (WRF) condition assessment are summarized in Table 2.2. Table 2.2 group assets by their major components, which provide a comprehensive scoring summary for WRF assets.

Table 2-1
Condition Assessment Rating Summary for Lift Stations
(High Priority = Immediately; Medium Priority = 5-10 years; Low Priority = 10-20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Year Installed	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
PS-201	Electrical	Standby Generator			3	Currently have to use portable generator	1.25	1.5	1.25	7.03	MEDIUM	$81,000
PS-203 Cherokee & "C" Operation	General	Laser Scan for as-built drawings of lift station	2.02 MGD		4	No as-builts of station	1.25	1.5	1.5	11.25	HIGH	$21,000
	General	Address hotels, restaurants, and increased flows.			4	Provide for future capacity of station.	1.25	1.5	1.5	11.25	HIGH	$21,000
	Process	Extend forcemains so both tie together in station			4	Maintenance Accessibility	1.25	1.5	1.5	11.25	HIGH	$63,000
	Process	Sandblast and coat pump room and piping.			4	Deterioration, rusting and corrosion.	1.25	1.5	1.5	11.25	HIGH	$16,000
	Process	Provide Pigging Station for the Dual Forcemains.			4	Access for forcemain cleaning.	1.25	1.5	1.5	11.25	HIGH	$31,000
	Process	Change pumps to self-priming type pumps.			4	Need for suction capability with potentially deeper wetwell.	1.25	1.5	1.5	11.25	HIGH	$151,000
	Process	Extend suction lines through current wetwell to new wet well.			4	Required for PS upgrades	1.25	1.5	1.5	11.25	HIGH	$63,000
	Process	Provide baffles or pre-rotation basin inserts (Ogee style wetwell)			4	Scour grease and clean wetwell.	1.25	1.5	1.5	11.25	HIGH	$21,000
	Structural/Architectural	Replace Roof			4	Old and deteriorated.	1.25	1.5	1.5	11.25	HIGH	$44,000
	Structural/Architectural	Construct new dual wetwell and fill old wetwell to grade.			4	Maintenance & Reliability	1.25	1.5	1.5	11.25	HIGH	$176,000
	Structural/Architectural	Provide access hatches over dual wetwell.			4	Access for Vactor Cleaning.	1.25	1.5	1.5	11.25	HIGH	$21,000
	HVAC	New HVAC system for the pump room and electrical room.			4	Required for PS upgrades	1.25	1.5	1.5	11.25	HIGH	$65,000
	Electrical	Provide new electrical switchgear, motor control center, and VFDs.			4	Required for PS upgrades	1.25	1.5	1.5	11.25	HIGH	$151,000
	Electrical	Provide new generator and move to "Old Wet Well" location.			4	Required for PS upgrades	1.25	1.5	1.5	11.25	HIGH	$71,000
	Electrical	Provide seal-offs to isolate per code requirements.			4	Required for PS upgrades	1.25	1.5	1.5	11.25	HIGH	$11,000
PS-204 Modern Press - 806 N West Avenue	Process	Add Davit Crane base on top slab of both wetwell and drywell	1.07 MGD		4	Safe removal of pumps and equipment.	1.25	1.5	1.5	11.25	HIGH	$5,000
	Electrical	New circuit breakers at upper (immediate) level with true lockable disconnects			4	Currently below grade in unsafe location	1.25	1.5	1.5	11.25	HIGH	$31,000
	Electrical	Move generator transfer switch outside on pole.			4	Currently below grade in unsafe location	1.25	1.5	1.5	11.25	HIGH	$21,000
PS-205 - 6th and Hawthorne	Architectural	Safe Access Maintenance Lift	0.41 MGD		4	Currently no safe access to below grade pump room	1.25	1.5	1.5	11.25	HIGH	$81,000
	Electrical	Generator			4	Currently have to use portable generator	1.25	1.5	1.5	11.25	HIGH	$81,000
	Electrical	Controls Updgrade			4	Controls are outdated	1.25	1.5	1.5	11.25	HIGH	$61,000

Table 2-1
Condition Assessment Rating Summary for Lift Stations
(High Priority = Immediately; Medium Priority = 5-10 years; Low Priority = 10-20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Year Installed	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
PS-206 Burnside	Structural/Architectural	Reseal Mag Meter Vault	0.84 MGD	1940s	4	Groundwater leaks into vault	1.25	1.5	1.5	11.25	HIGH	$31,000
	Structural/Architectural	Replace above grade building		1940s	4	Deteriorated building	1.25	1.5	1.5	11.25	HIGH	$112,000
	HVAC	New supply and exhaust HVAC System		1940s	4	Old and Outdated	1.25	1.5	1.5	11.25	HIGH	$41,000
	Electrical	New Generator and Electrical Upgrades		1940s	4	Existing is older, salvage generator.	1.25	1.5	1.5	11.25	HIGH	$121,000
PS-213	Electrical	Standby Generator			3	Currently have to use portable generator	1.25	1.5	1.25	7.03	MEDIUM	$81,000
PS-218 Tuthill Park - 3500 S. Blauvelt	Process	Monitor pump 4 for noise.	15.12 MGD	1960s	4	Rattling/tapping noise.	1.25	1.5	1.5	11.25	HIGH	
	Process	Change operation of seal water to run to pumps at all times.		1960s	4	Assurance there is seal water.	1.25	1.5	1.5	11.25	HIGH	$21,000
	Process	Replace seal water piping with PVC.		1960s	4	Corrosion on metallic piping	1.25	1.5	1.5	11.25	HIGH	$21,000
	Process	Add flow tubes to seal water lines.		1960s	4	Monitor seal water flow.	1.25	1.5	1.5	11.25	HIGH	$29,000
	Structural/Architectural	Install removable floodgates at the doors.		1960s	4	Prevent flood water from entering building.	1.25	1.5	1.5	11.25	HIGH	$36,000
	Structural/Architectural	Raise curb around wetwell openings.		1960s	4	Prevent flood water from entering wet well.	1.25	1.5	1.5	11.25	HIGH	$21,000
	Structural/Architectural	Construct new wall with a window to isolate electrical room.		1960s	4		1.25	1.5	1.5	11.25	HIGH	$15,000
	Structural/Architectural	Raise odor control transformer		1960s	4	Currently below flood elevation.	1.25	1.5	1.5	11.25	HIGH	$11,000
	HVAC	Provide additional ventilation for HVAC System.		1960s	4	Inadequate ventilation	1.25	1.5	1.5	11.25	HIGH	$31,000
	Electrical	Clean and coat or replace Bus bars.		1960s	4	Corrosion	1.25	1.5	1.5	11.25	HIGH	$151,000
	Electrical	Install video monitoring cameras.		1960s	4		1.25	1.5	1.5	11.25	HIGH	$31,000
	Electrical	Raise/rotate gas regulator.		1960s	4	Currently below flood elevation.	1.25	1.5	1.5	11.25	HIGH	$11,000
PS-220 Rock Island	Process	Remove and replace link seal on suction and forcemain piping.	0.56 MGD		4	Leaking at wall of pipe penetrations.	1.25	1.5	1.5	11.25	HIGH	$15,000
	HVAC	Install dehumidifier.			4	Room is damp.	1.25	1.5	1.5	11.25	HIGH	$10,000
	HVAC	Move unit heater.			4	Water is dripping on heater in current location.	1.25	1.5	1.5	11.25	HIGH	$20,000
	Electrical	Standby Generator			4	Currently have to use portable generator	1.25	1.5	1.5	11.25	HIGH	$80,000
	Process	Convert to submersible style station.	0.56 MGD		2	Address Flooding Issues	1.25	1.5	1.5	5.63	MEDIUM	$914,000
PS-221	Electrical	Standby Generator			3	Currently have to use portable generator	1.25	1.5	1.25	7.03	MEDIUM	$81,000
PS-224 - 50th Street N		Replace pumps with Flygt-N or Recessed Impeller Pumps	1.09 MGD		3	Ragging Problems	1.25	1.5	1.5	8.44	MEDIUM	$151,000

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Administration Building (1)	Building Structure	Replace Roof, Trim, Coping, & Flashing		1	1	1	2010	50	6	44	1		1	1.25	1.5	1.88	LOW	$271,000
	HVAC - General			1	2	1	2010	20	6	14	1		1	1.25	1.5	1.88	LOW	$272,000
	Electrical - General			1	2	1	2010	15	6	9	2		1	1.25	1.5	3.75	LOW	$191,000
Maintenance Building (2)	Building Structure	Replace Roof, Trim, Coping, & Flashing		4	4	4	1984	25	32	-7	4	Age & Reliability	1.25	1.5	1.5	11.25	HIGH	$367,000
	Mezzanine	Replace missing ladder rail and missing toe plate.		4	4	4	1984	25	32	-7	4	Safety	1.5	1.5	1.5	13.50	HIGH	$3,800
	HVAC System	Replace HVAC System		4	4	4	1984	20	32	-12	4	Age & Reliability	1.25	1.5	1.5	11.25	HIGH	$680,000
	Compressed Air System	Replace Air Compressor		3	3	3	1984	20	32	-12	3	Age & Reliability	1.5	1	1	4.50	MEDIUM	$20,100
	Building Structure	Sandblast Maintenance Bays Walls and Ceiling & Repaint		3	3	3	1984	20	32	-12	3	Faded/peeling paint	1.5	1	1	4.50	MEDIUM	$87,000
Grit Building (Headworks) (3)	Drum Screen #1 (03SC0301)	Drum	16.67 MGD	2	3	1	2007	20	9	11	2		1	1	1	2.00	LOW	$501,667
		Motor	3 HP															
		Dewatering S.																
	Drum Screen #2 (03S0302)	Drum	16.67 MGD	2	2	1	2007	20	9	11	2		1	1	1	2.00	LOW	$501,667
		Motor	3 HP															
		Dewatering S.																
	Drum Screen #3 (03SC0302)	Pump	16.67 MGD	2	2	1	2007	20	9	11	2		1	1	1	2.00	LOW	$501,667
		Motor	3 HP															
		Dewatering S.																
	Belt Conveyor (03BC0301)			2	2	1	2007	20	9	11			1	1	1	0.00	LOW	$201,000
	Grit Blower #1 (03BL0301)	Replace Blower	206 SCFM at 7 psi	3	2	3	1986	25	30	-5	4	Age/Wear & Reliability	1.5	1.5	1	9.00	MEDIUM	$10,500
		Replace Motor	15 HP															
	Grit Blower #2 (03BL0302)	Blower	206 SCFM at 7 psi	2	2	1	2002	25	14	11	2		1	1.5	1	3.00	LOW	$12,000
		Motor	15 HP															
	Grit Blower #3 (03BL0303)	Replace Blower	206 SCFM at 7 psi	3	2	3	1986	25	30	-5	4	Age/Wear & Reliability	1.5	1.5	1	9.00	MEDIUM	$10,500
		Replace Motor	15 HP															
	Grit Pump #1 (03PUM301)	Pump	250 gpm	2	2	2	2007	20	9	11	2		1	1	1	2.00	LOW	$82,250
		Motor	15 HP															
	Grit Pump #2 (03PUM302)	Pump	250 gpm	2	2	2	2007	20	9	11	2		1	1	1	2.00	LOW	$82,250
		Motor	15 HP															
	Grit Pump #3 (03PUM303)	Pump	250 gpm	2	2	2	2007	20	9	11	2		1	1	1	2.00	LOW	$82,250
		Motor	15 HP															
	Grit Pump #4 (03PUM304)for Dump Station	Pump	250	2	2	2	2007	20	9	11	2		1	1	1	2.00	LOW	$82,250
		Motor	20 HP															
	Grit Pump & Blower Piping	Sandblast and Recoat or Replace Piping		2	3	3	1986	40	30	10	4	Age & Deterioration	1.25	1.25	1	6.25	MEDIUM	$314,000
	Grit Pump Suction Valves	Replace 2 Gate Valves		2	3	3	1986	40	30	10	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$8,000
	Grit Pump Suction Valves - 4 Plug Valves & 1 Gate Valve			2	2	2	2007	40	9	31	2		1	1	1	2.00	LOW	$42,000
	Grit Pump & Blower Discharge Valves	Replace 13 Valves		2	3	3	1986	40	30	10	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$50,000
	Sampler Piping	Replace copper piping with PVC piping		5	5	5	2007	40	9	31	5	Pipe is severly corroded	1.5	1.5	1	11.25	HIGH	$13,000
	Grit Washer	Cyclone #1 (03CY301)	305 gpm	1	1	1	2015	20	1	19	1		1	1	1	1.00	LOW	$242,000
	Grit Washer	Cyclone #2 (03CY302)	305 gpm															
	Grit Washer	Classifier (03GRW301)	0.5 HP															
	Grit Chamber/Control Gates	Rehabilitate Influent Channel and Replace Gates		4	4	4	1986	40	30	10	4	Very corrosive area that requires frequent rehab.	1.5	1.5	1.25	11.25	HIGH	$610,000
	Concrete Staiway and Railing	Replace concrete around railing.		4	4	4	1986	25	30	-5	4	Safety Concern	1.5	1.5	1.5	13.50	HIGH	$1,200
	Sidewalks & Stoops	Replace Sidewalks & Stoops **as part of Facility Sidewalk Replacement Plan.**		3	3	3	1986	25	30	-5	4	Settling/separating from Bldg.	1.25	1.5	1.5	11.25	HIGH	$0
	Concrete Floor	Repair Concrete Floor at Overhead Door of Screen Room		3	3	3	1986	25	30	-5	3	Cracking/deterioration of floor.	1.5	1.5	1.5	10.13	HIGH	$18,000
	Roof Access Ladder	Repair Roof Access Ladder		4	4	4	1986	25	30	-5	4	Safety Concern	1.5	1.5	1.5	13.50	HIGH	$1,000
	Building Structure	Replace Exterior Doors		4	4	4	1986	25	30	-5	4	Age & Weathered	1.5	1.5	1.5	13.50	HIGH	$24,000
	Building Structure	Repair Brick on SE Corner of Bldg.		3	3	3	1986	25	30	-5	3	Damaged/missing brick	1.5	1.5	1.5	10.13	HIGH	$5,000
	Building Structure	Replace Roof, Coping, Trim, & Flashing		3	4	4	1986	25	30	-5	4	Age & Reliability	1.25	1.5	1.5	11.25	HIGH	$74,000
	HVAC	Replace HVAC System		3	4	4	1986	20	30	-10	4	Age/Reliability & Efficiency	1.25	1.5	1.5	11.25	HIGH	$143,000
	Electrical - General	Replace electrical		3	4	4	1986	15	30	-15	4	Update to Meet NFPA 820 Requirements	1.25	1.5	1.5	11.25	HIGH	$151,000
	Electrical	Repair exterior electrical conduits and supports		3	4	4	1986	15	30	-15	4	Age and Deterioration	1.25	1.5	1.5	11.25	HIGH	$51,000

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Sludge Pumping Building (4)	Sludge Pump #1 (04PUM401)	Pump		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$120,500
		Motor																
	Sludge Pump #2 (04PUM402)	Pump		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$120,500
		Motor																
	Sludge Pump #3 (04PUM403)	Pump		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$120,500
		Motor																
	Sludge Pump #4 (04PUM404)	Pump		1	1	1	2016	20	0	20	1		1	1	1	1	LOW	$120,500
		Motor																
	Building - Exterior Doors	Exterior Doors		3	4	4	1986	15	30	-15	4	Age and Condition	1	1.5	1.5	9.00	MEDIUM	$29,000
	HVAC - General	Add Supplemental Natural Gas Heat or Remove from Hot Water Loop and Install Natural Gas Heating. Add Dehumidification.		2	1	2	2014	20	2	18	4	Lacking heat at times during colder months. Condensation Issues.	1	1.5	1.5	9.00	MEDIUM	$64,000
	Electrical - Fiber Optic	Extend Fiber Optic Line		2	2	2	2000	15	16	-1	4		1.25	1.5	1.5	11.25	HIGH	$60,000
	Electrical - General	Replace electrical.		3	4	4	1986	15	30	-15	4	Update to Meet NFPA 820 Requirements	1.25	1.5	1.5	11.25	HIGH	$60,000
Primary Clarifiers (5)	Primary Clarifier #1	Restore int./ext. concrete surfaces		3	3	3	1986	50	30	20	3	Cracks/wear and discoloration of concrete	1	1.25	1.5	5.63	MEDIUM	$188,000
		Domes		2	2	2	1986	25	30	-5	1		1	1.25	1	1.25	LOW	$601,500
		Replace Mechanism Drive		3	4	4	1986	25	30	-5	4	Age/Reliability	1.5	1.25	1.25	9.38	MEDIUM	$151,000
		Replace/restore sludge collector/Metal Steps at Catwalk		3	4	4	1986	25	30	-5	4	Age and wear	1.5	1.25	1.25	9.38	MEDIUM	$459,000
		Replace windows system of Catwalk		4	4	4	1986	15	30	-15	4	Worn seals around observation windows	1.5	1.25	1.5	11.25	HIGH	$5,750
		Replace Telescoping Valve		3	4	4	1986	40	30	10	4	Significant Corrosion	1	1	1	4.00	MEDIUM	$16,000
		Drain Valve (05VAL051) (Being replaced under current CIP)		1	1	1	2016	40	0	40	1		1	1	1	1.00	LOW	$30,000
	Primary Clarifier #2	Restore int./ext. concrete surfaces		3	3	3	1986	50	30	20	3	Cracks/wear and discoloration of concrete	1	1.25	1.5	5.63	MEDIUM	$188,000
		Domes		2	2	2	1986	25	30	-5	2		1	1.25	1	2.50	LOW	$601,500
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	3	Age/Reliability	1.25	1.25	1.25	5.86	MEDIUM	$151,000
		Replace/restore sludge collector/Metal Steps at Catwalk		3	4	4	1986	25	30	-5	4	Age and wear	1.5	1.25	1.25	9.38	MEDIUM	$459,000
		Replace windows system of Catwalk		4	4	4	1986	15	30	-15	4	Worn seals around observation windows	1.5	1.25	1.5	11.25	HIGH	$5,750
		Replace Telescoping Valve		3	4	4	1986	40	30	10	4	Significant Corrosion	1	1	1	4.00	MEDIUM	$16,000
		Drain Valve (05VAL052) (Being replaced under current CIP)		1	1	1	2016	40	0	40	1		1	1	1	1.00	LOW	$30,000
	Primary Clarifier #3	Restore int./ext. concrete surfaces		3	3	3	1986	50	30	20	3	Cracks/wear and discoloration of concrete	1	1.25	1.5	5.63	MEDIUM	$188,000
		Domes		2	2	2	1986	25	30	-5	2		1	1.25	1	2.50	LOW	$601,500
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	3	Age/Reliability	1.25	1.25	1.25	5.86	MEDIUM	$151,000
		Replace/restore sludge collector/Metal Steps at Catwalk		3	4	4	1986	25	30	-5	4	Age and wear	1.5	1.25	1.25	9.38	MEDIUM	$459,000
		Replace windows system of Catwalk		4	4	4	1986	15	30	-15	4	Worn seals around observation windows	1.5	1.25	1.5	11.25	HIGH	$5,750
		Replace Telescoping Valve		3	4	4	1986	40	30	10	4	Significant Corrosion	1	1	1	4.00	MEDIUM	$16,000
		Drain Valve (05VAL053) (Being replaced under current CIP)		1	1	1	1986	40	30	10	1		1	1	1	1.00	LOW	$30,000
	Primary Clarifier #4	Restore int./ext. concrete surfaces		3	3	3	1986	50	30	20	3	Cracks/wear and discoloration of concrete	1	1.25	1.5	5.63	MEDIUM	$188,000
		Domes		2	2	2	1986	25	30	-5	2		1	1.25	1	2.50	LOW	$601,500
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	3	Age/Reliability	1.25	1.25	1.25	5.86	MEDIUM	$151,000
		Replace/restore sludge collector/Metal Steps at Catwalk		3	4	4	1986	25	30	-5	4	Age and wear	1.5	1.25	1.25	9.38	MEDIUM	$459,000
		Replace windows system of Catwalk		4	4	4	1986	15	30	-15	4	Worn seals around observation windows	1.5	1.25	1.5	11.25	HIGH	$5,750
		Replace Telescoping Valve		3	4	4	1986	40	30	10	4	Significant Corrosion	1	1	1	4.00	MEDIUM	$16,000
		Drain Valve (05VAL054) (Being replaced under current CIP)		1	1	1	1986	40	30	10	1		1	1	1	1.00	LOW	$30,000
	Electrical	Replace conduit and boxes at platforms		4	4	4	1986	15	30	-15	4	Corrosion	1.5	1.5	1.5	13.50	HIGH	$121,000
	Electrical	Replace Lightning Protection System		4	4	4	1986	15	30	-15	4	Downleads missing or broken	1.5	1.5	1.5	13.50	HIGH	$13,000
	HVAC/Odor Control			4	2	4	1986	20	30	-10	4	Compliance with NFPA 820	1.5	1.5	1	9.00	MEDIUM	
Splitter Manhole #3 (5A)	Slide Gate #1 (05VAL001)	Replace 48"x30" Slide Gate ↓ Opening		3	3	3	1986	30	30	0	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$73,250
	Slide Gate #2 (05VAL002)	Replace 48"x30" Slide Gate ↓ Opening		3	3	3	1986	30	30	0	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$73,250
	Slide Gate #3 (05VAL003)	Replace 48"x30" Slide Gate ↓ Opening		3	3	3	1986	30	30	0	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$73,250
	Slide Gate #4 (05VAL004)	Replace 48"x30" Slide Gate ↓ Opening		3	3	3	1986	30	30	0	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$73,250
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1986	50	30	20	2		1	1.25	1	2.50	LOW	$100,000

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
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Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
First Stage Trickling Filters (6)	Trickling Filter #1	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (06VAL601)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #2	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (06VAL602)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #3	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (06VAL603)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #4	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (06VAL604)		5	5	5	1986	40	30	10	3	Unable to operate valve	1	1.25	1.00	3.75	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
Splitter Manhole #4 (6A)	Slide Gate #1 (05VAL005)	Replace 72"x48" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$92,750
	Slide Gate #2 (05VAL006)	Replace 72"x48" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$92,750
	Slide Gate #3 (05VAL007)	Replace 72"x48" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$92,750
	Slide Gate #4 (05VAL008)	Replace 72"x48" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$92,750
	Slide Gate #5 (06VAL009)	Replace 36"Ø Bypass Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$61,000
	Concrete Structure	Repair concrete behind gate frame		2	2	2	1986	50	30	20	2	Spalled Concrete	1	1.25	1.5	3.75	LOW	$32,000
Manhole #8 (6B)	Civil/Site	Eliminate Sidewalk Steps and Replace Sidewalk from Splitter MH#4 to Splitter MH#5 **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3	Difficult to Clear Snow with UTV	1	1.25	1.25	4.69	MEDIUM	$0
	Concrete Structure	Repair Concrete Surfaces and Replace Grating		3	3	3	1986	50	30	20	3		1	1.25	1	3.75	LOW	$25,000
First Stage Intermediate Clarifiers (7)	Civil/Site	Fill/grade under humus valve supports		2	3	3	1986	25	30	-5	3	Space under stands.	1.25	1.25	1.25	5.86	MEDIUM	$3,600
	Clarifier #1	Concrete Basin		1	1	1	1986	50	30	20	1		1	1	1.25	1.25	LOW	
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	2	Age & Reliability	1.25	1.25	1.25	3.91	LOW	$121,000
	Clarifier #2	Concrete Basin		1	1	1	1986	50	30	20	1		1	1	1.25	1.25	LOW	
		Replace Mechansm Drive		2	3	3	1986	25	30	-5	2	Age & Reliability	1.25	1.25	1.25	3.91	LOW	$121,000
	Electrical	Replace conduit and boxes on walkways		3	4	4	1986	15	30	-15	4	Corrosion	1.5	1.5	1.5	13.50	HIGH	$50,000
Splitter Manhole #5 (7A)	Slide Gate #1 (07VAL010)	Replace 96"x36" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$105,000
	Slide Gate #2 (07VAL011)	Replace 96"x36" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$105,000
	Slide Gate #5 (07VAL012)	Replace 36"Ø Bypass Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$60,000
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1986	50	30	20	2		1	1.25	1	2.50	LOW	$69,000
Manhole #9 (7B)	Civil/Site	Replace Sidewalks from Splitter MH#5 to Splter MH#6		2	2	2	1986	50	30	20	2		1	1.25	1	2.50	LOW	$0
	Concrete Structure	Repair Concrete Surfaces and Replace Grating		2	2	2	1986	50	30	20	2		1	1.25	1	2.50	LOW	$25,000
	Control Gate #1 (07VAL021)	Replace 36"Ø Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$86,000
	Control Gate #2 (07VAL022)	Replace 36"Ø Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$86,000
Second Stage Trickling Filters (8)	Trickling Filter #1	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (08VAL801)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #2	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (08VAL802)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #3	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (08VAL803)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
	Trickling Filter #4	Dome		2	2	2	1986	25	30	-5	2		1	1.25	1.0	2.50	LOW	
		Distributor		1	1	1	2014	25	2	23	1		1	1.0	1.0	1.00	LOW	
		Replace EFF. Sluice Gate (08VAL804)		5	5	5	1986	40	30	10	2	Unable to operate valve	1.5	1.00	1.00	3.00	LOW	$50,250
		Media		2	2	2	1986	25	30	-5	2		1	1.0	1.0	2.00	LOW	
Splitter Manhole #6 (8A)	Slide Gate #1 (08VAL013)	Replace 72"x42" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate and Seals are Pulling Away from the Frames	1	1.5	1.25	3.75	LOW	$92,500
	Slide Gate #2 (08VAL014)	Replace 72"x42" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2		1	1.5	1.25	3.75	LOW	$92,500
	Slide Gate #3 (08VAL015)	Replace 72"x42" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2		1	1.5	1.25	3.75	LOW	$92,500
	Slide Gate #4 (08VAL016)	Replace 72"x42" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2		1	1.5	1.25	3.75	LOW	$92,500
	Slide Gate #5 (08VAL017)	Replace 36"Ø Bypass Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$60,000
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1986	50	30	20	2		1	1.25	1.5	3.75	LOW	$145,000
Manhole #10 (8B)	Civil/Site	Replace Sidewalks **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3		1	1.25	1.5	5.63	MEDIUM	$0
	Concrete Structure	Repair Concrete Surfaces and Replace Grating		3	3	3	1986	50	30	20	3		1	1.25	1	3.75	LOW	$29,000

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Condition Assessment Rating Summary for Water Reclamation Facility
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Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Second Stage Intermediate Clarifiers (9)	Clarifier #1	Concrete Basin		1	1	1	1986	50	30	20	1		1	1	1.25	1.25	LOW	
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	2	Age/Wear & Reliability	1.25	1.25	1.25	3.91	LOW	$121,000
	Clarifier #2	Concrete Basin		1	1	1	1986	50	30	20	1		1	1	1.25	1.25	LOW	
		Replace Mechanism Drive		2	3	3	1986	25	30	-5	2	Age/Wear & Reliability	1.25	1.25	1.25	3.91	LOW	$121,000
	Structural	Repair Concrete at the Guardrail Posts		3	4	4	1986	25	30	-5	4	Age and Safety	1.5	1.5	1.25	11.25	HIGH	$5,000
	Electrical	Replace conduit and boxes on walkways		3	4	4	1986	15	30	-15	4	Age & Corrosion	1.5	1.5	1.5	13.50	HIGH	$50,000
Splitter Manhole #7 (9A)	Civil/Site	Replace concrete sidewalk **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3	Cracking & Settling	1	1.25	1.25	4.69	MEDIUM	$0
	Civil/Site	Eliminate Sidewalk Steps/Widen Sidewalk **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3	Difficult to Clear Snow with UTV	1	1.25	1.25	4.69	MEDIUM	$0
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1986	50	30	20	2		1	1.5	1	3.00	LOW	$74,000
	Slide Gate #1 (09VAL018)	Replace 96"x36" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Difficult to Operate and	1	1.5	1.25	3.75	LOW	$105,000
	Slide Gate #2 (09VAL019)	Replace 96"x36" Slide Gate ↓ Opening		3	3	3	1986	40	30	10	2	Seals are Pulling Away	1	1.5	1.25	3.75	LOW	$105,000
	Slide Gate #3 (09VAL020)	Replace 36"Ø Bypass Sluice Gate		3	3	3	1986	40	30	10	2	from the Frames	1	1.5	1.25	3.75	LOW	$60,000
Manhole #11 (9B)	Civil/Site	Replace Sidewalks **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3	Replaced cracked Sidewalks	1	1.25	1.25	4.69	MEDIUM	$0
	Control Gate #1 (09VAL023)	Replace 36"Ø Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$86,000
	Control Gate #2 (09VAL024)	Replace 36"Ø Sluice Gate		3	3	3	1986	40	30	10	2	Difficult to Operate	1	1.5	1.25	3.75	LOW	$86,000
	Concrete Structure	Repair Concrete Surfaces and Replace Grating		2	2	2	1986	50	30	20	2		1	1.5	1	3.00	LOW	$30,000
Process Pumping (10)	Transfer Pump #1 (10PUM1001)	Pump	10,416 gpm	1	1	1	2009	20	7	13	2		1	1.5	1	3.00	LOW	$400,750
		Motor	250 HP															
		VFD	250 HP															
	Transfer Pump #2 (10PUM1002)	Pump	10,416 gpm	1	1	1	2009	20	7	13	2		1	1.5	1	3.00	LOW	$400,750
		Motor	250 HP															
		VFD	250 HP															
	Transfer Pump #3 (10PUM1003)	Pump	10,416 gpm	1	1	1	2009	20	7	13	2		1	1.5	1	3.00	LOW	$400,750
		Motor	250 HP															
		VFD	250 HP															
	Transfer Pump #4 (10PUM1004)	Pump	10,416 gpm	1	1	1	2009	20	7	13	2		1	1.5	1	3.00	LOW	$400,750
		Motor	250 HP															
		VFD	250 HP															
	Humus & In-Plant Pump #1 (10PUM1005)	Pump	1400 gpm	1	1	1	2013	20	3	17	1		1	1.5	1	1.50	LOW	$201,000
		Motor																
	Humus & In-Plant Pump #2 (10PUM1006)	Pump	1400 gpm	1	1	1	2013	20	3	17	1		1	1.5	1	1.50	LOW	$201,000
		Motor																
	Humus & In-Plant Pump #3 (10PUM1007)	Pump	1400 gpm	1	1	1	2013	20	3	17	1		1	1.5	1	1.50	LOW	$201,000
		Motor																
	Recirculation Pump #1 (10PUM1008)	Replace Pump	4200 gpm	3	3	3	1986	20	30	-10	3	Age/Reliability	1.25	1	1	3.75	LOW	$201,000
		Replace Motor																
Process Pumping (10)	Recirculation Pump #2 (10PUM1009)	Replace Pump	8200 gpm	3	3	3	1986	20	30	-10	3	Age/Reliability	1.25	1	1	3.75	LOW	$301,000
		Replace Motor																
	Recirculation Pump #3 (10PUM1010)	Replace Pump	8000 gpm	3	3	3	1986	20	30	-10	3	Age/Reliability	1.25	1	1	3.75	LOW	$301,000
		Replace Motor																
	Recirculation Pump #4 (10PUM1011)	Replace Pump	2500 gpm	3	3	3	1986	20	30	-10	3	Age/Reliability	1.25	1	1	3.75	LOW	$151,000
		Replace Motor																
	Recirculation Pump #5 (10PUM1012)	Replace Pump	8000 gpm	3	3	3	1986	20	30	-10	3	Age/Reliability	1.25	1	1	3.75	LOW	$301,000
		Replace Motor																
	Humus & In-Plant Piping	Replace Humus Line with Glass Line Pipe		2	3	3	1986	40	30	10	5	Age & Wear	1.5	1.5	1.25	14.06	HIGH	$360,000
	Building Structure	Seal Joints & Repair Concrete Between Wetwell & Drywell		5	5	5	1986	40	30	10	4	Leaking Between Joints	1.5	1.5	1.5	13.50	HIGH	$224,000
	Building Structure	Repair/ replace all exterior doors.		2	3	3	1986	40	30	10	4	Do not shut properly	1.25	1.25	1	6.25	MEDIUM	$41,000
	Building Structure	Replace Sealant/backer rod. Tuck point.		2	3	3	1986	40	30	10	4	Deterioration/Water Damage	1.25	1.25	1	6.25	MEDIUM	$90,000
	Building Structure	Installed a landing /stairs on the rear exit.		2	3	3	1986	40	30	10	4	Safety Reasons	1.25	1.25	1	6.25	MEDIUM	$7,000
	Building Structure	Sealant/backer rod on all windows.		2	3	3	1986	40	30	10	4	Leaks/Water Damage	1.25	1.25	1	6.25	MEDIUM	$6,000
	Electrical	Replace conduit and j-box near entrance		5	5	5	1986	15	30	-15	5	Age & Corrosion	1.5	1.5	1.5	16.88	HIGH	$30,600
Gravity Thickeners/Tunnel (11)	Gravity Thickener #1	Restore int./ext. concrete surfaces		3	3	3	1984	50	32	18	4	Cracks/wear and	1.5	1.25	1.5	11.25	HIGH	$145,000
		Dome		1	3	2	1984	25	32	-7	2		1.25	1.25	1	3.13	LOW	$551,000
		Replace Mechanism		4	5	5	1984	20	32	-12	5	Corrosion	1.5	1.5	1	11.25	HIGH	$547,000
		Rehab Support for Odor Control Blowers		2	3	3	1984	20	32	-12	4	Corrosion on Supports	1.5	1.25	1.5	11.25	HIGH	$4,500
	Gravity Thickener #2	Restore int./ext. concrete surfaces		3	3	3	1984	50	32	18	4	Cracks/wear and	1.5	1.25	1.5	11.25	HIGH	$145,000
		Repair stairs and landing		4	5	5	1984	50	32	18	5	Not properly secured.	1.5	1.5	1	11.25	HIGH	$4,000
		Dome		1	3	2	1984	25	32	-7	2		1.25	1.25	1	3.13	LOW	$551,000
		Replace Mechanism		4	5	5	1984	20	32	-12	5	Corrosion/thin metal	1.5	1.5	1	11.25	HIGH	$547,000
		Rehab Support for Odor Control Blowers		2	3	3	1984	20	32	-12	4	Corrosion on Supports	1.5	1.25	1.5	11.25	HIGH	$4,500

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Gravity Thickeners/Tunnel (11)	Tunnel	Seal, Waterproof, and Repair Concrete Walls		3	4	4	1984	50	32	18	4	Deteriorated Walls	1.25	1.5	1.5	11.25	HIGH	$109,000
		Install drainage system.		3	4	4	1984	50	32	18	4	Water leaks into tunnel through walls.	1.25	1.5	1.5	11.25	HIGH	$50,000
		Replace brick/tuckpoint Exit Stair Tower		3	4	4	1984	50	32	18	4	Water Damage	1.25	1.5	1.5	11.25	HIGH	$23,000
		Replace Roof, Coping, Trim & Flashing on Exit Stair Tower		3	4	4	1984	50	32	18	4	Water Damage	1.25	1.5	1.5	11.25	HIGH	$9,000
		Replace the single access door at the Exit Stair Tower		3	4	4	1984	50	32	18	4	Age & Weathered	1.25	1.5	1.5	11.25	HIGH	$7,000
		Sandblast and Recoat Piping		3	4	4	1984	40	32	8	4	Corrosion on Scum and Sludge Piping	1.5	1.5	1.25	11.25	HIGH	$91,000
	Thickened Sludge Pump #1 (11PUM1100)	Replace Pump	170 gpm	2	2	2	2006	20	10	10	5	Pumps is worn and inefficient	1.25	1.5	1.25	11.72	HIGH	$91,000
		Replace Motor	15 HP															
	Thickened Sludge Pump #2 (11PUM1101)	Replace Pump	170 gpm	2	2	2	2006	20	10	10	5	Pumps is worn and inefficient	1.25	1.5	1.25	11.72	HIGH	$91,000
		Replace Motor	15 HP															
	Thickened Sludge Pump #3 (11PUM1102)	Replace Pump	170 gpm	2	2	2	2006	20	10	10	5	Pumps is worn and inefficient	1.25	1.5	1.25	11.72	HIGH	$91,000
		Replace Motor	15 HP															
	Thickened Sludge Pump #4 (11PUM1103)	Replace Pump	170 gpm	2	2	2	2006	20	10	10	5	Pumps is worn and inefficient	1.25	1.5	1.25	11.72	HIGH	$91,000
		Replace Motor	15 HP															
	HVAC	Update HVAC System to Meet NFPA 820		4	2	4	1984	20	32	-12	4	Code Compliance	1.25	1.5	1.5	11.25	HIGH	$156,000
	Electrical	Replace Conduit at Thickener Platforms		3	4	3	1984	50	32	18	4	Age & Condition	1.5	1.5	1.5	13.50	HIGH	$49,000
	Electrical	Replace Conduit/Supports and Wiring in Tunnel		3	4	3	1984	50	32	18	4	Age & Condition	1.5	1.5	1.5	13.50	HIGH	$45,000
Digesters (12)	Heat Exchangers	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$830,000
	Gas Conditioning	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$3,600,000
	Digester Covers	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$2,600,000
	Digester Mixing Equipment	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$2,600,000
	Gas Storage Sphere			3	3	3	1984	20	32	-12	3		1	1.5	1	4.50	MEDIUM	$640,000
	Digester Heating	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$2,600,000
	FOG Receiving	Installed new under current CIP		1	1	1	2018	20	-2	22	1		1	1	1	1.00	LOW	$3,000,000
	Sludge Recirculation Pumps	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$500,000
	Sludge Transfer Pumps	Replaced/Installed new under current CIP		1	1	1	2016	20	0	20	1		1	1	1	1.00	LOW	$1,000,000
	Building Structure	Drainage system **(Addressed in Tunnel Improvements)**		3	4	4	1984	50	32	18	4	Water leaks into Bldg at West Side	1.25	1.5	1.5	11.25	HIGH	
	Building Structure	Roof & HVAC System are being replaced under current CIP		1	1	1	2016	50	0	50	1		1	1.5	1.5	2.25	LOW	$501,000
	Electrical	Remove electrical from existing electrical room		4	2	4	1984	20	32	-12	4	Code Compliance	1.5	1.5	1.5	13.50	HIGH	$1,044,000
Energy Recovery (13)	Generator #1	Caterpiller (Under current CIP for replacement)	350 KW	3	4	3	1984	20	32	-12	4	Requires Frequent Overhauls due to non-scrubbed biogas.	1.5	1.5	1.25	11.25	HIGH	
	Generator #2	Caterpiller (Under current CIP for replacement)	350 KW	3	4	3	1984	20	32	-12	4		1.5	1.5	1.25	11.25	HIGH	
	Generator #3	Jenbacker (Under current CIP for replacement)	844 KW	3	4	3	2012	20	4	16	4		1.5	1.5	1.25	11.25	HIGH	
	Building Structure	Replace Roof, Coping, Trim & Flashing Under Current CIP		1	1	1	2016	25	0	25	1	Age & Condition	1	1.5	1.25	1.88	LOW	$161,000
	Building Structure	Replace South Door W/Rollup Door		4	4	4	1984	25	32	-7	4	Issues with operation, function, & Size of existing	1.5	1.5	1.25	11.25	HIGH	$62,000
	Building Structure	Replace the Exterior Access Doors		4	4	4	1984	25	32	-7	4	Age & Weathered	1.5	1.5	1.25	11.25	HIGH	$31,000
	Gas Fired Hot Water Boilers			3	4	3	1984	20	32	-12	4	Age & Condition	1.5	1.5	1.25	11.25	HIGH	$241,000
	Heat Exchanger Tube (5 Each)			3	4	3	1984	20	32	-12	4	Age & Condition	1.5	1.5	1.25	11.25	HIGH	$251,000
	Indirect-heat type gas-fired rooftop, MAU			1	2	1	2010	20	6	14	2		1	1.5	1.25	3.75	LOW	$121,000
	Hot Water-Type Unit Heaters															0.00	LOW	$21,000
	Sludge Hot Water Pumps (3 Each)			1	2	1	2012	20	4	16	2		1	1.5	1.25	3.75	LOW	$151,000
	Generator Hot Water Pumps (2 Each)			1	2	1	2012	20	4	16	2		1	1.5	1.25	3.75	LOW	$101,000
	Boiler Hot Water Pump (2 Each)			3	4	3	1984	20	32	-12	4	Age & Condition	1.5	1.5	1.25	11.25	HIGH	$101,000
	Radiator For Energy Recovery Units (2 Each)			1	2	1	2012	20	4	16	2		1	1.5	1.25	3.75	LOW	$202,000
	Supply Fans (2 Each)			3	4	3	1984	20	32	-12	4	Age & Condition	1.5	1.5	1.25	11.25	HIGH	$21,000
	Hot Water Storage Tank	Replace the 26,000 gallon hot water storage tank.		2	2	2	1984	20	32	-12	2	Age & Condition	1.25	1.25	1	3.13	LOW	$184,000
	Roof Exhaust Fans #1 & #2			1	2	1	2010	20	6	14	2		1	1.5	1.25	3.75	LOW	$21,000
	Roof Exhaust Fans #3 & #4			3	4	3	1984	20	32	-12	4	Age & Condition	1.5	1.5	1.25	11.25	HIGH	$21,000
Solids Dewatering (14)	Building Structure - Roof			3	3	3	1984	50	32	18	5	Building currently not in use. Future dewatering project planned.	1.5	1.5	1.5	16.88	HIGH	$260,000
	Bldg - Exterior Doors			3	3	3	1984	50	32	18	5		1.5	1.5	1.5	16.88	HIGH	$37,000
	HVAC	Rezone Heat and Add Natural Gas Heating		5	5	5	1984	20	32	-12	5		1.5	1.5	1.5	16.88	HIGH	$289,000
	Electrical			5	5	5	1984	15	32	-17	5		1.5	1.5	1.5	16.88	HIGH	$621,000
Engine Generator (15)	Civil/Site	Replace Driveway and Pavement		4	4	4	1990	50	26	24	4	Cracked/deteriorated	1.25	1.25	1	6.25	MEDIUM	$84,000
	Generator	Size for future capacity needs		2	3	2	1990	20	26	-6	2	Redlines when two aeration blowers run.	1	1	1	2.00	LOW	$10,024,000
	Controls	Install utility circuit bypass		4	4	4	1990	15	26	-11	4	Service reliability	1.5	1.5	1.25	11.25	HIGH	$252,000
	Enclosure	Rehabilitate enclosure and provide platform and stairway.		2	3	2	1990	20	26	-6	4		1	1	1	4.00	MEDIUM	$12,000
Dumping Station (16)	Concrete Structure	Rehabilitate or repai concrete surfaces.		1	2	1	1990	50	26	24	1		1	1	1	1.00	LOW	$46,000
	Equipment	Replace dumping station equipment.		3	3	3	1990	20	26	-6	3		1	1	1	3.00	LOW	$202,000
	Electrical	Replace Conduit/Supports and Wiring		4	2	4	1990	20	26	-6	4	Age/Reliability	1.5	1.5	1	9.00	MEDIUM	$10,000

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Equipment Storage (17)	Building Structure	Replace Roof System		2	2	2	1992	25	24	1	2		1	1	1	2.00	LOW	$293,000
	Building Structure	Expand Office Area, add Showers & Locker Rooms.		4	3	4	1992	25	24	1	5	Space Requirements	1.25	1.5	1.25	11.72	HIGH	$428,000
	HVAC	Update HVAC System		4	4	5	1992	20	24	-4	5	Old Tube Heaters	1.5	1.25	1.25	11.72	HIGH	$141,000
Lime Feed System (18D)	Lime Silo/Lime Feed Equipment			2	2	2	2010	25	6	19	2		1	1	1	2.00	LOW	$1,002,000
Control Building (18)	Civil/Site	Correct Drainage on N & W Sides of Bldg. (Will be done with Digester Rehab Project).		5	5	5	1982	50	34	16	5	Water ponds and runs into Bldg.	1.5	1.5	1.5	16.88	HIGH	$61,000
	Blower #1 (18BLO001)	Replace with more efficient blower as part of Phase I Imp.	15,520 SCFM	4	4	4	1982	25	34	-9	4	Age and Efficiency	1.5	1.5	1.5	13.50	HIGH	$0
		Replace Motor	800 HP															
	Blower #2 (18BLO002)	Replace with more efficient blower as part of Phase I Imp.	15,520 SCFM	4	4	4	1982	25	34	-9	4	Age and Efficiency	1.5	1.5	1.5	13.50	HIGH	$0
		Replace Motor	800 HP															
	Blower #3 (18BLO003)	Replace with more efficient blower as part of Phase I Imp.	15,520 SCFM	4	4	4	1982	25	34	-9	4	Age and Efficiency	1.5	1.5	1.5	13.50	HIGH	$0
		Replace Motor	800 HP															
	Blower #4 (18BLO004)	Replace with more efficient blower as part of Phase I Imp.	15,520 SCFM	4	4	4	1982	25	34	-9	4	Age and Efficiency	1.5	1.5	1.5	13.50	HIGH	$0
		Replace Motor	800 HP															
	Building Structure	Roof, Coping, Trim, & Flashing Recently Replaced		1	1	1	2014	25	2	23	1		1	1	1	1.00	LOW	$260,000
	Building Structure	Replace ext. sealant and tuck point/Remodel Interior for more efficient use of space.		4	4	4	1982	25	34	-9	4	Deterioration/Water Damage	1.5	1.25	1.5	11.25	HIGH	$622,000
	Building - Exterior Doors	Replace the Exterior Access Doors (2 Single)		4	4	4	1982	25	34	-9	4	Aged & Worn	1.5	1.25	1.5	11.25	HIGH	$16,000
	HVAC	Replace entire HVAC system		4	4	4	1982	20	34	-14	4	Age/Reliability	1.5	1.5	1.25	11.25	HIGH	$603,000
	Electrical	Update controls as part of Phase Improvements		4	4	4	1982	20	34	-14	4	Age & Efficiency	1.5	1.5	1.5	13.50	HIGH	$0
	Electrical	Change blower voltage to 480 V.		4	4	4	1982	20	34	-14	4	Safety	1.25	1.5	1.25	9.38	MEDIUM	
	Electrical	Replace/relocate switchgear/separate switchgear circuits as part of Phase I Imp.		4	4	4	1982	15	34	-19	4	Age/Reliability	1.5	1.5	1.25	11.25	HIGH	$0
Splitter Manhole #1 (18A)	Slide Gate #1 (18VAL001)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #2 (18VAL002)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #3 (18VAL003)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #4 (18VAL004)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #5 (18VAL005)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #6 (18VAL006)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #7 (18VAL007)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #8 (18VAL008)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #9 (18VAL009)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #10 (18VAL010)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #11 (18VAL011)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Slide Gate #12 (18VAL012)	36" x 48" ↓Opening (Replace)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$0
	Concrete Structure	Cover concrete structure with aluminum tread plate to prevent splashing.		3	2	3	1982	50	34	16	3	Wastewater splashing out during high flows.	1	1.5	1	4.50	MEDIUM	$239,000
Manhole #1 (18B)	Concrete Structure	Cover concrete structure with aluminum tread plate to prevent splashing.		3	2	3	1982	50	34	16	3	Wastewater splashing out during high flows.	1	1.5	1	4.50	MEDIUM	$21,000
Aeration Basins (18C)	Concrete Basins	Repair Basin Bottom and Slope with grout		3	3	2	1982	50	34	16	3	Standing water in bottom of basins when drained	1	1.5	1	4.50	MEDIUM	$452,000
	Concrete Basins	Repair basin wall surfaces		3	3	2	1982	50	34	16	3	Cracking on the upper walls and basin bottoms	1	1.5	1	4.50	MEDIUM	$738,000
	Air Header Piping	Replace leaking couplings as part of Phase I Improvements		5	5	5	1982	40	34	6	5	Leaks at Couplings	1.5	1.5	1	11.25	HIGH	$0
	Diffusers	Replace with fine bubble diffusers as part of Phase I Improvements		5	5	5	1982	40	34	6	5	Inefficient. Missing Diffuser Tubes	1.5	1.5	1	11.25	HIGH	$0
	Air Valves	Replace the air valves and actuators as part of Phase I Improvements		5	5	5	1982	40	34	6	5	Corrosion	1.5	1.5	1	11.25	HIGH	$0
	Electrical	Replace Dissolved Oxygen Sensor Conduit		5	5	5	1982	15	34	-19	4	Corrision	1.25	1.25	1.25	7.81	MEDIUM	$103,000
	Electrical	Replace lighting around basins		5	5	5	1982	15	34	-19	4	Corrosion	1.25	1.25	1.25	7.81	MEDIUM	$47,000
	Electrical	Replace electrical J-boxes and conduit		5	5	5	1982	15	34	-19	5	Corrosion	1.5	1.5	1.5	16.88	HIGH	$164,000
RAS Building (19)	RAS Pump #1 (19PUMR01)	Replace Pump as part of Phase I Improvements	4700 @ 23 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	40 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	RAS Pump #2 (19PUMR02)	Replace Pump as part of Phase I Improvements	4700 @ 23 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	40 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	RAS Pump #3 (19PUMR03)	Replace Pump as part of Phase I Improvements	4700 @ 23 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	40 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	RAS Pump #4 (19PUMR04)	Replace Pump as part of Phase I Improvements	4700 @ 23 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	40 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	RAS Pump #5 (19PUMR05)	Replace Pump as part of Phase I Improvements	4700 @ 23 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	40 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	WAS Pump #1 (19PUMW01)	Replace Pump as part of Phase I Improvements	300 @ 46 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	10 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	
	WAS Pump #2 (19PUMW02)	Replace Pump as part of Phase I Improvements	300 @ 46 ft.	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	$0
		Replace Motor as part of Phase I Improvements	10 HP	3	3	4	1982	20	34	-14	4	Age/Wear & Reliability	1.25	1.25	1	6.25	MEDIUM	

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
RAS Building (19)	Building Structure	Mitigate Settling		4	4	4	1982	40	34	6	4	Masonry Cracking	1.25	1.5	1	7.50	MEDIUM	$51,000
RAS Building (19)	Building Structure	Replace Roof, Coping, Trim & Flashing		4	4	4	1982	40	34	6	4	Age/Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$107,000
	Building Structure	Seal Drywell		4	4	4	1982	40	34	6	4	Groundwater leaks into drywell	1.25	1.25	1	6.25	MEDIUM	$186,000
	Building Structure	Replace grating on northside of Bldg.		4	4	4	1982	40	34	6	4	Grating is bent	1.25	1.25	1	6.25	MEDIUM	$58,000
	Building Structure	Replace Sealant/backer rod. Tuck point.		2	3	3	1982	40	34	6	4	Deterioration/Water Damage	1.25	1.25	1	6.25	MEDIUM	$95,000
	Building - Exterior Doors	Replace Exterior Double Door		4	4	4	1982	50	34	16	4	Age & Weathered	1	1.25	1.5	7.50	MEDIUM	$17,000
	Electrical - General	Upgrade/replace electrical conduit, wiring and transformers.		4	4	4	1982	40	34	6	4	Age, Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$621,000
	HVAC - General	Update/replace HVAC equipment		4	4	4	1982	40	34	6	4	Age/Reliability	1.25	1.5	1.5	11.25	HIGH	$258,000
Final Clarifiers (20)	Clarifier #1	Basin - Repair concrete structure as part of Phase I Improvements		3	3	3	1982	50	34	16	3	Cracking/deterioration of concrete.	1.25	1.25	1.25	5.86	MEDIUM	$0
		Mechanism - Replace Sludge Collection Mechanism as part of Phase I Imp		2	3	3	1982	25	34	-9	4	Age & Wear	1.25	1.25	1.25	7.81	MEDIUM	$0
		Construct new in-board launderer off external wall as part of Phase I Improvements		5	3	3	1982	25	34	-9	4	Function Poorly at high flows	1.25	1.25	1	6.25	MEDIUM	$0
	Clarifier #2	Basin - Repair concrete structure as part of Phase I Improvements		1	1	1	1982	50	34	16	3	Cracking/deterioration of concrete.	1.25	1.25	1.25	5.86	MEDIUM	$0
		Mechanism - Replace Sludge Collection Mechanism as part of Phase I Imp		2	3	3	1982	25	34	-9	4	Age & Wear	1.25	1.25	1.25	7.81	MEDIUM	$0
		Construct new in-board launderer off external wall as part of Phase I Improvements		5	3	3	1982	25	34	-9	4	Function Poorly at high flows	1.25	1.25	1	6.25	MEDIUM	$0
	Clarifier #3	Basin - Repair concrete structure as part of Phase I Improvements		1	1	1	1982	50	34	16	3	Cracking/deterioration of concrete.	1.25	1.25	1.25	5.86	MEDIUM	$0
		Mechanism - Replace Sludge Collection Mechanism as part of Phase I Imp		2	3	3	1982	25	34	-9	4	Age & Wear	1.25	1.25	1.25	7.81	MEDIUM	$0
		Construct new in-board launderer off external wall as part of Phase I Improvements		5	3	3	1982	25	34	-9	4	Function Poorly at high flows	1.25	1.25	1	6.25	MEDIUM	$0
	Clarifier #4	Basin - Repair concrete structure as part of Phase I Improvements		1	1	1	1982	50	34	16	3	Cracking/deterioration of concrete.	1.25	1.25	1.25	5.86	MEDIUM	$0
		Mechanism - Replace Sludge Collection Mechanism as part of Phase I Imp		2	3	3	1982	25	34	-9	4	Age & Wear	1.25	1.25	1.25	7.81	MEDIUM	$0
		Construct new in-board launderer off external wall as part of Phase I Improvements		5	3	3	1982	25	34	-9	4	Function Poorly at high flows	1.25	1.25	1	6.25	MEDIUM	$0
	Site/Civil	Replace Concrete Steps and Sidewalks **as part of Facility Sidewalk Replacement Plan**		3	3	3	1986	50	30	20	3	Cracking and Settling	1.5	1.25	1.25	7.03	MEDIUM	$0
	Electrical	Replace with new mechanisms as part of Phase I Improvements		3	3	3	1982	15	34	-19	3	Age & Condition	1.25	1.25	1	4.69	MEDIUM	$0
	Piping/Valves	**Replace as part of new mechanisms**		3	3	3	1982	40	34	6	3	Age & Condition	1.25	1.25	1	4.69	MEDIUM	
Splitter Manhole #2 (20A)	Slide Gate #1 (20VAL013)	60" x 30" ↓ Opening		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$93,000
	Slide Gate #2 (20VAL014)	60" x 30" ↓ Opening		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$93,000
	Slide Gate #3 (20VAL015)	60" x 30" ↓ Opening		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$93,000
	Slide Gate #4 (20VAL016)	60" x 30" ↓ Opening		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$93,000
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1982	50	34	16	2		1	1.5	1	3.00	LOW	$227,000
Manhole #2(20B)	Slide Gate #1 (20VAL017)	30"Ø Sluice Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$73,000
	Slide Gate #2 (20VAL018)	30"Ø Sluice Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$73,000
	Slide Gate #3 (20VAL019)	30"Ø Sluice Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$73,000
	Slide Gate #4 (20VAL020)	30"Ø Sluice Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$73,000
	Concrete Structure	Rehab Concrete and Replace Grating and Guardrailing		2	2	2	1982	50	34	16	2		1	1.5	1	3.00	LOW	$91,000
Filter Building (21)	Filter Bays - 8 Each	34'x17'x8' deep		1	1	1	2012	25	4	21	1		1	1.25	1	1.25	LOW	$4,011,000
	Backwash Pump #1	Pump	6500 gpm @ 53ft.	1	1	1	2012	20	4	16	1		1	1.25	1	1.25	LOW	$501,333
		Motor	125 HP															
	Backwash Pump #2	Pump	6500 gpm @ 53ft.	1	1	1	2012	20	4	16	1		1	1.25	1	1.25	LOW	$501,333
		Motor	125 HP															
	Backwash Pump #3	Pump	6500 gpm @ 53ft.	1	1	1	2012	20	4	16	1		1	1.25	1	1.25	LOW	$501,333
		Motor	125 HP															
	Piping & Valves	Replace filter infl & effl valve actuators		4	4	4	1982	40	34	6	4	Valve Actuators are original	1.5	1.5	1.25	11.25	HIGH	$644,000
	Filter Bypass Weir	Raise filter bypass weir		4	4	4	1982	40	34	6	4	Restricts amount of flow to Filters	1.5	1.5	1.25	11.25	HIGH	$51,000
	Building Structure	Tuck-point exterior masonry		3	3	3	1982	50	34	16	3	Damaged Masonry	1.25	1.25	1	4.69	MEDIUM	$215,000
	Building Structure	Repair cracks on the SW wall of Bldg (inside and out)		3	3	3	1982	50	34	16	3	Water Intrusion	1.25	1.25	1	4.69	MEDIUM	$76,000
	Building Structure	Replace Sealant/backer rod in masonry joints.		3	3	3	1982	50	34	16	3	Water Damage	1.25	1.25	1	4.69	MEDIUM	$19,000
	Building Structure	Replace Sealant/backer rod on windows		3	3	3	1982	50	34	16	3	Water Intrusion	1.25	1.25	1	4.69	MEDIUM	$13,000

Table 2-2
Condition Assessment Rating Summary for Water Reclamation Facility
(High Priority = Immediately; Medium Priority = 5 – 10 years; Low Priority = 10–20 years)

Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
Filter Building (21)	Building Structure	Repaint walls in lower pipe gallery		3	3	3	1982	50	34	16	3	Paint is peeling	1.25	1.25	1	4.69	MEDIUM	$7,000
	Building - Exterior Doors	Replace Exterior Doors (1 double door and 1 single door)		4	4	4	1982	50	34	16	4	Age & Weathered	1	1.25	1.5	7.50	MEDIUM	$24,000
	Roof and HVAC System	Replace Roof and HVAC System		1	1	1	2012	20	4	16	1		1	1.5	1.25	1.88	LOW	$846,000
	Electrical	Update conduit and wiring and replace transformer.		4	4	4	1982	15	34	-19	4	Age, Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$321,000
Chemical Feed Building (22)	Civil/Site	Replace Sidewalks as part of Facility Sidewalk Replacement Plan		4	4	4	1982	50	34	16	4	Concrete Sidwalk is Cracked and Settling	1.25	1	1.5	7.50	MEDIUM	$0
	Sodium Hypochlorite Storage Tanks - 3 Each			1	1	1	2013	20	3	17	1		1	1.25	1.5	1.88	LOW	$321,000
	Sodium Bisulfite Storage Tank - 1 Each			1	1	1	2013	20	3	17	1		1	1.25	1.5	1.88	LOW	$101,000
	Sodium Hypochlorite Feed Skid - 2 Each			1	1	1	2013	20	3	17	1		1	1.25	1.5	1.88	LOW	$461,000
	Sodium Bisulfite Feed Skid - 1 Each			1	1	1	2013	20	3	17	1		1	1.25	1.5	1.88	LOW	$231,000
	Sodium Hypochlorite Transfer Pumps - 2 Each			2	1	2	2013	20	3	17	2	Issues overriding PLC	1	1.25	1.5	3.75	LOW	$181,000
Chemical Feed Building (22)	Building Structure	Rehab exterior west stairway		3	3	3	1982	50	34	16	3	Cracking concrete	1	1.25	1.5	5.63	MEDIUM	$2,000
	Building - Exterior Doors	Replace Exterior Doors (1 double door and 3 single door)		4	4	4	1982	50	34	16	4	Age & Weathered	1	1.25	1.5	7.50	MEDIUM	$47,000
	Building and HVAC	Replace Roof and HVAC System		1	1	1	2013	20	3	17	1		1	1.5	1.25	1.88	LOW	$424,000
	Electrical	Replace transformer and update conduit and wiring.		4	4	4	1982	15	34	-19	4	Age, Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$252,000
Chlorine Contact Basin (23)	Flash Mixer			2	2	2	2012	20	4	16	2		1	1.25	1	2.50	LOW	$61,000
	Parshall Flume	Replace with magnetic flow meter on effluent line as part of Phase I Improvements.		4	3	3	1982	20	34	-14	3	Questionable accuracy during flooding.	1	1.5	1	4.50	MEDIUM	$0
	Slide Gate #1 (22VAL070)	48"x48" ↓ Opening Influent Slide Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Slide Gate #2 (22VAL071)	48"x48" ↓ Opening Influent Slide Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Slide Gate #3 (22VAL072)	48"x48" ↓ Opening Effluent Slide Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Slide Gate #4 (22VAL073)	48"x48" ↓ Opening Effluent Slide Gate		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Covers			2	3	3	2014	10	2	8	3		1	1	1	3.00	LOW	$101,000
	Fiberglass Walkways			1	1	1	2014	25	2	23	1		1	1	1	1.00	LOW	$101,000
	Influent Chlorine Analyzers			1	2	2	2013	15	3	12	2		1	1.5	1	3.00	LOW	$20,500
	Effluent Chlorine Analyzer			1	2	2	2009	15	7	8	2		1	1.5	1	3.00	LOW	$20,500
	Concrete Structure	Expand basin for future capacity as part of Phase I Improvements		3	3	3	1982	50	34	16	3		1	1.5	1	4.50	MEDIUM	$0
Manhole #3 (23A)	Concrete Structure			2	2	2	1982	50	34	16	2		1	1.5	1	3.00	LOW	$21,000
Cascade Aerator (23B)	Concrete Structure	Repair Deteriorated Concrete Surfaces		3	3	3	1982	50	34	16	3		1	1.25	1	3.75	LOW	$201,000
	Sluice Gate #1 (23VAL080)	48"x48" Sluice Gate (Influent)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Sluice Gate #2 (23VAL081)	48"x48" Sluice Gate (Influent)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$90,500
	Sluice Gate #3 (23VAL082)	48"x36" Sluice Gate (Effluent)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$80,500
	Sluice Gate #4 (23VAL083)	48"x36" Sluice Gate (Effluent)		3	3	3	1982	40	34	6	2		1	1.5	1	3.00	LOW	$80,500
	Air Header Piping			3	3	3	1982	40	34	6	2		1.25	1	1	2.50	LOW	$101,000
	Air Diffusers			3	3	3	1982	40	34	6	2		1.25	1	1	2.50	LOW	$101,000

Table 2-2
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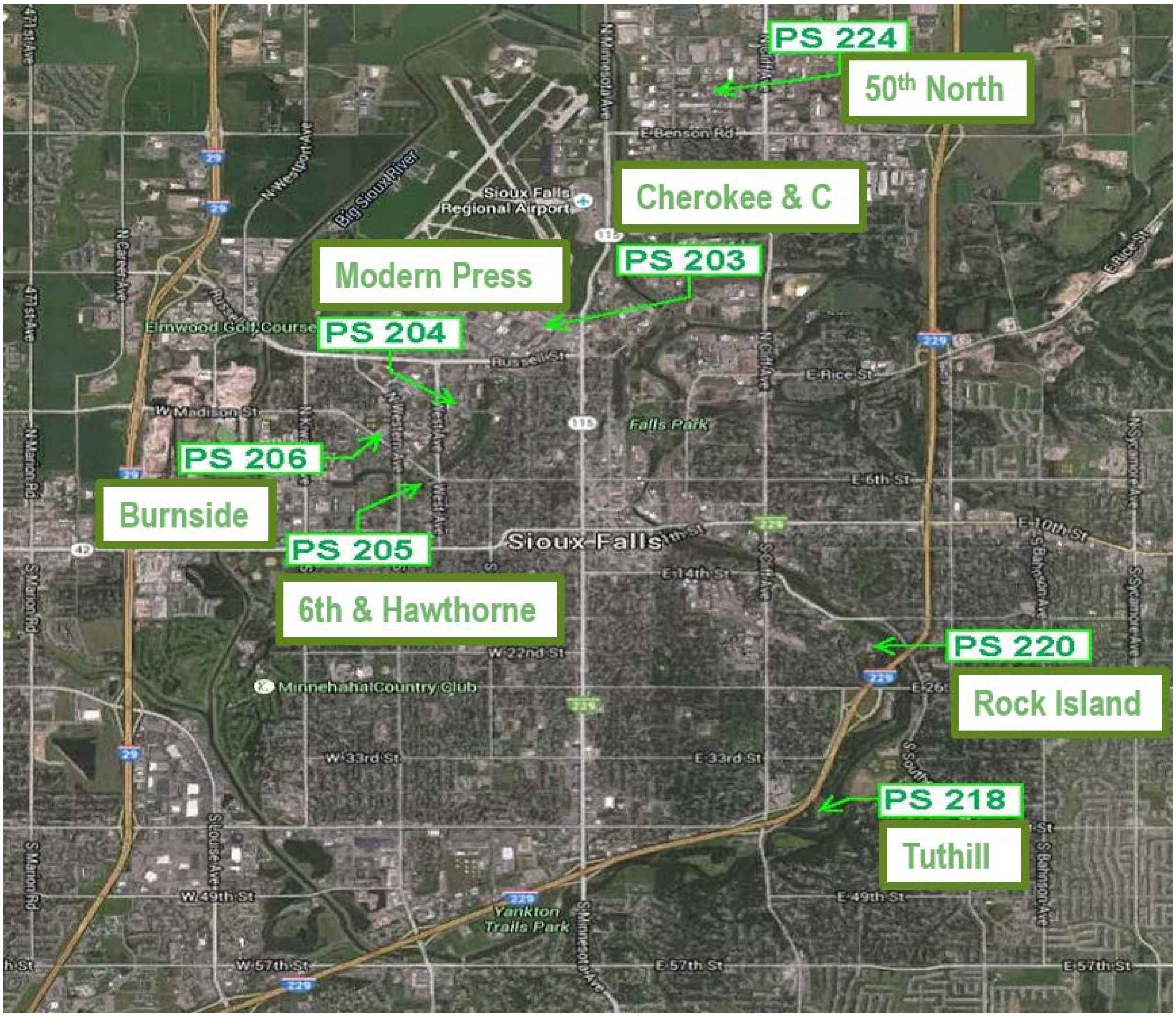
Major Structure	Major Component	Major Subcomponent	Capacity	Performance Rating	Condition Rating	Reliability Rating	Year Installed	Design Life	Actual Age	Residual Life	Current Asset Rating	Risk Description	Probability of Failure Rating	Operational Impact Rating	Safety Rating	Overall Asset Rating	Priority for Improvement	Estimated Cost
In-Plant Pumping (24)	NPW Pump #2 (24PUMP02)	Replace Pump	400 gpm @ 175 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$30,333
		Replace Motor	40 HP															
	NPW Pump #3 (24PUMP03)	Replace Pump	400 gpm @ 175 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$30,333
		Replace Motor	40 HP															
	NPW Pump #4 (24PUMP04)	Replace Pump	400 gpm @ 175 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$30,333
		Replace Motor	40 HP															
	NPW Pump Controls	Add Constant Pressure Pumping System to NPW Pumps		4	4	4	1982	15	34	-19	4	Pumps run continuously to prevent frequent cycling.	1.5	1.5	1	9.00	MEDIUM	$166,500
	Strainer #1 (24STR001)	Replace NPW Strainer #1		4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$24,500
	Strainer #2 (24STR002)	Replace NPW Strainer #2					1982	20	34	-14								$24,500
	NPW Flow Meter (24FLM038)	Replace NPW Flow Meter		4	4	4	1982	20	34	-14	4	Age	1.5	1.5	1	9.00	MEDIUM	$21,000
	In-Plant Waste Pump #1 (24PUMW01)	Replace and Increase Capacity of Pump	840 gpm @ 60 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$50,333
		Replace Motor	25 HP															
	In-Plant Waste Pump #2 (24PUMW02)	Replace and Increase Capacity of Pump	840 gpm @ 60 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$50,333
		Replace Motor	25 HP															
	In-Plant Waste Pump #3 (PUMW03)	Replace and Increase Capacity of Pump	840 gpm @ 60 ft	4	4	4	1982	20	34	-14	4	Age & Frequent Maintenance Required	1.5	1.5	1	9.00	MEDIUM	$50,333
		Replace Motor	25 HP															
	In-Plant Waste Controls	Add VFDs to In-Plant Waste Pumps		4	4	4	1982	15	34	-19	4		1.5	1.5	1	9.00	MEDIUM	$86,500
	In-Plant Waste Flow Meter (24FLM037)	Replace In-Plant Waste Flow Meter		4	4	4	1982	20	34	-14	4	Age & Condition	1.5	1.5	1	9.00	MEDIUM	$21,000
	Piping & Valves	Replace/upgrade piping and valves		4	4	4	1982	20	34	-14	4	Age & Condition	1.5	1.5	1	9.00	MEDIUM	$185,000
	Building Structure	Replace Roof, Coping, Trim & Flashing		4	4	4	1982	40	34	6	4	Age/Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$38,000
	Building Structure	Repair Brick on SW Corner of Bldg.		4	4	4	1982	50	34	16	4	Damaged Masonry	1	1.25	1.5	7.50	MEDIUM	$6,000
	Building Structure	Replace Sealant/backer rod. Tuck point.		4	4	4	1982	50	34	16	4	Water Damage	1	1.25	1.5	7.50	MEDIUM	$44,000
	Building - Exterior Door	Replace Exterior Double Door		4	4	4	1982	50	34	16	4	Age & Weathered	1	1.25	1.5	7.50	MEDIUM	$17,000
	HVAC	Replace HVAC System Including Heat Recovery and MAU		4	4	4	1982	40	34	6	4	Age/Reliability	1.25	1.5	1.5	11.25	HIGH	$236,000
	Electrical - General	Update Electrical		4	4	4	1982	15	34	-19	4	Age, Condition & Reliability	1.25	1.5	1.5	11.25	HIGH	$321,000
Civil/Sitework	Concrete Sidewalks/Steps	Remove/Replace and Widen the concrete sidewalks. Remove concrete sidewalk steps, regrade and replace with sidewalk.		4	4	4	1984	20	32	-12	4	Cracking, settling, & worn surfaces.	1.25	1.25	1.25	7.81	MEDIUM	$937,000
	Concrete Pavement	Remove and Replace Concrete Pavement and Curb & Gutter		4	4	4	1984	20	32	-12	4	Cracking, settlement, & worn surfaces	1.25	1.25	1.25	7.81	MEDIUM	$4,734,000
Site Electrical	Electrical Feed Loop	Replace the electrical duct bank feed loop		4	4	4	1984	20	32	-12	4	Old & Outdated	1.5	1.5	1.5	13.50	HIGH	$423,000
Equilization Basins (32)	Clarifier	Concrete Basin		2	2	2	1994	50	22	28	2		1	1.5	1	3.00	LOW	$138,000
		Sandblast and recoat center well		3	3	3	1994	25	22	3	3	Corrosion on Inlet Well	1	1.5	1	4.50	MEDIUM	$24,000
		Sandblast and recoat piping		3	3	3	1994	40	22	18	3	Corrosion on Influent Piping.	1	1.5	1	4.50	MEDIUM	$5,000
	Concrete Basins	Cell #1	3.4 MG	2	2	2	1994	50	22	28	2		1	1.5	1	3.00	LOW	$368,000
		Cell #2	8 MG															$496,000
	Grit Removal Equipment	Grit Pump		1	1	1	2007	20	9	11	1		1	1.25	1	1.25	LOW	$242,000
		Grit Cyclones																
		Grit Classifier																
	Wash Water	Route Non-Potable Water Supply to EQ									3	Conservation of water	1	1	1	3.00	LOW	$5,488,000
	Building Structure	Expand building to cover dumping pits **as part of current design project**.		2	2	2	1994	50	22	28	4	Freeze Potential	1.5	1.5	1.5	13.50	HIGH	$0
	Electrical	Replace bottom channel of MCC **as part of current design project**.		4	4	4	1994	50	22	28	4	Corrosion	1.5	1.5	1.5	13.50	HIGH	$0
	Electrical	Replace light fixtures in Bldg **as part of current design project**.		4	4	4	1994	50	22	28	4	Obsolete	1.5	1.5	1.5	13.50	HIGH	$0
	Electrical	Replace conduit supports in clarifier basin		4	4	4	1994	50	22	28	4	Corrosion	1.5	1.5	1.5	13.50	HIGH	$50,000
	General	Expand and Upgrade Facilities **as part of current design project**.		4	4	4	1994	50	22	28	4	Corrosion	1.5	1.5	1.5	13.50	HIGH	$0

2.3 Collection System

The following Figure 2.1 illustrates the general location of each lift station assessed.

Figure 2.1 Lift Station Assessment Location Map



2.3.1 PS-203 Cherokee & "C" Operation

The PS-203 structure is an old Air Guard facility, which was converted to City pump station. The pump station serves the area south of the airport to Russell Street and south of Russell on West Avenue to serve the Denny Sanford Premier Center and Howard Wood Field complex.

2.3.1.1 OPERATION

The pump station consists of three (3) pumps described as follows:

- Pump #1, Tag# 1126773 – Closest to generator or furthest east (southeast) in drywell.
  - o Fairbanks Morse; 4"x 4" pump (original to station)
  - o Eccentric reducer on suction side
  - o Volute measured approximately 18" outside diameter (OD)

- Highest pump suction line through wall
  - Lovejoy S-Flex style coupling
- Pump #2 - Center of drywell
  - Crane Deming; 6 x 4 x 3 pump (installed approximately 5 years ago by WRF staff)
  - Product Fig No. 7156
  - Welded steel spool on suction side with angular deflection in spool.
  - Volute measured approximately 20” OD
  - Lowest pump suction line through wall
  - Rexnord Omega style coupling
- Pump #3, Tag#1477545 – By stairwell or furthest west in drywell.
  - Fairbanks Morse 4” x 4” pump (original to station)
  - Eccentric reducer on suction side
  - Volute measured approximately 18” OD
  - Middle elevation pump suction line through wall, although nearly equal to Pump #2 elevation
  - Lovejoy S-Flex style coupling

2.3.1.2 CONDITION

- General Assessment
  - Structures are in good condition and structure/pump room has space for expansion.
  - Since the Sanford Premier Event Center has been added to the service area grease can be an issue.
  - Backups have not been an issue as there are no basements in the area.
- Drywell/Pump Room:
  - Pump #1 – Closest to generator or furthest east (southeast) in drywell.
    - No noticeable/troublesome noises when operating
  - Pump #2 – Center in drywell
    - Cavitation evident on suction side (in welded spool)
    - City staff should monitor the bearings on this pump closely
  - Pump #3 – By stairwell or furthest west in drywell.
    - No noticeable/troublesome noises when operating
- Forcemain
  - The force main is new except for the last segment from the split to two 10-inch lines back to the station.
- Wetwell
  - Rusted and corroded conduits and railings in the wetwell
  - Wetwell access below flume is a confined space and entrance is only allowed when using a self-contained breathing apparatus (SCBA). This is high risk and needs new wetwell as access is unsafe for maintenance and cleaning.
  - The current elevation requires backing sewage up influent sewer to get adequate depth at the suction inlets. There is potential to construct a new wetwell adjacent to the existing wetwell, deep enough to eliminate the need to back up sewage in the influent sewer. This would also offer the opportunity to correct the unsafe access issue.

- HVAC
  - Meets 6 air changes per hour.
- Electrical
  - Needs new generator.
  - Needs new electrical switchgear.

2.3.1.3 RECOMMENDATIONS

- General
  - PS-203 Cherokee & “C” Lift Station has been identified as highest risk. Safety is an issue and access to the wetwell needs to be addressed.
  - Budget for laser scan for as-built as there is no as-built documentation.
  - Address potential additional hotels, restaurants and their associated wastewater flows that could result from its proximity to the Premiere Center.
  - Review combining Pumps Stations 204, 205, and 206.
- Structural/Architectural
  - Inspect and replace roofing.
  - Construct new wetwell and fill old wetwell to grade for electrical.
    - Review the depth in preliminary design to allow for adjusting sewers to be installed in the street with minimum depth of bury. There are reportedly no basements currently in this area.
    - Consider using self-priming pumps for the future, as a deeper wetwell would require suction lift.
    - Potentially utilize Ogee style wetwell to provide velocity in the wetwell to scour grease.
- Drywell/Pump Room
  - Extend forcemains so both come into the lift station with a wye and control valve on each line, allowing control of the discharge location.
  - Sandblast and coat pump room and piping.
  - Move generator to old wetwell renovated room.
  - Provide a pigging station for the dual forcemains.
  - Future pumps could be self-priming type such as manufactured by Gorman-Rupp, to provide some suction lift capability.
- Wetwell
  - Construct a new dual wetwell complete with at-grade access hatches for Vactor truck cleaning to address safe access.
  - Extend the pump suction lines through current wetwell to south (southwest and construct a new wetwell south of current lift station.
  - Since flow comes into station generally perpendicular to existing pumps, review need for baffles in new wetwell to avoid pre-rotation and provide a proper flow entrance into the pumps.
- Electrical
  - Fill current wetwell with sand up to new floor and convert to a generator/electrical room.
  - Provide and install new electrical switchgear, motor control center and VFD’s.
  - Provide and install a new engine generator.

  - Provide seal-offs to isolate wetwell from drywell per code requirements.
- HVAC
  - Construct new supply and exhaust HVAC system for pumping room and main floor electrical/control area.

2.3.2 PS-204 Modern Press – 806 N West Avenue

2.3.2.1 OPERATION

This pump station is located on the service drive south of Madison Street, on the east side of West Ave. and serves the area immediately north and west including the Canaries' Stadium. This station has very few users with low flow.

2.3.2.2 CONDITION

- Drywell/Pump Room
  - Access via manhole steps is a safety issue.
  - Both pumps run quietly.
  - There is no evidence of air entrainment to an extent that it causes pumping issues, despite the fact that the influent drops into wetwell.
- Wetwell
  - Hydrogen sulfide attack evident on wetwell hatch and area surrounding hatch but it is not a widespread issue on walls.
- Electrical
  - Wiring looks good in drywell electrical cabinets.
  - The transfer switch and E-Gen pigtail are below grade, which is not a safe location.
  - No generator is installed at this station. When required, WRF staff sets a generator on top slab, climbs down to isolate the transfer switch and plugs the generator power into bottom of transfer switch. The remaining is automated by existing controls.
    NOTE: When using temporary power, the hatch to drywell cannot be fully closed/locked do to the cord entering through the hatch.
  - Safety issue: Circuit breakers are located in the lower level and should be moved to upper (intermediate) level at a minimum with true lockable disconnects.

2.3.2.3 RECOMMENDATIONS

- Move transfer switch outside on pole.
- Construct new circuit breakers at upper (intermediate) level at a minimum with true lockable disconnects.
- Add Davit crane base to top slab for both wetwell and drywell.
- Review combining pump stations 204, 205, and 206 and remove this lift station.

2.3.3 PS-205 – 6th Street and Hawthorne Avenue

2.3.3.1 OPERATION

This pump station serves the area south and west of Covell Lake and is located one block north of West 7th Street on N. Hawthorne Avenue.

2.3.3.2 CONDITION

- Structural/Architectural
  - o Structures are in good condition
    - o The building is very small and currently a ships ladder is the main access to pumps, making it very difficult to get things in and out of the station. Crews use beam near center of roof to attach a hoist and pull up equipment.
    - o Ships ladder is unsafe access.
- Drywell/Pump Room
    - o Pumps are in good condition.
- Wetwell
  - o Very minimal hydrogen sulfide damage in wetwell
  - o Grease reportedly does not cause issues at this station, as it serves a very small area
- HVAC
  - o The narrow ships ladder will be replaced by an elevator, which requires a minimum of six (6) air changes.
- Electrical
  - o Wiring in panels located in the drywell look good.
  - o The header was recently replaced and a magnetic flow meter was added on the discharge.
  - o SCADA and Controls are outdated.
  - o Does not include a permanent standby generator for emergency power outages and City maintenance staff are limit in the amount of time to respond to an outage before a sewer backup occurs.

2.3.3.3 RECOMMENDATIONS

- Install a Safe Access Maintenance Lift for safer access to the drywell/pump room.
- Install permanent standby generator.
- Update the SCADA and Controls.

2.3.4 PS-206 Burnside

2.3.4.1 OPERATION

The pump station is located west of the intersection of N. Western Avenue and W. Burnside Street, just north on N. Sigler Avenue. The pump station serves an area just northwest of the pump station, a small area with minimal flow.

2.3.4.2 CONDITION

- General
  - o City owns this entire corner lot.
- Drywell/Pump Room
  - o Pump #1 – North pump in drywell
    - ▪ Vibration is evident in casing – HDR recommends the alignment be checked.
  - o Pump #2 – South pump in drywell
    - ▪ Motor sounds good, no vibration

        - Bearings sound good
        - Pump had negligible vibration
    - Both pumps were mounted on brackets embedded in grout on the floor, have non-standard pump skids and the two pumps are mounted with different bearing frames.
    - Pump room has ample room for working on piping/pumps.
    - The discharge piping on both pumps is welded steel pipe
- Electrical
    - There are no issues or concerns observed with the wiring in the panels.
    - The magnetic flow meter (Foxboro) vault appears to be 48-inch precast manhole. The penetrations are grouted but there is standing water in the structure. The meter was not submerged at the time of the inspection. The water level appeared to be even with bottom of pipe.
    - There are lockable disconnects on main floor of drywell in building.
    - There are no seals-off on the conduits out to wet well. One conduit is for the Multi-Ranger and other is for float level power cables (which are 24vDc).
- Structural/Architectural
    - The building interior and roof are deteriorated.
    - The building is double row brick construction but was not constructed with bond break or staggered pattern between interior brick course and exterior brick course. City staff noted that a $14,000 tuck-pointing job is planned for this year.
    - Due to the poor structural and architectural condition, it is recommended to construct a new pump station structure.
- Drywell/Pump Room
    - Pump No. 1 is in good condition.
    - Pump No. 2 has apparent bearing issues and needs to be monitored or repaired.
- Electrical
    - There is standing water in the flow meter vault. The cause should be determined and corrected.
    - The pump station has a 60 kW generator, which was relocated from an older station. There was no battery status display on generator but City staff reported they test the generator at least monthly under load load. Staff also noted there were no known problems with generator but it is hard to get parts when required. The voltage regulator recently went out.
    - The automatic transfer switch controls are relatively new.

2.3.4.3 RECOMMENDATIONS

- Structural and architectural condition is poor and it is recommended that the above-grade pump station structure be rebuilt or replaced.
- Provide and install a new supply and exhaust HVAC system.
- Provide and install a new generator.
- Review combining pump stations 204, 205, and 206 and eliminate this lift station.

2.3.5 PS-218 Tuthill Park – 3500 S. Blauvelt

2.3.5.1 OPERATION

The station is located east of the Tuthill Park just southeast of I-229 with entrance through the bike trail off Cliff Avenue. This station has a large service area including the entire Sioux River South Trunk Sewer. The pump station has four pumps and is provided with an odor control system.

2.3.5.2 CONDITION

- General
  - Facility is in excellent condition.
  - Up to 17,000 gpm enters the lift station during high rainfall events.
  - Flooding
    - The floor elevation of pump station building is 6-inches below the 500-year flood elevation. When the river approaches that level, the crews need 2-day notice to place protection in the form of jersey barriers and plastic around main building. At those flood levels typical vehicle access from Cliff Avenue is cut off and access is via boat only.
    - Guides could be installed at all of the doors to allow stop logs or plates to be installed prior to flood events.
    - The odor control transformer appears to be in the floodplain.
- Drywell/Pump Room
  - The seal water supply and connections to seals should be corrected as noted below.
  - The pumps, piping and valves are in excellent condition.
  - All pumps have an interior Belzona coating.
  - Motors have been replaced on all of the pumps.
  - Pump # 1
    - Pump appeared to be running smoothly with no detectable noises of concern.
    - Aurora 10”x 12”, 3,600 gpm.
    - 40 HP motor, 720 RPM, VFD equipped.
    - Recommend moving the seal water connection location to the port on the seal.
  - Pump # 2
    - Pump appeared to be running smoothly with no detectable noises of concern.
    - Aurora 10”x 12”, 3,600 gpm.
    - 40 HP motor, 720 RPM, VFD equipped.
    - Recommend moving the seal water connection location to the port on the seal.
  - Pump # 3
    - Pump appeared to be running smoothly with no detectable noises of concern.
    - Aurora 10”x 12”, 3,600 gpm.
    - 40 HP motor, 720 RPM, VFD equipped.
    - Recommend moving the seal water connection location to the port on the seal.
  - Pump # 4
    - A slight rattle/tapping noise was detected on the bearing frame. Recommend that this noise be monitored and repairs made as necessary.

        - Aurora 10”x 12”, Model No. 88-03587, Type 6134-SF, 3,600 gpm.
        - 40 HP motor, 720 RPM, VFD equipped.
- Wetwell
    - In general, ragging has not been a problem at this lift station.
    - There is a curb around a rectangular opening to the wetwell. The curb around this opening could be raised to prevent water from entering the wetwell during flood events. Alternatively, this opening could be closed off completely.
    - The wetwell access door on the southwest corner of the lift station sticks. The door and frame may need to be replaced.
    - The City cleans the wetwell two times per year.
- HVAC
    - Needs ventilation improvements, as the ventilation in the Electrical Room and the connected Pump Room is inadequate.
    - The odor control system is shut down in the winter.
- Electrical
    - The standby generator gas regulator appears to be mounted too low, below the flood elevation.

2.3.5.3 RECOMMENDATIONS

- Structural/Architectural
    - Install removable floodgates at the doors.
    - Raise curb around wetwell opening to prevent water from entering the wetwell during flood events.
- Drywell/Pump Room
    - Monitor pump 4 for bearing noise and repair as necessary.
    - Seal water recommendations for all pumps:
        - Change operation of seal water so that seal water runs to pumps at all times, even when the pumps are not running.
        - A portion of the seal water piping appears to be metallic. It is corroded and should be replaced.
        - Recommend adding flow tubes to all seal water lines to monitor the seal water flow rate.
- Electrical Room
    - Construct new wall with a window to isolate electrical.
    - Bus bars are in poor condition but have been cleaned and coated.
    - The VFDs are at risk for corrosion with current arrangement.
    - Install video monitoring cameras to allow the City to determine if there is flooding in the station from a remote location. The station currently has the capability of accommodating a camera.
    - Raise odor control transformer if verified to be in the floodplain.
- Raise/rotate gas regulator if verified to be in the floodplain.
- HVAC
    - Needs HVAC improvements associated with establishing a separate electrical room.

2.3.6 PS-220 Rock Island

This pump station serves about twenty homes at end of 24th Street in Riverdale Park with minimal flow.

2.3.6.1 OPERATION

- The floodplain is 3 to 4 feet above main floor and the new meter base is 32” above main floor.
- This pump station is prone to vandalism, and the City frequently removes spray paint from the building.

2.3.6.2 CONDITION

- Architectural/Structural
  - Deteriorated interior roof and appears to have excessive humidity. A possible roof leak was noted on the upper level.
  - Some of the precast roof sections are damaged and reinforcing in the precast is exposed in some locations.
- Drywell/Pump Room
  - Pumps are in good condition.
    - Pump # 1 (South Pump)
      - Paco Pump: Serial Number M26869, 5 HP, 1170 RPM.
      - This pump does not have a seal water connection.
      - This pump did not run during the field visit.
      - There are no reported plugging/ragging issues associated with this pump.
      - The mechanical seals generally last 5 to 10 years on this pump.
      - Lincoln A.C. Motor: 5 HP, 1170 RPM, 80% min. efficiency.
    - Pump # 2 (North Pump)
      - Paco Pump: 5 HP, 1170 RPM.
      - This pump does not have a seal water connection.
      - No noticeable or troublesome noises when running.
      - The flow rate of the pump was recorded at 260 gpm.
      - There are no reported plugging/ragging issues associated with this pump.
      - The mechanical seals generally last 5 to 10 years on this pump.
      - Lincoln A.C. Motor: 5 HP, 1170 RPM, 80% min. efficiency.
  - The piping is in poor condition at wall. There are signs of leaking at the suction pipe and discharge pipe wall penetrations.
- Wetwell
  - The inside of the wetwell was not investigated during the assessment, but City staff reported that there is not significant hydrogen sulfide damage in the wetwell.
- HVAC
  - The room is damp.
  - It is recommended to move the heater due to accessibility.
  - Condensation was noted on the upper level ceiling and on the lower level piping.
- Electrical
  - The electrical and controls are relatively new.

- The floodplain is 3 to 4 feet above the main floor and the new meter base is 32" above main floor.
- The pump station should be new rewired in the lower level with new disconnects.
- The exterior lights have been damaged due to vandalism.
- This station recently received SCADA system upgrades, along with other pump stations in the city.
- The exterior wall electrical conduit penetrations are below the 100-year floodplain elevation.

2.3.6.3 RECOMMENDATIONS

- Short-term
  - The piping is in poor condition at wall and needs to be repaired or replaced.
  - Install a dehumidifier.
  - Move the heater. A leak is also dripping onto the unit.
- Long-term: Convert to a submersible pump station to address flood elevation issues.

2.3.7 PS-224 – 50th Street N

2.3.7.1 OPERATION

This lift station serves the City of Renner and industrial area shown.

2.3.7.2 CONDITION

- General
  - The design is a steel "can" type lift station.
  - Priority 1 corrections are required due to safety issues.
  - The only means of access is down elevator in tubular access shaft.
  - There is good access to the pump station and is located out of the floodplain.
- Electrical
  - The electrical equipment installation in the "can" is not code compliant.
  - The auto transfer switch, generator and VFDs are relatively new.
- Drywell/Steel "Can"
  - Pump #1 (South Pump)
    - Fairbanks Morse 6"x 8": single stage, 800 gpm, 5400 series
    - Figure No. 5443B which is prone to plugging/ragging issues. The curves of these pumps should be checked to see if this could be modified or operated differently to mitigate some of the plugging issues.
    - There were no noticeable or troublesome noises when running.
    - The bearings, coupler (Rexnord Omega style), and pump generally look and sound good.
  - Pump #2 (North pump)
    - Fairbanks Morse 6"x 8": single stage, 800 gpm, 5400 series
    - Figure No. 5443B which is prone to plugging/ragging issues
    - Reliance Electric Motor (10 hp): 1170 rpm; Nominal efficiency 91.0% (90.2% guaranteed)
    - Rexnord Omega style coupler shows no sign of wear.

        - Pump appears to have been over-greased slightly but not leaking
        - While operating, it sounds like a bearing going out.
        - The pump is loud, especially at start-up. This was assumed to be due to ragging
            - The pumps routinely plug with rags and cannot run on VFD's.
            - The wear rings on the pumps need to be replaced frequently.
            - Pump Number No. 2 sounds like it has a potential bearing issue.
            - The working space around the pumps is inadequate.
- Wetwell
    - The wastewater drops into the wetwell, however, hydrogen sulfide attack is mainly isolated to the very top and on the lid.

2.3.7.3 RECOMMENDATIONS

- It is recommended to replace the pumps with dry-pit submersible pumps (i.e. Flygt) or recessed impeller pumps (i.e. Wemco) to address ragging issues.

2.4 Treatment System

Figure 2.2 illustrates the general location of each component at the Water Reclamation Facility and the numbering system use to identify each component.

Figure 2.2 Water Reclamation Facility Assessment Location Map

2.4.1 Administration Building (1)

2.4.1.1 OPERATION

The administration building is a two-story building. The lower level is below grade on the north and east sides and at grade on the southwest side. The main level of the building includes the administration offices, conference and training rooms, storage and restrooms. The lower level of the building includes the laboratory, maintenance office, mechanical room, lunchroom and kitchen, electrical room, and men's and women's locker rooms. Several updates have been completed on the administration building in the last few years including HVAC upgrades, roof replacement, lighting, new laboratory facilities, and masonry tuck-pointing. Therefore, no major updates to the administration building are anticipated within the planning period.

2.4.1.2 CONDITION

- Architectural/Structural
  - The Administration Building was recently renovated and seems to be in good condition with no major issues.
  - A new thermoplastic polyolefin (TPO) roof system was installed on the Administration Building in 2012.
  - The Laboratory was remodeled in 2012.
  - The brick veneer was tuck-pointed in 2014 and is in good condition with no signs of settling.
- Electrical
  - Interior lighting was replaced with new lighting in the last ten years.
  - The facility no longer uses the uninterruptible power supply (UPS) in maintenance area.
  - The facility receives power from either Transformer T-9 or T-10 via a Zenith automatic transfer switch. The operation of the transfer switch needs to be checked. The only way to de-energy the ATS is by breakers inside the terminal compartment of T-9 and T-10, which is a questionable code issue.
  - Panelboards are manufactured by GE, MCC is GE 8000 Line.
- Mechanical
  - The HVAC was upgraded in the last ten years

2.4.1.3 RECOMMENDATIONS

- No major renovations or updates are recommended, since several updates have been completed on the building in the last three to ten years.

2.4.2 Maintenance Building (2)

2.4.2.1 OPERATION

The maintenance building serves many purposes at the WRFs including service and maintenance of vehicles, service and maintenance of wastewater treatment equipment, wash bay area for maintenance vehicles, and storage of spare parts and spare equipment.

2.4.2.2 CONDITION

- Architectural/Structural
  - o The structure seems to be in good overall condition.
  - o The brick veneer is in good condition with no signs of settling.
  - o The roof is the original built-up roof (BUR) and is at the end of its usable service life. Replacement of the roof is on the current capital improvements plan (CIP) for replacement in 2017.
  - o The ladder to the mezzanine above the shop office is missing railing on the right side and the top and is not OSHA compliant.

Mezzanine above Shop Office

  - o Missing toe plates in areas on the mezzanine.
  - o Paint on the ceiling and walls of the maintenance bays are peeling.
- Mechanical
  - o HVAC system is original and needs to be replaced. Replacement of the HVAC system is on the current CIP for replacement in 2017.
  - o Compressed air system is outdated.
- Electrical
  - o New lighting was installed a few years ago.
  - o The facility receives power from either Transformer T-9 or T-10 via a Zenith automatic transfer switch. The operation of the transfer switch needs to be checked. The only way to de-energy the ATS is by breakers inside the terminal compartment of T-9 and T-10, which is a questionable code issue.
  - o Panelboards are manufactured by GE; MCC is GE 8000 Line.
  - o Electrical equipment is located in a service bay; some equipment is showing surface rusting. Many boxes where located in front of panel boards and transformers, which is a code violation for accessibility and fire risk.

2.4.2.3 RECOMMENDATIONS

- Architectural/Structural
  - o The roof is at the end of its useful like and should be replaced as planned in 2017.
  - o Replace the missing rail on the right side of the ladder to the mezzanine.
  - o Replace the missing toe plates on the mezzanine.
  - o Sandblast maintenance bay walls and ceiling and repaint.
- Mechanical
  - o The HVAC system should be replaced as planned in 2017.

2.4.3 Grit Building (Headworks) (3)

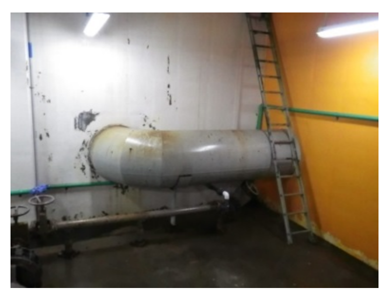
2.4.3.1 OPERATION

The Grit Building includes both screening and grit removal. Fine rotary drum screens remove large materials that could damage or plug equipment. The screenings removed are washed and pressed to remove excess water before disposal. Following screening, the wastewater enters two (2) aerated grit chambers where materials such as sand and gravel are removed to minimize wear on equipment in the remainder of the treatment process. Grit removed from the wastewater is washed and dewatered before discharge to a dumpster and final disposal in the landfill. Overflow from the grit washer is routed to the in-plant sewer system. The screening and grit removal equipment includes the following:

Rotary Drum Screen #1

- Three (3) Huber rotary drum fine screens with dewatering screw conveyors (Tag #s 03SC0301, 03S0302 & 03SC0303) – Installed in 2007. Preventative maintenance was completed on the rotary drum screens in 2016 including replacement of bearings and other miscellaneous items.
- One (1) 24-inch wide screenings belt conveyor (Tag # 03BC0301) – Installed in 2007.
- Two (2) concrete aerated grit chambers with dimensions of 27 ft. x 27 ft. x 14 ft. side-water depth with a coned bottom that extends 5 feet below the side walls. The aerated grit chambers are original and include the following equipment:
  - ¼” steel plate lift (eductor) tube with 304 stainless steel pipe supports.
  - 304 stainless steel air line.
  - ¼” plate steel baffles.
  - Galvanized diffusers, 3/8” holes, qty. 36 per diffuser; 160-320 SCFM per unit.
  - Aluminum bridge structure (6063-T6)
  - 3/8” aluminum checkered floor plate (6063-T6).
- Three (3) Roots (RAI frame 56) positive displacement blowers (Tag #s 03BL0301, 03BL0302, & 03BL0303) operating at 1300 rpm with a capacity of 206 SCFM at 7 psi (design) and 224 SCFM at 4 psi. Blowers are driven by 15 hp, 1750 rpm motors.
- Three (3) WEMCO Torque Flow Model C Grit Pumps (Tag #s 03PUM301, 03PUM302, & 03PUM303) – Installed new in 2007. Pump 1 was replaced in 2016.
- One (1) WEMCO Model C Grit Pump (Tag # 03PUM304) for the Dump Station – Installed new in 2007.
- Two (2) Grit Cyclones (Tag # 03CY301 & 03CY302) - Installed new in 2015.
- One (1) Grit Classifier (Washer) (Tag # 03GRW301) – Installed new in 2015.

Grit Pump and Discharge Valve



Grit Basin Influent Pipe

2.4.3.2 CONDITION

- Process
  - There is visible corrosion on the grit pump suction piping and valves due to moisture.

- Visible spots of corrosion on the grit pump discharge piping and check valves in the old grit washer room.

Stair Railings at NE Entrance

Walls in Lower Level Pump Room

North Side Concrete Walk

Mechanical Diffuser/Cover

SE Corner of Building

Concrete Floor at Overhead Door

- Grit basin influent pipe in the grit basement shows signs of corrosion on the exterior of the pipe. The condition of the interior of the pipe is unknown, but is part of the original plant and is anticipated to be in poor condition due to the environment.
- Grit Blower No. 2 (blower only) was replaced in 2002. The remaining blowers (Blowers No. 1 and No. 3) and motors are part of the original plant constructed in 1986. The blowers have had good maintenance and appear to be in good condition.
- There are spots of corrosion on the drums of the fine screens. However, this happened shortly after the fine screens were installed and no significant additional corrosion has occurred. These are constructed of 304 stainless steel.
- The copper pipe for the sampler line in the screenings building has severe corrosion.
- Corrosion on the grit chamber influent control gates.

- Architectural/Structural
  - The structure is in good condition overall, but does have some minor signs of settling.
  - The brick veneer is in good condition, but with some signs settling.
  - The concrete is severely deteriorated at the stair railings on the northeast entrance. The railings are loose and pose a safety concern.
  - There are minor cracks at the base of the walls in the lower level grit pump room allowing water to leak on the floor. These could be injection grouted to stop the leakage.
  - Structural stoops are either missing or they are separating from building at walk door locations. The concrete walks are settling and separating from the building. The sealant has completely deteriorated at the entire north side of the building.
  - Moderate rusting is apparent on the mechanical diffuser/cover.
  - Concrete floor at the overhead door is moderately deteriorating.
  - Brick is moderately damaged on the SE corner of the building.

- o The roof access ladder has at least three bolts at the top of the ladder that are not anchored causing the ladder to come loose from the wall.
  - o The screening portion of the facility has a new roof, but the rest of the building is original. A new roof is needed on the older, grit portion of the building and is on the current CIP.
  - o Old exterior doors are in poor condition.
  - o Concrete on the influent channel to the grit chamber is severely corroded.

Roof Access Ladder

- Mechanical
  - o HVAC system needs to be updated and is on the current CIP.
- Electrical
  - o Application of NFPA 820 for the entire building needs to be reviewed. The location of existing seal offs may not be code compliant.
  - o Some new light fixtures have been installed, but several are showing significant corrosion, due to condensation dripping on them.
  - o Exterior surface mounted conduits, especially on the north side, are showing significant corrosion with some support failures.
  - o The building is served by transformer T-9 and T-10. The transformers show significant enclosure deterioration. Each transformer has feeder breakers within the secondary terminal box, which is not ideal from a safety standpoint.
  - o Electrical equipment is manufactured by GE. MCCs are 8000 and E9000.

Exterior Conduits

Exterior Conduits

2.4.3.3 RECOMMENDATIONS

- Process
  - o Evaluate replacement of all original grit handling equipment.
  - o Eliminate copper piping in the screenings room and replace with PVC or FRP piping.
  - o Replace the control gates in the influent channel to the grit chambers.
- Architectural/Structural
  - o Repair the concrete around the railings of the stairway.
  - o Remove the sidewalks, prepare and compact the base, replacing walks and stoops.
  - o Repair the concrete floor at overhead door to screenings room.
  - o Repair the roof access ladder immediately for safety reasons. Repairs are required to the brickwork surrounding this area to eliminate water intrusion.
  - o Repair damaged brick on the SE corner of the building.
  - o The roof on the grit portion of the building is at the end of its useful like and should be replaced within the next year.
  - o Replace the four (4) exterior single access doors in the older grit portion of the building.
  - o Rehabilitate the concrete walls of the influent channel to the grit chambers.

- Mechanical
  - The HVAC system should be replaced as planned within the next year.
- Electrical
  - Upgrade facility to meet NFPA 820.
  - Repair exterior conduits and supports.

2.4.4 Sludge Pumping (4)

2.4.4.1 OPERATION

Settled solids from the primary clarifiers are removed from a sludge hopper at the bottom of each primary clarifier by individual sludge pumps located in the lower level of the Sludge Pumping Building. The scum pumps were removed from service. Therefore, floatable materials are removed from the scum pit of each clarifier by the primary sludge pumps. The major equipment in the sludge pumping building includes the following:

- Four (4) primary sludge pumps (Tag # 04PUM401, 04PUM402, 04PUM403, 04PUM404): Pump Nos. 1 through 3 are new Penn Valley double disc pumps installed in 2016. Pump No. 4 is in the process of being replaced with a new Penn Valley double disc pump.
- Primary sludge pump suction and discharge valves have been replaced with the new pumps.

2.4.4.2 CONDITION

- Process
  - Sludge pumps, piping, and valves are new or are in the process of being replaced and are or will be in excellent condition.
- Architectural/Structural
  - The building is in good overall condition.
  - The brick veneer is in good condition with no signs of settling.
  - New TPO roof was installed in 2014.
  - Exterior doors are in poor condition.
- Electrical
  - Review the application of NFPA 820 as rating of installed equipment is inconsistent.
  - Light fixtures in lower level are showing signs of deterioration.
  - Conduits, electrical and utility boxes are showing signs of deterioration.
  - Unfinished wiring exists in the lower level.
  - Electrical equipment is manufactured by GE. MCC is GE 8000.
  - Fiber optic communication line does not currently extend to Sludge Pumping.
- Mechanical
  - A new HVAC system was installed in 2014
  - Heating is provided by hot water from the central boiler system at the Energy Recovery Unit.
  - The unit lacks heat at times, due to competing heat requirements for other buildings that are also heated from the central boiler system.

2.4.4.3 RECOMMENDATIONS

- Architectural/Structural
  - o Replace the one (1) set of exterior double doors and the one (1) exterior single access door.
- Mechanical
  - o Provide supplemental heating for colder periods of the year.
  - o Provide additional ventilation or dehumidification to control condensation.
- Electrical
  - o Upgrade facility to meet NFPA 820.
  - o Finish project in lower level so there is no exposed wiring.
  - o Extend fiber optic line to the Sludge Pumping Building.

2.4.5 Primary Clarifiers (5)

2.4.5.1 OPERATION

The Primary Clarifiers consist of four 90 feet diameter concrete tanks that have an 8 feet side-water depth and a 1:12 sloped bottom. The primary clarifiers provide removal of both settleable solids and floatable (scum) material from the wastewater. Settled solids (primary sludge) that accumulate in each clarifier is collected by rotating scraper arms on the bottom of the tank and directed to the sludge withdrawal hopper. The sludge is then pumped to the anaerobic digesters. Floatable (scum) material is removed by a skimming device, which routes the scum to a pit located at each clarifier. The scum from each pit is also pumped to the anaerobic digesters. Each primary clarifier includes the following major equipment:

Primary Clarifier #1 Telescoping Valve Operator

Primary Clarifier #4 Rake Arm

Concrete Basins

- Eurodrive helical main drive
- 1 hp Baldor motor, explosion-proof to Class 1, Division 1
- Rotation Speed of two (2) complete arm revolution per hour
- ¼” ASTM A36 steel center column, drive cage, and truss arms (manufactured by Keene/Amwell).
- Walkway Bridge with aluminum enclosure
- 10 gauge brass squeegees
- Fiberglass Reinforced Plastic (FRP) Weirs
- Over-torque protection provided by motor overloads, drive cut-out and alarm limit switches, and a 50,000 ft-lb shear pin coupling.

2.4.5.2 CONDITION

- Process
  - o Corrosion is visible on the operator stand, gears, and the telescoping valves for the scum pits.

- o The clarifier mechanisms, including the center column, influent well, drive cage, arms, skimmer, cross collectors; weirs and scum trough were installed in 1986 with the original plant. The mechanisms appear to be in good condition and have been maintained on a regular basis. However, continued maintenance on the original equipment may no longer be cost effective and replacement needs to be evaluated.
- o The drain valves for the primary clarifiers are difficult to operate.


Operable Observation Window


Catwalk Aluminum Sheet Metal


Odor Control Ductwork


Interior of Clarifiers


Primary Clarifier Dome

- Architectural/Structural
  - o Concrete basins are in good condition. There is some discoloration on the exterior walls of the clarifiers and the grout or paint coating is wearing off in some locations.
  - o The step at the entrance door to the walkway bridges is showing signs of severe corrosion.
  - o The operable observation windows of the catwalk are showing signs of extensive wear on the weather stripping seals and hardware. Most are very hard to open with the exception of a couple that the hardware has been severely damaged.
  - o The aluminum sheet metal is oxidizing significantly inside the catwalk enclosure of all of the clarifiers around the window openings. This suggests that the windows are not sealed or the windows are left open.
  - o The insulation wrap on the odor control ductwork is severely deteriorated. HDR recommends replacing all of the insulation on every system.
  - o The interior concrete has some minor cracking in all four clarifiers with some spalling of concrete on the interior walls.
  - o The paint and coatings on the interior of the clarifier have severely deteriorated.
  - o The domes are original and are in good condition except for a few areas with minor damage at the concrete structure and minimal corrosion.
- Mechanical
  - o Just replaced the blowers for the Odor Control, which run all the time. Not all the blowers have been replaced.
  - o Check NFPA 820 to see if Odor Control is compliant.
- Electrical

- o Severe corrosion on the electrical boxes at the access platform to the clarifier walkway bridges.
- o Lightning protection down-leads are missing or broken.

Electrical Box

Electrical Box at Entrance to Primary Clarifier

2.4.5.3 RECOMMENDATIONS

- Process
  - o Replace the clarifier mechanism drives.
  - o Evaluate replacement or sandblasting and coating of all metals surfaces including the center column, influent well, drive cage, arms, skimmer, cross collectors; weirs and scum trough.
  - o If still used, replace the scum telescoping valves on the clarifiers, otherwise remove the telescoping valves.
- Architectural/Structural
  - o Recoat exterior concrete surfaces with the next five (5) years.
  - o Restore interior concrete surfaces with gunite, epoxy grout or coating.
  - o Replace the entire window systems on the windows of the catwalks that are severely damaged and replace the weather stripping on the remaining windows to minimize further corrosion.
- Electrical
  - o Replace all the conduit and associated electrical equipment between Sludge Pumping and the access platforms.
  - o Repair the lightning protection system.
- Mechanical
  - o Reviewed NFPA 820 and determine that Odor Control is compliant with the current NFPA standards.

2.4.6 Splitter Manhole #3 (5A)

Splitter Manhole #3

2.4.6.1 OPERATION

Wastewater from the aerated grit chambers flow to Splitter Manhole #3. Splitter Manhole #3 provides for equal distribution of flow to the primary clarifiers. Splitter Manhole #3 includes the following:

- Concrete structure with overall inside dimensions of 10’-10” x 14’-8” x 12’-0” high. The center influent well, which receives aerated grit effluent, is 5’- 0” x 10’-10”. The structure includes four (4) effluent boxes, which are 4’-0”x 5’-0” with a weir wall height of 8’-3” that direct flow to each individual clarifier.
- Four (4) fabricated aluminum, 48” x 30”, downward opening slide gates for control of wastewater flow to the primary clarifiers (Tag #s 05VAL001, 05VAL002, 05VAL003, & 05VAL004).
- Aluminum grating and hand railing.

2.4.6.2 CONDITION

- Process
  - o The slide gates stick and are difficult to operate.
- Architectural/Structural
  - o Concrete appears to be in good condition.
  - o Aluminum grating and hand railing are in good condition


Slide Gates of Splitter Manhole #3

2.4.6.3 RECOMMENDATIONS

- Process
  - o Replace the four (4) fabricated aluminum slide gates. Should consider stainless steel replacements.

2.4.7 First Stage Trickling Filters (6)

2.4.7.1 OPERATION

The trickling filters provide secondary treatment of the wastewater. They are designed to remove the majority of the organic (BOD) loading carried by the wastewater. The four (4) First Stage Trickling Filters are 135 feet in diameter and are 7 feet deep. The rotary distributor equipment for the first stage trickling filters was replaced in 2013. The rotary distributor equipment was manufactured by WesTech (Model RDS10S). Each trickling filter includes the following major equipment:


First Stage Trickling Filter #1 Rotary Distributor

- Center mast and mounting base of 304 stainless steel.
- Support cage, 304 stainless steel.
- Center barrel with arm connection flanges, 304 stainless steel.
- Top thrust bearing, precision spherical roller type, oil lubricated.
- Stabilizing bearing, precision spherical roller type, and grease lubricated.
- Bearing housing, cast aluminum and stainless steel.
- Mechanical barrel seal, annular Buna-N rings with 304 stainless steel hardware.
- Four (4) Distributor Arms with forward and reversing nozzles, 304 stainless steel.
- Spreaders, molded polycarbonate with interchangeable acrylic orifice plates.
- Quick-opening flush gates on ends of arms, 304 stainless steel.
- Vertical tie rods, 304 stainless steel.
- Horizontal support cables, 304 stainless steel.
- Anchor bolts and assembly fasteners, 304 stainless steel.
- Aluminum domes.
- Four (4) 36"x 36" Effluent Sluice Gates (Tag #s 06VAL601, 06VAL602, 06VAL603, & 06VAL604).


First Stage Trickling Filter #1 Vent


First Stage Trickling Filter Domes

2.4.7.2 CONDITION

- Process
  - o The rotary distributor mechanisms for the first stage trickling filters were replaced in 2013 and are in good condition.
  - o Manually actuated effluent valves on the first stage trickling filters are difficult to operate.
  - o There is corrosion on the vent screen covers.
- Architectural/Structural
  - o Domes are in good condition. Repairs were made to the domes in 2013 including, replacement of the hatches, replacement of the grounding cables, rods, and connectors; replacement of missing strut cap bolts and cap screws, replacement of dampers with new manually operated dampers, and repair or replacement of panels.
  - o There are a few areas of the domes with minor damage to the metal trim at the concrete structure, but this damage does not require immediate repairs.

2.4.7.3 RECOMMENDATION

- Process
  - o Replace the effluent valves on the first stage trickling filters.

2.4.8 Splitter Manhole #4 (6A)

2.4.8.1 OPERATION

Splitter Manhole #4

Splitter Manhole #4 receives primary clarifier effluent and recirculation flow from the recirculation pumps located in the Process Pump Building. Splitter Manhole #4 provides for equal distribution of these combined flows to the First Stage Trickling Filters. Flow can also be bypassed from Splitter Manhole #4 to Splitter Manhole #5. Splitter Manhole #4 includes the following:

- Concrete structure with overall inside dimensions of 14'-8" x 15'-10" x 14'-0" high. The center influent well is 5'- 0" x 15'-10". The structure includes four (4) effluent boxes, which are 4'-0"x 7'-0" with a weir wall height of 8'-9" that direct flow to each individual First Stage Trickling Filter.
- Four (4) fabricated aluminum, 72" x 48", downward opening slide gates for control of wastewater flow to the trickling filters (Tag #s 06VAL005, 06VAL006, 06VAL007, & 06VAL008).
- One (1) 36" Ø Sluice Gate for Bypass (Tag # 06VAL009).
- Aluminum grating and hand railing.
- Two (2) aluminum ladders.

2.4.8.2 CONDITION

- Process
  - o The slide gates stick and are difficult to operate.

- o Gasket seals are pulling away from the gate guides as indicated by the photo of Slide Gate 06VAL007.
- Architectural/Structural
  - o Concrete appears to be in good condition. However, there is some spalled concrete behind the frame of Slide Gate 06VAL015.
  - o Aluminum grating, ladders, and hand railing are in good condition.


Slide Gate 06VAL007

2.4.8.3 RECOMMENDATIONS

- Process
  - o Replace the four (4) fabricated aluminum slide gates. May want to consider replacement with stainless steel gates.
  - o Replace the one (1) bypass sluice gate. May want to consider replacement with stainless steel gate.
- Architectural/Structural
  - o Repair the spalled concrete.

2.4.9 Manhole #8 (6B)

2.4.9.1 OPERATION

Manhole #8 collects effluent from the First Stage Trickling Filters and directs it to the First Stage Intermediate Clarifier splitter box (Splitter Structure #5). Manhole #8 includes the following:

- Concrete structure with inside dimensions of 5’-0” x 6’-0” x 13’-6” high and 6” grout invert.
- Aluminum grating.


Manhole #8

2.4.9.2 CONDITION

- Civil/Site
  - o Concrete sidewalk steps at Manhole #8 are difficult to clear snow with UTV.
- Architectural/Structural
  - o Concrete appears to be in good condition.

2.4.9.3 RECOMMENDATIONS

- Civil/Site
  - o Evaluate grading options or sidewalk configurations to eliminate sidewalk steps.
  - o Replace sidewalks with wider sidewalks to accommodate the UTV.

2.4.10 First Stage Intermediate Clarifiers (7)

2.4.10.1 OPERATION

Each stage of the trickling filters is followed by two (2) intermediate clarifiers to remove biomass that sloughs of the trickling filter media. The two (2) First Stage Intermediate Clarifiers are 105-foot diameter with side-water depth of 10 feet. Effluent from the clarifiers flows by gravity to the

Second Stage Trickling Filters. Settled solids, referred to as humus, from the intermediate clarifiers is removed and routed to the Process Pumping Station where the Humus Pumps pump the humus to the Grit Removal Units and then subsequently resettled in the Primary Clarifiers and pump to the Anaerobic Digesters. Each First Stage Intermediate Clarifier includes the following major equipment:

- Eurodrive helical main drive
- 1 hp General Electric motor, premium efficiency, TEFC.
- Rotation Speed of two (2) complete arm revolution per hour
- ¼" ASTM A36 steel center column, drive cage, and truss arms
- Walkway bridge
- 10 gauge brass squeegees
- Fiberglass reinforced plastic (FRP) weirs
- Over-torque protection provided by motor overloads, drive cut-out and alarm limit switches, and a 50,000 ft-lb shear pin coupling.

2.4.10.2 CONDITION

- Process
  - The clarifier mechanisms, including the center column, influent well, drive cage, arms, skimmer, and scum trough were installed in 1986 with the original plant. The mechanisms appear to be in good condition and have been maintained on a regular basis.
  - Manually actuated drain (Humus) valves need to be assessed – they are original and difficult to operate.
  - Ground has eroded away under the concrete support for the drain valve operator stands.
- Architectural/Structural
  - Concrete basins are in good condition. There is some discoloration on the exterior walls of the clarifiers.
  - The access walkway and center platform are in good condition.
- Electrical
  - Electrical boxes on the walkways have severe surface corrosion as indicated in the adjacent photo.

Electrical Box on Walkway of First Stage Intermediate Clarifier #2

2.4.10.3 RECOMMENDATIONS

- Process
  - Fill and grade under the concrete supports for the drain valve operator stands.
  - Replace the mechanism drives.
- Electrical
  - Replace the electrical boxes and conduit that have corrosion.

2.4.11 Splitter Manhole #5 (7A)

2.4.11.1 OPERATION

Splitter Manhole #5 receives effluent from the First Stage Trickling Filters and provides equal distribution of the flow to the First Stage Intermediate Clarifiers. Flow can also be bypassed from Splitter Manhole #5 to Splitter Manhole #6. Splitter Manhole #5 includes the following:

Splitter Manhole #5

- Concrete structure with overall inside dimensions of 10’-0” x 15’-2” x 9’-0” high. The center influent well, which receives First Stage Trickling Filter effluent is 5’- 6” x 10’-0”. The structure includes two (2) effluent boxes, which are 4’-0” x 10’-0” with a weir wall height of 4’-6” that direct flow to each individual clarifier.
- Two (2) fabricated aluminum, 96” x 36”, downward opening slide gates, with two interconnecting operators, for control of wastewater flow to the First Stage Intermediate Clarifiers (Tag #s 07VAL010 & 07VAL011).
- One (1) 36”Ø Sluice Gate for Bypass (Tag # 07VAL012).
- Aluminum grating and hand railing.

2.4.11.2 CONDITION

- Process
  - The slide gates stick and are difficult to operate.
- Architectural/Structural
  - Concrete appears to be in good condition. However, there are some minor cracks in the concrete behind the bypass sluice gate.
  - Aluminum grating and hand railing are in good condition

2.4.11.3 RECOMMENDATIONS

- Process
  - Replace the two (2) fabricated aluminum slide gates. May want to consider replacement with stainless steel gates.
  - Replace the one (1) bypass sluice gate. May want to consider replacement with stainless steel gate.

2.4.12 Manhole #9 (7B)

2.4.12.1 OPERATION

Manhole #9 collects effluent from the First Stage Intermediate Clarifiers and directs it to the Second Stage Trickling Filter splitter box (Splitter Structure #6). Manhole #9 includes the following:

Manhole #9

- Concrete structure with inside dimensions of 5’-0” x 6’-0” x 13’-0” high and 1 ft. grout invert.
- Two (2) 36”Ø Sluice Gates (Tag #s 07VAL021 and 07VAL022).

- Aluminum grating.

Light Fixture Support at Manhole #9

2.4.12.2 CONDITION

- Process
  - o The sluice gates stick and are difficult to operate.
- Architectural/Structural
  - o Concrete appears to be in good condition.
  - o Aluminum grating is in good condition.
- Electrical
  - o Corrosion of support pipe for the light fixtures as indicated by the photo.

2.4.12.3 RECOMMENDATIONS

- Process
  - o Replace the two (2) sluice gates. May want to consider replacement with stainless steel gates.

2.4.13 Second Stage Trickling Filters (8)

Second Stage Trickling Filter #1
Rotary Distributor

2.4.13.1 OPERATION

The four (4) Second Stage Trickling Filters are 145 feet in diameter and are also 7 feet deep. The rotary distributor equipment for the second stage trickling filters were also replaced in 2013. The rotary distributor equipment was manufactured by WesTech (Model RDS10S). Each trickling filter includes the following major equipment:

- Center mast and mounting base of 304 stainless steel.
- Support cage, 304 stainless steel.
- Center barrel with arm connection flanges, 304 stainless steel.
- Top thrust bearing, precision spherical roller type, oil lubricated.
- Stabilizing bearing, precision spherical roller type, and grease lubricated.
- Bearing housing, cast aluminum and stainless steel.
- Mechanical barrel seal, annular Buna-N rings with 304 stainless steel hardware.
- Four (4) Distributor Arms with forward and reversing nozzles, 304 stainless steel.
- Spreaders, molded polycarbonate with interchangeable acrylic orifice plates.
- Quick-opening flush gates on ends of arms, 304 stainless steel.
- Vertical tie rods, 304 stainless steel.
- Horizontal support cables, 304 stainless steel.
- Anchor bolts and assembly fasteners, 304 stainless steel.
- Aluminum domes.
- Four (4) 36”x 36” Effluent Sluice Gates (Tag #s 08VAL801, 08VAL802, 08VAL803, & 08VAL804).

2.4.13.2 CONDITION

- Process

- o The rotary distributor mechanisms for the second stage trickling filters were replaced in 2013 and are in good condition.
- o Manually actuated effluent valves on the second stage trickling filters are difficult to operate.

- Architectural/Structural
  - o Domes are in good condition. Repairs were made to the domes in 2013 including, replacement of the hatches, replacement of the grounding cables, rods, and connectors; replacement of missing strut cap bolts and cap screws, replacement of dampers with new manually operated dampers, and repair or replacement of panels.
  - o There are a few areas of the domes with minor damage to the metal trim at the concrete structure, but this damage does not require immediate repairs.

2.4.13.3 RECOMMENDATION

- Process
  - o Replace the four (4) effluent valves on the second stage trickling filters.

2.4.14 Splitter Manhole #6 (8A)

Splitter Manhole #6

2.4.14.1 OPERATION

Splitter Manhole #6 receives First Stage Intermediate Clarifier effluent, recirculation flow from the recirculation pumps located in the Process Pump Building, and thickener supernatant. Splitter Manhole #6 provides for equal distribution of these combined flows to the Second Stage Trickling Filters. Flow can also be bypassed from Splitter Manhole #7. Splitter Manhole #6 includes the following:

- Concrete structure with overall inside dimensions of 14’-8” x 15’-10” x 13’-6” high. The center influent well is 5’- 0” x 15’-10”. The structure includes four (4) effluent boxes, which are 4’-0”x 7’-0” with a weir wall height of 8’-9” that direct flow to each individual Second Stage Trickling Filter.
- Four (4) fabricated aluminum, 72” x 42”, downward opening slide gates for control of wastewater flow to the trickling filters (Tag #s 08VAL013, 08VAL014, 08VAL015, & 08VAL016).
- One (1) 36” Ø Sluice Gate for Bypass (08VAL017).
- Aluminum grating and hand railing.

Slide Gate 08VAL014

2.4.14.2 CONDITION

- Process
  - o The slide gates stick and are difficult to operate.
  - o Gaskets seals are pulling away from the gate guides as indicated by the photo of Slide Gate 08VAL014.
- Architectural/Structural
  - o Concrete appears to be in good condition.
  - o Aluminum grating and hand railing are in good condition

2.4.14.3 RECOMMENDATIONS
- Process
  - Replace the four (4) fabricated aluminum slide gates.
  - Replace the one (1) bypass sluice gate.

2.4.15 Manhole #10 (8B)

2.4.15.1 OPERATION
Manhole #10 collects effluent from the Second Stage Trickling Filters and directs it to the Second Stage Intermediate Clarifier splitter box (Splitter Structure #7). Manhole #10 includes the following:
- Concrete structure with inside dimensions of 5'-0" x 6'-0" x 16'-0" high and 6" grout invert.
- Aluminum grating.


Manhole #10

2.4.15.2 CONDITION
- Civil/Site
  - Concrete sidewalk is settling around Manhole #10.
- Architectural/Structural
  - Concrete appears to be in good condition.

2.4.15.3 RECOMMENDATIONS
- Replace concrete sidewalks around Manhole #10. Replace with wider sidewalks.

2.4.16 Second Stage Intermediate Clarifiers (9)

2.4.16.1 OPERATION
Effluent from the Second Stage Trickling Filters flows by gravity to two (2) Second Stage Intermediate Clarifiers that are 105-foot diameter with side-water depth of 10 feet. Effluent from the Second Stage Intermediate Clarifiers flows to the Process Pumping Station for transfer to the activated sludge system. Settled solids, referred to as humus, from the intermediate clarifiers is removed and routed to the Process Pumping Station where the Humus Pumps pump the humus to the Grit Removal Units and then subsequently resettled in the Primary Clarifiers and pump to the Anaerobic Digesters. Each Second Stage Intermediate clarifier includes the following major equipment:
- Eurodrive helical main drive
- 1 hp General Electric motor, premium efficiency, TEFC.
- Rotation Speed of two (2) complete arm revolution per hour
- ¼" ASTM A36 steel center column, drive cage, and truss arms
- Walkway Bridge
- 10 gauge brass squeegees
- Fiberglass Reinforced Plastic (FRP) Weirs


Second Stage Intermediate Clarifier #2

- Over-torque protection provided by motor overloads, drive cut-out and alarm limit switches, and a 50,000 ft-lb shear pin coupling.

Electrical Box on Walkway of Second Stage Clarifier #1

2.4.16.2 CONDITION

- Process
  - The clarifier mechanisms, including the center column, influent well, drive cage, arms, skimmer, and scum trough were installed in 1986 with the original plant. The mechanisms appear to be in good condition and have been maintained on a regular basis.
- Architectural/Structural
  - Concrete basins are in good condition. There is some discoloration on the exterior walls of the clarifiers.
  - There is deterioration of the concrete at the guardrail post locations.
  - The access walkway and center platform are in good condition.
- Electrical
  - Electrical boxes on the walkways have severe surface corrosion as shown in the adjacent photo.

2.4.16.3 RECOMMENDATIONS

- Process
  - Replace the mechanism drives.
- Architectural/Structural
  - Repair concrete at the guardrail post locations to minimize safety hazards.
- Electrical
  - Replace the electrical boxes and conduit that have corrosion.

2.4.17 Splitter Manhole #7 (9A)

2.4.17.1 OPERATION

Splitter Manhole #7

Splitter Manhole #7 receives effluent from the Second Stage Trickling Filters and provides equal distribution of the flow to the Second Stage Intermediate Clarifiers. Flow can also be bypassed from Splitter Manhole #7 to the Transfer Pump Wetwell in the Process Pumping Building. Splitter Manhole #7 includes the following:

- Concrete structure with overall inside dimensions of 10’-0” x 15’-2” x 9’-6” high. The center influent well, which receives First Stage Trickling Filter effluent, is 5’- 6” x 10’-0”. The structure Includes two (2) effluent boxes, which are 4’-0”x 10’-0” with a weir wall height of 4’-9” that direct flow to each individual clarifier.
- Two (2) fabricated aluminum, 96” x 36”, downward opening slide gates, with two interconnecting operators, for control of wastewater flow to the First Stage Intermediate Clarifiers (Tag #s 09VAL018 & 09VAL019).

- One (1) 36”Ø Sluice Gate for Bypass (Tag #09VAL020).
- Aluminum grating and hand railing.

Sidewalks at Splitter Manhole #7

2.4.17.2 CONDITION

- Civil/Site
  - o Concrete sidewalk around Splitter Manhole #7 is settling and cracking.
  - o Concrete sidewalk steps at Manhole #7 are difficult to clear snow with UTV.
- Process
  - o The slide gates stick and are difficult to operate.
- Architectural/Structural
  - o Concrete appears to be in good condition.
  - o Aluminum grating and hand railing is in good condition

2.4.17.3 RECOMMENDATIONS

- Civil/Site
  - o Replace sidewalks around Splitter Manhole #7. Replace with wider sidewalks.
  - o Evaluate grading options or sidewalk configurations to eliminate sidewalk steps.
- Process
  - o Replace the two (2) fabricated aluminum slide gates and the one (1) sluice gate.
  - o Replace the one (1) bypass sluice gate.
  - o May want to consider replacement with stainless steel gates.

2.4.18 Manhole #11 (9B)

Manhole #11

2.4.18.1 OPERATION

Manhole #11 collects effluent from the Second Stage Intermediate Clarifiers and directs it to the Transfer Pump wetwell in the Process Pumping Building. Manhole #9 includes the following:

- Concrete structure with inside dimensions of 5’-0” x 6’-0” x 13’-0” high and 1 ft. grout invert.
- Two (2) 36”Ø Sluice Gates (Tag #s 09VAL023 & 09VAL024).
- Aluminum grating.

2.4.18.2 CONDITION

- Civil/Site Work
  - o Concrete site walk around Manhole #11 is cracked and settling
- Process
  - o The sluice gates stick and are difficult to operate.

- Architectural/Structural
    - Concrete appears to be in good condition.
    - Paint is peeling of the operator pipe stand.
    - Aluminum grating is in good condition

2.4.18.3 RECOMMENDATIONS

- Civil/Site Work
    - Replace cracked and settled sidewalks. Replace with wider sidewalks were practical.
- Process
    - Replace the two (2) sluice gates. May want to consider replacement with stainless steel gates.

2.4.19 Process Pumping (10)

2.4.19.1 OPERATION


Transfer Pumps #1, #2, #3, & #4.

Process pumping includes the following three pumping systems:

- Transfer Pumps - Pump trickling filter effluent to the activated sludge system.
- Humus/In-plant Waste Pumps – Pumping of trickling filter humus and In-plant waste to the Grit Removal Units.
- Recirculation Pumps – Recirculation of settled solids from the first and second station intermediate clarifiers to the trickling filters. The plant is currently not recirculating flow back to the trickling filters. However, when the recirculation system is being operated, the flow from each clarifier is routed to the Process Pumping Station where the first and second stage recirculation pumping systems pump the separate flows to the first and second stage filter influent control structures.


Trickling Filter Humus & In-Plant Waste Pumps #1, #2, & #3

Transfer pumping includes the following:

- Transfer Wetwell that receives trickling filter effluent.
- Four (4) pumps with variable speed drives (Tag #s 10PUM1001, 10PUM1002, 10PUM1003, & 10PUM1004). New impellers were installed in these pumps in 2014 to increase the design capacity to 10,416 gpm. Three pumps operating in parallel will pump 31,250 gpm (45 MGD) at maximum speed.
    - Controls to provide automatic speed adjustment of the pumps in order to maintain a constant wet –well level.

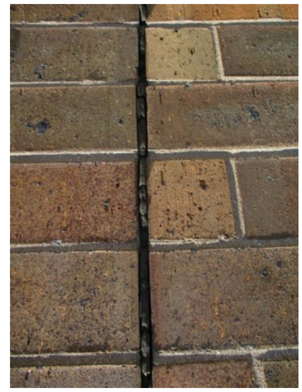
Trickling Filter Humus & In-plant waste pumping includes the following:

- Wetwell, which receives humus from the intermediate clarifiers
- and waste from the south in-plant sewer system.
- Three (3) 1400 gpm pumps with variable speed drives (Tag #s 10PUM1005, 10PUM1006, & 10PUM1007). Impellers for these pumps were replaced in 2013.
- Controls for automatic stop, lead pump start, lag, and pump start based on rising and falling wetwell level.

Trickling Filter Recirculation Pumping includes the following:

- Two (2) first stage recirculation pumps (2500 gpm and 8000 gpm) (Tag #s 10PUM1011 & 10PUM1012).
- One (1) 8000 gpm first and second stage (swing) recirculation pump (Tag #10PUM1010).
- One (1) second stage recirculation Wetwell, which receives settled solids flow from the second stage clarifiers.
- Two (2) second stage recirculation pumps (4200 gpm and 8200 gpm) (Tag #s 10PUM1008 & 10PUM1009).

North Side Exterior Doors


Masonry Control Joint Sealant


Rear Exit of Process Pumping Building


Interior Paint in Process Pumping Building

2.4.19.2 CONDITION

- Process
  - o New transfer pumps were installed in 2014 and are in good condition.
  - o City has not checked limit of the actual total pumping capacity of the transfer pumps with the new larger impellers installed.
  - o Piping is original and further inspection should be considered to determine its condition.
  - o Humus pipe is thin from wear.
- Architectural/Structural
  - o Process pumping building structure appears to be in good condition.
  - o The brick veneer is in good condition, but with a few signs of settling.
  - o The exterior doors on the north side of the building do not shut properly.
  - o The exterior and interior masonry control joint sealant is significantly deteriorating.
  - o The rear exit is missing a stoop and stairs.
  - o Interior paint is deteriorating due to condensation and water intrusion around windows.
  - o Drywell – leaking in the structure – look at drywell wall
  - o New roof was installed in 2010.
- Mechanical
  - o New HVAC system installed in 2009 - 2011. HVAC system is working fine.
- Electrical
  - o At exterior, on a j-box near the entrance, the conduits emerging from underground show significant corrosion.
  - o Transfer pumps have newer Allen-Bradley VFDs.

- o Humus pumps have newer Schneider VFDs.
- o Electrical equipment manufactured by GE. Main gear is AV Line and MCC is 8000 Line.
- o Recirculation pumps have magnetic starters. They were originally installed with VFDs. However, when the VFDs quit working, City staff disconnected the VFDs and installed across the line starters, as the VFDs were not considered to be necessary.

2.4.19.3 RECOMMENDATIONS

- Process
  - Replace the humus line with glass-lined piping.
- Architectural/Structural
  - Repair or replace the exterior double doors on the north side of the building.
  - Replace the three (3) exterior single access doors.
  - Replace the sealant and backer rod on the masonry control joints throughout the building. Tuck-point as necessary where water has damaged brick and CMU.
  - Install a landing and stairs on the rear exit for safety reasons.
  - Replace sealant and backer rod on all windows to eliminate future water damage.
  - Repair leaking from wetwell to drywell.
- Electrical
  - Replace electrical conduit and junction box near the entrance.

Gravity Thickener Mechanism

2.4.20 Gravity Thickeners/Tunnels (11)

2.4.20.1 OPERATION

The gravity thickeners receive waste activated sludge (WAS) from the activated sludge system and increase the sludge thickness and optimize the use of the anaerobic digesters. In the past, the gravity thickeners also received sludge from the primary clarifiers. However, primary sludge is no longer sent to the thickeners and is pumped directly to the anaerobic digesters. Supernatant overflow from the thickeners flows by gravity to the Second Stage Trickling Filter influent splitter box (Splitter Manhole #6). The Thickener Sludge Pumps and Piping are located in the tunnel between the two gravity thickeners. The plows on the bottom of the rotating truss arms direct thickened sludge to the central sludge hopper of each gravity thickener. The thickener sludge pumps draw sludge from the central sludge hoppers and pump it to the digesters. Each gravity thickener system includes the following:

Tunnel at Door to Digester Building

- 55 ft diameter concrete tanks with a side-water depth of 12 ft.
- Mechanism:
  - ¼” ASTM A36 steel center column, drive cage, and truss arms (manufactured by Keene/Amwell).
  - Eurodrive helical main drive

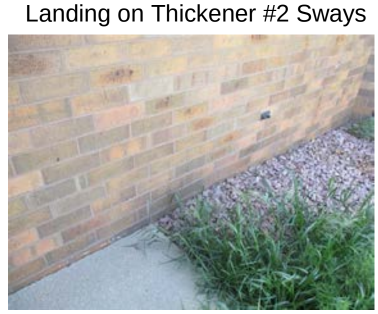
- o Baldor motor, explosion-proof to Class 1, Division 1
  - o Rotation Speed of two (2) complete arm revolution per hour
  - o 10 gauge brass squeegees
  - o Over-torque protection provided by motor overloads, drive cut-out and alarm limit switches.
- Walkway Bridge with aluminum enclosure
- Fiberglass Reinforced Plastic (FRP) Weirs
- Four (4) Thickened Sludge Transfer Pumps (Tag #s 11PUM1100, 11PUM1101, 11PUM1102, and 11PUM1103). Pumps were replaced in 2006 with mechanical diaphragm pumps. 15 HP Each, 170 gpm at 50 ft. TDH.
- Concrete Blend Tank

2.4.20.2 CONDITION

- Process
  - o The mechanisms have severe metal deterioration. Rehabilitation and replacement was recommended as part of the previous Master Plan and remains as a recommendation.
  - o There is deterioration of piping in the tunnels.
  - o Corrosion on the scum piping.
  - o Corrosion in gray blend tank influent piping.
  - o Paint is peeling off on the Sludge Thickener Pumps (specifically noted on pump 1100).
  - o Corrosion on Thickened Sludge Pumps.
  - o Corrosion on thickened sludge piping at tunnel wall into Digester Room. Corrosion on couplings of thickened sludge piping and corrosion on scum piping at hangers.
- Architectural/Structural
  - o The structural concrete of the thickener tanks appears to be in good condition, but there is minor pitting on the concrete walls and some concrete deterioration, some at the overflow weirs.
  - o Exterior concrete walls of thickener tanks have some exposed aggregate and staining.
  - o Visible corrosion/pitting on the supports for the odor control blowers.
  - o Thickener domes are original but appear to be in good condition. There is some pitting on the side hatch of the domes.

Landing on Thickener #2 Sways

Tunnel Floors



Exterior South End of Tunnel

Interior South End of Tunnel

- o The stair and landing on Thickener No. 2 sways and is not properly secured to the structure. This is potentially a safety concern.
- o The tunnel floors are completely wet with condensation. This poses a safety hazard for slipping.
- o The South end of the tunnel at the Digester Building has severe water damage due to a failing expansion joint system. This expansion joint location is at a low point on the site and high concentrations of rain and ground water accumulate over this location.
- o The roofing and scupper is failing thus causing severe water damage to the CMU and brick veneer on the Exit Stair Tower.
- o Access door is in poor condition.


Interior CMU on Exit Stair Tower


Brick Veneer on Exit Stair Tower

- Mechanical
  - o Blowers (motors and fans) have been replaced on both thickeners in last two years (2014).
- Electrical
  - o Significant corrosion of conduits at the platforms.
  - o Conduits in the tunnel at the wall penetration to the Digester Building are failing due to corrosion.


Electrical Conduits in Tunnel


Electrical Conduits at Platform

2.4.20.3 RECOMMENDATIONS

- Process
  - o Replace the thickener mechanisms.
- Architectural/Structural
  - o Restore interior and exterior concrete surfaces of the thickener tanks with gunite or epoxy grout.
  - o Repair stairs and landing at Thickener No. 2.
  - o Remove the ground cover required to replace any damaged waterproofing membrane and the entire expansion joint system. Recommend installing a drainage system to divert water away from this low spot on the site.
  - o At the Exit Stair Tower, replace a large portion of the brick veneer on the east side of this structure as well as tuck-pointing other portions of the brick veneer and interior CMU wall.
  - o On exit stair tower replace the ballasted loose laid EPDM roof and install a new scupper/flashing system before any tuck-pointing work is done to eliminate this from reoccurring.
  - o Replace the single access door at the exit stair tower.

- Electrical
  - Replace conduit at Thickener platforms.
  - Repair drainage issues to stop water leaks into tunnel, and then replace failed conduits.
- Mechanical
  - Review NFPA 820 to see if the Odor Control is compliant with the current NFPA standards.

2.4.21 Digester (12)

2.4.21.1 OPERATION

The primary purpose of the anaerobic digestion system is to stabilize the wastewater sludge produced at the Water Reclamation Facility, making the sludge safe for disposal. The anaerobic digestion system is comprised of three (3) primary digesters and one (1) secondary digester. Each digester is 65 feet in diameter, has a side-water depth of 31 feet and an active volume of 0.77 million gallons. The total capacity of the primary digesters is 2.3 million gallons. The anaerobic digestion system consists of the following:

- Digester Mixing Equipment – Two of the primary digesters and the secondary digester are equipped with a draft tube mixing system that was installed as part of the original equipment design. One of the primary digesters uses a Rotamix Vortex mixing system that was installed in 2010.
- Digester Covers – Each primary digester is equipped with a floating steel cover. The secondary digester cover was replaced in 2015 with a fixed cover.
- Gas Storage Sphere – Gas produced from the anaerobic digesters is scrubbed to remove hydrogen sulfide and then transferred by two (2) gas compressors to the storage sphere. Each of the gas compressors has a capacity of 300 SCFM at 30 psig. The gas storage sphere has a volume of 69,456 ft^3 at 30 psi. Gas from the storage sphere is used as a fuel for the engine generator units and boiler, located in the Energy Recovery Unit.
- Digester Heating – The primary digestion system is heated using heat exchangers and waste heat generated by one (1) 844 kW engine generator and two (2) 445 kW engine generators used for energy recovery. The raw primary sludge is heated to approximately 98 deg. F before it enters the primary digesters. The heat exchangers have the ability to heat sludge at a rate of 2.0 million BTUs/hr. The engine generators are fueled by methane gas, which is produced form the digestion process.
- Sludge Recirculation Pumps – Sludge recirculation pumps are used to move the contents from within the digesters through the heat exchangers and back into the digesters. Heat is transferred to the sludge utilizing hot water from within the heat exchangers.
- Sludge Transfer Pumps – These pumps are used to transfer sludge between the digesters.

2.4.21.2 CONDITION

- Process
  - Digester covers are currently being replacing.
  - Digester mixers are also being replaced.
  - Converting secondary digester to a primary digester as part of current upgrades.

- Modifying how sludge is transferred
- Three (3) new Alfa-Laval Spiral Heat Exchangers have recently been installed.
- Piping has been repainted on heat exchangers.
- New Kinetrol actuators have been installed on sludge piping to heat exchangers.
- New sludge piping is being installed that is glass-lined.

- Architectural/Structural
  - The structure seems to be in good condition overall.
  - The brick veneer is in good condition with no signs of settling.
  - Rain water pools in front of doors causing the stoops and concrete to crack and settle.
  - There is water damage to brick veneer system. A tuck-pointing project is under way on this building. This roof is currently scheduled to have a new roof system installed throughout this structure.
  - The exterior access doors are old and in poor condition.

Water Damage to Brick Veneer

- Mechanical
  - A significant portion of the HVAC equipment was replaced in 2014.
  - Piping in the basement is being replaced as part of the current CIP.
- Electrical
  - NFPA 820 concerns with common door between electrical room and heat exchanger room.
  - Electrical equipment is manufactured by GE. Main switchgear is AV Line and MCC is 8000 Line.
  - Electrical is being upgraded.

2.4.21.3 RECOMMENDATIONS

- Architectural/Structural
  - Look at installing drain tile at east end of tunnel (west side of digester building). Intercept water to keep away from north and west sides of the digester building.
  - Flashing and roofing needs to be done to eliminate the source of water problems.
  - Replace the single exterior access door and three (3) sets of exterior double doors.
- Electrical
  - Review NFPA 820 and make appropriate corrections.

2.4.22 Energy Recovery (13)

2.4.22.1 OPERATION

The energy recovery system is designed to use digester gas to provide facility energy requirements to the maximum extend digester gas is available. Three biogas engine-generator units are provided to use the digester gas to generate electricity and provide process heating with gas engine heat recovery systems. Two, duel fuel, hot water boilers are also provided to use digester gas as a primary fuel in the winter months. Typically, the WRF utilizes the gas engine-generator units year-round and utilize the boiler units for back-up. When process and heating energy required exceeds that available from the digester gas produced, natural gas is used. The Energy Recovery System includes the following primary equipment:

Energy Recovery Building Roof

- Two (2) Caterpillar Model G399, 350 KW, biogas engine-generators.
- One (1) Jenbacker, 844 KW, biogas engine generator.
- Two (2) gas-fired hot water boilers.
- One (1) indirect-heating type, gas-fired, rooftop, make-up air unit.
- Five (5) hot water-type unit heaters.
- Two (2) roof exhaust fans.

2.4.22.2 CONDITION

- Mechanical
  - The boilers need to be replaced (1982 Fireman). Boilers are operated in the winter for heat.
- Architectural
  - The structure seems to be in good condition overall.
  - The brick veneer is in good condition with no signs of settling.
  - The roofing system is a fully adhered white EPDM single-ply membrane. The roof membrane has lost its reflective coating and is nearing its useful service life. The roof is currently scheduled to have a new TPO roof system installed.
  - Exterior doors are old and in poor condition.
- Electrical
  - The rooms have a common wall with the digester, which is an NFPA 820 compliance issue.
  - Generators are 4160V and paralleling switchgear is connected the 4160V site distribution loop.
  - Electrical equipment is manufactured by GE. MCC is 8000 Line.

2.4.22.3 RECOMMENDATIONS

- Architectural/Structural
  - Replace the roof as scheduled in current CIP.
  - Replace the two (2) sets of exterior double doors and the one (1) single access door.
- Mechanical
  - Replace boilers.
  - Replace roof exhaust fans #3 and #4.
- Electrical
  - Review NFPA 820 and make appropriate corrections.

2.4.23 Solids Dewatering (14)

2.4.23.1 OPERATION

The solids dewatering facility was decommissioned several years ago and has been used strictly for storage. A new solids dewatering system is included in a future CIP project.

2.4.23.2 CONDITION

- General
  - o Items in this area will be addressed in an upcoming dewatering project.
- Architectural/Structural
  - o The structure seems to be in good condition overall with a few small signs of settling.
  - o The brick veneer is in good condition with few signs of settling.
  - o The roof is the original built up roof (BUR) and needs to be replaced with the upcoming dewatering project.
  - o Exterior doors are weathered and in poor condition.
- Mechanical
  - o Evaluate odor control with the upcoming project. The original odor control fan was removed.
  - o The HVAC old coil needs to be upgraded as part of FOG/Dewatering project.
- Electrical
  - o Electrical equipment is manufactured by GE. Main switchgear is AV Line and MCC is 8000 Line.
  - o Main switchgear was damaged by water (roof leak).
  - o Electrical fed off of Digester Building

2.4.23.3 RECOMMENDATIONS

- General
  - o Identify what needs to be included in the future dewatering project for placement on the future CIP.
- Architectural/Structural
  - o Replace roof when building is renovated.
  - o Replace the five (5) single access doors.
- Electrical
  - o Replace main switchgear and MCC when building is renovated.

2.4.24 Engine Generator (15) and Utility Service Entrance

2.4.24.1 OPERATION

The WRF is fed by one medium voltage utility circuit through a step down transformer to 4160V for distribution throughout the plant. The WRF also has a 2000 KW diesel engine generator that is used for standby power.

Standby Generator

2.4.24.2 CONDITION

- General
  - o Muffler/exhaust is rusty.
  - o Rusting on the enclosure
  - o Rust discoloration of the concrete slab of enclosure
  - o Step to electrical room doors has no handrail or platform, unsafe condition.
- Civil
  - o Pavement surface needs to be resurfaced (some low spots)
  - o No settlement of the concrete driveway, but concrete looks worn.
  - o Open joints at concrete approach pavement and bituminous pavement.
- Electrical
  - o The generator room was extremely hot when inspected.
  - o The paralleling switchgear feeds a pad mounted sectionalizing gear, which divides the power delivery into two circuits to the Control Building.

2.4.24.3 RECOMMENDATIONS

- Civil
  - o Replace/repair pavement as part of Civil/Sitework improvements project.
- Electrical
  - o EPA emissions requirements will require significant exhaust treatment or even engine replacement to run the generator if the utility service is still available.
  - o The facility staff indicated that service reliability could be improved if a utility bypass circuit was installed that would bypass the generator and associated paralleling switchgear.

2.4.25 Dumping Station (16)

2.4.25.1 OPERATION

The dumping station is used for emptying sewage Vactor trucks that have been used to clean sewers. It has also been used for dumping of septage trucks. The future plan is to decommission the dumping station at the WRF and have all Vactor trucks and septage trucks dump at the Equalization Basin.

Septage Dumping Station

2.4.25.2 CONDITION

- Architectural/Structural
  - o The structure appears to be in good condition.
  - o The concrete is moderately deteriorating at the face of the dumping area.

Concrete at Face of Dumping Area

2.4.25.3 RECOMMENDATIONS

- Continue to provide maintenance as required.
- Remove the electrical conduit and wiring, as it is no longer used.

2.4.26 Equipment Storage (17)


Exterior of Equipment Storage Building

2.4.26.1 OPERATION

The equipment storage building is used to store maintenance vehicles, sewer Vactor trucks, and other maintenance equipment for the collection system department. There is also an office area in the northwest corner of the building.

2.4.26.2 CONDITION

- Architectural/structural
  - The metal building is in good condition and all overhead doors are operational.
  - The roofing is the original metal roof installed in 1995 and is in good condition for being 20 years old.
  - The office area in this building will be expanded to the west to take up the entire north bay of the building.
- Mechanical
  - HVAC has old tube heaters that have soot buildup when running.


Interior of Equipment Storage Building

2.4.26.3 RECOMMENDATIONS

- Architectural/Structural
  - Add larger office area in southwestern corner of building.
  - Add restrooms and locker room facilities.
  - New roof should put into the CIP for replacement in the next five years.
- Mechanical
  - Update HVAC system, including a new HVAC system for proposed expanded office area.

2.4.27 Lime Feed System (18D)

2.4.27.1 OPERATION

Lime is fed to the activated sludge system at Splitter Manhole No. 1 to provide alkalinity for nitrification. A new lime feed system was installed in 2013 and consists of the following:

- Package hydrated lime storage/feed system with foundation.
- Electrical and instrumentation wiring and connections from existing buildings to package hydrated lime system.
- Water piping and connections from existing facility and existing non-potable piping to the hydrated lime system.
- Lime slurry and waste piping between the hydrated lime system and Splitter Manhole No. 1.

2.4.27.2 CONDITION

- General
  - The lime feed system is new within the last three years and in good condition. The only complaint is that it is dusty, which is typical for lime systems.

2.4.27.3 RECOMMENDATIONS

- None.

2.4.28 Control Building (18)

2.4.28.1 OPERATION

The activated sludge process provides further reduction of the organic strength of the waste and provides for the conversion of ammonia nitrogen to nitrate nitrogen through oxidation. The activated sludge system includes the aeration basins, blowers, diffuser system, control building, RAS pumping, and final clarifiers. The Control Building houses the blowers, blower piping, and controls for the activated sludge process. The following activated sludge process equipment is located in Control Building:

Blower #4

- Four (4) multi-stage centrifugal blowers located in the Control Building (Tag #s 18BLO001, 18BLO002, 18BLO003, and 18BLO004). Each blower is driven by an 800 HP, 4160 volt motor with capacity of 15,520 SCFM at 6.8 psi. The blowers are used to provide oxygen to the aeration basins through the coarse bubble diffusers. Under normal daily flows only one blower is operating. They use a second blower approximately 5 months out of the year.

2.4.28.2 CONDITION

- Civil
    - Grading in the northwest area of the Control Building allows water to come into the blower room through the overhead door and flood the floor.
- Process
    - Blowers use a large amount of energy. The Master Plan will propose a new type to reduce power.
    - Blower piping insulation looks good, but has some tears.
    - Cracking around the expansion connection on the blower discharge piping.

Overhead Door on Northwest Side of Control Building

- Architectural/structural
    - Structurally the building is in good condition.
    - The exterior sealant and backer rod is significantly deteriorating.
    - The roof is the original built-up roof.
    - The exterior access doors are weathered and in poor condition.
- Mechanical
    - HVAC system is original and several pieces of the HVAC equipment are due for replacement.
- Electrical
    - The Control Building’s 5kV Main-Tie-Main (MTM) switchgear feeds the Plant with two 5kV loops and provides power to the blowers. Each loop consists of pad mounted sectionalizer switches and pad mounted step down transforms to feed the facilities at

480V. A replacement project for the south loop (cables, switches, transformers) is almost complete. The replacement project for the north loop is being planned.

  - o The observed conditions of the original pad mounted switches and transformers show significant outdoor/weather deterioration of the enclosures. It is recommended to continue with the replacement plans, so that the project is completed in the next few years.
  - o There is a power factor correction capacitor on each blower and on the main bus.
  - o Main 5kV switchgear is fused switch GE Limitamp. Blowers have autotransformer starters. Loop fused switches and bus capacitors have contactors with remote control switches in the control room.
  - o Electrical equipment is manufactured by GE. MCC is 7700 Line.
  - o Pad mounted transformers have significant corrosion.
  - o Arc flash evaluation was conducted with good results.

2.4.28.3 RECOMMENDATIONS

- Civil/Site
  - o Re-grade northwest side of building to reduce ponding and water in the blower room – possibly install and intake and tie into a storm drain line.
- Process
  - o Replace blower with more efficient blowers.
  - o Look at aeration headers, control valves and repair, repaint or replace as necessary.
- Architectural/Structural
  - o Remodel building to update and make more efficient use of space.
  - o Tuck-point brick as necessary.
  - o Replace all exterior masonry sealant and backer rod.
  - o Replace the two (2) single access doors.
- Mechanical
  - o Replace/upgrade the entire HVAC system.
- Electrical
  - o The two switchgear south loop circuits (cabling) are routed in the same conduit. Separation will improve reliability of the distribution loop.
  - o Provide updated control system for automated and efficient control of the blowers and aeration system.
  - o Check if Xcel Energy would give a credit for changing to blowers that are more efficient.
  - o Review switchgear location and possible hazard with garage door access, possibly relocate.
  - o Look at changing blower voltage from 4160 Volt to 480Volt.
  - o The main 5kV GE Limit amp switchgear is nearing the end of it useful life. Budgeting for replacement should be considered.

2.4.29 Splitter Manhole #1 (18A)

Splitter Manhole #1

2.4.29.1 OPERATION

Trickling filter effluent is pumped by the transfer pumps in the Process Pumping Building to the western half of Splitter Manhole #1 and return activated sludge (RAS) is pumped to the eastern half of Splitter Manhole #1. Splitter Manhole No. 1 provides for equal distribution of wastewater flow and RAS to the aeration basins. Lime is also added to the wastewater in Splitter Manhole #1. Splitter Manhole #1 includes the following:

- Concrete structure with overall dimensions of 32'-6" x 18'-0" x 11'-0" high. Two center influent wells, one for RAS and one for trickling filter effluent, which are 6'- 0" x 14'-9". Twelve (12) effluent boxes, which are 4'-0"x 4'-3" with a weir, wall height of 7'-6".
- Six (6) fabricated aluminum, 36" x 48", downward opening slide gates for control of wastewater flow to the aeration basins (Tag #s 18VAL004, 18VAL005, 18VAL006, 18VAL010, 18VAL011, 18VAL012).
- Six (6) fabricated aluminum, 36" x 48", downward opening slide gates for control of RAS flow to the aeration basins (Tag #s 18VAL001, 18VAL002, 18VAL003, 18VAL007, 18VAL008, 18VAL009).
- Aluminum grating, hand railing, and ladder.

2.4.29.2 CONDITION

- Process
  - o Coating on gate operator handwheels is cracking.
  - o Very little corrosion on the gate guides above grating.
- Architectural/Structural
  - o The walls have minor cracking.

2.4.29.3 RECOMMENDATIONS

- Process
  - o Evaluate raising the concrete walls, as it is critical hydraulically. Water splashes out of the structure at or above a flow of 35 MGD. This would require modifications or replacement of the slide gates, grading, and lime feed piping.

2.4.30 Manhole #1 (18B)

Manhole #1

2.4.30.1 OPERATION

Manhole #1 collects effluent from the aeration basins and directs it to the final clarifier splitter box (Splitter Structure #2). Manhole #1 includes the following:

- Concrete structure with inside dimensions of 5'-0" x 10'-0" x 13'-9" high.
- Aluminum grating.

2.4.30.2 CONDITION

- Architectural/structural

- o Concrete appears to be in good condition.
- o Aluminum grating appears to be structurally sound, but has mineral (calcium) buildup on the surface.

2.4.30.3 RECOMMENDATIONS

- Process
  - o Evaluate raising the concrete walls, as it is critical for getting water through plant. Water splashes out at or above a flow of 35 MGD.

2.4.31 Aeration Basins (18C)

2.4.31.1 OPERATION

The activated sludge aeration basins are where oxygen is added to the wastewater and mixing of the wastewater with return activated sludge occurs. The aeration basins consist of the following:

- Six (6) aeration basins. Each basin is 283'-10" x 43'-4" with a maximum side-water depth of 15 ft. The total volume of the aeration basins is approximately 8.2 million gallons.
- Stainless steel headers and coarse bubble diffusers are mounted in each aeration basin. The air stream from the diffusers provides oxygen to the microorganisms and also provides for mixing of the contents within each basin. The diffusers have a dirty water transfer efficiency of 4-5%, which provides an oxygen transfer rate of 1,925 to 2,400 lbs/hr.


Aeration Header Piping

CONDITION

- Process
  - o There is some corrosion on the air header piping and leaking is occurring at the couplings.
  - o There is visible corrosion on the influent piping and valves.
  - o The Sanitaire Coarse Bubble Diffusers appear to be in good condition.
  - o In general, aeration basin inlet valves are in good condition.
  - o The aeration basin air piping has leaks and the valve actuators need to be replaced.
  - o The system has difficulty getting adequate air flow to the end of the aeration basin.
  - o The basins cannot be drained completely without using a sump pump.


Aeration Basin #4A

- Architectural/structural
  - o Aeration Basins No. 4 and No. 5 were out of service at the time of the condition assessment walkthrough. Some cracking of concrete on the floor of Aeration Basin No. 4 was visible. Lifting of the concrete and spalling was noticeable on the floor of Cell C of Aeration Basin No. 4. There are hairline cracks on the interior walls of all the basins.


Aeration Basin#4A Influent Piping

- Electrical
  - o A mixture of conduit material has been used; PVC, PVC coated RGS and aluminum. The PVC conduit is expanding and contracting with the weather so it is not straight.
  - o There is corrosion on the electrical junction boxes and support systems around the aeration basins.

Electrical Junction Box at Aeration Basin #4A

2.4.31.2 RECOMMENDATIONS

- Process
  - o Evaluate updating the aeration system with fine bubble aeration.
  - o Replace the valve actuators
  - o Look at sloping the bottom of the basins or putting in a center channel for better draining.
- Architectural/structural
  - o Repair the cracked surface concrete on aeration basins.
  - o Repair the concrete on the floors of the basins that is cracking and spalling.
- Electrical
  - o Replace the electrical junction boxes, support systems and PVC conduit.

2.4.32 RAS Building (19)

RAS Pumps #1, #2, #3, #4, & #5

2.4.32.1 OPERATION

The RAS Building houses both the return activated sludge (RAS) pumps and the waste activated sludge (WAS) pumps. The major equipment in the RAS pumping building includes the following:

- Five (5) Return Activated Sludge (RAS) Pumps (Tag # 19PUMR01, 19PUMR02, 19PUMR03, 19PUMR04, & 19PUMR05). The pumps are the original Allis Chalmers Vertical Centrifugal Pumps.
- One (1) 30-inch RAS Flow Meter (Tag #19FLM21) meters RAS flow back to Splitter Structure #1.
- Four (4) 16-inch RAS Flow Meters (Tag #s 19FLM20A, 19FLM20B, 19FLM20C, & 19FLM20D) meter RAS flow from the Final Clarifiers to the RAS wetwell.
- Two (2) Waste Activated Sludge (WAS) Pumps (Tag #s 19PUMW01 & 19PUMW02).
- One (1) WAS Flow Meter (Tag #19FLM022).

WAS Pumps #1 & #2

2.4.32.2 CONDITION

- Process
  - o All RAS and WAS pumps are original.
  - o Slight grinding/vibration was noted in RAS Pump No. 3 during the inspection.

- o Assess pump valves is poor.
- o New Valmatic Swing-Flex check valves have been recently been installed on all the RAS Pump Discharge piping.
- o The wetwell is a limiting factor and the hydraulics need to be evaluated for potential improvements.

- Architectural/structural
  - o The structure seems to be in good condition overall. However, the building shows signs of significant settling. Construction/excavation was underway on the east side of the building.
  - o The brick veneer is in good condition, but with few signs of settling.
  - o The roof is the original BUR roof. The roofing is near the end of its usable service life and is on the current CIP for replacement.
  - o The grating on the North side of the building is severely bent. This poses a safety hazard.

Grating on North Side of the RAS Building

  - o Along the north wall, there are moderate cracks in the interior face of the masonry. The types of masonry cracking are indicative of building settlement.
  - o The exterior sealant is severely deteriorating.
  - o Water intrusion into the drywell. Is occurring
  - o The building is settling on the exterior walls.
  - o The exterior door is weathered and in poor condition.

Interior Wall of the RAS Building

Exterior Wall Sealant of the RAS Building

- Mechanical
  - o The HVAC system is original and needs to be replaced
- Electrical
  - o Review NFPA 820 ratings for this building.
  - o The transformer enclosures are in poor condition, with paint peeling off over 90% of the entire enclosures.
  - o Electrical equipment is manufactured by GE.MCC is 7700 Line.
  - o Newer Allen-Bradley VFDs.
  - o New magnetic flow meters were installed on the RAS piping from the final clarifiers.

Electrical Transformers at the RAS Building

2.4.32.3 RECOMMENDATIONS

- Process
  - o Determine what needs to be done for future nutrient removal. Building will likely need to be expanded.
  - o Check wetwell capacity and hydraulics.
  - o Replace both the RAS and WAS pumps.
- Architectural/structural

- o Seal drywell to eliminate water intrusion.
  - o Mitigate settling of building.
  - o Replace roof within the next 5 years.
  - o Replace grating on north side of building.
  - o Replace sealant and backer rod throughout the building exterior. Tuck-point as necessary.
  - o Replace the one set of exterior double doors.
- Mechanical
  - o Replace exhaust, make-up air unit and heat recovery system.
  - o Replace electric make-up air unit with gas-fired unit.
- Electrical
  - o Expand electrical based on building expansion requirements for nutrient removal.

2.4.33 Final Clarifiers (20)

2.4.33.1 OPERATION

Final Clarifier #1

Four (4) Final Clarifiers are located after the Aeration Basins and provide for the settling and removal of activated sludge from the treated wastewater. Each Final Clarifier is 100-foot diameter with side-water depth of 14 feet. The Clarifiers are center-fed with peripheral weirs. The clarifiers remove solids from the bottom by means of "suction tubes" attached to the collector arms. Settled sludge is directed by V-type plow arrangement to the sludge suction tubes, which then flows by gravity to the center sight box. Adjustable slip tubes are provided to control the rate of flow. From the sightbox, the sludge is pumped by the Return Activated Sludge (RAS) pumps. The Final Clarifiers include the following equipment manufactured by Walker Process:

- Eurodrive variable speed drives, all but one (1) have been replaced with constant speed drives.
- Rotation speed is two (2) complete arm revolutions per hour
- ¼" ASTM A36 steel center column, drive cage, and truss arms
- Walkway bridge
- 20 gauge brass squeegees on 'V' plow type flights
- Over-torque protection provided by motor overloads, drive cut-out and Belleville spring load detection system.

Paint and Coating of the Final Clarifiers

Concrete Steps and Sidewalk to the Final Clarifiers

2.4.33.2 CONDITION

- Process
  - o Mechanisms are old, with corrosion on many of the

structural members, compromising the structural integrity of the mechanisms.
  - o Clarifiers have a shallow side-water depth, which provides less than optimal performance during normal and wet weather flows.
  - o The draft tube mechanisms do not provide optimal sludge withdrawal and suspension of the sludge blanket.
  - o The center well design is outdated. Strong density currents result, which leads to less than optimal performance.
  - o Inboard launders are hard to access to remove algae that grows in the launderers. Additionally, during high flows the City has had issues with solids going over the outside of the weirs.
  - o The Final Clarifiers have experienced problems with floating/rising sludge.
  - o Final Clarifiers are on the current CIP for replacement.


Parge/Skim Coating on the Clarifier Tanks

- Architectural/Structural
  - o The tank structures appear to be in good condition overall.
  - o The paint and coatings are in good condition for the age of the clarifiers.
  - o Some of the concrete steps and sidewalk show signs of significant settling.
  - o There is mild to moderate delamination of the parge/skim coating on the clarifier tanks.

2.4.33.3 RECOMMENDATIONS

- Process
  - o Perform hydraulic analysis to evaluate relocation of the launders and add baffles.
  - o Consider in-board weirs mounted off external walls.
  - o Provide stainless steel mechanism/components to minimize/eliminate corrosion.
  - o With mechanism replacement, install state of the art flocculation center wells.
  - o Replace the draft tube mechanisms with Towbro sludge removal mechanisms.
  - o Install weir covers to control algae.
- Architectural/Structural
  - o Recoat concrete and structural items within the next 5 years.
  - o Repair the damaged areas of the concrete walls and repaint the surfaces.

2.4.34 Splitter Manhole #2 (20A)

2.4.34.1 OPERATION

Splitter Manhole #2 receives effluent from the Aeration Basins And provides equal distribution of the flow to the four (4) Final Clarifiers. Splitter Manhole #2 includes the following:


Splitter Structure #2

- Concrete structure with overall inside dimensions of 17’-0” x 17’-0” x 13’-6” high. The center influent well which receives First Stage Trickling Filter effluent is 7’- 0” x 7’-0”. The structure includes four (4) effluent boxes, which are 4’-0”x 7’-0” with a weir wall height of 9’-6” that direct flow to each individual clarifier.

- Four (4) fabricated aluminum, 60” x 30”, downward opening slide gates for control of wastewater flow to the Final Clarifiers.
- Aluminum grating and hand railing.
- Aluminum ladder.

2.4.34.2 CONDITION
- Architectural/structural
  - Concrete appears to be in good condition.

2.4.34.3 RECOMMENDATIONS
- None.

2.4.35 Manhole #2 (20B)

2.4.35.1 OPERATION
Manhole #2 collects effluent from the Final Clarifiers and directs it to the Effluent Filter Units. Manhole #2 includes the following:
- Concrete structure with inside dimensions of 5’-0” x 10’-0” x 12’-2” high and 6” grout invert.
- Four (4) 30”Ø Slide Gates
- Aluminum grating and hand railing.
- Aluminum Ladder.


Manhole #2

2.4.35.2 CONDITION
- Architectural/structural
  - Concrete appears to be in good condition.

2.4.35.3 RECOMMENDATIONS
- None.

2.4.36 Filter Building (21)

2.4.36.1 OPERATION
Effluent from the Final Clarifiers flows to the Effluent Filter Unit for final polishing. Eight (8) gravity sand filters, 34 feet by 17 feet by 8 feet deep, further remove remaining pollutants in the water. Each filter consists of a 3’-0” layer of granular anthracite. The filters are periodically taken out of service and backwashed to remove accumulated solids. Backwashing is accomplished by three (3) 125 Hp vertical turbine pumps, each with a capacity of 6,500 gpm at 53 ft. TDH. Solids removed from the filters during backwashing are routed to the backwash storage tank. Backwash wastewater from the storage tank is pumped by the in-plant waste pumps to the influent of the final clarifiers or the influent or the aeration basins.


Effluent Filter Room

2.4.36.2 CONDITION
- Process

- o The filter media and equipment were replaced in 2011 and are in good condition.
  - o Valve actuators were not replaced with the filter upgrades in 2011. Need to assess actuators for replacement.
  - o The elevation of the filter bypass weir restricts the amount of flow to the filters.
- Architectural/structural
  - o The structure seems to be in good condition overall with a few small signs of settling.
  - o The brick veneer is in good condition with few signs of settling.
  - o The masonry grout on the exterior concrete wall on the south side of the building is deteriorating.
  - o There is moderate cracking on the inside face of the southwest wall of the building.


South Side Exterior Concrete Wall


Interior Southwest Wall


Window in Filter Building


Lower Pipe Gallery

  - o The exterior sealant is significantly deteriorating.
  - o Paint is deteriorating due to condensation and water intrusion around windows.
  - o The wall paint finish in the lower pipe gallery is deteriorating and peeling.
  - o The roof was replaced in 2011 and is in good condition.
  - o Exterior doors are weathered and in poor condition.
- Mechanical
  - o The HVAC system for the Filter Building was replaced in 2011 and is in good condition.
- Electrical
  - o Electrical equipment is manufactured by GE. MCC is 7700 Line.
  - o Building humidity has caused surface rusting of the electrical equipment.
  - o Newer Allen-Bradley and Schneider VFDs have been installed.

2.4.36.3 RECOMMENDATIONS

- Process
  - o Adjust bypass weirs.
  - o Replace valve actuators.
- Architectural/Structural
  - o Repair the masonry damage and grout on the south side of the building.
  - o Repair cracks (inside and outside) on the southwest wall to eliminate water intrusion.
  - o Replace the control joint sealant and backer rod throughout the building exterior. Tuck-point as necessary where water has damaged brick and CMU.
  - o Replace sealant and backer rod on all windows to eliminate future damage.
  - o Repaint the walls in the lower pipe gallery in the next 5 years.

- Replace the one (1) single exterior access door and the one (1) set of double exterior doors.
- Electrical
  - Update electrical conduit and wiring.

2.4.37 Chemical Feed Building (22)

Sodium Hypochlorite Feed Pumps and Storage Tanks

2.4.37.1 OPERATION

The chemical feed building houses the sodium hypochlorite storage and feed equipment as well as the sodium bisulfite storage and feed equipment. Sodium hypochlorite is fed for disinfection of the wastewater effluent. Sodium hypochlorite can be fed at three locations, including the filter influent, filter effluent/backwash clearwell, and at the rapid mix basin that precedes the chlorine contact basin. Sodium bisulfite is fed for dechlorination of the wastewater effluent at the discharge end of the chlorine contact basin. The equipment in the Chemical Feed Building includes the following:

- Three (3) 10’-0”Ø x 11’-8” high fiberglass sodium hypochlorite storage tanks, each with a volume of 6,279 gallons.
- One (1) 10’-0”Ø x 10’-0” high fiberglass sodium bisulfite storage tank with a volume of 5,095 gallons.
- Two (2) sodium hypochlorite feed skids, each with two (2) Watson-Marlow Peristaltic pumps. Each pump has a capacity of 252 GPH at 60 psi.
- One (1) sodium bisulfite feed skid with two (2) Watson-Marlow Peristaltic pumps. Each pump has a capacity of 156 GPH at 60 psi.
- Two (2) IWAKI, 1 HP, Magnetic Drive Pumps for transferring sodium hypochlorite between storage tanks.

2.4.37.2 CONDITION

- Civil/Site
  - Concrete sidewalk around the building is settling away from building.
- Process
  - New chemical storage and feed equipment for chlorination and dechlorination were installed in 2013 and is in good condition.
- Architectural/structural
  - The structure seems to be in good condition overall with a few small signs of settling. The brick veneer is in good condition with few signs of settling.
  - The exterior stairs are deteriorating on the north side of the building. This deterioration does not require any immediate repairs at this time.
  - Exterior access doors are weathered and in poor condition.
- Mechanical
  - Building HVAC System was replaced in 2013 and is in good working condition.
- Electrical

- o Service pad mounted transformers have corrosion.
- o Electrical equipment is manufactured by GE. MCC is 7700 Line.
- o Had difficulty overriding the PLC to manually operate the chemical feed pumps under local control.

2.4.37.3 RECOMMENDATIONS

- Civil/Site
  - o Replace Sidewalks
- Architectural/structural
  - o Rehabilitate exterior stairs.
  - o Replace the one (1) set of exterior double doors and the three (3) single access doors.

2.4.38 Chlorine Contact Basin (23)

2.4.38.1 OPERATION

Filtered water flows to the Chlorine Contact Basin where sodium hypochlorite is added for disinfection. Residual chlorine in the wastewater is removed by sodium bisulfite. The chlorine contact basins include the following major components:

Chlorine Contact Basins

- Two (2) concrete chlorine contact basins, each basin has a volume of 18,900 ft^3.
- One (1) 15 HP flash mixer located in the rapid mix basin (Tag #23MIX001).
- One (1) Parshall flume with 4 foot throat width.
- Two (2) 48" x 48" downward opening slide gates for isolation of influent flow to each Chorine Contact Basin (Tag #s 22VAL070 and 22VAL071).
- Two (2) 48"x48" slide gates for isolation of the chlorine contact basins at the effluent end (Tag #s 22VAL072 and 22VAL073).
- Aluminum hand railing around perimeter of basin.
- Polypropylene tank covers. Three (3) sections installed in 2013.
- Two (2) Fiberglass walkways with solid surface grating and ladders also installed in 2013.
- Two (2) Endress+Hauser Chlorine Residual Analyzers (AE/AIT-726A & AE/AIT-726B) near contact basin influent.
- One (1) Effluent Chlorine Residual Analyzer.

2.4.38.2 CONDITION

- Architectural/structural
  - o Concrete of contact basins are in good condition.

2.4.38.3 RECOMMENDATIONS

- Process
  - o Add additional chlorine contact chamber for added volume and detention time for future capacity.

- Change flow monitoring from the Parshall flume to partial flow mag meter or full flow mag meter to be located between the chlorine contact basin and Manhole #3.

2.4.39 Manhole #3 (23A)

2.4.39.1 OPERATION

Manhole #3 directs effluent from the chlorine contact basin to the Cascade Aerator. Manhole #3 includes the following:

- Concrete structure with inside dimensions of 6'-0" x 6'-0" x 10'-6" high and 6" grout invert.
- Aluminum grating.

Manhole #3

2.4.39.2 CONDITION

- Architectural/structural
  - Concrete appears to be in good condition.
  - Aluminum grating appears to be in good condition.

2.4.39.3 RECOMMENDATIONS

- None.

2.4.40 Cascade Aerator (23B)

South Half of Cascade Aerator

2.4.40.1 OPERATION

The Cascade Aeration Unit increases the dissolved oxygen in the water before final discharge to the Big Sioux River. The Cascade Aeration Unit includes the following equipment:

- Two (2) 48" x 48" sluice gates for isolation of influent flow to each half of the cascade aerator (Tag #s 23VAL080 and 23VAL081).
- Two (2) 48" x 36" sluice gates for isolation of each half of the cascade aerator at the effluent end (Tag #s 23VAL082 and 23VAL083).
- Aeration header piping and aeration diffusers.
- Air valves for isolation of each diffuser lateral (Tag #s 23VAL800, 23VAL801, 23VAL802, & 23VAL803).

2.4.40.2 CONDITION

- Cascade aerator is in good condition.

2.4.40.3 RECOMMENDATIONS

- None.

2.4.41 In-plant Pumping (24)

2.4.41.1 OPERATION

The In-Plant Pumping Building includes both the Non-Potable Water (NPW) Pumps and the In-Plant Waste Pumps. The NPW pumps are located on the intermediate level of the

Non-Potable Water Pumps #2, #3, & #4

In-Plant Waste Pumping Building and the In-Plant Waste Pumps are located on the lower level of the building.


In-Plant Waste Pumps #1, #2, & #3

Non-potable Water (NPW): NPW is used at the liquid waste hauler dump station, which has a spray bar in the lower chamber that operates after each dump. During winter months, a fire hose runs continuously to prevent freezing. In the past NPW was used for the chlorination and dechlorination systems, and is still used for dechlorination. Therefore, from mid April through October 1st water is used for dechlorination makeup solutions. In winter months, NPW is used to fill the three aeration basins, which are not in use. NPW is added continuously to the aeration basins through 2" connections to the NPW hydrants. In addition, NPW is used for wash down of any units that are taken out of service. The NPW system consists of the following.


NPW Strainer

- Three (3) centrifugal pumps, each with a stated design capacity of 400 gpm at 175 ft. TDH. Each pump has a constant speed 40 hp motor (Tag #s 24PUMP02, 24PUMP03, & 24PUMP04).
- Two (2) 6" Strainers (Tag #s 24STR001 and 24STR002).
- One (1) 10" Plant Water Flow Meter (Tag #24FLM038)

In-Plant Waste Pumps: The In-Plant Waste Pumps are used to pump backwash water from the backwash storage basin to the influent of the final clarifiers or the influent or the aeration basins. Operation of the in-plant waste pumps is directly related to the effluent filters. The in-plant waste pumps were designed to return the volume of backwash wastewater from the backwashing of 6 filters over a period of 5.4 hours in the evening or 516,000 gallons. The In-Plant Waste Pumping System includes the following:

- The In-Plant Waste Pumps consist of three (3) 25 hp, non-clog constant speed, centrifugal pumps that are each rated for 840 gpm at 60 ft. TDH (Tag #s 24PUMW01, 24PUMW02, and 24PUMW03).
- One (1) 10" In Plant Waste Flow Meter (Tag #24FLM037).

2.4.41.2 CONDITION

- Process
  - The Non-Potable Water Pumps and the In-Plant Waste Pumps are original and replacement should be considered.
  - In-Plant Waste Pumps appear to use an excessive amount of seal water.
  - Corrosion is very visible on the In-Plant Waste Pumps.
  - There is no hydro pneumatic tank on the NPW system or VFDs to adjust pump speed to meet NPW demands. To avoid frequent on-off cycling, plant staff attempts to make sure


In-plant Pumping Building Interior Wall


Sealant on Exterior Wall

water is in use year round at an appropriate rate.
    - NPW strainers are original and replacement should be considered.
    - Water intrusion is occurring through link seals in the In-Plant Waste Pumping drywell (Lower Level). There is staining on the concrete walls as a result of the leaking seals.

Crack in Exterior Wall

- Architectural/structural
    - The structure seems to be in good condition overall with a few small signs of settling.
    - The brick veneer is in good condition with few signs of settling.
    - The roof is the original BUR Roof and it is at the end of its usable service life.
    - The drywell is leaking through the gap between the floor and the walls. While this poses no immediate structural problems, there is the concern of a constant thin layer of water on the floor for safety reasons.
    - The exterior sealant is severely deteriorated.
      There is a moderate crack on the exterior face of the SW corner of the building.
    - The exterior double door is old, weathered and in poor condition.
- Mechanical
    - The HVAC system is original.
    - The utilities and plumbing are original.
- Electrical
    - Electrical equipment is manufactured by GE. MCC is 7700 Line.

2.4.41.3 RECOMMENDATIONS

- Process
    - Installation of a constant pressure non-potable water pumping system with variable frequency drives is recommended.
    - Add VFDs to the In-Plant Waste Pumps.
    - Evaluate replacement of the Non-Potable Water Pumps and the In-Plant Waste pumps.
    - Replace and update the strainers on the NPW system.
    - Repair or replace link seals around piping that exits building.
- Architectural/structural
    - Replace the roof as it is at the end of its useful life.
    - Replace sealant and backer rod throughout the building exterior. Tuck-point as necessary where water has damaged brick and CMU.
    - Repair the crack and brick on the exterior face of the SW corner of the building as necessary.
    - Replace the one (1) set of exterior double doors.
- Mechanical
    - Replace exhaust, make-up air unit and heat recovery system.
    - Replace electric make-up air unit with gas-fired unit.

West Equalization Basin

2.4.42 EQ Basins –Chambers and Cliff (32)

2.4.42.1 OPERATION

The primary purpose of the flow equalization basin is to store excess flows during periods of high infiltration/inflow and reduce the peak flows going to the Water Reclamation Facility to a manageable level. Recently the flow equalization basin has provided a location for high strength industrial waste, septage and Vactors to be discharged. The Equalization Basins include the following major components:

Grit Cyclones and Grit Washer at the EQ Basins

- One (1) 110' Ø clarifier with side-water depth of 9 feet. The Clarifier includes a bridge walkway, sludge draw-off line, sludge collection mechanism, and influent feed well that limits the maximum flow velocity to 0.15 fps. The clarifier drive is 4 ½ HP.
- A concrete basin divided into two (2) cells. Cell 1 has a volume of 3.4 million gallons and Cell 2 has a capacity of 8 million gallons.
- A grit removal unit that includes one (1) Wemco Torque-Flow, Model C Grit pump, two (2) WEMCO grit cyclones, and one (1) grit classifier.

2.4.42.2 CONDITION

- General
  - Built in 1994
- Process
  - Center well of clarifier has rust and the influent pipe has corrosion.
  - Bypass pipe and valve have corrosion.
  - The City is currently making improvements to the dump station.
  - The City does have concerns about freezing in the dump station during the winter.
- Electrical
  - Electrical equipment is manufactured by GE. MCC is 8000 Line.
  - Bottom channel of MCC is corroding.
  - Everything is pretty dirty within the building.
  - Light fixtures use T12 lamps, which are obsolete.
  - Conduit supports on the basin are corroded.

Septage/Vactor Truck Dumping Pit at EQ Basins

2.4.42.3 RECOMMENDATIONS

- Process
  - Extend the building over the concrete dumping pits to prevent freezing during the winter or evaluate other means of preventing freezing or icing in the dump station during the winter.
  - Construct a non-potable water line across the River with the Outfall project for future use in running non-potable water from the WRF to the EQ Basins.
  - Consider the possibility of extending the raw water line from Great Bear Recreation area to the EQ Basins.
  - Sandblast and recoat piping, valves, and other metal surfaces that have corrosion.

- Electrical
  - o Replace the bottom channel of MCC.
  - o Update light fixtures.
  - o Replace conduit supports in basin.

2.4.43 Site Paving and Sidewalks

2.4.43.1 OPERATION

Concrete roads were constructed as part of the original facility to provide access by vehicles to the buildings throughout the WRF. The concrete roads on the north side of the plant the provide access to the Control Building, RAS building, Filter Building, Chemical Feed Building, In-Plant Waste Pumping Building, and Aeration Basins was constructed in 1984. The concrete roads on the south side of the plant that surround the Trickling Filters and provide access to the Grit Building, Primary Clarifiers, Gravity Thickeners, Digester and Energy Recovery Buildings, Sludge Dewatering Building, Process Pumping Building, and the Trickling Filter complex were constructed in 1986. The concrete access roads have a 20 feet pavement width including integral curb and gutter. There is approximately 260,000 square feet of concrete pavement throughout the WRF including parking areas along with approximately 18,000 lineal feet of curb and gutter.

Concrete sidewalks were also constructed as part of the original facility to provide walking access to the various buildings and structures at the WRF. Due to steep grade changes there are steps on the sidewalk south of the Filter Building, on the sidewalk from the Primary Clarifiers to the Digester Building, and on the sidewalk at Manhole No. 8 and Manhole No. 10 between the Trickling Filters. The existing sidewalks are generally 4 feet in width. There is approximately 36,000 square feet of concrete sidewalk throughout the WRF.

2.4.43.2 CONDITION

The concrete pavement is in poor condition. Patching has been done in several locations, however, the pavement has become worn and cracked, and is in need of replacement.

The concrete sidewalks have several areas where there is settlement, cracking, and both vertical and horizontal separation from adjacent structures. The narrow sidewalks make it difficult to clear snow using the City's UTV. Steps on the sidewalk also make it difficult to clear snow with the UTV.

2.4.43.3 RECOMMENDATIONS

- Removal and replacement of the concrete pavement through the WRF is recommended.
- Removal of existing concrete sidewalks and replacement with minimum 6 feet wide sidewalks were practical is recommended to allow better access for clearing snow with the City's UTV.
- Removal of the steps in the sidewalks by the Filter Building, from the Primary Clarifiers to the Digester Building, and at Manhole No. 8 and No. 10 is recommended. Re-grading and reconfiguring the sidewalks considered to allow removal of the steps.

3 PUMP STATION RECOMMENDATIONS

The following is a listing of the recommended improvements for the collection system lift stations that were reviewed as part of the condition assessment.

3.1.1 PS-203 Cherokee & "C" Operation

This lift station is outdated and has been identified as highest risk due to safety issues and access to the wetwell. The following are a list of recommended improvements to PS-203:

- Laser scan for as-built as there is no as-built documentation.
- Address potential new construction of hotels, restaurants, and their associated increased wastewater flows.
- Replace roofing.
- Construct a new dual wetwell and fill old wetwell to grade for electrical and generator equipment.
- Extend forcemains so both enter the lift station independently with a wye and control valve on each line to control discharge location.
- Sandblast and coat pump room and piping.
- Move the generator to the "Old Wetwell" location and renovate room.
- Construct pigging station for the dual forcemains.
- Change pumps to self-priming pumps.
- Provide access hatches over dual wetwell for Vactor truck cleaning.
- Extend suction lines through current wetwell to new wetwell.
- Install baffles or pre-rotation basin inserts to prevent vortexing.
- Replace electrical switchgear, motor control center, and VFDs.
- Provide new generator.
- Install seal-offs to isolate per code requirements.
- Provide new HVAC system for the pump room and electrical room.

3.1.2 PS-204 Modern Press – 806 N. West Avenue

The following are the recommended improvements to PS-204:

- Move the generator transfer switch outside and mounted on a pole.
- Construct new circuit breakers at upper (intermediate) level at a minimum with true lockable disconnects.
- Add Davit Crane bases on the top slabs for both the wetwell and drywell.

Combining Pump Stations 204, 205, and 206 was evaluated and it was determined that the cost to combine these three lift stations into one lift station would be significantly higher than upgrading the three lift stations separately. The approximate total project cost to construction gravity sewer from the three existing lift station to a location in the southeast corner of Burnside Park where a new lift station would be construction would be $8.0 Million; whereas the cost to upgrade each lift station in its current location would be $360,000.

Combining Pump Stations 204 and 206 only was evaluated as well and it was similarly determined that the cost to combine these two lift stations into one lift station would be significantly higher than upgrading the two lift stations individually. The approximate total project cost to construction gravity sewer from PS-204 to PS-206 and then replacing or upgrading PS-206 would be $5.8 Million. Whereas the cost to upgrade each lift station in its current location would be $360,000.

3.1.3 PS-205 -6th and Hawthorne

A ships ladder, which is unsafe, is used for access down to the drywell/pump room of the lift unsafe access. Installation of a safe access maintenance lift is recommended for safer access down to the drywell/pump room.

SCADA and Controls are either outdated or very limited in capability. Updates to the SCADA system and controls are recommended.

A permanent standby generator is not currently provide for emergency power outages and City maintenance staff are limit in the amount of time to respond to an outage before a sewer backup occurs. Installation of a permanent standby generator is recommended.

3.1.4 PS-206 Burnside

The following are the recommended improvements to PS-206:

- The structural condition of PS-206 is poor and the above-grade pump station structure is recommended to be completely rebuilt.
- A new supply and exhaust HVAC system is recommended for this station.
- A new generator is recommended.

3.1.5 PS-218 Tuthill Park – 3500 S. Blauvelt

The following are the recommended improvements to PS-218:

- Install removable floodgates at all the doors, as the flood elevation is 3 to 4 feet above the main floor elevation.
- Raise the curb around the wetwell opening to prevent water from entering the wetwell during flood events.
- Pump #4 has a slight rattle/tapping noise. Continue to monitoring pump for noise and repair.
- Modify the seal water system
    - Change operation of seal water so that the seal water runs to pumps at all times, even when pumps are not running.
    - Replace metallic seal water piping with PVC or FRP.
    - Add flow tubes to all seal water lines to monitor seal water flow rate.
- Close off doorway between the electrical room and the pump room with a masonry wall to isolate the electrical. Include window in masonry wall.
- Replace bus bars in the electrical MCCs.
- Install video monitoring cameras to allow the City to view the station from a remote location and determine if there is flooding at the station.

- Raise the odor control transformer if verified to be in the flood plain.
- Raise/rotate the gas regulator if verified to be in the flood plain.
- Provide additional ventilation in the electrical room when it is isolated from the pumping room.

3.1.6 PS-220 Rock Island

Short-term, immediate recommended improvements to PS-220 include:

- Both the pump suction piping and the forcemain piping are in poor condition due to leaking at the wall penetrations. Repair or removal and replacement of the pipe link seals is recommended.
- The drywell room is damp and installation of a dehumidifier is recommended.
- The unit heater in the drywell needs to be moved as water that is leaking through the wall is running onto the heater.
- Install a permanent standby generator.

Long-term recommended improvements to PS-220 include demolishing the entire existing station and converting it to a submersible pump type lift station to address flood elevation issues.

3.1.7 PS-224 – 50th Street N

Recommend installing dry-pit pumps (i.e. Flygt-N type) or recessed impeller pumps (Wemco) to address ragging issues.

3.1.8 PS-201, PS-213, and PS-221

These three lift stations were not reviewed, but do not have permanent standby generators. Installation of standby generators at these three lift stations is recommended.

3.1.9 All Lift Stations

A detailed review of the supervisor control and data acquisition (SCADA) equipment and system was not in the scope of the Master Planning Report. However, it was noted during review of the lift stations that the older lift stations have outdated SCADA equipment and upgrades are recommended.

Table 3.1 is a summary of the High Priority and Medium Priority Improvements and Estimate Project Cost.

Table 3.1 Pump Station Condition Assessment Recommendations

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-203 Cherokee & "C" Operation	General	No as-built of station	Laser scan for as-built drawings of lift station	$21,000
			Provide for future capacity of station.	Address hotels, restaurants, and increased flows.	$21,000
		Process	Maintenance accessibility	Extend forcemains so both tie together in station	$63,000
			Deterioration, rusting and corrosion.	Sandblast and coat pump room and piping.	$16,000
			Access for forcemain cleaning.	Provide pigging station for the dual forcemains.	$31,000
			Need for suction capability with potentially deeper wetwell.	Change pumps to self-priming type pumps.	$151,000
			Required for PS upgrades	Extend suction lines through current wetwell to new wetwell.	$63,000
			Scour grease and clean wetwell.	Provide baffles or pre-rotation basin inserts (Ogee style wetwell)	$21,000
		Structural/Architectural	Old and deteriorated.	Replace roof	$44,000
			Maintenance & reliability	Construct new dual wetwell and fill old wetwell to grade.	$176,000
			Access for Vactor truck for cleaning.	Provide access hatches over dual wetwell.	$21,000
		HVAC	Required for PS upgrades	New HVAC system for the pump room and electrical room.	$65,000
		Electrical	Required for PS upgrades	Provide new electrical switchgear, motor control center, and VFDs.	$151,000
			Required for PS upgrades	Provide new generator and move to "Old Wetwell" location.	$71,000
			Required for PS upgrades	Provide seal-offs to isolate per code requirements.	$11,000
High	PS-204 Modern Press - 806 N West Avenue	Process	Safe removal of pumps and equipment.	Add Davit crane base on top slab of both wetwell and drywell	$5,000
		Electrical	Currently below grade in unsafe location	New circuit breakers at upper (immediate) level with true lockable disconnects	$31,000
			Currently below grade in unsafe location	Move generator transfer switch outside on pole.	$21,000

Table 3.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-205 6th and Hawthorne	Architectural	Currently no safe access to the below grade pump room	Add Safe Access Maintenance Unit	$81,000
		Electrical	Currently have to use portable generator.	Provide Standby Generator with Self Contained Enclosure	$81,000
		Electrical	Controls are outdated.	Upgrade the Controls	$61,000
High	PS-206 Burnside	Structural/Architectural	Groundwater leaks into vault	Reseal mag meter vault	$31,000
			Deteriorated building	Replace above grade building	$112,000
		HVAC	Old and outdated	New supply and exhaust HVAC System	$41,000
		Electrical	Existing is older, salvage generator.	New generator and electrical upgrades	$121,000
High	PS-218 Tuthill Park - 3500 S. Blauvelt	Process	Rattling/tapping noise.	Monitor pump 4 for noise.	
			Assurance there is seal water.	Change operation of seal water to run to pumps at all times.	$21,000
			Corrosion on metallic piping	Replace seal water piping with PVC.	$21,000
			Monitor seal water flow.	Add flow tubes to seal water lines.	$29,000
		Structural/Architectural	Prevent flood water from entering building.	Install removable floodgates at the doors.	$36,000
			Prevent flood water from entering wetwell.	Raise curb around wetwell openings.	$21,000
				Construct new wall with a window to isolate electrical room.	$15,000
			Currently below flood elevation.	Raise odor control transformer	$11,000
		HVAC	Inadequate ventilation	Provide additional ventilation for HVAC System.	$31,000
		Electrical	Corrosion	Clean and coat or replace bus bars.	$151,000
				Install video monitoring cameras.	$31,000
			Currently below flood elevation.	Raise/rotate gas regulator.	$11,000

Table 3.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-220 Rock Island	Process	Leaking at wall of pipe penetrations.	Remove and replace link seal on suction and forcemain piping.	$15,000
		HVAC	Room is damp.	Install dehumidifier.	$10,000
			Water is dripping on heater in current location.	Move unit heater.	$20,000
		Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$80,000
High	All Lift Stations	SCADA & Controls	Some equipment and Software is outdated	Upgrade SCADA Equipment.	$275,000
				Total High Priority Recommended Lift Station Improvements	**$2,289,000**
Medium	PS-201	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-213	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-220 Rock Island	Process	Address flooding issues	Convert to submersible style station.	$914,000
	PS-221	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-224 - 50th Street N	Entire Station	Ragging problems	Replace pumps with Flygt-N or recessed impeller pumps	$151,000
				Total Medium Priority Recommended Lift Station Improvements	**$1,308,000**
				Total Combined High and Medium Priority Recommended Lift Station Improvements	**$3,597,000**

4 TREATMENT SYSTEM RECOMMENDATIONS

The following is a listing of High Priority (Immediate) and Medium Priority (5-10 Years) recommendations for the Water Reclamation Facility based on the condition assessment.

4.1 High Priority Recommendations

4.1.1 Maintenance Building (2)

The roof and HVAC system have exceeded their useful life, have become unreliable, and need to be replaced. There is also a missing rail on the ladder to the mezzanine and missing toe plates around the mezzanine with creates a safety concern. The missing rail and missing toe plates need to be replaced.

4.1.2 Grit Building (Headworks) (3)

Copper piping, which runs through the screenings room, is severely corroded. The copper piping needs to be replaced with PVC piping or FRP.

The roof and HVAC system of the older portion of the building have exceeded their useful life, have become unreliable, and need to be replaced.

There are several building defects that were noted, which affect the integrity of the building as well as create safety concerns. The following are recommended for addressing these defects:

- Repair the concrete around the railings of the stairway.
- Remove the concrete sidewalks, compact the soils and replace the sidewalks and stoops.
- Repair the concrete floor at the overhead door to screenings room.
- Repair the roof access ladder immediately for safety reasons. Repairs will have to be made to the brickwork surrounding this area to eliminate water intrusion.
- Repair damaged brick on the SE corner of the building.
- Replace the four (4) exterior single access doors in the older grit portion of the building due to age and weathered condition.

The electrical conduits, supports, and wiring on the interior and exterior of the older grit portion of the building needs to be replaced due to age, corrosion, and deterioration. Seal-offs need to be installed on the electrical conduits at the wall separating the old grit room from the screenings room to meet NFPA 820 requirements. This would allow the old grit room to be declassified.

The concrete in the aerated grit chambers were coated in 2001. However, the influent channels to the grit chambers were not coated and have severe corrosion on the concrete. The influent control gates also have signs of corrosion. The influent channel should be coated with a corrosion protective coating and the influent control gates should be replaced with stainless steel gates.

4.1.3 Sludge Pumping Building (4)

Electrical conduit and wiring is original and needs to be replaced to bring it up to current NFPA 820 codes. The fiber optic line needs to be extended to the Sludge Pumping Building to provide better monitoring and control of the sludge pumping equipment.

4.1.4 Primary Clarifiers (5)

The seals around the operable observation windows of the catwalks are worn resulting in corrosion on the interior walls of the catwalks. The entire window system should be replaced on the windows that are severely damaged. The weather stripping should be replaced on the remaining windows.

There is severe corrosion on the electrical boxes at the access platform to the clarifier walkway bridges and the lightning protection down-leads are missing or broken. All the conduit and associated electrical equipment between the Sludge Pumping Building and the access platforms of the Primary Clarifiers should be replaced. The lightning protection system should also be replaced.

4.1.5 First Stage Intermediate Clarifiers (7)

The electrical boxes on the walkways have severe corrosion. Replacement of these electrical boxes and conduit on the walkways is recommended.

4.1.6 Second Stage Intermediate Clarifiers (9)

Concrete has deteriorated around some of the guardrail posts and repair of the concrete is recommended. The electrical boxes on the walkways have severe corrosion. Replacement of these electrical boxes and conduit on the walkways is recommended.

4.1.7 Process Pumping Building (10)

There is corrosion on the electrical junction box near the entrance and replacement of the conduit and junction box is recommended.

There is leaking through the wetwell wall into the drywell and sealing the joints and repairing of the concrete is recommended to stop the leaking.

The humus piping and humus suction and discharge valves are thin from wear. Replacement of all the humus piping and valves with glass lined ductile iron is recommended.

4.1.8 Gravity Thickeners/Tunnels (11)

4.1.8.1 GRAVITY THICKENERS

The equipment in the gravity thickeners, including the sludge collectors, mechanism drives, weirs, and scum troughs are over 30 years old and have visible wear and corrosion. The interior concrete surfaces in the basins have pitting, cracking, and are deteriorated. There is also exposed aggregate and staining on the exterior concrete walls.

The mechanism drives should be replaced and a spare drive provided for emergency replacement. The metal surfaces of the sludge collection equipment including the center column, influent well, drive cage, arms, skimmer, cross collectors; weirs and scum trough should be replaced or sandblasted and recoated. Concrete surfaces of the gravity thickeners should be coated and restored to minimize further deterioration. The stairway and platform on Thickener No. 2 sways and is not properly secured to the structure. The stairway and platform should be secured. Sandblasting and recoating the supports for the odor control blowers is recommended due to visible corrosion and pitting on the supports.

There is significant corrosion on the conduits at the Gravity Thickener platforms and replacement of the conduit, supports, and wiring is recommended.

4.1.8.2 TUNNEL

The existing roof system and HVAC system for the Tunnel exit stair two is original, is in poor condition, and is not reliable. Replacing and upgrade of the roof system and HVAC system is recommended.

The south end of the tunnel at the Digester Building has severe water damage due to a failing expansion joint system. There is also severe water damage to the CMU and brick veneer on the exit stair tower. Removal of the ground cover and replacing any damaged waterproofing membrane and the entire expansion joint system is recommended. Installation of a drainage system to divert water away from the low spots is also recommended. Tuck-point portions of the brick veneer and interior CMU wall is needed where there is water damage.

The exterior single access door should be replaced due to age and weathered condition.

Process piping in the tunnels has severe corrosion and peeling paint due to moisture. Sandblasting and recoating the process piping in the tunnels is recommended.

Electrical conduits in the tunnel at the wall penetration to the Digester Building are failing due to moisture and corrosion and replacement of the failed conduits, supports, and wiring is recommended.

The thickened sludge pumps located in the west tunnel are worn, inefficient, and require a significant amount of maintenance. Replacement of the thickened sludge pumps is recommended.

4.1.9 Digester Building (12)

Several improvements have been made to the digester facilities and several other improvements are in the process of being made. These improvements include replacement of the roof and HVAC system, replacement of the digester covers, mixing and heating equipment, and relocation of some of the electrical equipment to a new building to meet NFPA 820 requirements. Electrical equipment no relocated as part of the current improvements should be relocated to fully meet the NFPA 820 requirements. Other improvements scheduled for the digester facilities include construction of fat, oil, and grease (FOG) receiving and feeding facilities.

There is water damage at the west door from the digester building to the tunnel. Installation of a drainage system is recommended and is addressed in the recommended tunnel improvements.

4.1.10 Energy Recovery Building (13)

Along with the digester facilities, several improvements have been made to the Energy Recovery Facilities and other improvements are already planned in the City's current capital improvements plan (CIP). These improvements include replacement of the roof and some of the HVAC equipment and replacement of the energy recovery equipment including changing out the engine generators to micro-turbines. Gas conditioning is also planned for improvements to the Energy Recovery Facilities.

There are however, some high priority improvements that are recommended for the Energy Recovery Building, which are not including in the City's current CIP. These improvements include:

- Replacing Exhaust Fans #3 and #4 and the supply fans, which are over 30 years old
- Replacing the boiler and boiler pumps, which are outdated
- Replacing the heat exchanger tubes

There are also issues with the operation, size, and function of the one (1) set of exterior double doors on the south side of the Energy Recovery Building. Replacement of this door with an electric operated rollup door is recommended. Replacement of the exterior single access door and second set of exterior double access doors is also recommended.

4.1.11 Solids Dewatering Building (14)

The Solids Dewatering Building was decommissioned several years ago and has been used strictly for storage. A new solids dewatering system is included in a future CIP project. The roof system and HVAC system of the solids dewatering building have reached there useful life and replacement is recommended with the future solids dewatering project. The electrical is also outdated and replacement is recommended with the future solids dewatering project.

The exterior single access doors to the building should also be replaced due to age and weathered condition.

4.1.12 Engine Generator and Utility Service Entrance (15)

Installation of a utility bypass circuit that would bypass the generator and associated paralleling switchgear is recommended to improve service reliability.

4.1.13 Equipment Storage Building (17)

The office area in the northwest part of the building is not large enough to support the number of staff that currently use the office area. Additionally, there are no restrooms, shower and locker rooms in the Equipment Storage Building, which creates and inconvenience for the staff that use the facility. Expansion of the office within the west side of the building along with construction of restrooms and locker room facilities is recommended.

The HVAC system is old and inefficient and will need to be replaced and updated to accommodate the additional office area, restrooms, showers, and locker rooms.

4.1.14 Control Building (18)

The existing HVAC system is over 30 years old, is inefficient and unreliable and needs to be replaced.

The exterior masonry joints of the building are deteriorated and replacement of the backer rod and joint sealant in the control joints is recommended. Tuck-pointing of the exterior masonry is also recommended.

The age and location of the switchgear in the blower room is a potential hazard. Replacement and relocation of the switchgear, possibly to the old lime feed room is recommended. Replacement of the switchgear should be done in combination with replacement of the aeration blowers. These improvements are included as part of the Phase I Improvements to the WRF.

The blower and controls for the aeration system are old, outdated and inefficient, using a large amount of energy when operating. Replacement of the blowers with high efficiency blowers is recommended. Replacement of the blowers should be done in combination with replacement of the diffusers in the aeration basins. These improvements are also included as part of the Phase I Improvements to the WRF.

Water ponds in the northwest area of the building and runs into the blower room through the overhead door. Grading the northwest side of the building so water flows away from the building and constructing an intake and storm sewer to carry the water south and east to the existing storm sewer is recommended.

4.1.15 Aeration Basin (18C)

The existing aeration valves and actuators are old and difficult to operate and maintain. Air also leaks out of the air header piping at the mechanical couplings. Replacement of the valves and actuators is recommended along with replacement of the couplings and gaskets on the air header piping as part of the Phase I Improvements to the WRF.

The electrical PVC conduit around the aeration basins has expanded and contracted due to weather and there is visible corrosion on the electrical junction boxes and supports. Replace of all the electrical conduit, junction boxes, and supports is recommended.

The air diffusers are an older inefficient coarse bubble system. Replacement with a fine bubble diffuser system is recommended. Replacement of the air diffuser system will need to be done in combination with the aeration blowers as part of the Phase I Improvements to the WRF.

4.1.16 RAS Building (19)

The existing roof system and HVAC system for the RAS Building are original, in poor condition, and are not reliable. Replacing and upgrade of the roof system and HVAC system is recommended.

The electrical conduit supports, and wiring on the interior of the RAS Building need to be replaced due to age, corrosion, and deterioration. The electrical transformers located on the east side of the building are in poor condition and also need to be replaced along with the associated conduit and wiring.

4.1.17 Filter Building (21)

There is surface rusting of electrical equipment, conduits, and wiring due to building humidity. The electrical equipment, conduits, and wiring should be replaced.

The actuators for the filter function valves are old and outdated and were not replaced with the filter upgrades completed in 2012. These valve actuators should be replaced.

The elevation of the bypass weir limits the amount of flow that goes to the filters. The bypass weir should be adjusted to allow more flow to be directed through the filters during high flows.

4.1.18 Chemical Feed Building (22)

The electrical transformer is in poor condition with corrosion on the enclosure. Replacement of the transformer and associated electrical conduit and wiring is recommended.

4.1.19 In-Plant Pumping (24)

The existing roof system and HVAC system for the In-Plant Pumping Building are original, in poor condition, and are not reliable. Replacing and upgrading of the roof system and HVAC system is recommended.

There is old and outdated electrical equipment, conduits and conduit supports that are in poor condition and need to be replaced.

4.1.20 Equalization Basins (32)

Several high priority improvements are planned for the Equalization Basins under the current CIP. These improvements include:

- Automation of the screening, wash water, grit removal, and grit conveying.
- Providing manifests.
- Sampling of septage received and high strength waste.
- Addition of a scale house for billing loads.
- Improving access for larger trucks.
- Extension of the existing building over dumping pit for freeze protection.
- Updates to the electrical.

Improvements no included in the current CIP for the Equalization Basins is replacement of the electrical conduit supports in the clarifier basin. Replacement of the electrical conduits, supports, and wiring is recommended.

4.1.21 Site Electrical

The electrical duct-bank loop that provides service to the buildings around the plant is the original from 1984. Half of the loop has already been replaced. Replacement of the second half of the electrical duct-bank is recommended.

4.2 Medium Priority Recommendations

4.2.1 Maintenance Building (2)

The compressed air system in the maintenance building is old, worn, and unreliable. Replacement with a new compressed air system is recommended.

Paint on the interior Maintenance Building walls and ceiling, primarily in maintenance bays is peeling. Sandblasting and repainting is recommended.

4.2.2 Grit Building (Headworks) (3)

Grit Blowers #1 and #3 are the original blowers installed in 1986 and should be replaced, as the reliability is uncertain due to age and wear.

The grit pump and blower piping and many of the suction and discharge valves are from the original construction of the facility in 1986. The piping should be sandblasted and recoated or replaced and the valves replaced.

4.2.3 Sludge Pumping Building (4)

The sludge pumping building lacks heat at times, because of competing heat requirements with other buildings that are also provided with heat from the central boiler system. Supplemental natural gas heat should be provided or the hot water loop to the sludge pumping building removed and primary heat provided by natural gas heating. Additional ventilation or dehumidification needs to be provided to control condensation.

Replace the one (1) set of exterior double doors and one (1) single access door due to age and weathered condition.

4.2.4 Primary Clarifiers (5)

The equipment in the primary clarifiers, including the sludge collectors, mechanism drives, weirs, and scum troughs are over 30 years old and have visible wear and some corrosion. The scum telescoping valves also have severe corrosion. The concrete in the basins is in good condition. However, there are some cracked, deteriorated, and discolored concrete surfaces.

The mechanism drives should be replaced and a spare drive provided for emergency replacement. The metal surfaces of the sludge collection equipment including the center column, influent well, drive cage, arms, skimmer, cross collectors; weirs and scum trough should be replaced or sandblasted and recoated. If still used, scum telescoping valves on the clarifiers should be replaced, otherwise remove the telescoping valves. Concrete surfaces of the clarifiers should be coated and restored to minimize further deterioration. The metal steps at the entrance to the catwalks should also be replaced due to severe corrosion.

4.2.5 Manhole #8 (6B)

The concrete sidewalk steps and narrow sidewalks make it difficult to clear snow with the UTV. The sidewalks around the manhole are also settling and cracking. The sidewalk steps should be removed and the area regarded and the sidewalk configured so that the steps can be eliminated as part of the overall pavement and sidewalk replacement plan. The sidewalks should be removed and replaced with wider sidewalks from Splitter Manhole #4 to Splitter Manhole #5 as part of the overall pavement and sidewalk replacement plan.

4.2.6 First Stage Intermediate Clarifiers (7)

The ground has eroded away under the concrete support for the drain valve operator stands. Filling and grading under the concrete support is recommended.

4.2.7 Manhole #10 (8B)

The concrete sidewalks are too narrow for clearing snow with a UTV. Removal and replacement of the sidewalks with wider sidewalks from Splitter Manhole #6 to Manhole #10 is recommended as part of the overall pavement and sidewalk replacement plan.

4.2.8 Splitter Manhole #7 (9A)

The concrete sidewalk steps and narrow sidewalks make it difficult to clear snow with the UTV. The sidewalks around the manhole are also settling and cracking. The sidewalk steps should be removed, the area regarded and the sidewalk configured so that the steps can be eliminated. The sidewalks around the manhole should be removed, the base below compacted and the sidewalks replaced with wider sidewalks as part of the overall pavement and sidewalk replacement plan.

4.2.9 Manhole #11 (9B)

The sidewalks are cracked and there is settling around the manhole. Removal of the sidewalks, filling and re-compacting the base under the sidewalks and then replacement with wider sidewalks is recommended as part of the overall pavement and sidewalk replacement plan.

4.2.10 Process Pumping (10)

The exterior north double doors do not shut properly and need to be replaced. The three (3) single access doors are also weathered and in poor condition and should be replaced.

The exterior and interior masonry control joint sealant is significantly deteriorated and replacement with backer rod and new sealant is recommended to eliminate future water damage.

The rear exit is missing a stoop and stairs and construction of a landing and steps is recommended.

The interior paint is deteriorating due to condensation and water intrusion around the windows. Replacing the sealant and backer rod around all the windows to eliminate future water damage is recommended.

4.2.11 Digesters (12)

A detailed inspection of the digester gas storage sphere was not performed as part of the scope of the Master Plan preparation. However, due to the corrosive environment inside the storage sphere it is anticipated that there is surface corrosion of the interior walls. Inspection of the gas storage sphere and sandblasting and recoating the interior and exterior surfaces is recommended.

4.2.12 Engine Generator and Utility Service Entrance (15)

The exhaust of the generator is very rusty and there are rust spots on the enclosure. Either wrapping the exhaust with an aluminum product or arc sprayed with an aluminum coating is recommended on the exhaust. On the enclosure, removal of the rust spots and application of a protective coating is recommended.

The steps into the enclosure do not have hand railing or a platform, which creates an unsafe condition. Construction of a stairway with platform is recommended to improve access to the generator enclosure.

The asphalt and concrete pavement at the generator is worn, has several low spots and open control joints. Complete replacement of the driveway and parking area to the generator is recommended.

4.2.13 Dumping Station (16)

The electrical conduit and conduit supports at the dumping station have significant corrosion and should be replaced.

4.2.14 Splitter Manhole #1 (18A)

Water splashes out of the splitter manhole when pumped flows exceed 35 MGD. Covering the splitter structure with aluminum checker plate is recommended to prevent splashing.

4.2.15 Manhole #1 (18B)

Water also splashes out of Manhole #1 when flows exceed 35 MGD and there is mineral buildup on the grating over the manhole. Replacement of the grating over the manhole with aluminum checker plate to prevent splashing is recommended.

4.2.16 Aeration Basin (18C)

There are minor cracks in the concrete floor and walls of the aeration basins. Operations staff is unable to completely drain the basins without the use of sump pumps. Repair of the concrete walls and floor surfaces is recommended along with grout sloping the basin floors to provide better drainage.

The conduit, boxes, and supports for the dissolved oxygen (DO) sensor cables have corrosion and should be replaced.

The light stands and fixtures around the aeration basins are outdated and inefficient and should be replaced with more efficient LED lighting.

4.2.17 RAS Building (19)

The Return Activated Sludge (RAS) pumps and Waste Activated Sludge (WAS) pumps are original and have reached there useful life and replacement is recommended. Replacement of the RAS and WAS pumps, including the costs, are incorporated into the Phase I Improvements to the WRF.

The exterior masonry sealant of the building is severely deteriorated and the building has signs of settlement. Mitigating building settlement and repair of the exterior masonry is recommended. The backer rod and sealant should be replaced in the exterior masonry control joints and tuck-pointing should be done on the entire building.

There is water intrusion into the drywell of the building. The concrete joints should be sealed and the concrete repaired to stop water from leaking into the drywell.

The one (1) set of exterior double doors should be replaced due to age and weathered condition.

The grating on the north side of the building is severely bent and poses a safety hazard. Replacement of this grating is recommended.

4.2.18 Final Clarifiers (20)

Several concerns were noted with the final clarifiers including old mechanisms with corrosion, draft tubes that provide suboptimal sludge removal, center wells that are outdated and effluent weirs that are hard to access for cleaning. Past issues with foaming and rising sludge during high flows was also noted by the operations staff. Other issues with the final clarifiers are moderate delamination of the surface coating on the concrete tanks and concrete steps and sidewalks that have settled and cracked.

Recommendations for the Final Clarifiers include constructing in-board weirs mounted off external walls, replacing the draft tube mechanisms with updated removal system, such as Towbro sludge removal mechanisms, and providing stainless steel mechanisms and components to minimize or eliminate corrosion. Installation of state of the art flocculation center wells and weir covers to control algae is also recommended.

The deteriorated concrete surfaces of the clarifier basins should be recoated and the concrete sidewalks and steps should be removed and replaced.

The electrical conduits and boxes on the walkway bridges of the final clarifiers have severe surface corrosion and should be replaced with upgrades to the mechanisms.

Upgrades to the Final Clarifiers, including the costs, are incorporated into the Phase I Improvements to the WRF.

4.2.19 Filter Building (21)

There is moderate cracking on the inside face of the southeast building wall and there is deterioration of the paint around the inside of the windows due to condensation and water intrusion around the windows. The exterior masonry joint sealant has also deteriorated. The masonry damage should be repaired and tuck-pointing completed on the exterior. Backer rod and sealant should be replaced on all the windows to stop the water intrusions.

The wall paint finish in the lower pipe gallery is peeling and faded. Repainting the lower level pipe gallery walls is recommended.

The one (1) set of exterior double doors and one (1) exterior single access door should be replaced due to age and weathered condition.

4.2.20 Chemical Feed Building (22)

The sidewalks around the chemical feed building need to be replaced due to settling and cracking and the repairs to the exterior stairways need to be made due to cracking concrete. Replacement of the sidewalk around the chemical feed building is recommended as part of the overall pavement and sidewalk replacement plan.

The one (1) set of exterior double doors and three (3) exterior single access doors should be replaced due to age and weathered condition.

4.2.21 Chlorine Contact Basin (23)

Effluent flow is monitored via a Parshall flume, which is not a highly accurate device. At or above a 100-year flood event water will back up effluent from the Chlorine contact basin to where the existing Parshall flume flow meter will become submerged and less accurate. Additionally, even under normal flow conditions the changes in flow direction upstream and downstream of the flume also negatively impact its accuracy. Removal of the Parshall flume (or it could be left in place but not used) and installation of a magnetic flow meter on the effluent line between the Chlorine Contact Basin and the Cascade Aerator is recommended. Manhole #3 could be eliminated when the new flow meter is installed.

Replacement of the effluent flow meter and expansion of the chlorine contact basin to accommodate projected future flows, including the costs, is incorporated into the Phase I Improvements to the WRF.

4.2.22 In-Plant Pumping (24)

The exterior masonry sealant of the building is severely deteriorated and there is moderate cracking on the exterior face of the building in the southwest corner. The masonry needs to be repaired and the backer rod and sealant replaced in the exterior masonry control joints. Tuck-pointing should be done on the entire building.

The one (1) set of exterior double doors should be replaced due to age and weathered condition.

There is water intrusion into the drywell between the floor and wall. The concrete joints should be sealed and the concrete repaired to stop water from leaking into the drywell.

The Non-Potable Water (NPW) pumps and the In-Plant Waste pumps are original and have visible corrosion on the pumps and replacement of these pumps is recommended.

The volume of filter backwash water was reduced with the upgrades to the filters and the addition of an air backwash system and the rate the In-Plant Waste Pumps return backwash wastewater to the final clarifiers or aeration basins could be reduced. Installation of VFDs on the In-Plant Waste Pumps is recommended to allow varying the return of backwash wastewater by the pumps, to reduce cycling and flow peaks.

The NPW pumping system is inefficient and operations staff has to make sure non-potable water is in use year-round to make sure the NPW Pumps are not cycling on and off continuously. Installation of a constant pressure pumping system (Aquavar type system) including a small pressure tank, pressure control and valves, and control panel and variable frequency drives is recommended. Replacement of the original strainers is also recommended.

The piping, valves, meters, and strainers on both the NPW system and In-Plant Waste system are old and outdated. Replacement of all the valves, meters, and strainers is recommended along with sandblasting and recoating the piping.

The link seals on the suction lines in the wall between the In-Plant Waste wetwell and drywell leak, causing staining on the walls. Replacement of the link seals is recommended.

4.2.23 Site Pavement and Sidewalks

The concrete pavement is in poor condition and the concrete sidewalks have several areas where there is settlement, cracking, and both vertical and horizontal separation from adjacent structures. The narrow sidewalks make it difficult to clear snow using the City's UTV. Steps on the sidewalk also make it difficult to clear snow with the UTV.

Removal and replacement of the concrete pavement throughout the WRF is recommended. Removal of existing concrete sidewalks and replacement with minimum 6 feet wide sidewalks were practical is recommended to allow better access for clearing snow with the City's UTV. Removal of the steps in the sidewalks by the Filter Building, from the Primary Clarifiers to the Digester Building, and at Manhole No. 8 and No. 10 is recommended and reconfiguring the sidewalks considered, allowing removal of the steps.

4.2.24 Equalization Basins (32)

The center well of clarifier has rust and the influent pipe to the clarifier has corrosion. There is also corrosion on the bypass pipe and valve of the clarifier. Sandblasting and recoating the center well, influent piping and bypass piping and valve are recommended.

Table 4.1 is a summary of the High Priority and Medium Priority Improvements and Estimate Project Cost.

Table 4.1 WRF Condition Assessment Recommendations

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	Maintenance Building (2)	Building Structure	Age & reliability	Replace roof, trim, coping, & flashing	$367,000
		Mezzanine	Safety	Replace missing ladder rail and missing toe plate.	$3,800
		HVAC System	Age & reliability	Replace HVAC system	$680,000
High	Grit Building (Headworks)(3)	Copper Piping	Pipe is severely corroded	Replace copper piping with PVC piping	$13,000
		Grit Chambers/Control Gates	Very corrosive area that requires frequent rehab.	Rehabilitate influent channel and replace gates	$610,000
		Concrete Floor	Cracking/deterioration of floor.	Repair concrete floor at overhead door of screen room	$18,000
		Building Structure	Damaged/missing brick	Repair brick on SE corner of bldg.	$5,000
		Concrete Stairway and Railing	Safety concern	Replace concrete around railing.	$1,200
		Sidewalks & Stoops	Settling/separating from bldg.	Replace sidewalks & stoops **as part of Facility Sidewalk Replacement Plan**	$0
		Roof Access Ladder	Safety concern	Repair roof access ladder	$1,000
		Building Structure	Age & weathered	Replace the exterior doors (4 Single Doors)	$24,000
			Age & reliability	Replace roof, coping, trim, & flashing	$74,000
		HVAC	Age/reliability & efficiency	Replace HVAC system	$143,000
		Electrical - General	Update to meet NFPA 820 requirements	Replace electrical	$151,000
		Electrical	Age and deterioration	Repair exterior electrical conduits and supports	$51,000
High	Sludge Pumping Building (4)	Electrical - Fiber Optic		Extend fiber optic line	$60,000
		Electrical - General	Update to meeting NFPA 820 requirements	Replace electrical	$60,000
High	Primary Clarifiers (5)	Primary Clarifier #1	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Primary Clarifier #2	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Primary Clarifier #3	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Primary Clarifier #4	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Electrical	Corrosion	Replace conduit and boxes at platforms	$121,000
			Downleads missing or broken	Replace lightning protection system	$13,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	First Stage Intermediate Clarifiers (7)	Electrical	Corrosion	Replace conduit and boxes on walkways	$50,000
High	Second Stage Intermediate Clarifiers (9)	Structural	Age & safety	Replace concrete at the guardrail posts	$5,000
		Electrical	Age & corrosion	Replace conduit and boxes on walkways	$50,000
High	Process Pumping (10)	Humus & In-Plant Piping	Age & wear	Replace humus line with glass lined pipe	$360,000
		Building Structure	Leaking between joints	Seal joints & repair concrete between wetwell & drywell	$224,000
		Electrical	Age & corrosion	Replace conduit and j-box near entrance	$30,600
High	Gravity Thickeners/Tunnel (11)	Gravity Thickener #1	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$145,000
			Corrosion	Replace mechanism	$547,000
			Corrosion on supports	Rehab support for odor control blowers	$4,500
		Gravity Thickener #2	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$145,000
			Not properly secured	Repair stairs and landing	$4,000
			Corrosion/thin metal	Replace mechanism	$547,000
			Corrosion on supports	Rehab support for odor control blowers	$4,500
		Tunnel	Deteriorated walls	Concrete walls	$109,000
			Water leaks into tunnel through walls.	Install drainage system.	$50,000
			Water damage	Replace brick/tuck-point exit stair tower	$23,000
			Water damage	Replace roof, coping, trim & flashing on exit stair tower	$9,000
			Door is old and weathered	Replace the single access door at the tunnel tower exit	$7,000
			Corrosion on scum and sludge piping	Sandblast and recoat piping	$91,000
		Thickened Sludge Pump #1 (11PUM1100)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		Thickened Sludge Pump #2 (11PUM1101)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		Thickened Sludge Pump #3 (11PUM1102)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	Gravity Thickeners/Tunnel (11)	Thickened Sludge Pump #4 (11PUM1103)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		HVAC	Code Compliance	Update HVAC system to meet NFPA 820	$156,000
		Electrical	Age & condition	Replace conduit at thickener platforms	$49,000
			Age & condition	Replace conduit/supports and wiring in tunnel	$45,000
High	Digesters (12)	Building Structure	Water leaks into bldg. At west side	Install drainage system **(addressed in tunnel improvements)**.	$0
		Electrical	Code compliance	Remove electrical from existing electrical room	$1,044,000
High	Energy Recovery (13)	Generator #1	Requires frequent overhauls due to non-scrubbed biogas.	Caterpillar **(Under current CIP for replacement)**	$0
		Generator #2	Requires frequent overhauls due to non-scrubbed biogas.	Caterpillar **(Under current CIP for replacement)**	$0
		Generator #3	Requires frequent overhauls due to non-scrubbed biogas.	Jenbacker **(Under current CIP for replacement)**	$0
		Building Structure	Issues with operation, function, & size of existing double doors.	Replace south door w/rollup door	$62,000
		Building Structure	Doors are old and weathered	Replace the exterior access doors (2 double and 1 single)	$31,000
		Gas Fired Hot Water Boilers	Age & condition	Replace the boilers	$241,000
		Heat Exchanger Tube (5 Each)	Age & condition	Replace the heat exchanger tubes	$251,000
		Boiler Hot Water Pump (2 Each)	Age & condition	Replace the boiler hot water pumps	$101,000
		Supply Fans (2 Each)	Age & condition	Replace the supply fans	$21,000
		Roof Exhaust Fans #3 & #4	Age & condition	Replace exhaust fans #3 & #4	$21,000
High	Solids Dewatering (14)	Building Structure - Roof	Age & condition	Replace with dewatering project	$260,000
		Building – Exterior Doors	Age & condition	Replace the exterior access doors (5 single)	$37,000
		HVAC	Age & condition	Upgrade and rezone heat and add natural gas heating	$289,000
		Electrical	Age & condition	Replace/upgrade with dewatering project	$621,000
High	Engine Generator (15)	Controls	Service reliability	Install utility circuit bypass	$252,000
High	Equipment Storage (17)	Building Structure	Space requirements	Expand office area to NW part of bldg.	$428,000
		HVAC	Old tube heaters	Update HVAC system and expand to new office area	$141,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	Control Building (18)	Civil/Site	Water ponds and runs into bldg.	Correct drainage on N & W sides of bldg.	$61,000
High	Control Building (18)	Blower #1 (18BLO001)	Age and efficiency	Replace blower **(Included in Phase I Improvements)**	$0
			Age and efficiency	Replace motor **(Included in Phase I Improvements)**	
		Blower #2 (18BLO002)	Age and efficiency	Replace blower **(Included in Phase I Improvements)**	$0
			Age and efficiency	Replace motor **(Included in Phase I Improvements)**	
		Blower #3 (18BLO003)	Age and efficiency	Replace blower **(Included in Phase I Improvements)**	$0
			Age and efficiency	Replace motor **(Included in Phase I Improvements)**	
		Blower #4 (18BLO004)	Age and efficiency	Replace blower **(Included in Phase I Improvements)**	$0
			Age and efficiency	Replace motor **(Included in Phase I Improvements)**	
		Electrical	Age & efficiency	Update controls **(Included in Phase I Improvements)**	$0
		Building Structure	Deterioration and water damage	Replace ext. sealant and tuck-point	$622,000
		Building – Exterior Doors	Aged & worn	Replace the exterior access doors (2 single)	$16,000
		HVAC	Age/reliability	Replace entire HVAC system	$603,000
		Electrical	Age/reliability	Replace/relocate switchgear/separate switchgear circuits **(Included as part of Phase I Improvements)**.	$0
High	Aeration Basins (18C)	Air Header Piping	Leaks at couplings	Replace leaking couplings **(Included as part of Phase I Improvements)**.	$0
		Diffusers	Inefficient. Missing diffuser tubes	Replace with fine bubble diffusers **(Included as part of Phase I Improvements)**.	$0
		Influent Valves	Corrosion	Replace the valve actuators **(Included as part of Phase I Improvements)**.	$0
		Electrical	Corrosion	Replace electrical J-boxes and conduit	$164,000
High	RAS Building (19)	Building Structure	Age/condition & reliability	Replace roof, coping, trim & flashing	$107,000
		Electrical - General	Age, condition & reliability	Upgrade electrical conduit and wiring.	$621,000
		HVAC - General	Age/reliability	Update/replace HVAC equipment	$258,000
High	Filter Building (21)	Piping & Valves	Valve actuators are original	Replace filter inf. & eff. valve actuators	$644,000
		Filter Bypass Weir	Restricts flow to filters	Raise filter bypass weir	$51,000
		Electrical	Age, condition & reliability	Update conduit and wiring.	$321,000
High	Chemical Feed Building (22)	Electrical	Age, condition & reliability	Replace transformer and update conduit and wiring.	$252,000
High	In-Plant Pumping (24)	Building Structure	Age & condition	Replace roof, coping, trim & flashing	$38,000
		Electrical – General	Age, Condition, & Reliability	Update Electrical	$321,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	In-Plant Pumping (24)	HVAC	Age, Condition, & Reliability	Replace HVAC System Including Heat Recovery and MAU	$236,000
High	Site Electrical	Electrical Feed Loop	Age, Condition & Reliability	Replace electrical ductbank feed loop	$423,000
High	Equalization Basins (32)	Building Structure	Freeze potential	Expand building to cover dump pits **(Included as part of a current design project)**.	$0
		Electrical	Corrosion	Replace bottom channel of MCC **(Included as part of a current design project)**.	$0
			Obsolete	Replace light fixtures in bldg. **(Included as part of a current design project)**.	$0
			Corrosion	Replace conduit supports in clarifier basin	$50,000
		Entire Facilities	Labor intensive, outdated, and difficult truck access.	Expand and upgrade facilities as Part of Current Design Project	
				Total High Priority Recommended WRF Improvements	**$14,026,600**
Medium	Maintenance Building (2)	Compressed Air System	Age/wear & reliability	Replace air compressor	$20,100
		Building Structure	Faded/peeling paint	Sandblast maintenance bay walls and ceiling & repaint	$87,000
Medium	Grit Building (Headworks)(3)	Grit Blower #1 (03BL0301)	Age/wear & reliability	Replace blower	$10,500
			Age/wear & reliability	Replace motor	
		Grit Blower #3 (03BL0303)	Age/wear & reliability	Replace blower	$10,500
			Age/wear & reliability	Replace motor	
		Grit Pump & Blower Piping	Age & deterioration	Sandblast and recoat or replace piping	$314,000
		Grit Pump Suction Valves	Age/wear & reliability	Replace 2 Gate Valves	$8,000
		Grit Pump & Blower Discharge Valves	Age/wear & reliability	Replace 13 Valves	$50,000
Medium	Sludge Pumping Building (4)	Building – Exterior Door	Aged & worn	Replace the exterior doors (1 double and 1 single)	$29,000
		HVAC - General	Lacking heat at times during the colder months. Condensation Issues.	Add supplemental natural gas heat or remove from hot water loop and install natural gas heating. Add dehumidification.	$64,000
Medium	Primary Clarifiers (5)	Primary Clarifier #1	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanism drive	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant Corrosion	Replace telescoping valve	$16,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	Primary Clarifiers (5)	Primary Clarifier #2	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		Primary Clarifier #3	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		Primary Clarifier #4	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		HVAC/Odor Control	Compliance with NFPA 820	Evaluate compliance with NFPA 820	
Medium	Manhole #8 (6B)	Civil/Site	Sidewalks are difficult to clear snow with UTV	Eliminate sidewalk steps and replace sidewalk from Splitter MH#4 to Splitter MH#5 **as part of facility sidewalk replacement plan**	$0
Medium	First Stage Intermediate Clarifiers (7)	Civil/Site	Space under stands.	Fill/grade under humus valve supports	$3,600
Medium	Manhole 10 (8B)	Civil/Site	Sidewalks are difficult to clear snow with UTV	Replace Sidewalks **as part of facility sidewalk replacement plan**	$0
Medium	Splitter Manhole #7 (9A)	Civil/Site	Cracking & settling	Replace concrete sidewalk **as part of facility sidewalk replacement plan**	$0
			Steps and sidewalks difficult to clear snow with UTV	Eliminate Sidewalk Steps/Widen Sidewalk **as part of facility sidewalk replacement plan**	$0
Medium	Manhole #11 (9B)	Civil/Site	Cracked sidewalks	Replaced cracked sidewalks **as part of facility sidewalk replacement plan**	$0
Medium	Process Pumping (10)	Building Structure	Doors do not shut properly	Repair/ replace all exterior doors.	$41,000
			Deterioration/water damage	Replace Sealant/backer rod. Tuck-point.	$90,000
			Safety Reasons	Installed a landing /stairs on the rear exit.	$7,000
			Leaks/water damage	Sealant/backer rod on all windows.	$6,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	Engine Generator (15)	Civil/Site	Cracked/deteriorated	Replace driveway and pavement	$84,000
Medium	Engine Generator (15)	Enclosure	Corrosion & safety requirements	Rehabilitate enclosure and provide platform and stairs	$12,000
Medium	Dumping Station (16)	Electrical	Electrical no longer used	Remove & Demolish conduit/supports and wiring.	$10,000
Medium	Control Building (18)	Electrical	Safety	Evaluate changing the blower voltage to 480 V.	
Medium	Splitter Manhole #1 (18A)	Concrete Structure	Wastewater splashing out during high flows	Cover concrete structure with aluminum tread plate to prevent splashing.	$239,000
Medium	Manhole #1 (18B)	Concrete Structure	Wastewater splashing out during high flows	Cover concrete structure with aluminum tread plate to prevent splashing.	$21,000
Medium	Aeration Basins (18C)	Concrete Basins	Standing water in bottom of basins when drained	Slope bottom of basins with grout	$452,000
Medium	Aeration Basins (18C)	Concrete Basins	Cracking on the upper walls and basin bottoms	Repair basin bottom and wall surfaces	$738,000
Medium	Aeration Basins (18C)	Electrical	Corrosion on conduits	Replace dissolved oxygen sensor conduit	$103,000
Medium	Aeration Basins (18C)	Electrical	Corrosion & outdated lighting	Replace lighting around basins	$47,000
Medium	RAS Building (19)	RAS Pump #1 (19PUMR01)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements).**	$0
Medium	RAS Building (19)	RAS Pump #1 (19PUMR01)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #2 (19PUMR02)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #2 (19PUMR02)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #3 (19PUMR03)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #3 (19PUMR03)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #4 (19PUMR04)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #4 (19PUMR04)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #5 (19PUMR05)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	RAS Pump #5 (19PUMR05)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	WAS Pump #1 (19PUMW01)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	WAS Pump #1 (19PUMW01)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	WAS Pump #2 (19PUMW02)	Age/wear & reliability	Replace pump **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	WAS Pump #2 (19PUMW02)	Age/wear & reliability	Replace motor **(Included in Phase I Improvements)**.	$0
Medium	RAS Building (19)	Building Structure	Masonry cracking	Mitigate settling	$51,000
Medium	RAS Building (19)	Building Structure	Groundwater leaks into drywell	Seal drywell	$186,000
Medium	RAS Building (19)	Building Structure	Grating is bent	Replace grating on North-side of bldg.	$58,000
Medium	RAS Building (19)	Building Structure	Deterioration/water damage	Replace sealant/backer rod. Tuck-point.	$95,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	RAS Building (19)	Building – Exterior Door	Age & weathered	Replace exterior double door	$17,000
Medium	Final Clarifiers (20)	Clarifier #1	Cracking/deterioration of concrete	Basin - Repair concrete structure **(Included in Phase I Improvements).**	$0
			Age & wear	Mechanism - Replace sludge collection mechanism **(Included in Phase I Improvements).**	$0
			Weirs function poorly at high flows	Construct new in-board launderer off external wall **(Included in Phase I Improvements).**	$0
		Clarifier #2	Cracking/deterioration of concrete	Basin - Repair concrete structure **(Included in Phase I Improvements).**	$0
			Age & wear	Mechanism **(Included in Phase I Improvements).**	$0
			Weirs function poorly at high flows	Construct new in-board launderer off external wall **(Included in Phase I Improvements).**	$0
		Clarifier #3	Cracking/deterioration of concrete	Basin - Repair concrete structure **(Included in Phase I Improvements).**	$0
			Age & wear	Mechanism **(Included in Phase I Improvements).**	$0
			Weirs function poorly at high flows	Construct new in-board launderer off external wall **(Included in Phase I Improvements).**	$0
		Clarifier #4	Cracking/deterioration of concrete	Basin - Repair concrete structure **(Included in Phase I Improvements).**	$0
			Age & wear	Mechanism **(Included in Phase I Improvements)**	$0
			Weirs function poorly at high flows	Construct new in-board launderer off external wall **(Included in Phase I Improvements).**	$0
		Site/Civil	Cracking and settling concrete steps and sidewalks	Replace concrete steps and sidewalks as part of Facility Sidewalk Replacement Plan.	$0
		Electrical	Age & condition	Replace with new mechanisms **as part of the Phase I Improvements.**	$0
		Piping/Valves	Age & condition	Replace as part of new mechanisms **(Included in Phase I Improvements)**.	$0
Medium	Filter Building (21)	Building Structure	Damaged masonry	Repair masonry on south side of Bldg.	$215,000
			Water intrusion	Repair cracks on the SW wall of Bldg. (inside and out)	$76,000
			Water damage	Replace Sealant/backer rod. Tuck-point.	$19,000
			Water intrusion	Replace Sealant/backer rod on windows	$13,000

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	Filter Building (21)	Building – Exterior Doors	Age & weathered	Replace Exterior Doors (1 double door and 1 single)	$24,000
		Building Structure	Paint is peeling	Repaint walls in lower pipe gallery	$7,000
Medium	Chemical Feed Building (22)	Civil/Site	Concrete sidewalk is cracked and settling	Replace sidewalk **as part of Facility Sidewalk Replacement Plan**.	$0
		Building Structure	Cracking concrete	Rehab exterior west stairway	$2,000
		Building – Exterior	Age & weathered	Replace exterior doors (1 double door and 3 single)	$47,000
Medium	Chlorine Contact Basin (23)	Parshall Flume	Questionable accuracy during flooding.	Replace with magnetic flow meter on effluent line **(Included as part of Phase I Improvements**.	$0
		Concrete Structure	Expansion required for future capacity	Expand **as part of Phase I Improvements**	$0
Medium	In-Plant Pumping (24)	NPW Pump #2 (24PUMP02)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump #3 (24PUMP03)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump #4 (24PUMP04)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump Controls	Pumps run continuously to prevent frequent cycling	Add constant pressure pumping system to NPW Pumps.	$166,500
		Strainer #1 (24STR001)	Age & frequent maintenance required	Replace NPW strainer #1	$24,500
		Strainer #2 (24STR002)	Age & frequent maintenance required	Replace NPW strainer #2	$24,500
		NPW Flow Meter (24FLM038)	Age	Replace NPW flow meter	$21,000
Medium	In-Plant Pumping (24)	In-Plant Waste Pump #1 (24PUMW01)	Age & frequent maintenance required	Replace pump	$50,333
			Age & frequent maintenance required	Replace motor	

Table 4.1 (Continued)

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	In-Plant Pumping (24)	In-Plant Waste Pump #2 (24PUMW02)	Age & frequent maintenance required	Replace pump	$50,333
			Age & frequent maintenance required	Replace motor	
		In-Plant Waste Pump #3 (PUMW03)	Age & frequent maintenance required	Replace pump	$50,333
			Age & frequent maintenance required	Replace motor	
		In-Plant Waste Controls		Add VFDs to In-Plant Waste Pumps	$86,500
		In-Plant Waste Flow Meter (24FLM037)	Age & condition	Replace In-Plant Waste Flow Meter	$21,000
		Piping & Valves	Age & condition	Replace/upgrade piping and valves	$185,000
		Building Structure	Damaged masonry	Repair brick on SW corner of bldg.	$6,000
			Water damage	Replace sealant/backer rod. Tuck-point.	$44,000
		Building – Exterior Door	Age & weathered	Replace exterior double door	$17,000
Medium	Civil/Site	Concrete Sidewalks/Steps	Cracking, settlement, worn	Replace, widen, re-grade and eliminate concrete steps	$937,000
		Concrete Pavement	Cracking, settlement, worn	Remove and replace pavement and curb & gutter	$4,734,000
Medium	Equalization Basins (32)	Clarifier	Corrosion on inlet well	Sandblast and recoat center well	$24,000
			Corrosion on influent piping	Sandblast and recoat piping	$5,000
				Total Medium Priority Recommended WRF Improvements	**$13,690,700**
				Total Combined High and Medium Priority Recommended WRF Improvements	**$27,717,300**

APPENDIX A

DETAILS COSTS FOR PUMP STATION CONDITION ASSESSMENT RECOMMENDATIONS

2016 Wastewater Treatment and Collection System Master Plan
Summary of Lift Station Improvements Costs

Item	Lift Station	Recommended Improvements	Priority	Est. Project Cost
1	Lift Station PS-201	Standby Generator	Medium	$81,000
2	Lift Station PS-203	Renovate and Upgrade Lift Station	High	$914,000
3	PS-204, PS-205, & PS-206	Combine PS-204, PS-205, & PS-206	Low	$8,038,000
4	PS-204 & PS-206	Combine PS-204 & PS-206	Low	$5,844,000
5	Lift Station PS-204	Upgrade Electrical and Provide Davit Crane Bases	High	$55,000
6	Lift Station PS-205	Safe Access Maintenance Lift	High	$81,000
7	Lift Station PS-205	Standby Generator and Controls Upgrades	High	$141,000
8	Lift Station PS-206	Complete Lift Station Rebuild	High	$303,000
9	Lift Station PS-213	Standby Generator	Medium	$81,000
10	Lift Station PS-218	Upgrade Lift Station to Address Flooding Issues and Electrical Panel Corrosion	High	$370,000
11	Lift Station PS-220	Complete Short-term Improvements - Replace Wall Piping Seals and Relocate Heater.	High	$126,000
12	Lift Station PS-220	Complete Long-Term Improvements - Replace Existing Lift Station with a Submersible Station.	Medium	$914,000
13	Lift Station PS-221	Standby Generator	Medium	$81,000
14	Lift Station PS-224	Replace Existing Pumps with Dry-Pit Flygt N-Pumps or Recessed Impeller Pumps	High	$151,000

Computed: KFN | **Date:** 10/11/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-201

Task: Standby Generator

Priority: Medium

Existing Condition:

1. Station does not have its own designated generator

Recommendation:

2. Provide standby generator with self contained enclosure.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Standby Generator	1	LS	$40,000.00	$40,000
Subtotal				$40,000
Undeveloped Design Detail(25%)				$10,000
Construction Subtotal W/Contingencies				**$50,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$8,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$65,000**
Engineering, Admin., Legal, Permitting (24%)				$16,000
Total Project Cost				**$81,000**

Computed: KFN **Date:** 10/11/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Component: Lift Station PS-203

Task: Renovate and Upgrade Lift Station

Priority: High

Existing Condition:

1. Existing Lift Station is outdated and has safety concerns.

Recommendation:

1. Laser scan for as-built as there is no as-built documentation.
2. Address potential hotels, restaurants, and increased flows.
3. Replace Roofing.
4. Construct new dual wetwell and fill old wetwell to grade for electrical and generator.
5. Extend forcemains so both are in station with wye and control valve on each line to control discharge location
6. Sandblast and coat pump room and piping.
7. Move generator to "Old Wet Well" location and renovate room.
8. Provide Pigging Station for the Dual Forcemains.
9. Provide Self-Priming Pumps.
10. Provide access hatches over dual wetwell for Vactor Truck cleaning.
11. Extend suction lines through current wetwell to new wet well.
12. Provide baffles or pre-rotation basin inserts.
13. Provide new electrical switchgear, motor control center, and VFDs.
14. Provide new generator.
15. Provide seal-offs to isolate per code requirements.
16. Provide new HVAC system for the pump room and electrical room.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	1,155	SF	$2.50	$2,888
Roof Insulation	2,888	SF	$4.38	$12,633
PVC Roof Membrane	12	SQ	$375.00	$4,331
Flashing	136	LF	$8.75	$1,190
Sealant & Caulking	289	SF	$3.13	$902
HVAC System	1	EA	$16,000.00	$16,000
Ductwork Replacement	1	LS	$16,000.00	$16,000
Laser Scan for As-Built Drawings	1	LS	$10,000.00	$10,000
Address Capacity of Lift Station	1	LS	$10,000.00	$10,000
New Wet Well	1	LS	$35,000.00	$35,000
Wet Well Shoring	1	LS	$50,000.00	$50,000

Fill Old Wet Well	1	LS	$2,500.00	$2,500
Pre-Rotation Basins or Baffles	1	LS	$10,000.00	$10,000
Extend Forcemains	1	LS	$25,000.00	$25,000
Forcemain Connections	1	LS	$6,000.00	$6,000
Sandblast and coat pump room and piping	1	LS	$7,500.00	$7,500
Renovate Room for Generator	1	LS	$10,000.00	$10,000
Pigging Station	1	LS	$15,000.00	$15,000
New Self-Priming Pumps	3	EA	$25,000.00	$75,000
Wet Well Access Hatches	1	LS	$10,000.00	$10,000
Extend Suction Lines	1	LS	$25,000.00	$25,000
Suction Line Connections	1	LS	$6,000.00	$6,000
New Electrical Switchgear, MCC, and VFDs	1	LS	$75,000.00	$75,000
New Generator	1	LS	$25,000.00	$25,000
Provide electrical seal-offs	1	LS	$5,000.00	$5,000
Subtotal				$456,000
Undeveloped Design Detail(25%)				$114,000
Construction Subtotal W/Contingencies				**$570,000**
General Conditions, Mobilization (5%)				$29,000
Sales Tax Allowance (5%)				$30,000
Overhead & Profit (15%)				$94,000
Bonds & Insurance (2%)				$14,000
Total Construction Cost				**$737,000**
Engineering, Admin., Legal, Permitting (24%)				$177,000
Total Project Cost				**$914,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: PS-204, PS-205, & PS-206

Task: Combine PS-204, PS-205, & PS-206

Priority: Low

Existing Condition:

1. Currently Operate 3 Separate Sanitary Lift Stations that Serve the area around Coval Lake.
2. PS-204 has a firm pumping capacity of 1.07 MGD.
3. PS-205 has a firm pumping capacity of 0.41 MGD.
4. PS-206 has a firm pumping capacity of 0.84 MGD.

Recommendation:

1. Construct New 2.3 MGD Lift Station in the south corner of Burnside Park.
2. Construct 12" Forcemain from New Lift Station to West Ave & 3rd Street. Connect to Existing 36" Interceptor Sewer.
2. Construct New 10" Gravity Sewer from PS-204 to New Lift Station in Burnside Park.
3. Construct New 10" Gravity Sewer from PS-206 to New Lift Station in Burnside Park.
4. Construction New 8" Gravity Sewer from PS-205 to New Lift Station in Burnside Park.
5. Demolish Existing PS-204
6. Demolish Existing PS-205
7. Demolish Existing PS-206

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000.00	$25,000
Clearing	1	LS	$35,000.00	$35,000
Remove Concrete Curb & Gutter	4375	LF	$4.50	$19,688
Saw Existing Pavement	4500	LF	$3.75	$16,875
Remove Concrete Pavement	9725	SY	$12.00	$116,700
Remove Sanitary Manholes	7	EA	$500.00	$3,500
Remove Sewer Pipe	900	LF	$7.00	$6,300
Remove Storm Sewer Pipe	400	LF	$8.50	$3,400
Remove Watermain	1800	LF	$5.00	$9,000
Scarify and Recompact Subgrade	9725	SY	$0.96	$9,336
Incidental Grading Work	1	LS	$20,000.00	$20,000
Base Course	4300	TON	$13.30	$57,190
Trench Stabilization	1150	TON	$0.15	$173
Select Fill	11700	TON	$5.00	$58,500
Concrete Pavment	9725	SY	$50.00	$486,250

Concrete Curb & Gutter	4375	LF	$18.00	$78,750
10" C900 DR 18 PVC Watermain	1800	LF	$60.00	$108,000
10" Watermain Bedding Material	1800	LF	$6.00	$10,800
Watermain Fittings	6000	LB	$9.50	$57,000
Connect to Existing Watermain	4	EA	$1,000.00	$4,000
Traffic Control	1	LS	$20,000.00	$20,000
Pavement Markings	1	LS	$10,000.00	$10,000
Placing Topsoil	300	CY	$4.50	$1,350
Salvage Topsoil	300	CY	$1.25	$375
Sodding	1500	SY	$3.60	$5,400
Fertilizer	1550	LB	$0.86	$1,333
Inlet Protection	10	EA	$120.00	$1,200
Replace RCP Storm Sewer Pipe	400	LF	$32.00	$12,800
Rock Excavation	5,000	CY	$89.00	$445,000
8"Ø Sanitary Sewer Pipe 10"-12" Deep	250	LF	$41.00	$10,250
8"Ø Sanitary Sewer Pipe 12"-14" Deep	250	LF	$49.00	$12,250
10"Ø Sanitary Sewer Pipe 14"-16" Deep	965	LF	$48.00	$46,320
10"Ø Sanitary Sewer Pipe 16"-18" Deep	965	LF	$52.00	$50,180
10"Ø Sanitary Sewer Pipe 18"-20" Deep	965	LF	$55.00	$53,075
10"Ø Sanitary Sewer Pipe 20"-22" Deep	965	LF	$58.00	$55,970
48" Lined Manhole 10'-12' Deep	2	EA	$5,600.00	$11,200
48" Lined Manhole 12'-14' Deep	2	EA	$5,900.00	$11,800
48' Lined Manhole 14'-16' Deep	3	EA	$6,900.00	$20,700
48" Lined Manhole 16'-18' Deep	2	EA	$7,700.00	$15,400
48" Lined Manhole 18'-20' Deep	2	EA	$8,700.00	$17,400
48" Lined Manhole 20'-22' Deep	1	EA	$10,000.00	$10,000
8" Sanitary Sewer Pipe Bedding Material	500	LF	$5.00	$2,500
10" Sanitary Sewer Pipe Bedding Material	3,860	LF	$7.00	$27,020
8" Boots for Manholes	12	EA	$145.00	$1,740
10" Boots for Manholes	12	EA	$200.00	$2,400
Reconnect Sewer Service	10	EA	$700.00	$7,000
Trench Dewatering	1	LS	$100,000.00	$100,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$50,000.00	$50,000
Manhole Frame and Cover Type A	12	EA	$930.00	$11,160
Manhole External Frame Seal	12	EA	$335.00	$4,020
Manhole Exfiltration/vacuum test	12	EA	$340.00	$4,080
Sanitary Sewer Joint Air Test	4,360	LF	$1.80	$7,848
Sanitary Sewer Pipe Deflection Test	4,360	LF	$0.85	$3,706
Locating Utility	4	EA	$480.00	$1,920
Verify Utility	4	EA	$305.00	$1,220
Demolish Existing Lift Station PS-204	1	LS	$10,000.00	$10,000
Demolish Existing Lift Station PS-205	1	LS	$15,000.00	$15,000
Demolish Existing Lift Station PS-206	1	LS	$15,000.00	$15,000
New 2.3 MGD Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750.00	$26,250
Concrete Walls	150	CY	$1,000.00	$150,000

Concrete Top Slab	27	CY	$1,000.00	$27,000
Excavation	2,355	CY	$50.00	$117,750
Rock Excavation	2,400	CY	$89.00	$213,600
Backfilling	4,400	CY	$25.00	$110,000
Crushed Rock Base	95	TON	$26.00	$2,470
Dewatering	1	LS	$50,000.00	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000.00	$20,000
Dry Well False Floor	1	LS	$20,000.00	$20,000
Painting	1	LS	$36,000.00	$36,000
Aluminum Hatches	1	LS	$30,000.00	$30,000
Hoists, Crane Railings	1	LS	$30,000.00	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000.00	$108,000
Interior Piping, Valves, and Fittings	1	LS	$145,000.00	$145,000
Sump Pump System	1	LS	$10,000.00	$10,000
MCC/VFDs	1	LS	$130,000.00	$130,000
Instrumentation and Controls	1	LS	$50,000.00	$50,000
Electrical	1	LS	$72,000.00	$72,000
Standby Generator	1	LS	$40,000.00	$40,000
HVAC	1	LS	$25,000.00	$25,000
Plumbing	1	LS	$18,000.00	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000.00	$50,000
Site Work	1	LS	$55,000.00	$55,000
Miscellaneous	1	LS	$75,000.00	$75,000
Mag Meter Vault including Mag Meter	1	LS	$45,000.00	$45,000
New 12" Forcemain	1,500	LF	$100.00	$150,000
Subtotal				$4,009,000
Undeveloped Design Detail(25%)				$1,003,000
Construction Subtotal W/Contingencies				**$5,012,000**
General Conditions, Mobilization (5%)				$251,000
Sales Tax Allowance (5%)				$263,000
Overhead & Profit (15%)				$829,000
Bonds & Insurance (2%)				$127,000
Total Construction Cost				**$6,482,000**
Engineering, Admin., Legal, Permitting (24%)				$1,556,000
Total Project Cost				**$8,038,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: PS-204 & PS-206

Task: Combine PS-204 & PS-206

Priority: Low

Existing Condition:

1. Currently Operate 2 Separate Sanitary Lift Stations that Serve the area North of 6th Street and West of Coval Lake.
2. PS-204 has a firm pumping capacity of 1.07 MGD.
3. PS-206 has a firm pumping capacity of 0.84 MGD.

Recommendation:

1. Construct New 1.9 MGD Lift Station at PS -206 Site.
2. Construct Parallel 10" Forcemain from PS-206 to Existing 36" Interceptor Sewer at Western Avenue.
2. Construct New 10" Gravity Sewer from PS-204 to Burnside St & Sigler Ave.
3. Construct New 12" Gravity Sewer from Burnside St & Sigler Ave. to PS-206
3. Demolish Existing PS-204
4. Demolish Existing PS-206

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$15,000.00	$15,000
Clearing	1	LS	$20,000.00	$20,000
Remove Concrete Curb & Gutter	2200	LF	$4.50	$9,900
Saw Existing Pavement	2500	LF	$3.75	$9,375
Remove Concrete Pavement	4900	SY	$12.00	$58,800
Remove Sanitary Manholes	2	EA	$500.00	$1,000
Remove Sewer Pipe	200	LF	$7.00	$1,400
Remove Storm Sewer Pipe	200	LF	$8.50	$1,700
Remove Watermain	900	LF	$5.00	$4,500
Scarify and Recompact Subgrade	4900	SY	$0.96	$4,704
Incidental Grading Work	1	LS	$10,000.00	$10,000
Base Course	2200	TON	$13.30	$29,260
Trench Stabilization	575	TON	$0.15	$86
Select Fill	5850	TON	$5.00	$29,250
Concrete Pavment	4900	SY	$50.00	$245,000
Concrete Curb & Gutter	2200	LF	$18.00	$39,600
10" C900 DR 18 PVC Watermain	900	LF	$60.00	$54,000
10" Watermain Bedding Material	900	LF	$6.00	$5,400

Watermain Fittings	3000	LB	$9.50	$28,500
Connect to Existing Watermain	2	EA	$1,000.00	$2,000
Traffic Control	1	LS	$10,000.00	$10,000
Pavement Markings	1	LS	$5,000.00	$5,000
Placing Topsoil	150	CY	$4.50	$675
Salvage Topsoil	150	CY	$1.25	$188
Sodding	750	SY	$3.60	$2,700
Fertilizer	775	LB	$0.86	$667
Inlet Protection	5	EA	$120.00	$600
Replace RCP Storm Sewer Pipe	200	LF	$32.00	$6,400
Rock Excavation	2,500	CY	$89.00	$222,500
10"Ø Sanitary Sewer Pipe 14"-16" Deep	500	LF	$48.00	$24,000
10"Ø Sanitary Sewer Pipe 16"-18" Deep	500	LF	$52.00	$26,000
10"Ø Sanitary Sewer Pipe 18"-20" Deep	500	LF	$55.00	$27,500
10"Ø Sanitary Sewer Pipe 20"-22" Deep	500	LF	$58.00	$29,000
12"Ø Sanitary Sewer Pipe 20"-22" Deep	200	LF	$62.00	$12,400
48' Lined Manhole 14'-16' Deep	2	EA	$6,900.00	$13,800
48" Lined Manhole 16'-18' Deep	2	EA	$7,700.00	$15,400
48" Lined Manhole 18'-20' Deep	1	EA	$8,700.00	$8,700
48" Lined Manhole 20'-22' Deep	1	EA	$10,000.00	$10,000
10" Sanitary Sewer Pipe Bedding Material	2,000	LF	$7.00	$14,000
12" Sanitary Sewer Pipe Bedding Material	200	LF	$9.00	$18,000
10" Boots for Manholes	10	EA	$145.00	$1,450
12" Boots for Manholes	2	EA	$200.00	$400
Reconnect Sewer Service	10	EA	$700.00	$7,000
Trench Dewatering	1	LS	$100,000.00	$100,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$50,000.00	$50,000
Manhole Frame and Cover Type A	6	EA	$930.00	$5,580
Manhole External Frame Seal	6	EA	$335.00	$2,010
Manhole Exfiltration/vacuum test	6	EA	$340.00	$2,040
Sanitary Sewer Joint Air Test	2,200	LF	$1.80	$3,960
Sanitary Sewer Pipe Deflection Test	2,200	LF	$0.85	$1,870
Locating Utility	4	EA	$480.00	$1,920
Verify Utility	4	EA	$305.00	$1,220
Demolish Existing Lift Station PS-204	1	LS	$10,000.00	$10,000
Demolish Existing Lift Station PS-206	1	LS	$15,000.00	$15,000
New 1.9 MGD Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750.00	$26,250
Concrete Walls	150	CY	$1,000.00	$150,000
Concrete Top Slab	27	CY	$1,000.00	$27,000
Excavation	2,355	CY	$50.00	$117,750
Rock Excavation	2,400	CY	$89.00	$213,600
Backfilling	4,400	CY	$25.00	$110,000
Crushed Rock Base	95	TON	$26.00	$2,470
Dewatering	1	LS	$50,000.00	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000.00	$20,000

Dry Well False Floor	1	LS	$20,000.00	$20,000
Painting	1	LS	$36,000.00	$36,000
Aluminum Hatches	1	LS	$30,000.00	$30,000
Hoists, Crane Railings	1	LS	$30,000.00	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000.00	$108,000
Interior Piping, Valves, and Fittings	1	LS	$145,000.00	$145,000
Sump Pump System	1	LS	$10,000.00	$10,000
MCC/VFDs	1	LS	$130,000.00	$130,000
Instrumentation and Controls	1	LS	$50,000.00	$50,000
Electrical	1	LS	$72,000.00	$72,000
Standby Generator	1	LS	$40,000.00	$40,000
HVAC	1	LS	$25,000.00	$25,000
Plumbing	1	LS	$18,000.00	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000.00	$50,000
Site Work	1	LS	$55,000.00	$55,000
Miscellaneous	1	LS	$75,000.00	$75,000
Mag Meter Vault including Mag Meter	1	LS	$45,000.00	$45,000
New 10" Forcemain	500	LF	$80.00	$40,000
Subtotal				$2,916,000
Undeveloped Design Detail(25%)				$729,000
Construction Subtotal W/Contingencies				**$3,645,000**
General Conditions, Mobilization (5%)				$182,000
Sales Tax Allowance (5%)				$191,000
Overhead & Profit (15%)				$603,000
Bonds & Insurance (2%)				$92,000
Total Construction Cost				**$4,713,000**
Engineering, Admin., Legal, Permitting (24%)				$1,131,000
Total Project Cost				**$5,844,000**

Computed: KFN

Date: 10/11/2016

HDR Job No: 10028508

Checked: DVP

Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-204

Task: Upgrade Electrical and Provide Davit Crane Bases

Priority: High

Existing Condition:

1. Transfer switch and E-Gen pigtail are below grade, which is not a safe location
2. Circuit breakers are in lower level and should be moved to upper (intermediate) level at a minimum with true lockable disconnects.
3. Station does not have its own designated generator

Recommendation:

1. Move transfer switch outside on pole
2. Construct new circuit breakers at upper (intermediate) level at a minimum with true lockable disconnects.
3. Add Davit crane base to top slab for both wetwell and drywell.
4. ~~Provide standby generator with self contained enclosure.~~
5. Review combining 204, 205, and 206 and demolish station

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Move generator transfer switch to outside pole	1	LS	$10,000.00	$10,000
Standby Generator & Self Contained Enclosure	0	LS	$40,000.00	$0
Circuit Breakers with Lockable Disconnects	1	LS	$15,000.00	$15,000
Davit crane base	2	EA	$1,000.00	$2,000
Subtotal				$27,000
Undeveloped Design Detail(25%)				$7,000
Construction Subtotal W/Contingencies				**$34,000**
General Conditions, Mobilization (5%)				$1,700
Sales Tax Allowance (5%)				$1,800
Overhead & Profit (15%)				$5,600
Bonds & Insurance (2%)				$900
Total Construction Cost				**$44,000**
Engineering, Admin., Legal, Permitting (24%)				$10,600
Total Project Cost				**$55,000**

Computed: KFN
Date: 10/11/2016
HDR Job No: 10028508

Checked: DVP
Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-205

Task: Safe Access Maintenance Lift

Priority: High

Existing Condition:

Recommendation:

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Safe Access Maintenance Lift	1	LS	$40,000.00	$40,000
Subtotal				$40,000
Undeveloped Design Detail(25%)				$10,000
Construction Subtotal W/Contingencies				**$50,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$8,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$65,000**
Engineering, Admin., Legal, Permitting (24%)				$16,000
Total Project Cost				**$81,000**

Computed: KFN **Date:** 10/11/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-205

Task: Standby Generator and Controls Upgrades

Priority: High

Existing Condition:

Recommendation:

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Standby Generator	1	LS	$40,000.00	$40,000
Update Controls	1	LS	$30,000.00	$30,000
Subtotal				$70,000
Undeveloped Design Detail(25%)				$18,000
Construction Subtotal W/Contingencies				**$88,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$15,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$114,000**
Engineering, Admin., Legal, Permitting (24%)				$27,000
Total Project Cost				**$141,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-206

Task: Complete Lift Station Rebuild

Priority: High

Existing Condition:

1. Structural condition of existing above grade building is in poor condition.

Recommendation:

1. Replace existing above grade building.
2. Construct new supply and exhaust HVAC system.
3. Provide and install new generator.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Demolish Existing Building	1	LS	$5,000.00	$5,000
New Masonry Building	225	SF	$225.00	$50,625
New Generator	1	LS	$40,000.00	$40,000
HVAC	1	LS	$20,000.00	$20,000
Electrical Replacement and Upgrades	1	LS	$20,000.00	$20,000
Reseal Mag Meter Vault	1	LS	$15,000.00	$15,000
Subtotal				$151,000
Undeveloped Design Detail(25%)				$38,000
Construction Subtotal W/Contingencies				**$189,000**
General Conditions, Mobilization (5%)				$9,000
Sales Tax Allowance (5%)				$10,000
Overhead & Profit (15%)				$31,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$244,000**
Engineering, Admin., Legal, Permitting (24%)				$59,000
Total Project Cost				**$303,000**

Computed:	KFN	**Date:**	10/11/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-213

Task: Standby Generator

Priority: Medium

Existing Condition:

1. Station does not have its own designated generator

Recommendation:

2. Provide standby generator with self contained enclosure.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Standby Generator	1	LS	$40,000.00	$40,000
Subtotal				$40,000
Undeveloped Design Detail(25%)				$10,000
Construction Subtotal W/Contingencies				**$50,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$8,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$65,000**
Engineering, Admin., Legal, Permitting (24%)				$16,000
Total Project Cost				**$81,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-218

Task: Upgrade Lift Station to Address Flooding Issues and Electrical Panel Corrosion

Priority: High

Existing Condition:

1. Floor Elevation of pump station is 6-inches below the 500 year flood elevation.
2. VFDs are at risk of corrosion with current arrangement.
3. A portion of the seal water piping appears to be metallic. It is corroded and should be replaced.
4. Bus bars are in rough condition – have been cleaned and coated.
5. Needs ventilation as ventilation in Electrical Room and connected Pump Room is inadequate

Recommendation:

1. Install removable floodgates at the doors.
2. Raise curb around wetwell openings to prevent water from entering wetwll during flood events.
3. Monitor pump 4 for noise.
4. Change operation of seal water so that seal water runs to pumps at all times, even when the pumps are not running.
5. Replace seal water piping with PVC.
6. Add flow tubes to all seal water lines to monitor the seal water flow rate.
7. Construct new wall with a window to isolate electrical room.
8. Clean and coat or replace Bus bars.
9. Install video monitoring cameras to allow the City to determine if there is flooding in the station from a remote location. (The station currently has the capability of accommodating a camera.)
10. Raise odor control transformer
11. Raise/rotate gas regulator to be above flood elevation.
12. Provide additional ventilation for HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Install removable stop logs/floodgates at doors	5	EA	$3,500.00	$17,500
Raise curb around wetwell openings	1	LS	$10,000.00	$10,000
Modify operation of seal water system	1	LS	$10,000.00	$10,000
Replace seal water piping with PVC	1	LS	$10,000.00	$10,000
Seal Water Flow Tubes	4	EA	$3,500.00	$14,000
Masonry Wall for Electrical	20	SF	$200.00	$4,000
Window	1	EA	$3,000.00	$3,000
Replace electrical bus bars	1	LS	$75,000.00	$75,000
Install Video Cameras	1	LS	$15,000.00	$15,000
Raise odor control transformer	1	LS	$5,000.00	$5,000

Raise/rotate gas regulator	1	LS	$5,000.00	$5,000
Provide additional ventilation	1	LS	$15,000.00	$15,000
Subtotal				$184,000
Undeveloped Design Detail(25%)				$46,000
Construction Subtotal W/Contingencies				**$230,000**
General Conditions, Mobilization (5%)				$12,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$38,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$298,000**
Engineering, Admin., Legal, Permitting (24%)				$72,000
Total Project Cost				**$370,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-220

Task: Complete Short-term Improvements - Replace Wall Piping Seals and Relocate Heater.

Priority: High

Existing Condition:

1. Piping in poor condition at wall. Signs of leaking noted at the suction pipe and discharge pipe wall penetrations
2. Room is damp.
3. Move heater due to accessibility.
4. Condensation was noted on the upper level ceiling and on the lower level piping
5. Station does not have its own designated generator

Recommendation:

1. Piping is in poor condition at wall and needs to be addressed.
2. Install dehumidifier.
3. Need to move heater as leak is running on unit.
4. Provide standby generator with self contained enclosure.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace Pipe Link Seals	3	EA	$2,500.00	$7,500
Standby Generator	1	LS	$40,000.00	$40,000
Install dehumidifier	1	EA	$5,000.00	$5,000
Relocate Heater	1	EA	$10,000.00	$10,000
Subtotal				$63,000
Undeveloped Design Detail(25%)				$16,000
Construction Subtotal W/Contingencies				**$79,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$4,000
Overhead & Profit (15%)				$13,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$102,000**
Engineering, Admin., Legal, Permitting (24%)				$24,000
Total Project Cost				**$126,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-220

Task: Complete Long-Term Improvements - Replace Existing Lift Station with a Submersible Station.

Priority: Medium

Existing Condition:

1. Deteriorated interior roof and humidity. A possible roof leak was noted on the upper level.
2. Some of the precast roof sections are damaged and portions of the reinforcing are exposed.
3. Flood Plain is 3 to 4 feet above Main Floor and New Meter Base is 32” above Main Floor.
4. Needs new re-wiring in the lower level – new disconnects.
5. Exterior wall electrical conduit penetrations are below the 100-year floodplain elevation.

Recommendation:

1. Long-term: Convert to submersible to address flood elevation issues.
2. Costs include complete demolition of existing station and construction of a new submersible lift station.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Grading	1	LS	$15,000.00	$15,000
Landscaping	1	LS	$12,000.00	$12,000
Dewatering	1	LS	$30,000.00	$30,000
Demolition/Abandoment of Existing Facilities	1	LS	$17,000.00	$17,000
Base Course	90	Ton	$13.30	$1,197
Concrete Paving and Driveways (6")	267	SY	$50.00	$13,350
Valve Vault Excavation/Backfill	210	CY	$50.00	$10,500
Wet Well Excavation/Backfill	800	CY	$50.00	$40,000
Rock Excavation	300	CY	$89.00	$26,700
Crushed Rock Base	95	Ton	$26.00	$2,470
Wet Well	1	LS	$35,000.00	$35,000
Submersible Pumps with Baffles	2	EA	$20,000.00	$40,000
Wet Well Liner	700	SF	$6.00	$4,200
Access Hatches	2	EA	$3,000.00	$6,000
Valve Vault	1	LS	$15,000.00	$15,000
Ladder	1	EA	$2,500.00	$2,500
Gravity Sewer	100	LF	$40.00	$4,000
Forcemain	100	LF	$20.00	$2,000
Forcemain Connection	1	EA	$3,500.00	$3,500
4" Plug Valves	2	EA	$5,000.00	$10,000
4" Check Valves	2	EA	$4,500.00	$9,000
Paining and Protective Coatings	1	LS	$9,000.00	$9,000

Pipe Supports	1	LS	$3,000.00	$3,000
Valve Vault Sump Pump and Controls	1	EA	$6,000.00	$6,000
Misc Piping, Valves, Fittings, ETC	1	LS	$18,000.00	$18,000
Stanby Generator	1	LS	$40,000.00	$40,000
Electrical	1	LS	$50,000.00	$50,000
Controls	1	LS	$30,000.00	$30,000
Subtotal				$456,000
Undeveloped Design Detail(25%)				$114,000
Construction Subtotal W/Contingencies				**$570,000**
General Conditions, Mobilization (5%)				$29,000
Sales Tax Allowance (5%)				$30,000
Overhead & Profit (15%)				$94,000
Bonds & Insurance (2%)				$14,000
Total Construction Cost				**$737,000**
Engineering, Admin., Legal, Permitting (24%)				$177,000
Total Project Cost				**$914,000**

Computed:	KFN	**Date:**	10/11/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-221

Task: Standby Generator

Priority: Medium

Existing Condition:

1. Station does not have its own designated generator

Recommendation:

2. Provide standby generator with self contained enclosure.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Standby Generator	1	LS	$40,000.00	$40,000
Subtotal				$40,000
Undeveloped Design Detail(25%)				$10,000
Construction Subtotal W/Contingencies				**$50,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$8,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$65,000**
Engineering, Admin., Legal, Permitting (24%)				$16,000
Total Project Cost				**$81,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lift Station PS-224

Task: Replace Existing Pumps with Dry-Pit Flygt N-Pumps or Recessed Impeller Pumps

Priority: High

Existing Condition:

1. Existing pumps are prone to plugging and ragging problems.

Recommendation:

1. Recommended installing dry-pit Flygt or recessed impeller pumps to address ragging issues.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Pumps	2	EA	$5,000.00	$10,000
New recessed impeller pumps	2	EA	$25,000.00	$50,000
Electrical Modifications	1	LS	$15,000.00	$15,000
Subtotal				$75,000
Undeveloped Design Detail(25%)				$19,000
Construction Subtotal W/Contingencies				**$94,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$16,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$122,000**
Engineering, Admin., Legal, Permitting (24%)				$29,000
Total Project Cost				**$151,000**

APPENDIX B

DETAILS COSTS FOR WATER RECLAMATION FACILITY CONDITION ASSESSMENT RECOMMENDATIONS

2016 Wastewater Treatment and Collection System Master Plan
Summary of WRF Recommended Condition Assessment Improvements Costs

Item	Facility Component	Recommended Improvements	Priority	Est. Project Cost
1	Administration Building (1)	Replace Roof and HVAC System	Low	$543,000
2	Administration Building (1)	Replace and Upgrade Electrical	Low	$191,000
3	Maintenance Building (2)	Replace Roof and HVAC System	High	$1,047,000
4	Maintenance Building (2)	Replace Missing Ladder Rail and Toe Plate On Mezzanine	High	$3,800
5	Maintenance Building (2)	Replace Air Compressor	Medium	$20,100
6	Maintenance Building (2)	Sandblast and Repaint Maintenance Bay Walls	Medium	$87,000
7	Grit Building (3)	Replace Old Portion of Building Roof and HVAC System	High	$216,000
8	Grit Building (3)	Replace Grit Blowers #1 and #3	Medium	$21,000
9	Grit Building (3)	Replace Grit Blowers #2	Low	$12,000
10	Grit Building (3)	Grit Piping Improvements	Medium	$372,000
11	Grit Building (3)	Replace the copper sampler piping	High	$13,000
12	Grit Building (3)	Miscellaneous Site and Building Improvements	High	$64,000
13	Grit Building (3)	Electrical Improvements	High	$201,000
14	Grit Building (3)	Rehabilitate Influent Channel and Effluent Weirs, and Replace the Control Gates	High	$610,000
15	Grit Building (3)	Replace the Screenings Equipment	Low	$1,705,000
16	Grit Building (3)	Replace the Four (4) Grit Pumps	Low	$329,000
17	Grit Building (3)	Grit Pump Suction Piping/Valves	Low	$42,000
18	Grit Building (3)	Replace the Grit Washers/Cyclones and Classifier Equipment	Low	$242,000
19	Sludge Pumping Building (4)	HVAC Improvements	Medium	$64,000
20	Sludge Pumping Building (4)	Replace the Exterior Access Doors	Medium	$29,000
21	Sludge Pumping Building (4)	Electrical Improvements	High	$120,000
22	Sludge Pumping Building (4)	Replace the Primary Sludge Pumps (4 Each)	Low	$482,000
23	Primary Clarifiers (5)	Catwalk Window Improvements	High	$22,100
24	Primary Clarifiers (5)	Electrical Improvements	High	$133,000
25	Primary Clarifiers (5)	Mechanism and Concrete Basin Rehab.	Medium	$3,254,000
26	Primary Clarifiers (5)	Replace the Dome Covers.	Low	$2,406,000
27	Primary Clarifiers (5)	Replace the Clarifier Drain Valves	Low	$120,000
28	Splitter Manhole #3 (5A)	Slide Gate Replacement	Low	$293,000
29	Splitter Manhole #3 (5A)	Rehabilitation Concrete Structure and Replace Grating and Handrailing	Low	$100,000
30	First Stage Trickling Filters (6)	Replace the Effluent Sluice Gates	Low	$201,000
31	Splitter Manhole #4 (6A)	Replace the Slide Gates and Sluice Gate	Low	$463,000
32	Manhole #8 (6B)	Site Improvements (Part of facility sidewalk replacement plan)	Medium	$0
33	Manhole #8 (6B)	Rehabilitation Concrete Structure and Replace Grating	Low	$25,000
34	First Stage Intermediate Clarifiers (7)	Electrical Improvements	High	$50,000
35	First Stage Intermediate Clarifiers (7)	Replace Mechanism Drives	Low	$242,000
36	First Stage Intermediate Clarifiers (7)	Miscellaneous Site Improvements	Medium	$3,600
37	Splitter Manhole #5 (7A)	Replace the Slide Gates and Sluice Gate	Low	$270,000
38	Splitter Manhole #5 (7A)	Rehabilitation Concrete Structure and Replace Grating and Guardrailing	Low	$69,000
39	Manhole #9 (7B)	Replace the 36' Sluice Gates	Low	$172,000
40	Manhole #9 (7B)	Rehabilitation Concrete Structure and Replace Grating	Low	$25,000
41	Manhole #9 (7B)	Site Improvements (Part of facility sidewalk replacement plan)	Low	$0
42	Second Stage Trickling Filters (8)	Replace the Effluent Sluice Gates	Low	$201,000
43	Splitter Manhole #6 (8A)	Slide Gate and Sluice Gate Replacement	Low	$430,000
44	Splitter Manhole #6 (8A)	Rehabilitation Concrete Structure and Replace Grating and Guardrailing	Low	$145,000
45	Manhole #10 (8B)	Site Improvements (Part of facility sidewalk replacement plan)	Medium	$0
46	Manhole #10 (8B)	Rehabilitation Concrete Structure and Replace Grating	Low	$29,000
47	Second Stage Intermediate Clarifiers (9)	Repair Guardrail Post	High	$5,000
48	Second Stage Intermediate Clarifiers (9)	Electrical Improvements	High	$50,000
49	Second Stage Intermediate Clarifiers (9)	Replace Mechanism Drives	Low	$242,000
50	Splitter Manhole #7 (9A)	Slide Gate and Sluice Gate Replacement	Low	$270,000
51	Splitter Manhole #7 (9A)	Site Improvements (Part of facility sidewalk replacement plan)	Medium	$0
52	Splitter Manhole #7 (9A)	Rehabilitation Concrete Structure and Replace Grating and Guardrailing	Low	$74,000
53	Manhole #11 (9B)	Site Improvements (Part of facility sidewalk replacement plan)	Medium	$0
54	Manhole #11 (9B)	Replace the Sluice Gates	Low	$172,000
55	Manhole #11 (9B)	Rehabilitation Concrete Structure and Replace Grating	Low	$30,000

2016 Wastewater Treatment and Collection System Master Plan
Summary of WRF Recommended Condition Assessment Improvements Costs

Item	Facility Component	Recommended Improvements	Priority	Est. Project Cost
1	Administration Building (1)	Replace Roof and HVAC System	Low	$543,000
56	Process Pumping Building (10)	Electrical Improvements	High	$30,600
57	Process Pumping Building (10.)	Repair Leaking from Wetwell to Drywell	High	$224,000
58	Process Pumping Building (10.)	Replace the Humus Line	High	$360,000
59	Process Pumping Building (10)	Miscellaneous Building Improvements	Medium	$143,000
60	Process Pumping Building (10)	Replace the Transfer Pumps (4 Each)	Low	$1,603,000
61	Process Pumping Building (10)	Replace the Humus Pumps (3 Each)	Low	$603,000
62	Process Pumping Building (10)	Replace the Recirculation Pumps (5 Each)	Low	$1,254,000
63	Gravity Thickeners/Tunnels (11)	Replace Roof at Exit Stair Tower and Update HVAC System	High	$165,000
64	Gravity Thickeners/Tunnel (11)	Replace the Mechanisms and Rehabilitate the Concrete Basins of the Gravity Thickeners.	High	$1,396,000
65	Gravity Thickeners/Tunnel (11)	Miscellaneous Tunnel Improvements.	High	$278,000
66	Gravity Thickeners/Tunnels (11)	Electrical Improvements in the Tunnels and at the Gravity Thickeners	High	$93,000
67	Gravity Thickeners/Tunnels (11)	Replace the Thickened Sludge Pumps (4 Each)	High	$361,000
68	Gravity Thickeners/Tunnels (11)	Replace the Dome Covers.	Low	$1,102,000
69	Digester Building (12)	Replace Roof and HVAC System	Low	$501,000
70	Digester Building (12)	Replace Digester Covers, Mixing and Heating Equipment	Low	$16,731,000
71	Digester Building (12)	Relocate and Replace Electrical Equipment	High	$1,044,000
72	Digester Building (12)	Rehabilitation Gas Storage Sphere	Medium	$640,000
73	Energy Recovery Building (13)	Replace Older Exhaust Fans and Boiler System	High	$632,000
74	Energy Recovery Building (13)	Replace Exterior Doors and South Door with Rollup Door	High	$93,000
75	Energy Recovery Building (13)	Replace the 26,000 Gallon Hot Water Storage Tank	Low	$184,000
76	Energy Recovery Building (13)	Replace Roof System	Low	$161,000
77	Energy Recovery Building (13)	Replace Energy Recovery System	High	$4,500,000
78	Energy Recovery Building (13)	Replace Ancilliary Energy Recovery Equipment	Low	$453,000
79	Energy Recovery Building (13)	Replace Newer Exhaust Fans and Boiler System	Low	$161,000
80	Sludge Dewatering Building (14)	Replace Roof and HVAC System	High	$549,000
	Sludge Dewatering Building (14)	Replace the Exterior Access Doors	High	$37,000
81	Sludge Dewatering Building (14)	Replace/Upgrade Electrical	High	$621,000
82	Engine Generator and Utility Service Entrance (15)	Generator Enclosure Rehab and Miscellaneous Improvements	Medium	$95,000
83	Engine Generator and Utility Service Entrance (15)	Utility Circuit Bypass	High	$252,000
84	Engine Generator and Utility Service Entrance (15)	New Engine Generator Sized for Future Conditions	Low	$10,024,000
85	Dumping Station (16)	Demolish Existing Electrical Conduits/Supports, and Wiring	Medium	$10,000
86	Dumping Station (16)	Rehabilitation Concrete Structure and Replace Equipment	Low	$248,000
87	Equipment Storage Building (17)	Expand Office Area and Upgrade HVAC System	High	$569,000
88	Equipment Storage Building (17)	Replace Metal Roof	Low	$293,000
89	Control Building (18)	Replace HVAC System	High	$603,000
90	Control Building (18)	Replace and Relocate Switchgear	High	$1,473,000
91	Control Building (18)	Site Improvements	High	$61,000
92	Control Building (18)	Blower and Controls Improvements	High	$4,080,000
93	Control Building (18)	Miscellaneous Building Improvements	High	$639,000
94	Control Building (18)	Replace Roof	Low	$260,000
95	Splitter Manhole #1 (18A)	Cover concrete basin to prevent splashing.	Medium	$239,000
96	Manhole #1 (18B)	Cover Concrete Manhole to Prevent Splashing	Medium	$21,000
97	Aeration Basins (18C)	Aeration System Rehabilitation	High	$1,048,000
98	Aeration Basins (18C)	Electrical Conduit, Junction Boxes, and Wiring Replacement	High	$164,000
99	Aeration Basins (18C)	Replace Lighting and DO Sensor Conduit and Wiring.	Medium	$149,000
100	Aeration Basins (18C)	Upgrade Aeration System to Fine Bubble System	High	$2,807,000
101	Aeration Basin (18C)	Concrete Basin Rehabilitation	Medium	$1,190,000
102	Lime Feed System (18D)	Replace Lime Feed System	Low	$1,002,000
103	RAS Building (19)	Replace Roof and HVAC System	High	$366,000
104	RAS Building (19)	Replace/Upgrade Electrical	High	$621,000
105	RAS Building (19)	Miscellaneous Building Improvements	Medium	$404,000
106	RAS Building (19)	Replace the RAS and WAS Pumps	Medium	$331,000
107	Final Clarifiers (20)	Replace Mechanisms and Rehabilitate the Concrete Basins.	Medium	$6,242,000
108	Final Clarifiers (20)	Electrical Improvements	Medium	$120,000
109	Splitter Manhole #2 (20A)	Replace the Slide Gates and Rehabilitation the Concrete	Low	$599,000
110	Manhole #2 (20B)	Replace the Sluice Gates and Rehabilitation the Concrete	Low	$382,000
111	Filter Building (21)	Replace and Upgrade Electrical	High	$321,000
112	Filter Building (21)	Valve and Weir Improvements	High	$694,000
113	Filter Building (21)	Miscellaneous Building Improvements	Medium	$352,000
114	Filter Building (21)	Replace Roof and HVAC System	Low	$846,000

2016 Wastewater Treatment and Collection System Master Plan
Summary of WRF Recommended Condition Assessment Improvements Costs

Item	Facility Component	Recommended Improvements	Priority	Est. Project Cost
1	Administration Building (1)	Replace Roof and HVAC System	Low	$543,000
115	Filter Building (21)	Filter Equipment Upgrades	Low	$5,514,000
116	Chemical Feed Building (22)	Replace and Upgrade Electrical	High	$252,000
117	Chemical Feed Building (22)	Site Improvements	Medium	$17,000
118	Chemical Feed Building (22)	Replace the Exterior Access Doors	Medium	$47,000
119	Chemical Feed Building (22)	Replace Chemical Storage, Feed Equipment and Piping	Low	$1,292,000
120	Chemical Feed Building (22)	Replace Roof and HVAC System	Low	$424,000
121	Chlorine Contact Chamber (23)	Effluent Meter Improvements	Medium	$655,000
122	Chlorine Contact Chamber (23)	Replace Existing Slide Gates, Covers, Walkways, and Analyzers.	Low	$662,000
123	Chlorine Contact Chamber (23)	Expand Chlorine Contact Basin to Meet Future Conditions.	Low	$3,071,000
124	Manhole #3 (23A)	Rehabilitation Concrete Structure and Replace Grating	Low	$21,000
125	Cascade Aerator (23B)	Replace Existing Slide Gates, Aeration Equipment, and Repair Concrete.	Low	$743,000
126	In-Plant Waste Pumping Building (24)	Replace Building Roof and HVAC System	High	$273,000
127	Inplant Pumping Building (24)	Replace and Upgrade Electrical	High	$321,000
128	Inplant Pumping Building (24)	Equipment and Piping Upgrades	Medium	$765,000
129	Inplant Pumping Building (24)	Miscellaneous Building Improvements	Medium	$67,000
130	Equalization Basins (32)	Replace the Grit Washer Equipment	Low	$242,000
131	Equalization Basins (32)	Repair Concrete Surfaces.	Low	$1,001,000
132	Equalization Basins (32)	Piping and Centerwell Coating Restoration	Medium	$29,000
133	Equilization Basins (32)	Building and Electrical Modifications	High	$1,094,000
134	Equilization Basins (32)	Construct Non-Potable Watermain to the EQ Basins	Low	$5,488,000
135	Equilization Basins (32)	Expansion and Improvements	High	$7,242,000
136	Civil/Sitework	Concrete Sidewalk/Step Removal/Replacement & Widening.	Medium	$937,000
137	Civil/Sitework	Concrete Pavement Removal and Replacement	Medium	$4,734,000
138	Site Electrical	Replace Electrical Ductbank Loop	High	$423,000

Computed: KFN
Date: 10/3/2016
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Checked: DVP
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Component: Administration Building (1)

Task: Replace Roof and HVAC System

Priority: Low

Existing Condition:

1. The Roof System for the Adminstration Building was replaced in 2010 and is in good condition.
2. The HVAC System for the Administration Building was replaced in 2010 and is in good condition.

Recommendation:

1. Replace the existing roof system in 20 years when it has reached its useful life.
2. Replace and upgrade the existing HVAC System in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	7,300	SF	$2.50	$18,250
Roof Insulation	18,250	SF	$4.38	$79,844
PVC Roof Membrane	73	SQ	$375.00	$27,375
Flashing	370	LF	$8.75	$3,238
Sealant & Caulking	1,825	SF	$3.13	$5,703
Replace/Upgrade HVAC System	1	LS	$135,000.00	$135,000
Subtotal				$270,000
Undeveloped Design Detail(25%)				$68,000
Construction Subtotal W/Contingencies				**$338,000**
General Conditions, Mobilization (5%)				$17,000
Sales Tax Allowance (5%)				$18,000
Overhead & Profit (15%)				$56,000
Bonds & Insurance (2%)				$9,000
Total Construction Cost				**$438,000**
Engineering, Admin., Legal, Permitting (24%)				$105,000
Total Project Cost				**$543,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Administration Building (1)

Task: Replace and Upgrade Electrical

Priority: Low

Existing Condition:

1. The Electrical for the Adminstration Building was replaced in 2010 and is in good condition.

Recommendation:

1. Plan for replace and upgrade of the Electrical System in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Electrical	1	LS	$20,000.00	$20,000
Replace Electrical Equipment, Conduit and Wiring	1	LS	$75,000.00	$75,000
Subtotal				$95,000
Undeveloped Design Detail(25%)				$24,000
Construction Subtotal W/Contingencies				**$119,000**
General Conditions, Mobilization (5%)				$6,000
Sales Tax Allowance (5%)				$6,000
Overhead & Profit (15%)				$20,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$154,000**
Engineering, Admin., Legal, Permitting (24%)				$37,000
Total Project Cost				**$191,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Maintenance Building (2)

Task: Replace Missing Ladder Rail and Toe Plate On Mezzanine

Priority: High

Existing Condition:

Part of the railing is missing on the ladder to the mezzanine and there are sections of toe plates missing around the perimeter of the mezzanine which creates an unsafe condition.

Recommendation:

Replace the missing ladder rail and install toe plate around the perimeter of the mezzanine.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Missing Ladder Rail	5	LF	$100.00	$500
Replace Missing Toe Plate	55	LF	$25.00	$1,375
Subtotal				$1,900
Undeveloped Design Detail(25%)				$500
Construction Subtotal W/Contingencies				**$2,400**
General Conditions, Mobilization (5%)				$100
Sales Tax Allowance (5%)				$100
Overhead & Profit (15%)				$400
Bonds & Insurance (2%)				$100
Total Construction Cost				**$3,100**
Engineering, Admin., Legal, Permitting (24%)				$700
Total Project Cost				**$3,800**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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HDR Computation

CIP Item

Subject: Maintenance Building (2)

Task: Replace Air Compressor

Priority: Medium

Existing Condition:

1. Existing Air Compressor is Worn and Unreliable.

Recommendation:

1. Replace Air Compressor.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace 7/2-HP Air Compressor and Dryer	1	EA	$10,000.00	$10,000
Subtotal				$10,000
Undeveloped Design Detail(25%)				$2,500
Construction Subtotal W/Contingencies				**$12,500**
General Conditions, Mobilization (5%)				$600
Sales Tax Allowance (5%)				$700
Overhead & Profit (15%)				$2,100
Bonds & Insurance (2%)				$300
Total Construction Cost				**$16,200**
Engineering, Admin., Legal, Permitting (24%)				$3,900
Total Project Cost				**$20,100**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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HDR Computation

CIP Item

Subject: Maintenance Building (2)

Task: Sandblast and Repaint Maintenance Bay Walls

Priority: Medium

Existing Condition:

1. Deteriorating wall paint finish maintenance bays.

Recommendation:

1. Repaint Maintenance Bay walls and Ceilings in Maintenance Building.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sandblast and Repaint Masonry Walls	16,000	SF	$2.65	$42,400
Subtotal				$43,000
Undeveloped Design Detail(25%)				$11,000
Construction Subtotal W/Contingencies				**$54,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$9,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$70,000**
Engineering, Admin., Legal, Permitting (24%)				$17,000
Total Project Cost				**$87,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Component: Maintenance Building (2)

Task: Replace Roof and HVAC System

Priority: High

Existing Condition:

1. The existing Roof System is the original installed in 1984, is in poor working condition, and not reliable.
2. The existing HVAC System is the original installed in 1984, is in poor working condition and not reliable.

Recommendation:

1. Replace the existing roof system including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	9,928	SF	$2.50	$24,820
Roof Insulation	24,820	SF	$4.38	$108,588
PVC Roof Membrane	99	SQ	$375.00	$37,230
Flashing	437	LF	$8.75	$3,827
Sealant & Caulking	2,482	SF	$3.13	$7,756
Replace Exhaust Fans	10	EA	$3,125.00	$31,250
New Exhaust Fans	2	EA	$3,125.00	$6,250
Replace Makeup Air Units	4	EA	$55,000.00	$220,000
Replace Unit Heaters	5	EA	$3,125.00	$15,625
New HVAC Controls	1	LS	$25,000.00	$25,000
Ductwork Replacement	1	LS	$40,000.00	$40,000
Subtotal				$521,000
Undeveloped Design Detail(25%)				$131,000
Construction Subtotal W/Contingencies				**$652,000**
General Conditions, Mobilization (5%)				$33,000
Sales Tax Allowance (5%)				$34,000
Overhead & Profit (15%)				$108,000
Bonds & Insurance (2%)				$17,000
Total Construction Cost				**$844,000**
Engineering, Admin., Legal, Permitting (24%)				$203,000
Total Project Cost				**$1,047,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Replace Old Portion of Building Roof and HVAC System

Priority: High

Existing Condition:

1. The existing Roof System is the original installed in 1984, is in poor working condition, and not reliable.
2. The existing HVAC System is the original installed in 1984, is in poor working condition and not reliable.

Recommendation:

1. Replace the existing roof system including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	1,705	SF	$5.00	$8,527
Roof Insulation	4,264	SF	$4.38	$18,654
PVC Roof Membrane	17	SQ	$375.00	$6,396
Flashing	185	LF	$8.75	$1,622
Sealant & Caulking	426	SF	$3.13	$1,332
Replace Exhaust Fans	1	EA	$3,125.00	$3,125
Replace Gas-Fired MAU	1	EA	$55,000.00	$55,000
Replace Supply Fan	1	EA	$3,125.00	$3,125
Ductwork Replacement	1	LS	$10,000.00	$10,000
Subtotal				$108,000
Undeveloped Design Detail(25%)				$27,000
Construction Subtotal W/Contingencies				**$135,000**
General Conditions, Mobilization (5%)				$7,000
Sales Tax Allowance (5%)				$7,000
Overhead & Profit (15%)				$22,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$174,000**
Engineering, Admin., Legal, Permitting (24%)				$42,000
Total Project Cost				**$216,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Replace Grit Blowers #1 and #3

Priority: Medium

Existing Condition:

Grit Blowers #1 and #3 are the original installed in 1986 and should be replaced as a result of age, wear and unreliability.

Recommendation:

Replace Grit Blowers #1 and #3.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Blowers	2	EA	$500.00	$1,000
Provide New Grit Blowers	2	EA	$3,125.00	$6,250
Electrical/Controls	1	LS	$2,500.00	$2,500
Subtotal				$10,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$13,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$2,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$17,000**
Engineering, Admin., Legal, Permitting (24%)				$4,000
Total Project Cost				**$21,000**

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CIP Item

Subject: Grit Building (3)

Task: Replace Grit Blowers #2

Priority: Low

Existing Condition:

1. Grit Blowers #2 was replaced in 2002.

Recommendation:

1. Plan for replacement of Grit Blower #2 in 2022 from wear and tear.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Blower	1	EA	$1,000.00	$1,000
Provide New Grit Blower	1	EA	$3,125.00	$3,125
Electrical/Controls	1	LS	$2,500.00	$2,500
Subtotal				$7,000
Undeveloped Design Detail(25%)				$2,000
Construction Subtotal W/Contingencies				**$9,000**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$1,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$10,000**
Engineering, Admin., Legal, Permitting (24%)				$2,000
Total Project Cost				**$12,000**

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CIP Item

Subject: Grit Building (3)

Task: Grit Piping Improvements

Priority: Medium

Existing Condition:

1. Visible corrosion on the grit pump suction piping and valves.
2. Visible corrosion on the grit pump discharge piping and check valves.
3. Many of the valves on the grit piping and blower piping are original from 1986.
4. 36" Grit basin influent piping has corrosion on the exterior and expected to be wearing thin on the interior.

Recommendation:

1. Replace all original grit handling piping and valves.
2. Replace the 36" grit basin influent piping.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Suction Gate Valves	2	EA	$1,875.00	$3,750
Replace Grit Pump Disch. Valves	4	EA	$1,875.00	$7,500
Replace Grit Blower Disch. Valves	9	EA	$1,875.00	$16,875
Sandblast and Repaint Piping	2	EA	$3,000.00	$6,000
Bypass Pumping	1	LS	$100,000.00	$100,000
Replace/Rehab 36" Grit Basin Influent Pipe	1	LS	$50,000.00	$50,000
Subtotal				$185,000
Undeveloped Design Detail(25%)				$47,000
Construction Subtotal W/Contingencies				**$232,000**
General Conditions, Mobilization (5%)				$12,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$38,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$300,000**
Engineering, Admin., Legal, Permitting (24%)				$72,000
Total Project Cost				**$372,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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CIP Item

Subject: Grit Building (3)

Task: Replace the copper sampler piping

Priority: High

Existing Condition:

1. Copper sampler piping in the screens room has severe corrosion.

Recommendation:

1. Replace the copper sampler piping with PVC piping in the screen room.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace sampler piping in screen room with PV(	125	LF	$52.00	$6,500
Subtotal				$6,500
Undeveloped Design Detail(25%)				$1,625
Construction Subtotal W/Contingencies				**$8,125**
General Conditions, Mobilization (5%)				$400
Sales Tax Allowance (5%)				$400
Overhead & Profit (15%)				$1,000
Bonds & Insurance (2%)				$200
Total Construction Cost				**$10,125**
Engineering, Admin., Legal, Permitting (24%)				$2,000
Total Project Cost				**$13,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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CIP Item

Subject: Grit Building (3)

Task: Miscellaneous Site and Building Improvements

Priority: High

Existing Condition:

1. Concrete is severely deteriorated at the stair railings on the NE entrance and the railings are loose.
2. Structural stoops are either missing or they are separating from building at walk door locations.
3. The concrete walks are settling and separating from the building.
4. Sealant between the sidewalks and building has completely deteriorated at the entire N side of the building.
5. Concrete floor at Overhead door is moderately deteriorating
6. Roof Access Ladder has at least three bolts that are not anchored causing the ladder to come loose from the wall
7. Brick is moderately damaged on the SE corner of the building.
8. Exterior doors or old, weathered, and in poor condition.

Recommendation:

1. Repair the concrete around the stairway railing.
2. Remove the walks, compace the soils and replace the walks and stoops.
3. Replace the concrete floor at the overhead door to the screenings room.
4. Repair and replace the fasteners of the roof access ladder.
5. Repair the damaged brick on the SE corner of the building.
6. Replace the exterior doors

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Repair Concrete Around Stairway Railing	1	EA	$562.50	$563
Replace Concrete Sidewalks & Stoops	700	SF	$10.00	$7,000
Replace Concrete Floor at Overhead Door	575	SF	$15.00	$8,625
Repair Roof Access Ladder	1	LS	$500.00	$500
Repair Brick at SE Corner of Bldg	1	LS	$2,500.00	$2,500
Remove and replace exterior single doors	4	EA	$3,000.00	$12,000
Subtotal				$32,000
Undeveloped Design Detail(25%)				$8,000
Construction Subtotal W/Contingencies				**$40,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$7,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$52,000**

Engineering, Admin., Legal, Permitting (24%)	$12,000
Total Project Cost	**$64,000**

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CIP Item

Subject: Grit Building (3)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Application of NFPA 820 for the entire building needs to be reviewed. Location of existing seal offs may not be code compliant.
2. Some new light fixture, but several are showing significant corrosion, due to condensation dripping on them.
3. Exterior surface mounted conduits, especially on the north side, are showing significant corrosion with some support failures.
4. The transformers show significant enclosure deterioration. Each transformer has feeder breakers within the secondary terminal box, which is not ideal from a safety stand point.

Recommendation:

1. Add seal-offs in the conduits on both sides of the wall between the old grit room and screenings room
2. Replace conduit and light fixtures in the old portion of the building.
3. Replace exterior surface mounted conduits.
4. Replace the electrical transformers.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Upgrade Interior Electrical In Grit Part of Bldg	1	LS	$25,000.00	$25,000
Replace the electrical transformers.	2	EA	$25,000.00	$50,000
Repair Exterior Electrical Conduits & Supports	1	LS	$25,000.00	$25,000
Subtotal				$100,000
Undeveloped Design Detail(25%)				$25,000
Construction Subtotal W/Contingencies				**$125,000**
General Conditions, Mobilization (5%)				$6,000
Sales Tax Allowance (5%)				$7,000
Overhead & Profit (15%)				$21,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$162,000**
Engineering, Admin., Legal, Permitting (24%)				$39,000
Total Project Cost				**$201,000**

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HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Rehabilitate Influent Channel and Effluent Weirs, and Replace the Control Gates

Priority: High

Existing Condition:

1. Concrete is severely deteriorated in the influent channel structure.
2. Concrete is severely deteriorated on the effluent weir walls.
3. Control Gates are severley corroded.

Recommendation:

1. Repair the concrete in the aerated grit chamber.
2. Replace the control gates with stainless steel gates.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$100,000.00	$100,000
Repair Concrete Surfaces	2,500	SF	$37.50	$93,750
Replace 48" x 36" Slide Gates	1	EA	$30,000.00	$30,000
Replace 96" x 36" Slide Gates	2	EA	$40,000.00	$80,000
Subtotal				$304,000
Undeveloped Design Detail(25%)				$76,000
Construction Subtotal W/Contingencies				**$380,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$63,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$492,000**
Engineering, Admin., Legal, Permitting (24%)				$118,000
Total Project Cost				**$610,000**

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HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Replace the Screenings Equipment

Priority: Low

Existing Condition:

1. Screenings Equipment was installed in 2006 with an estimated usefull life of 20 years.

Recommendation:

1. Replace the drum screens and screenings conveyor.
2. Update electrical as required when replacing the screenings equipment.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the drum screens	3	EA	$250,000.00	$750,000
Remove and replace the screenings conveyor	1	EA	$100,000.00	$100,000
Subtotal				$850,000
Undeveloped Design Detail(25%)				$213,000
Construction Subtotal W/Contingencies				**$1,063,000**
General Conditions, Mobilization (5%)				$53,000
Sales Tax Allowance (5%)				$56,000
Overhead & Profit (15%)				$176,000
Bonds & Insurance (2%)				$27,000
Total Construction Cost				**$1,375,000**
Engineering, Admin., Legal, Permitting (24%)				$330,000
Total Project Cost				**$1,705,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Replace the Four (4) Grit Pumps

Priority: Low

Existing Condition:

1. Grit Pumps were replaced in 2007 with the Screenings Addition.

Recommendation:

1. Plan for replacement of Grit Pumps in 2027 from wear and tear.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Grit Pumps	4	EA	$2,500.00	$10,000
Provide New Grit Pumps	4	EA	$36,000.00	$144,000
Electrical/Controls	4	EA	$2,500.00	$10,000
Subtotal				$164,000
Undeveloped Design Detail(25%)				$41,000
Construction Subtotal W/Contingencies				**$205,000**
General Conditions, Mobilization (5%)				$10,000
Sales Tax Allowance (5%)				$11,000
Overhead & Profit (15%)				$34,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$265,000**
Engineering, Admin., Legal, Permitting (24%)				$64,000
Total Project Cost				**$329,000**

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Grit Pump Suction Piping/Valves

Priority: Low

Existing Condition:

1. 4 Plug Valves and 1 Gate Valve on the Grit Pump Suction Piping were installed in 2007 with the screenings addition.

Recommendation:

1. Plan for replacement of the 4 Plug Valves and 1 Gate Valve on the Suction Piping of the Grit Pumps for 2027.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Suction Gate Valves	5	EA	$3,000.00	$15,000
Sandblast and Repaint Piping	2	EA	$3,000.00	$6,000
Subtotal				$21,000
Undeveloped Design Detail(25%)				$6,000
Construction Subtotal W/Contingencies				**$27,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$4,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$34,000**
Engineering, Admin., Legal, Permitting (24%)				$8,000
Total Project Cost				**$42,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Grit Building (3)

Task: Replace the Grit Washers/Cyclones and Classifier Equipment

Priority: Low

Existing Condition:

1. Grit Washer and Cyclones were installed in 2007 with the Screenings Addition.

Recommendation:

1. Plan for replacing the Grit Washer Including Cyclones and Classifier in 2027.
2. Update electrical as required when replacing the grit washer equipment.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the Grit Washers/Cyclones and Classifier	1	LS	$120,000.00	$120,000
Subtotal				$120,000
Undeveloped Design Detail(25%)				$30,000
Construction Subtotal W/Contingencies				**$150,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$25,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$195,000**
Engineering, Admin., Legal, Permitting (24%)				$47,000
Total Project Cost				**$242,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Pumping Building (4)

Task: HVAC Improvements

Priority: Medium

Existing Condition:

1. Lacking heat at times due to competing heat requirements on hot water system.
2. Condensation issue in building.

Recommendation:

1. Provide Gas Unit Heaters for supplemental heat during the colder winter months.
2. Provide additional air supply and exhaust fans or dehubmidifiers to remove condensation.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Gas Unit Heaters for Supplemental Heat	2	EA	$3,125.00	$6,250
Supply/Exhaust Fans or Dehumidifiers	2	EA	$6,250.00	$12,500
Electrical	1	LS	$3,000.00	$3,000
Gas Piping System for GUH	200	LF	$50.00	$10,000
Subtotal				$32,000
Undeveloped Design Detail(25%)				$8,000
Construction Subtotal W/Contingencies				**$40,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$7,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$52,000**
Engineering, Admin., Legal, Permitting (24%)				$12,000
Total Project Cost				**$64,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Pumping Building (4)

Task: Replace the Exterior Access Doors

Priority: Medium

Existing Condition:

1. The existing exterior access doors are old, weathered and in poor condition.

Recommendation:

1. Replace the existing exterior doors.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Doors	3	EA	$500.00	$1,500
New Double Door	1	EA	$8,000.00	$8,000
New Single Access Doors	1	EA	$4,000.00	$4,000
Subtotal				$14,000
Undeveloped Design Detail(25%)				$4,000
Construction Subtotal W/Contingencies				**$18,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$23,000**
Engineering, Admin., Legal, Permitting (24%)				$6,000
Total Project Cost				**$29,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Pumping Building (4)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Conduits, electrical and utility boxes are showing signs of deterioration.

Recommendation:

1. Upgrade the electrical

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Upgrade Electrical Wiring In Bldg	1	LS	$15,000.00	$15,000
Replace Electrical Conduits & Boxes	1	LS	$15,000.00	$15,000
Extend Fiber Optic Line	1	LS	$30,000.00	$30,000
Subtotal				$60,000
Undeveloped Design Detail(25%)				$15,000
Construction Subtotal W/Contingencies				**$75,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$4,000
Overhead & Profit (15%)				$12,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$97,000**
Engineering, Admin., Legal, Permitting (24%)				$23,000
Total Project Cost				**$120,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Pumping Building (4)

Task: Replace the Primary Sludge Pumps (4 Each)

Priority: Low

Existing Condition:

1. The Primary sludge pumps were replaced in 2016.

Recommendation:

1. Plan for replacement of the Primary Sludge Pumps in 2036.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove/Replace Primary Sludge Pumps	4	EA	$60,000.00	$240,000
Subtotal				$240,000
Undeveloped Design Detail(25%)				$60,000
Construction Subtotal W/Contingencies				**$300,000**
General Conditions, Mobilization (5%)				$15,000
Sales Tax Allowance (5%)				$16,000
Overhead & Profit (15%)				$50,000
Bonds & Insurance (2%)				$8,000
Total Construction Cost				**$389,000**
Engineering, Admin., Legal, Permitting (24%)				$93,000
Total Project Cost				**$482,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Primary Clarifiers (5)

Task: Catwalk Window Improvements

Priority: High

Existing Condition:

1. Worn seals around the operable observation windows of the catwalks resulting in corrosion on the interior walls of the catwalks.

Recommendation:

1. Replace the entire window system on the windows that are severly damaged.
2. Replace the weather stripping on the remaining windows.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace damaged windows on the PC Catwalks	8	EA	$1,000.00	$8,000
Replace Window Seals on the PC Catwalks	8	EA	$400.00	$3,200
Subtotal				$11,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$14,000**
General Conditions, Mobilization (5%)				$700
Sales Tax Allowance (5%)				$700
Overhead & Profit (15%)				$2,300
Bonds & Insurance (2%)				$400
Total Construction Cost				**$18,100**
Engineering, Admin., Legal, Permitting (24%)				$4,000
Total Project Cost				**$22,100**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Primary Clarifiers (5)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Severe corrosion on the electrical boxes at the access platform to the clarifier walkway bridges.
2. Lightning protection downleads are missing or broken.

Recommendation:

1. Replace all the conduit and associated electrical equipment between Sludge Pumping and the access platforms
2. Repair the lightning protection system

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Repair the lightning protection system	4	EA	$1,500.00	$6,000
Replace Electrical from Platforms to Bldg #4	4	EA	$15,000.00	$60,000
Subtotal				$66,000
Undeveloped Design Detail(25%)				$17,000
Construction Subtotal W/Contingencies				**$83,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$4,000
Overhead & Profit (15%)				$14,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$107,000**
Engineering, Admin., Legal, Permitting (24%)				$26,000
Total Project Cost				**$133,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Primary Clarifiers (5)

Task: Mechanism and Concrete Basin Rehab.

Priority: Medium

Existing Condition:

1. Corrosion is visible on the operator stand, gears, and the telescoping valves for the scum pits
2. Cracks/deterioration of concrete surfaces on the interior clarifier basins.
3. Clarifier mechanisms are original from 1986, have worn surfaces and are unreliable.
4. There is discoloration on the exterior concrete walls.
5. The step at the entrance door to the walkway bridges is showing signs of severe corrosion
6. Drain valves are difficult to operate, but are currently being replaced.

Recommendation:

1. Replace the mechanism drives and provide a spare drive.
2. Replace the sludge collection portion of the mechanisms along with the wiers and scum baffles.
3. Replace the telescoping valves in the scum pits.
4. Recoat the exterior concrete surfaces and repair the interior concrete surfaces with gunite, expoxy grout, or coating.
5. Replace the steps at the entrance to the catwalks.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the PC Mechanism Drives	4	EA	$60,000.00	$240,000
Spare Mechanism Drive	1	EA	$60,000.00	$60,000
Remove & Reset Domes	4	EA	$2,500.00	$10,000
Replace sludge collection mechanism	4	EA	$225,000.00	$900,000
Replace the metal steps at the catwalk entrance	4	EA	$1,500.00	$6,000
Replace Scum Telescoping Valves	4	EA	$8,000.00	$32,000
Restore Int./Ext. Concrete Surfaces (50%)	9,998	SF	$37.50	$374,918
Replace the drain valves	0	EA	$15,000.00	$0
Subtotal				$1,623,000
Undeveloped Design Detail(25%)				$406,000
Construction Subtotal W/Contingencies				**$2,029,000**
General Conditions, Mobilization (5%)				$101,000
Sales Tax Allowance (5%)				$107,000
Overhead & Profit (15%)				$336,000
Bonds & Insurance (2%)				$51,000
Total Construction Cost				**$2,624,000**
Engineering, Admin., Legal, Permitting (24%)				$630,000
Total Project Cost				**$3,254,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Primary Clarifiers (5)

Task: Replace the Dome Covers.

Priority: Low

Existing Condition:

1. The Domes on the Primary Clarifiers are Original and May need to be replaced in the future.

Recommendation:

1. Plan for replacement of the four (4) Primary Clarifier Aluminum Domes by 2036.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the PC Domes	4	EA	$300,000.00	$1,200,000
Subtotal				$1,200,000
Undeveloped Design Detail(25%)				$300,000
Construction Subtotal W/Contingencies				**$1,500,000**
General Conditions, Mobilization (5%)				$75,000
Sales Tax Allowance (5%)				$79,000
Overhead & Profit (15%)				$248,000
Bonds & Insurance (2%)				$38,000
Total Construction Cost				**$1,940,000**
Engineering, Admin., Legal, Permitting (24%)				$466,000
Total Project Cost				**$2,406,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Primary Clarifiers (5)

Task: Replace the Clarifier Drain Valves

Priority: Low

Existing Condition:

1. Drain valves are currently being replace in 2016 because they are difficult to operate.

Recommendation:

1. Plan for replacement of the drain valves again in 2036.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the drain valves	4	EA	$15,000.00	$60,000
Subtotal				$60,000
Undeveloped Design Detail(25%)				$15,000
Construction Subtotal W/Contingencies				**$75,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$4,000
Overhead & Profit (15%)				$12,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$97,000**
Engineering, Admin., Legal, Permitting (24%)				$23,000
Total Project Cost				**$120,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #3 (5A)

Task: Slide Gate Replacement

Priority: Low

Existing Condition:

1. The existing slide gates stick and are difficult to operate.

Recommendation:

1. Replace the four (4) slide gates with new fabricated aluminum slide gates.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 48"x30" Slide Gates	4	EA	$30,000.00	$120,000
Subtotal				$145,000
Undeveloped Design Detail(25%)				$37,000
Construction Subtotal W/Contingencies				**$182,000**
General Conditions, Mobilization (5%)				$9,000
Sales Tax Allowance (5%)				$10,000
Overhead & Profit (15%)				$30,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$236,000**
Engineering, Admin., Legal, Permitting (24%)				$57,000
Total Project Cost				**$293,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #3 (5A)

Task: Rehabilitation Concrete Structure and Replace Grating and Handrailing

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating and handrailing for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	1200	SF	$37.50	$45,000
Remove and replace handrailing	35	LF	$45.00	$1,575
Remove and replace grating	90	SF	$40.00	$3,600
Subtotal				$50,000
Undeveloped Design Detail(25%)				$13,000
Construction Subtotal W/Contingencies				**$63,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$10,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$81,000**
Engineering, Admin., Legal, Permitting (24%)				$19,000
Total Project Cost				**$100,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: First Stage Trickling Filters (6)

Task: Replace the Effluent Sluice Gates

Priority: Low

Existing Condition:

1. Manually operated effluent sluice gates for the trickling filters are stuck and unable to be operated.

Recommendation:

1. Replace the effluent sluice gates on all four (4) of the First Stage Trickling Filters.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace 36"x36" Effluent Sluice Gates	4	EA	$25,000.00	$100,000
Subtotal				$100,000
Undeveloped Design Detail(25%)				$25,000
Construction Subtotal W/Contingencies				**$125,000**
General Conditions, Mobilization (5%)				$6,000
Sales Tax Allowance (5%)				$7,000
Overhead & Profit (15%)				$21,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$162,000**
Engineering, Admin., Legal, Permitting (24%)				$39,000
Total Project Cost				**$201,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #4 (6A)

Task: Replace the Slide Gates and Sluice Gate

Priority: Low

Existing Condition:

1. The existing four (4) slide gates and bypass sluice gate stick and are difficult to operate.
2. Gasket seals are pulling away from the gate guides

Recommendation:

1. Replace the four (4) slide gates with new fabricated aluminum slide gates.
2. Replace the bypass sluice gate with a new 36" sluice gate.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 72" x 48" Slide Gates	4	EA	$40,000.00	$160,000
Repair Spalled Concrete	105	SF	$150.00	$15,750
Replace 36" Sluice Gate	1	EA	$30,000.00	$30,000
Subtotal				$231,000
Undeveloped Design Detail(25%)				$58,000
Construction Subtotal W/Contingencies				**$289,000**
General Conditions, Mobilization (5%)				$14,000
Sales Tax Allowance (5%)				$15,000
Overhead & Profit (15%)				$48,000
Bonds & Insurance (2%)				$7,000
Total Construction Cost				**$373,000**
Engineering, Admin., Legal, Permitting (24%)				$90,000
Total Project Cost				**$463,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #8 (6B)

Task: Rehabilitation Concrete Structure and Replace Grating

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	297	SF	$37.50	$11,138
Remove and replace grating	30	SF	$40.00	$1,200
Subtotal				$12,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$15,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$20,000**
Engineering, Admin., Legal, Permitting (24%)				$5,000
Total Project Cost				**$25,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #8 (6B)

Task: Site Improvements (Part of facility sidewalk replacement plan)

Priority: Medium

Existing Condition:

1. Concrete sidewalk steps at Manhole #8 are difficult to clear snow with UTV.
2. Sidewalks are settling around Manhole #8 and too narrow for clearing snow with UTV.

Recommendation:

1. Remove the existing sidewalk steps, regrade area and configure sidewalk to eliminate sidewalk steps.
2. Widen sidewalks replaced to provide better access for clearing snow with UTV.
3. Replace and widen the sidewalks from Splitter MH #4 to Splitter MH #5.
4. **Complete work as part of sidewalk replacement plan for entire plant.**

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Stairway	29	SY	$12.00	
Remove Existing Sidewalk	300	SY	$12.00	
Site Grading and Restoration	1	LS	$3,000.00	
New Concrete Sidewalk	3850	SF	$7.00	
Subtotal				$0
Undeveloped Design Detail(25%)				$0
Construction Subtotal W/Contingencies				**$0**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$0
Bonds & Insurance (2%)				$0
Total Construction Cost				**$0**
Engineering, Admin., Legal, Permitting (24%)				$0
Total Project Cost				**$0**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: First Stage Intermediate Clarifiers (7)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Electrical boxes on the walkways have severe surface corrosion.

Recommendation:

1. Replace the electrical boxes and conduit that have corrosion.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Electrical Boxes and Conduits	2	EA	$12,000.00	$24,000
Subtotal				$24,000
Undeveloped Design Detail(25%)				$6,000
Construction Subtotal W/Contingencies				**$30,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$5,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$40,000**
Engineering, Admin., Legal, Permitting (24%)				$10,000
Total Project Cost				**$50,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: First Stage Intermediate Clarifiers (7)

Task: Replace Mechanism Drives

Priority: Low

Existing Condition:

1. Clarifier mechanisms are original from 1986 and are unreliable due to age and wear.

Recommendation:

1. Replace the mechanism drives.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the Clarifier Mechanism Drives	2	EA	$60,000.00	$120,000
Subtotal				$120,000
Undeveloped Design Detail(25%)				$30,000
Construction Subtotal W/Contingencies				**$150,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$25,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$195,000**
Engineering, Admin., Legal, Permitting (24%)				$47,000
Total Project Cost				**$242,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: First Stage Intermediate Clarifiers (7)

Task: Miscellaneous Site Improvements

Priority: Medium

Existing Condition:

1. Ground has eroded away under the concrete support for the drain valve operator stands

Recommendation:

1. Fill and grade under the concrete supports for the drain valve operator stands.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Grade Under Humus Valve Supports	1	LS	$500.00	$500
Subtotal				$1,000
Undeveloped Design Detail(25%)				$1,000
Construction Subtotal W/Contingencies				**$2,000**
General Conditions, Mobilization (5%)				$100
Sales Tax Allowance (5%)				$100
Overhead & Profit (15%)				$300
Bonds & Insurance (2%)				$100
Total Construction Cost				**$2,600**
Engineering, Admin., Legal, Permitting (24%)				$1,000
Total Project Cost				**$3,600**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #5 (7A)

Task: Replace the Slide Gates and Sluice Gate

Priority: Low

Existing Condition:

1. The existing two (2) slide gates and bypass sluice gate stick and are difficult to operate.

Recommendation:

1. Replace the two (2) slide gates with new fabricated aluminum slide gates.
2. Replace the bypass sluice gate with a new 36" sluice gate.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 96" x 36" Slide Gates	2	EA	$40,000.00	$80,000
Replace 36" Sluice Gate	1	EA	$30,000.00	$30,000
Subtotal				$135,000
Undeveloped Design Detail(25%)				$34,000
Construction Subtotal W/Contingencies				**$169,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$9,000
Overhead & Profit (15%)				$28,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$218,000**
Engineering, Admin., Legal, Permitting (24%)				$52,000
Total Project Cost				**$270,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #5 (7A)

Task: Rehabilitation Concrete Structure and Replace Grating and Guardrailing

Priority: Low

Existing Condition:

1. The existing concrete, grating and Guardrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating and handrailing for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	813	SF	$37.50	$30,488
Remove and replace Guardrailing	34	LF	$45.00	$1,530
Remove and replace grating	80	SF	$40.00	$3,200
Subtotal				$35,000
Undeveloped Design Detail(25%)				$9,000
Construction Subtotal W/Contingencies				**$44,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$7,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$56,000**
Engineering, Admin., Legal, Permitting (24%)				$13,000
Total Project Cost				**$69,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #9 (7B)

Task: Replace the 36' Sluice Gates

Priority: Low

Existing Condition:

1. The sluice gates stick and are difficult to operate.

Recommendation:

1. Replace the two (2) sluice gates with new 36" sluice gates.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 36" Sluice Gate	2	EA	$30,000.00	$60,000
Subtotal				$85,000
Undeveloped Design Detail(25%)				$22,000
Construction Subtotal W/Contingencies				**$107,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$6,000
Overhead & Profit (15%)				$18,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$139,000**
Engineering, Admin., Legal, Permitting (24%)				$33,000
Total Project Cost				**$172,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #9 (7B)

Task: Rehabilitation Concrete Structure and Replace Grating

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	300	SF	$37.50	$11,250
Remove and replace grating	30	SF	$40.00	$1,200
Subtotal				$12,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$15,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$20,000**
Engineering, Admin., Legal, Permitting (24%)				$5,000
Total Project Cost				**$25,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #9 (7B)

Task: Site Improvements (Part of facility sidewalk replacement plan)

Priority: Low

Existing Condition:

1. Sidewalks are settling around Manhole #9 and too narrow for clearing snow with UTV.

Recommendation:

1. Replace and widen the sidewalks from Splitter MH #5 to Splitter MH #6.
2. **Complete work as part of sidewalk replacement plan for entire plant.**

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Sidewalk	190	SY	$12.00	
Site Grading and Restoration	1	LS	$1,500.00	
New Concrete Sidewalk	2200	SF	$7.00	
Subtotal				$0
Undeveloped Design Detail(25%)				$0
Construction Subtotal W/Contingencies				**$0**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$0
Bonds & Insurance (2%)				$0
Total Construction Cost				**$0**
Engineering, Admin., Legal, Permitting (24%)				$0
Total Project Cost				**$0**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Second Stage Trickling Filters (8)

Task: Replace the Effluent Sluice Gates

Priority: Low

Existing Condition:

1. Manually operated effluent sluice gates for the trickling filters are stuck and unable to be operated.

Recommendation:

1. Replace the effluent sluice gates on all four (4) of the First Stage Trickling Filters.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace 36"x36" Effluent Sluice Gates	4	EA	$25,000.00	$100,000
Subtotal				$100,000
Undeveloped Design Detail(25%)				$25,000
Construction Subtotal W/Contingencies				**$125,000**
General Conditions, Mobilization (5%)				$6,000
Sales Tax Allowance (5%)				$7,000
Overhead & Profit (15%)				$21,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$162,000**
Engineering, Admin., Legal, Permitting (24%)				$39,000
Total Project Cost				**$201,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #6 (8A)

Task: Slide Gate and Sluice Gate Replacement

Priority: Low

Existing Condition:

1. The existing four (4) slide gates and bypass sluice gate stick and are difficult to operate.
2. Gasket seals are pulling away from the gate guides

Recommendation:

1. Replace the four (4) slide gates with new fabricated aluminum slide gates.
2. Replace the bypass sluice gate with a new 36" sluice gate.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 72" x 42" Slide Gates	4	EA	$40,000.00	$160,000
Replace 36" Sluice Gate	1	EA	$30,000.00	$30,000
Subtotal				$215,000
Undeveloped Design Detail(25%)				$54,000
Construction Subtotal W/Contingencies				**$269,000**
General Conditions, Mobilization (5%)				$13,000
Sales Tax Allowance (5%)				$14,000
Overhead & Profit (15%)				$44,000
Bonds & Insurance (2%)				$7,000
Total Construction Cost				**$347,000**
Engineering, Admin., Legal, Permitting (24%)				$83,000
Total Project Cost				**$430,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #6 (8A)

Task: Rehabilitation Concrete Structure and Replace Grating and Guardrailing

Priority: Low

Existing Condition:

1. The existing concrete, grating and Guardrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating and handrailing for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	1750	SF	$37.50	$65,625
Remove and replace Guardrailing	45	LF	$45.00	$2,025
Remove and replace grating	112	SF	$40.00	$4,480
Subtotal				$72,000
Undeveloped Design Detail(25%)				$18,000
Construction Subtotal W/Contingencies				**$90,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$15,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$117,000**
Engineering, Admin., Legal, Permitting (24%)				$28,000
Total Project Cost				**$145,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #10 (8B)

Task: Site Improvements (Part of facility sidewalk replacement plan)

Priority: Medium

Existing Condition:

1. Sidewalks are settling around Manhole #10 and too narrow for clearing snow with UTV.

Recommendation:

1. Replace and widen the sidewalks from Splitter Manhole #6 to Manhole #10.
2. **Complete work as part of sidewalk replacement plan for entire plant.**

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Sidewalk	245	SY	$12.00	
Site Grading and Restoration	1	LS	$2,500.00	
New Concrete Sidewalk	2815	SF	$7.00	
Subtotal				$0
Undeveloped Design Detail(25%)				$0
Construction Subtotal W/Contingencies				**$0**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$0
Bonds & Insurance (2%)				$0
Total Construction Cost				**$0**
Engineering, Admin., Legal, Permitting (24%)				$0
Total Project Cost				**$0**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #10 (8B)

Task: Rehabilitation Concrete Structure and Replace Grating

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	352	SF	$37.50	$13,200
Remove and replace grating	30	SF	$40.00	$1,200
Subtotal				$14,000
Undeveloped Design Detail(25%)				$4,000
Construction Subtotal W/Contingencies				**$18,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$23,000**
Engineering, Admin., Legal, Permitting (24%)				$6,000
Total Project Cost				**$29,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Second Stage Intermediate Clarifiers (9)

Task: Repair Guardrail Post

Priority: High

Existing Condition:

1. Concrete has deteriorated around some of the guardrail posts.

Recommendation:

1. Repair the concrete around the guardrail posts.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Repair Concrete At Guardrail Posts	3	EA	$562.50	$1,688
Subtotal				$2,000
Undeveloped Design Detail(25%)				$1,000
Construction Subtotal W/Contingencies				**$3,000**
General Conditions, Mobilization (5%)				$200
Sales Tax Allowance (5%)				$200
Overhead & Profit (15%)				$500
Bonds & Insurance (2%)				$100
Total Construction Cost				**$4,000**
Engineering, Admin., Legal, Permitting (24%)				$1,000
Total Project Cost				**$5,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Second Stage Intermediate Clarifiers (9)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Electrical boxes on the walkways have severe surface corrosion.

Recommendation:

1. Replace the electrical boxes and conduit that have corrosion.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Electrical Boxes and Conduits	2	EA	$12,000.00	$24,000
Subtotal				$24,000
Undeveloped Design Detail(25%)				$6,000
Construction Subtotal W/Contingencies				**$30,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$5,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$40,000**
Engineering, Admin., Legal, Permitting (24%)				$10,000
Total Project Cost				**$50,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Second Stage Intermediate Clarifiers (9)

Task: Replace Mechanism Drives

Priority: Low

Existing Condition:

1. Clarifier mechanisms are original from 1986 and are unreliable due to age and wear.

Recommendation:

1. Replace the mechanism drives.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the Int. Clarifier Mechanism Drives	2	EA	$60,000.00	$120,000
Subtotal				$120,000
Undeveloped Design Detail(25%)				$30,000
Construction Subtotal W/Contingencies				**$150,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$25,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$195,000**
Engineering, Admin., Legal, Permitting (24%)				$47,000
Total Project Cost				**$242,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #7 (9A)

Task: Slide Gate and Sluice Gate Replacement

Priority: Low

Existing Condition:

1. The existing two (2) slide gates and bypass sluice gate stick and are difficult to operate.

Recommendation:

1. Replace the two (2) slide gates with new fabricated aluminum slide gates.
2. Replace the bypass sluice gate with a new 36" sluice gate.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 96" x 36" Slide Gates	2	EA	$40,000.00	$80,000
Replace 36" Sluice Gate	1	EA	$30,000.00	$30,000
Subtotal				$135,000
Undeveloped Design Detail(25%)				$34,000
Construction Subtotal W/Contingencies				**$169,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$9,000
Overhead & Profit (15%)				$28,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$218,000**
Engineering, Admin., Legal, Permitting (24%)				$52,000
Total Project Cost				**$270,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #7 (9A)

Task: Site Improvements (Part of facility sidewalk replacement plan)

Priority: Medium

Existing Condition:

1. Sidewalks are settling around Splitter Manhole #7.
2. Concrete sidewalk steps at Splitter Manhole #7 are difficult to clear snow with UTV.

Recommendation:

1. Remove and replace the sidewalks around Splitter Manhole #7.
2. Remove the existing sidewalk steps, regrade area and configure sidewalk to eliminate sidewalk steps.
3. Widen sidewalks replaced to provide better access for clearing snow with UTV.
4. **Complete work as part of sidewalk replacement plan for entire plant.**

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Sidewalk and Stairway	55	SY	$12.00	
Site Grading and Restoration	1	LS	$3,000.00	
New Concrete Sidewalk	840	SF	$7.00	
Subtotal				$0
Undeveloped Design Detail(25%)				$0
Construction Subtotal W/Contingencies				**$0**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$0
Bonds & Insurance (2%)				$0
Total Construction Cost				**$0**
Engineering, Admin., Legal, Permitting (24%)				$0
Total Project Cost				**$0**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #7 (9A)

Task: Rehabilitation Concrete Structure and Replace Grating and Guardrailing

Priority: Low

Existing Condition:

1. The existing concrete, grating and Guardrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating and handrailing for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	860	SF	$37.50	$32,250
Remove and replace Guardrailing	34	LF	$45.00	$1,530
Remove and replace grating	80	SF	$40.00	$3,200
Subtotal				$37,000
Undeveloped Design Detail(25%)				$10,000
Construction Subtotal W/Contingencies				**$47,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$8,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$60,000**
Engineering, Admin., Legal, Permitting (24%)				$14,000
Total Project Cost				**$74,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #11 (9B)

Task: Site Improvements (Part of facility sidewalk replacement plan)

Priority: Medium

Existing Condition:

1. Sidewalks are cracked and settling around Manhole #11.

Recommendation:

1. Replace and widen the sidewalks around Manhole #11.
2. **Complete work as part of sidewalk replacement plan for entire plant.**

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Sidewalk	100	SY	$12.00	
Site Grading and Restoration	1	LS	$1,500.00	
New Concrete Sidewalk	1155	SF	$7.00	
Subtotal				$0
Undeveloped Design Detail(25%)				$0
Construction Subtotal W/Contingencies				**$0**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$0
Bonds & Insurance (2%)				$0
Total Construction Cost				**$0**
Engineering, Admin., Legal, Permitting (24%)				$0
Total Project Cost				**$0**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #11 (9B)

Task: Replace the Sluice Gates

Priority: Low

Existing Condition:

1. The existing sluice gates stick and are difficult to operate.

Recommendation:

1. Replace the sluice gates with a new 36" sluice gate.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 36" Sluice Gate	2	EA	$30,000.00	$60,000
Subtotal				$85,000
Undeveloped Design Detail(25%)				$22,000
Construction Subtotal W/Contingencies				**$107,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$6,000
Overhead & Profit (15%)				$18,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$139,000**
Engineering, Admin., Legal, Permitting (24%)				$33,000
Total Project Cost				**$172,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #11 (9B)

Task: Rehabilitation Concrete Structure and Replace Grating

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	355	SF	$37.50	$13,313
Remove and replace grating	30	SF	$40.00	$1,200
Subtotal				$15,000
Undeveloped Design Detail(25%)				$4,000
Construction Subtotal W/Contingencies				**$19,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$24,000**
Engineering, Admin., Legal, Permitting (24%)				$6,000
Total Project Cost				**$30,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10)

Task: Electrical Improvements

Priority: High

Existing Condition:

1. Corrosion on the electrical junction box near the entrance.

Recommendation:

1. Replace the electrical conduit and junction box near the entrance

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Exterior Electrical Conduit & J-Box	1	LS	$15,000.00	$15,000
Subtotal				$15,000
Undeveloped Design Detail(25%)				$4,000
Construction Subtotal W/Contingencies				**$19,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,200
Bonds & Insurance (2%)				$500
Total Construction Cost				**$24,700**
Engineering, Admin., Legal, Permitting (24%)				$5,900
Total Project Cost				**$30,600**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10.)

Task: Repair Leaking from Wetwell to Drywell

Priority: High

Existing Condition:

1. Dry well – leaking in the structure at the wet well wall.

Recommendation:

1. Seal the joints and repair concrete to stop leaking from the wet well into the dry well.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Cleaning and Preparation Work	1000	SF	$25.00	$25,000
Wetwell Joint Sealing	100	Gal	$700.00	$70,000
Subtotal				$70,000
Undeveloped Design Detail(25%)				$18,000
Construction Subtotal W/Contingencies				**$140,000**
General Conditions, Mobilization (5%)				$7,000
Sales Tax Allowance (5%)				$7,000
Overhead & Profit (15%)				$23,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$181,000**
Engineering, Admin., Legal, Permitting (24%)				$43,000
Total Project Cost				**$224,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10.)

Task: Replace the Humus Line

Priority: High

Existing Condition:

1. Humus piping to the wet well is thin from wear.
2. Suction and discharge piping and valves for the Humus/Inplant Pumps are thin from wear.

Recommendation:

1. Replace all the humus piping and valves with glass line ductile iron pipe.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove existing 12" DIP	45	LF	$75.00	$3,375
Remove existing 14" DIP	72	LF	$100.00	$7,200
Remove existing 18" DIP	31	LF	$125.00	$3,875
Remove existing valves	18	EA	$250.00	$4,500
12" Glass Lined DIP	45	LF	$270.00	$12,150
14" Glass Lined DIP	72	LF	$330.00	$23,760
18" Glass Lined DIP	31	LF	$430.00	$13,330
14"x6" Glass Lined DIP Reducer	6	EA	$900.00	$5,400
14" Glass Lined DIP 90 Deg. Elbow	6	EA	$1,700.00	$10,200
18"x 14" Glass Lined DIP Reducer	1	EA	$1,800.00	$1,800
18"X 14" Glass Lined DIP Wye	3	EA	$5,600.00	$16,800
18" Glass Lined DIP 90 Deg. Elbow	2	EA	$3,600.00	$7,200
12" Gate Valves	4	EA	$3,000.00	$12,000
14" Gate Valves	6	EA	$4,000.00	$24,000
14" Check Valves	3	EA	$6,000.00	$18,000
Wetwell Concrete Repair	100	SF	$150.00	$15,000
Subtotal				$179,000
Undeveloped Design Detail(25%)				$45,000
Construction Subtotal W/Contingencies				**$224,000**
General Conditions, Mobilization (5%)				$11,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$37,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$290,000**
Engineering, Admin., Legal, Permitting (24%)				$70,000
Total Project Cost				**$360,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10)

Task: Miscellaneous Building Improvements

Priority: Medium

Existing Condition:

1. Exterior north double doors do not shut properly.
2. Exterior/interior masonry control joint sealant is significantly deteriorated.
3. Rear exit is missing stoop and stairs.
4. Interior paint is deteriorating due to condensation and water intrusion around windows.

Recommendation:

1. Replace the north double doors.
2. Replace sealant and backer rod in masonry joints.
3. Tuck point masonry as necessary where water has damaged brick and CMU.
4. Construct a landing and steps at rear exit.
5. Replace sealant and backer rod on all windows to eliminate future water damage.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Single Exterior Doors	3	EA	$4,000.00	$12,000
Replace Ext. Double Doors on North Side of Bld	1	EA	$8,000.00	$8,000
Tuck-pointing (Assume 50% of Bldg).	2,478	SF	$15.00	$37,163
Replace Sealant/Backer Rod in Masonry Jts	288	LF	$25.00	$7,200
Landing and Stairs on Rear Exit	6	CY	$600.00	$3,300
Replace Sealant and Backer Rod on Windows	7	EA	$400.00	$2,800
Subtotal				$71,000
Undeveloped Design Detail(25%)				$18,000
Construction Subtotal W/Contingencies				**$89,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$15,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$115,000**
Engineering, Admin., Legal, Permitting (24%)				$28,000
Total Project Cost				**$143,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10)

Task: Replace the Transfer Pumps (4 Each)

Priority: Low

Existing Condition:

1. The transfer pumps were replaced in 2009 and are in good working condition.

Recommendation:

1. Plan for replacement of the Transfer Pumps in 2029.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove/Replace Transfer Pumps	4	EA	$200,000.00	$800,000
Subtotal				$800,000
Undeveloped Design Detail(25%)				$200,000
Construction Subtotal W/Contingencies				**$1,000,000**
General Conditions, Mobilization (5%)				$50,000
Sales Tax Allowance (5%)				$53,000
Overhead & Profit (15%)				$165,000
Bonds & Insurance (2%)				$25,000
Total Construction Cost				**$1,293,000**
Engineering, Admin., Legal, Permitting (24%)				$310,000
Total Project Cost				**$1,603,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10)

Task: Replace the Humus Pumps (3 Each)

Priority: Low

Existing Condition:

1. The Humus Pumps were replaced in 2013 and are in good working condition.

Recommendation:

1. Plan for replacement of the Transfer Pumps in 2029.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove/Replace Humus Pumps	3	EA	$100,000.00	$300,000
Subtotal				$300,000
Undeveloped Design Detail(25%)				$75,000
Construction Subtotal W/Contingencies				**$375,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$62,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$486,000**
Engineering, Admin., Legal, Permitting (24%)				$117,000
Total Project Cost				**$603,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Process Pumping Building (10)

Task: Replace the Recirculation Pumps (5 Each)

Priority: Low

Existing Condition:

1. The Humus Pumps were replaced in 2013 and are in good working condition.

Recommendation:

1. Plan for replacement of the Transfer Pumps in 2029.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove/Replace Recirculation Pump #1	1	EA	$100,000.00	$100,000
Remove/Replace Recirculation Pump #2	1	EA	$150,000.00	$150,000
Remove/Replace Recirculation Pump #3	1	EA	$150,000.00	$150,000
Remove/Replace Recirculation Pump #4	1	EA	$75,000.00	$75,000
Remove/Replace Recirculation Pump #5	1	EA	$150,000.00	$150,000
Subtotal				$625,000
Undeveloped Design Detail(25%)				$157,000
Construction Subtotal W/Contingencies				**$782,000**
General Conditions, Mobilization (5%)				$39,000
Sales Tax Allowance (5%)				$41,000
Overhead & Profit (15%)				$129,000
Bonds & Insurance (2%)				$20,000
Total Construction Cost				**$1,011,000**
Engineering, Admin., Legal, Permitting (24%)				$243,000
Total Project Cost				**$1,254,000**

Computed: KFN
Date: 10/3/2016
HDR Job No: 10028508

Checked: DVP
Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnels (11)

Task: Replace Roof at Exit Stair Tower and Update HVAC System

Priority: High

Existing Condition:

1. The existing Roof System at the Tunnel Exit Stair Tower is original, is in poor working condition, and not reliable.
2. The existing HVAC System in the Tunnel Exit Stair Tower is original, is in poor working condition and not reliable.

Recommendation:

1. Replace the existing roof system at the Tunnel Exit Stair Tower including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System at the Tunnel Exit Stair Tower.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	174	SF	$5.00	$871
Roof Insulation	436	SF	$4.38	$1,906
PVC Roof Membrane	2	SQ	$375.00	$653
Flashing	58	LF	$8.75	$508
Sealant & Caulking	44	SF	$3.13	$136
Replace Exhaust Fan	1	EA	$3,125.00	$3,125
Makeup Air Unit	1	EA	$55,000.00	$55,000
New Exhaust Fan	1	EA	$3,125.00	$3,125
Ductwork Replacement	1	LS	$16,000.00	$16,000
Subtotal				$82,000
Undeveloped Design Detail(25%)				$21,000
Construction Subtotal W/Contingencies				**$103,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$17,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$133,000**
Engineering, Admin., Legal, Permitting (24%)				$32,000
Total Project Cost				**$165,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnel (11)

Task: Replace the Mechanisms and Rehabilitate the Concrete Basins of the Gravity Thickeners.

Priority: High

Existing Condition:

1. Pitting/cracks/deterioration of concrete surfaces on the interior walls of the gravity thickener.
2. Gravity Thickener mechanisms are original from 1986, have worn surfaces and are unreliable.
3. There is exposed aggregate and staining on the exterior concrete walls.
4. The stairway and platform on Thickener No. 2 sways and is not properly secured to the structure.
5. Visible corrosion/pitting on the supports for the odor control blowers.

Recommendation:

1. Replace the mechanism drives and provide a spare drive.
2. Replace the sludge collection portion of the mechanisms along with the wiers and scum baffles.
3. Recoat the exterior concrete surfaces and repair the interior concrete surfaces with gunite, expoxy grout, or coating.
4. Secure the stairs and landing at the entrance to Gravity Thickener No. 2.
5. Rehab (Sandblast and recoat) the supports for the odor control blowers.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the Thickener Mechanism Drives	2	EA	$60,000.00	$120,000
Spare Mechanism Drive	1	EA	$60,000.00	$60,000
Remove & Reset Domes	2	EA	$2,500.00	$5,000
Replace sludge collection mechanism	2	EA	$180,000.00	$360,000
Secure the stairs and landing at Thickener #2	1	LS	$2,000.00	$2,000
Rehab Supports for Odor Control Blowers	2	EA	$2,000.00	$4,000
Restore Int./Ext. Concrete Surfaces (50%)	3,845	SF	$37.50	$144,199
Subtotal				$696,000
Undeveloped Design Detail(25%)				$174,000
Construction Subtotal W/Contingencies				**$870,000**
General Conditions, Mobilization (5%)				$44,000
Sales Tax Allowance (5%)				$46,000
Overhead & Profit (15%)				$144,000
Bonds & Insurance (2%)				$22,000
Total Construction Cost				**$1,126,000**
Engineering, Admin., Legal, Permitting (24%)				$270,000
Total Project Cost				**$1,396,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnel (11)

Task: Miscellaneous Tunnel Improvements.

Priority: High

Existing Condition:

1. The south end of the tunnel at the Digester Building has severe water damage due to a failing expansion joint system.
2. There is severe water damage to the CMU and brick veneer on the Exit Stair Tower
3. Process Piping in the tunnels has severe corrosion and peeling paint due to moisture.
4. The exterior single access door is in poor condition.

Recommendation:

1. Remove the ground cover and replace any damaged waterproofing membrane and the entire expansion joint system.
2. Installing a drainage system to divert water away from the low spots of the tunnel walls.
3. At the Exit Stair Tower replace a large portion of the brick veneer on the east side of the structure.
4. Tuck point portions of the brick veneer and Interior CMU wall that have water damage.
5. Sandblast and recoat process pumps and piping in the Tunnels.
6. Replace the exterior single access door.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
4" HDPE Perforated Drain Piping	700	LF	$35.00	$24,500
Tuck point at Tunnel exit	572	SF	$15.00	$8,580
Repair Brick at SE Corner of Bldg	1	LS	$2,500.00	$2,500
Concrete Wall Joint Sealing and Waterproofing.	50	Gal	$700.00	$35,000
Concrete Wall Repair	500	SF	$37.50	$18,750
Sandblast and recoat piping	3000	SF	$15.00	$45,000
Replace Exterior Access Door	1	E	$3,000.00	$3,000
Subtotal				$138,000
Undeveloped Design Detail(25%)				$35,000
Construction Subtotal W/Contingencies				**$173,000**
General Conditions, Mobilization (5%)				$9,000
Sales Tax Allowance (5%)				$9,000
Overhead & Profit (15%)				$29,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$224,000**
Engineering, Admin., Legal, Permitting (24%)				$54,000
Total Project Cost				**$278,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnels (11)

Task: Replace the Thickened Sludge Pumps (4 Each)

Priority: High

Existing Condition:

1. The Thickened sludge pumps are worn, inefficient, and require a significant amount of maintenance.

Recommendation:

1. Replace the Thickened Sludge Pumps.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove/Replace Thickened Sludge Pumps	4	EA	$45,000.00	$180,000
Subtotal				$180,000
Undeveloped Design Detail(25%)				$45,000
Construction Subtotal W/Contingencies				**$225,000**
General Conditions, Mobilization (5%)				$11,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$37,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$291,000**
Engineering, Admin., Legal, Permitting (24%)				$70,000
Total Project Cost				**$361,000**

Computed: KFN
Date: 10/3/2016
HDR Job No: 10028508

Checked: DVP
Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnels (11)

Task: Electrical Improvements in the Tunnels and at the Gravity Thickeners

Priority: High

Existing Condition:

1. There is significant corrosion of conduits at the Gravity Thickener platforms.
2. Conduits in the tunnel at the wall penetration to the Digester Building are failing due to moisture and corrosion.

Recommendation:

1. Replace electrical conduit, supports, and wiring at Thickener platforms.
2. Replace failed conduits, supports, and wiring in the tunnels.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Electrical at Thickener Platforms	2	EA	$12,000.00	$24,000
Replace Conduit/Supports & Wiring in Tunnel	1	LS	$22,000.00	$22,000
Subtotal				$46,000
Undeveloped Design Detail(25%)				$12,000
Construction Subtotal W/Contingencies				**$58,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$10,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$75,000**
Engineering, Admin., Legal, Permitting (24%)				$18,000
Total Project Cost				**$93,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Gravity Thickeners/Tunnels (11)

Task: Replace the Dome Covers.

Priority: Low

Existing Condition:

1. The Domes on the Thickeners are Original and May need to be replaced in the future.

Recommendation:

1. Plan for replacement of the two (2) Thickener Aluminum Domes by 2036.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the PC Domes	2	EA	$275,000.00	$550,000
Subtotal				$550,000
Undeveloped Design Detail(25%)				$138,000
Construction Subtotal W/Contingencies				**$688,000**
General Conditions, Mobilization (5%)				$34,000
Sales Tax Allowance (5%)				$36,000
Overhead & Profit (15%)				$114,000
Bonds & Insurance (2%)				$17,000
Total Construction Cost				**$889,000**
Engineering, Admin., Legal, Permitting (24%)				$213,000
Total Project Cost				**$1,102,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Digester Building (12)

Task: Replace Roof and HVAC System

Priority: Low

Existing Condition:

1. The Roof System for the Digester Building is being replaced under the current CIP.
2. The HVAC Systems for the Digester Building is also being replace under the current CIP

Recommendation:

1. Replace the roof system in 20 years when it has reached its useful life.
2. Replace and upgrade the HVAC System when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	5,300	SF	$2.50	$13,250
Roof Insulation	13,250	SF	$4.38	$57,969
PVC Roof Membrane	53	SQ	$375.00	$19,875
Flashing	350	LF	$8.75	$3,063
Sealant & Caulking	1,325	SF	$3.13	$4,141
Replace and Upgrade HVAC System	1	LS	$150,000.00	$150,000
Subtotal				$249,000
Undeveloped Design Detail(25%)				$63,000
Construction Subtotal W/Contingencies				**$312,000**
General Conditions, Mobilization (5%)				$16,000
Sales Tax Allowance (5%)				$16,000
Overhead & Profit (15%)				$52,000
Bonds & Insurance (2%)				$8,000
Total Construction Cost				**$404,000**
Engineering, Admin., Legal, Permitting (24%)				$97,000
Total Project Cost				**$501,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Digester Building (12)

Task: Replace Digester Covers, Mixing and Heating Equipment

Priority: Low

Existing Condition:

1. Digester Covers, Mixing and Heating Equipment is being replaced under current CIP.

Recommendation:

1. Replace the Digester Covers, Mixing and Heating Equipment in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Heat Exchangers	1	LS	$414,000.00	$414,000
Gas Conditioning	1	LS	$1,795,900.00	$1,795,900
Digester Covers	1	LS	$1,297,000.00	$1,297,000
Digester Mixing Equipment	1	LS	$1,297,000.00	$1,297,000
Gas Storage Sphere				$0
Digester Heating	1	LS	$1,297,000.00	$1,297,000
FOG Receiving	1	LS	$1,496,500.00	$1,496,500
Sludge Recirculation Pumps	3	EA	$83,145.00	$249,435
Sludge Transfer Pumps	5	EA	$99,800.00	$499,000
Subtotal				$8,346,000
Undeveloped Design Detail(25%)				$2,087,000
Construction Subtotal W/Contingencies				**$10,433,000**
General Conditions, Mobilization (5%)				$522,000
Sales Tax Allowance (5%)				$548,000
Overhead & Profit (15%)				$1,725,000
Bonds & Insurance (2%)				$265,000
Total Construction Cost				**$13,493,000**
Engineering, Admin., Legal, Permitting (24%)				$3,238,000
Total Project Cost				**$16,731,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Digester Building (12)

Task: Relocate and Replace Electrical Equipment

Priority: High

Existing Condition:

1. Location of electrical equipment does not meet NFPA 820 requirements due to common wall with the digester.

Recommendation:

1. Construct separate electrical building.
2. Relocate and replace electrical equipment.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
New Electrical Building	500	SF	$300.00	$150,000
HVAC System	1	LS	$50,000.00	$50,000
Plumbing	1	LS	$20,000.00	$20,000
New Electrical Equipment	1	LS	$300,000.00	$300,000
Subtotal				$520,000
Undeveloped Design Detail(25%)				$130,000
Construction Subtotal W/Contingencies				**$650,000**
General Conditions, Mobilization (5%)				$33,000
Sales Tax Allowance (5%)				$34,000
Overhead & Profit (15%)				$108,000
Bonds & Insurance (2%)				$17,000
Total Construction Cost				**$842,000**
Engineering, Admin., Legal, Permitting (24%)				$202,000
Total Project Cost				**$1,044,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Digester Building (12)

Task: Rehabilitation Gas Storage Sphere

Priority: Medium

Existing Condition:

1. Sphere is original.

Recommendation:

1. Rehabilitate Gas Storage Sphere.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sandblast and Recoat Gas Storage Sphere	12,750	SF	$25.00	$318,750
Subtotal				$319,000
Undeveloped Design Detail(25%)				$80,000
Construction Subtotal W/Contingencies				**$399,000**
General Conditions, Mobilization (5%)				$20,000
Sales Tax Allowance (5%)				$21,000
Overhead & Profit (15%)				$66,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$516,000**
Engineering, Admin., Legal, Permitting (24%)				$124,000
Total Project Cost				**$640,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Older Exhaust Fans and Boiler System

Priority: High

Existing Condition:

1. Boilers and Boiler Pumps are outdated
2. Room has a common wall with the digester, which is an NFPA 820 issue.
3. Roof exhaust fans #3 & #4 are original.

Recommendation:

1. Replace the two boilers and boiler pumps with updated boilers and pumps.
2. Replace older roof exhaust fans (#3 & #4) with updated exhaust fans of same size.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Exhaust Fan (#3 & #4)	2	EA	$5,000.00	$10,000
Replace Supply Fans	2	EA	$5,000.00	$10,000
Replace Boiler	2	EA	$60,000.00	$120,000
Replace Heat Exchanger Tubes	5	EA	$25,000.00	$125,000
Replace Boiler Pump	2	EA	$10,000.00	$20,000
Boiler Piping Replacement	1	LS	$30,000.00	$30,000
Subtotal				$315,000
Undeveloped Design Detail(25%)				$79,000
Construction Subtotal W/Contingencies				**$394,000**
General Conditions, Mobilization (5%)				$20,000
Sales Tax Allowance (5%)				$21,000
Overhead & Profit (15%)				$65,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$510,000**
Engineering, Admin., Legal, Permitting (24%)				$122,000
Total Project Cost				**$632,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Exterior Doors and South Door with Rollup Door

Priority: High

Existing Condition:

1. There are Issues with the operation, function, and size of the double doors on south side of building.
2. Issues with all exterior doors due to age and condition.

Recommendation:

1. Evaluate replacement of south door with new roll-up door.
2. Replace the exterior access doors (1 double door and 3 single doors)

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Double Door	1	EA	$500.00	$500
Building Mods to Accommodate new Door	2	EA	$2,500.00	$5,000
New Rollup Door with Electric Opener	1	EA	$25,000.00	$25,000
Replace Exterior Double Door	1	EA	$6,500.00	$6,500
Replace Exterior Single Doors	3	EA	$3,000.00	$9,000
Subtotal				$46,000
Undeveloped Design Detail(25%)				$12,000
Construction Subtotal W/Contingencies				**$58,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$10,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$75,000**
Engineering, Admin., Legal, Permitting (24%)				$18,000
Total Project Cost				**$93,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace the 26,000 Gallon Hot Water Storage Tank

Priority: Low

Existing Condition:

1. The Hot Water Storage Tank is old, outdated, with signs of corrosion.

Recommendation:

1. Replace the 26,000 Gallon Hot Water Storage Tank with a new Fiberglass Tank.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace Hot Water Storage Tank	1	EA	$91,000.00	$91,000
Subtotal				$91,000
Undeveloped Design Detail(25%)				$23,000
Construction Subtotal W/Contingencies				**$114,000**
General Conditions, Mobilization (5%)				$6,000
Sales Tax Allowance (5%)				$6,000
Overhead & Profit (15%)				$19,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$148,000**
Engineering, Admin., Legal, Permitting (24%)				$36,000
Total Project Cost				**$184,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Roof System

Priority: Low

Existing Condition:

1. The Roof System for the Digester Building is being replaced under the current CIP.
2. The HVAC Systems for the Digester Building is also being replace under the current CIP

Recommendation:

1. Replace the roof system in 20 years when it has reached its useful life.
2. Replace and upgrade the HVAC System when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	4,300	SF	$2.50	$10,750
Roof Insulation	10,750	SF	$4.38	$47,031
PVC Roof Membrane	43	SQ	$375.00	$16,125
Flashing	300	LF	$8.75	$2,625
Sealant & Caulking	1,075	SF	$3.13	$3,359
Replace and Upgrade HVAC System	1	LS	$0.00	$0
Subtotal				$80,000
Undeveloped Design Detail(25%)				$20,000
Construction Subtotal W/Contingencies				**$100,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$17,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$130,000**
Engineering, Admin., Legal, Permitting (24%)				$31,000
Total Project Cost				**$161,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Energy Recovery System

Priority: High

Existing Condition:

1. Engine Generators are currently used for electrical generation and energy recovery.

Recommendation:

1. Replace engine generators with microturbines.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove existing engine generators	3	EA	$40,000.00	$120,000
New Microturbines	1	LS	$2,125,000.00	$2,125,000
Subtotal				$2,245,000
Undeveloped Design Detail(25%)				$562,000
Construction Subtotal W/Contingencies				**$2,807,000**
General Conditions, Mobilization (5%)				$140,000
Sales Tax Allowance (5%)				$147,000
Overhead & Profit (15%)				$464,000
Bonds & Insurance (2%)				$71,000
Total Construction Cost				**$3,629,000**
Engineering, Admin., Legal, Permitting (24%)				$871,000
Total Project Cost				**$4,500,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Ancilliary Energy Recovery Equipment

Priority: Low

Existing Condition:

1. Sludge Hot Water Pumps were replaced in 2012
2. Generator Hot Water Pumps were replaced in 2012
3. Radiators for the Energy Recovery Units were replaced in 2012

Recommendation:

1. Plan for replacement of the equipment in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Sludge Hot Water Pumps	3	EA	$25,000.00	$75,000
Replace Generator Hot Water Pumps	2	EA	$25,000.00	$50,000
Replace Radiators for Energy Recovery Units	2	EA	$50,000.00	$100,000
Subtotal				$225,000
Undeveloped Design Detail(25%)				$57,000
Construction Subtotal W/Contingencies				**$282,000**
General Conditions, Mobilization (5%)				$14,000
Sales Tax Allowance (5%)				$15,000
Overhead & Profit (15%)				$47,000
Bonds & Insurance (2%)				$7,000
Total Construction Cost				**$365,000**
Engineering, Admin., Legal, Permitting (24%)				$88,000
Total Project Cost				**$453,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Energy Recovery Building (13)

Task: Replace Newer Exhaust Fans and Boiler System

Priority: Low

Existing Condition:

1. Indirect Fired Type Gas-Fired Rooftop MAU was replaced in 2010
2. Roof Exhaust Units #1 & #2 were replaced in 2010

Recommendation:

1. Replace HVAC Equipment when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Exhaust Fan (#1 & #2)	2	EA	$5,000.00	$10,000
Replace Hot Water Type Unit Heaters	2	EA	$5,000.00	$10,000
Replace Gas Fired Rooftop MAU	1	EA	$60,000.00	$60,000
Subtotal				$80,000
Undeveloped Design Detail(25%)				$20,000
Construction Subtotal W/Contingencies				**$100,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$17,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$130,000**
Engineering, Admin., Legal, Permitting (24%)				$31,000
Total Project Cost				**$161,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Dewatering Building (14)

Task: Replace Roof and HVAC System

Priority: High

Existing Condition:

1. The existing Roof System is the original, is in poor working condition, and not reliable.
2. The existing HVAC System is the original, is in poor working condition, inefficient, and not reliable.

Recommendation:

1. Replace the existing roof system including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System.
3. Rezone Electrical
4. Install Natural Gas Heating Units

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	7,000	SF	$2.50	$17,500
Roof Insulation	17,500	SF	$4.38	$76,563
PVC Roof Membrane	70	SQ	$375.00	$26,250
Flashing	385	LF	$8.75	$3,369
Sealant & Caulking	1,750	SF	$3.13	$5,469
Replace Exhaust Fan	1	EA	$3,125.00	$3,125
Replace Fan	2	EA	$3,125.00	$6,250
Replace MAU	1	EA	$55,000.00	$55,000
Natural Gas Heat Unit	1	EA	$55,000.00	$55,000
Ductwork Replacement	1	LS	$24,000.00	$24,000
Subtotal				$273,000
Undeveloped Design Detail(25%)				$69,000
Construction Subtotal W/Contingencies				**$342,000**
General Conditions, Mobilization (5%)				$17,000
Sales Tax Allowance (5%)				$18,000
Overhead & Profit (15%)				$57,000
Bonds & Insurance (2%)				$9,000
Total Construction Cost				**$443,000**
Engineering, Admin., Legal, Permitting (24%)				$106,000
Total Project Cost				**$549,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Dewatering Building (14)

Task: Replace the Exterior Access Doors

Priority: High

Existing Condition:

1. The existing access doors are old, weathered and in poor condition.

Recommendation:

1. Replace the existing exterior doors.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Doors	5	EA	$500.00	$2,500
New Single Access Doors	5	EA	$3,000.00	$15,000
Subtotal				$18,000
Undeveloped Design Detail(25%)				$5,000
Construction Subtotal W/Contingencies				**$23,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$4,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$30,000**
Engineering, Admin., Legal, Permitting (24%)				$7,000
Total Project Cost				**$37,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sludge Dewatering Building (14)

Task: Replace/Upgrade Electrical

Priority: High

Existing Condition:

1. Conduits, electrical and switchgear are showing signs of deterioration.

Recommendation:

1. Upgrade the electrical
2. Replace the electrical transformers.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Switchgear	1	LS	$10,000.00	$10,000
Replace Switchgear, Conduits and Wiring	1	LS	$250,000.00	$250,000
Replace the Transformers	2	EA	$25,000.00	$50,000
Subtotal				$310,000
Undeveloped Design Detail(25%)				$78,000
Construction Subtotal W/Contingencies				**$388,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$64,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$501,000**
Engineering, Admin., Legal, Permitting (24%)				$120,000
Total Project Cost				**$621,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Engine Generator and Utility Service Entrance (15)

Task: Generator Enclosure Rehab and Miscellaneous Improvements

Priority: Medium

Existing Condition:

1. Muffler/exhaust is rusty.
2. Rust on the enclosure.
3. Rust/discoloration of concrete support slab.
4. Step up to enclosure has no hand rail or platform creating and unsafe condition.
5. Deteriorate pavement – low spots, worn surface.
6. Generator redlines if two aeration blowers are operating.

Recommendation:

2. Replace pavement.
3. Remove rust spots from enclosure.
4. Verify Generator meets future capacity requirements.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove existing pavement	550	SY	$12.00	$6,600
Replace Pavement	4,950	SF	$7.00	$34,650
Rehabilitate Enclosure	1	LS	$2,500.00	$2,500
Provide Stairway and Platform	1	LS	$3,000.00	$3,000
Verify Capacity of Generator for Future Req.				$0
Subtotal				$47,000
Undeveloped Design Detail(25%)				$12,000
Construction Subtotal W/Contingencies				**$59,000**
General Conditions, Mobilization (5%)				$3,000
Sales Tax Allowance (5%)				$3,000
Overhead & Profit (15%)				$10,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$77,000**
Engineering, Admin., Legal, Permitting (24%)				$18,000
Total Project Cost				**$95,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Engine Generator and Utility Service Entrance (15)

Task: Utility Circuit Bypass

Priority: High

Existing Condition:

1. Service reliability could be improved.

Recommendation:

1. Install utility bypass for service reliability.
2. Replace pavement.
3. Remove rust spots from enclosure.
4. Verify Generator meets future capacity requirements.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Install utility bypass	1	LS	$125,000.00	$125,000
Subtotal				$125,000
Undeveloped Design Detail(25%)				$32,000
Construction Subtotal W/Contingencies				**$157,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$26,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$203,000**
Engineering, Admin., Legal, Permitting (24%)				$49,000
Total Project Cost				**$252,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Engine Generator and Utility Service Entrance (15)

Task: New Engine Generator Sized for Future Conditions

Priority: Low

Existing Condition:

1. Current Generator redlines when two aeration blowers run.

Recommendation:

1. Replace Engine Generator with a new generator sized for future conditions

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace Generator	1	LS	$5,000,000	$5,000,000
Subtotal				$5,000,000
Undeveloped Design Detail(25%)				$1,250,000
Construction Subtotal W/Contingencies				**$6,250,000**
General Conditions, Mobilization (5%)				$313,000
Sales Tax Allowance (5%)				$328,000
Overhead & Profit (15%)				$1,034,000
Bonds & Insurance (2%)				$159,000
Total Construction Cost				**$8,084,000**
Engineering, Admin., Legal, Permitting (24%)				$1,940,000
Total Project Cost				**$10,024,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Dumping Station (16)

Task: Demolish Existing Electrical Conduits/Supports, and Wiring

Priority: Medium

Existing Condition:

1. Electrical is no longer used at the Dump Station.

Recommendation:

1. Demolish electrical conduit, supports, and wiring to the Dumping Station.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Conduit/Supports & Wiring	1	LS	$5,000.00	$5,000
Subtotal				$5,000
Undeveloped Design Detail(25%)				$2,000
Construction Subtotal W/Contingencies				**$7,000**
General Conditions, Mobilization (5%)				$0
Sales Tax Allowance (5%)				$0
Overhead & Profit (15%)				$1,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$8,000**
Engineering, Admin., Legal, Permitting (24%)				$2,000
Total Project Cost				**$10,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Dumping Station (16)

Task: Rehabilitation Concrete Structure and Replace Equipment

Priority: Low

Existing Condition:

1. The existing concrete and equipment are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the equipment.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Int./Ext. Concrete Surfaces	600	SF	$37.50	$22,500
Remove and replace Equipment	1	LS	$100,000.00	$100,000
Subtotal				$123,000
Undeveloped Design Detail(25%)				$31,000
Construction Subtotal W/Contingencies				**$154,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$26,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$200,000**
Engineering, Admin., Legal, Permitting (24%)				$48,000
Total Project Cost				**$248,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equipment Storage Building (17)

Task: Expand Office Area and Upgrade HVAC System

Priority: High

Existing Condition:

1. Office area is not large enough to support the number of staff currently in the office.
2. There is no restrooms, showers, and locker rooms for maintenance and office staff.
3. HVAC is old tube heaters that soot up when running.

Recommendation:

1. Expand office area to support number of staff working in the office.
2. Add showers and locker room facilities with expanded office area.
3. Replace the outdated HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Expand Office Area	1	LS	$150,000.00	$150,000
Add Shower and Locker Room Facilities	1	LS	$62,500.00	$62,500
Replace and Expand HVAC Sys.	1	LS	$70,000.00	$70,000
Subtotal				$283,000
Undeveloped Design Detail(25%)				$71,000
Construction Subtotal W/Contingencies				**$354,000**
General Conditions, Mobilization (5%)				$18,000
Sales Tax Allowance (5%)				$19,000
Overhead & Profit (15%)				$59,000
Bonds & Insurance (2%)				$9,000
Total Construction Cost				**$459,000**
Engineering, Admin., Legal, Permitting (24%)				$110,000
Total Project Cost				**$569,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equipment Storage Building (17)

Task: Replace Metal Roof

Priority: Low

Existing Condition:

1. Existing Roof is is good condition.

Recommendation:

1. Plan for replacement of the roof in 20 years.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace Metal Roof	7250	SF	$20.00	$145,000
Subtotal				$145,000
Undeveloped Design Detail(25%)				$37,000
Construction Subtotal W/Contingencies				**$182,000**
General Conditions, Mobilization (5%)				$9,000
Sales Tax Allowance (5%)				$10,000
Overhead & Profit (15%)				$30,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$236,000**
Engineering, Admin., Legal, Permitting (24%)				$57,000
Total Project Cost				**$293,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Replace HVAC System

Priority: High

Existing Condition:

1. Existing HVAC system is old, inefficient, and unreliable.

Recommendation:

1. Replace the HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Exhaust Fans	7	EA	$3,125.00	$21,875
Replace Air Handling Unit	1	EA	$55,000.00	$55,000
Replace Condensing Unit	1	EA	$55,000.00	$55,000
Replace Automatic Dampers	10	EA	$10,000.00	$100,000
Replace Electric FinTubes	2	EA	$1,875.00	$3,750
Replace Heat Recovery Unit	1	EA	$55,000.00	$55,000
Replace Electric Unit Heaters	3	EA	$3,125.00	$9,375
Subtotal				$300,000
Undeveloped Design Detail(25%)				$75,000
Construction Subtotal W/Contingencies				**$375,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$62,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$486,000**
Engineering, Admin., Legal, Permitting (24%)				$117,000
Total Project Cost				**$603,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Replace and Relocate Switchgear

Priority: High

Existing Condition:

1. Location of switchgear is a potential hazard at overhead door.

Recommendation:

1. Replace and relocate switchgear. Potentially relocate to old lime feed room. Evaluate changing to 480 volt.
2. Group replacement of switchgear with replacement of the aeration blowers.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Switchgear	1	LS	$15,000.00	$15,000
Replace and Relocate Switchgear to Old Lime RM	1	LS	$720,000.00	$720,000
Subtotal				$735,000
Undeveloped Design Detail(25%)				$184,000
Construction Subtotal W/Contingencies				**$919,000**
General Conditions, Mobilization (5%)				$46,000
Sales Tax Allowance (5%)				$48,000
Overhead & Profit (15%)				$152,000
Bonds & Insurance (2%)				$23,000
Total Construction Cost				**$1,188,000**
Engineering, Admin., Legal, Permitting (24%)				$285,000
Total Project Cost				**$1,473,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Site Improvements

Priority: High

Existing Condition:

1. Water ponds in the northwest area of building and runs into the blower room.

Recommendation:

1. Re-grade the northwest side of building to reduce water ponding.
2. Install intake and tie into storm sewer

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Concrete Sidewalk and Apron	44	SY	$12.00	$533
Site Grading Modiifications	1	LS	$1,500.00	$1,500
Catch Basin	1	EA	$5,500.00	$5,500
Storm Sewer Manhole	1	EA	$5,000.00	$5,000
15" Storm Sewer Piping	140	LF	$80.00	$11,200
Connect to Existing Storm Sewer Structure	1	EA	$1,500.00	$1,500
Replace Concrete Sidewalk and Apron	400	SF	$7.00	$2,800
Site Restoration	1	LS	$1,000.00	$1,000
Subtotal				$30,000
Undeveloped Design Detail(25%)				$8,000
Construction Subtotal W/Contingencies				**$38,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$6,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$49,000**
Engineering, Admin., Legal, Permitting (24%)				$12,000
Total Project Cost				**$61,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Blower and Controls Improvements

Priority: High

Existing Condition:

1. Blowers are old and use a large amount of energy.
2. The blower and aeration system has an old and outdated control system.

Recommendation:

1. Replace the blowers with higher efficient blowers.
2. Update the control system.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Blowers	1	LS	$50,000.00	$50,000
Replace Blowers	4	EA	$421,000.00	$1,684,000
Update Control System	1	LS	$300,000.00	$300,000
Subtotal				$2,034,000
Undeveloped Design Detail(25%)				$509,000
Construction Subtotal W/Contingencies				**$2,543,000**
General Conditions, Mobilization (5%)				$127,000
Sales Tax Allowance (5%)				$134,000
Overhead & Profit (15%)				$421,000
Bonds & Insurance (2%)				$65,000
Total Construction Cost				**$3,290,000**
Engineering, Admin., Legal, Permitting (24%)				$790,000
Total Project Cost				**$4,080,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Miscellaneous Building Improvements

Priority: High

Existing Condition:

1. Deterioration of exterior building sealant and backer rod in masonry construction joints.
2. The space in the building could be used more efficiently.
3. Exterior doors are aged and worn.

Recommendation:

1. Remodel interior for more efficient use of space.
2. Tuck point exterior brick masonry.
3. Replace all exterior masonry sealant and backer rod.
4. Replace the exterior single access doors.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Tuck-pointing	9,835	SF	$15.00	$147,525
Replace Sealant/Backer Rod in Masonry Jts	471	LF	$25.00	$11,775
Remodel Interior	1	LS	$150,000.00	$150,000
Replace exterior single doors	2	EA	$4,000.00	$8,000
Subtotal				$318,000
Undeveloped Design Detail(25%)				$80,000
Construction Subtotal W/Contingencies				**$398,000**
General Conditions, Mobilization (5%)				$20,000
Sales Tax Allowance (5%)				$21,000
Overhead & Profit (15%)				$66,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$515,000**
Engineering, Admin., Legal, Permitting (24%)				$124,000
Total Project Cost				**$639,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Control Building (18)

Task: Replace Roof

Priority: Low

Existing Condition:

1. The Roof System for the Control Building was replaced in 2014 and is in good condition.

Recommendation:

1. Plan for replacement the roof system including the trim, coping, and flashing again in 2034.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	6,958	SF	$2.50	$17,395
Roof Insulation	17,395	SF	$4.38	$76,103
PVC Roof Membrane	70	SQ	$375.00	$26,093
Flashing	382	LF	$8.75	$3,343
Sealant & Caulking	1,740	SF	$3.13	$5,436
Subtotal				$129,000
Undeveloped Design Detail(25%)				$33,000
Construction Subtotal W/Contingencies				**$162,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$9,000
Overhead & Profit (15%)				$27,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$210,000**
Engineering, Admin., Legal, Permitting (24%)				$50,000
Total Project Cost				**$260,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #1 (18A)

Task: Cover concrete basin to prevent splashing.

Priority: Medium

Existing Condition:

1. Water splashes out of splitter structure at flows above 35 MGD.

Recommendation:

1. Cover Concrete Basin of Splitter Manhole #1 with aluminum tread plate to prevent splashing.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	0	LS	$50,000.00	$0
Aluminum Tread Plate Covers	585	SF	$200.00	$117,000
Remove and Reset Lime Feed Piping	1	LS	$2,000.00	$2,000
Replace 36" x 48" Slide Gates	0	EA	$35,000.00	$0
Subtotal				$119,000
Undeveloped Design Detail(25%)				$30,000
Construction Subtotal W/Contingencies				**$149,000**
General Conditions, Mobilization (5%)				$7,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$25,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$193,000**
Engineering, Admin., Legal, Permitting (24%)				$46,000
Total Project Cost				**$239,000**

Computed: KFN   **Date:** 10/3/2016   **HDR Job No:** 10028508

Checked: DVP   **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #1 (18B)

Task: Cover Concrete Manhole to Prevent Splashing

Priority: Medium

Existing Condition:

1. Water splashes out of the structure at flows above 35 MGD.
2. There is mineral buildup on the grating over Manhole No. 1.

Recommendation:

1. Cover Concrete Basin of Splitter Manhole #1 with aluminum tread plate to prevent splashing.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	0	LS	$25,000.00	$0
Aluminum Tread Plate Covers	50	SF	$200.00	$10,000
Remove and Replace Aluminum Grating	0	SF	$40.00	$0
Install Guardrail	0	LF	$42.00	$0
New Ladder	0	VF	$100.00	$0
Subtotal				$10,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$13,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$2,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$17,000**
Engineering, Admin., Legal, Permitting (24%)				$4,000
Total Project Cost				**$21,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Aeration Basins (18C)

Task: Aeration System Rehabilitation

Priority: High

Existing Condition:

1. Basin air valves and actuators are old and difficult to operate and maintain.
2. Air header piping leaks at the mechanical couplings.

Recommendation:

1. Replace air valves and actuators.
2. Replace leaking couplings on the air header piping.
3. Replace the 18" Butterfly Valve on the aeration piping to the backwash storage tank.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing 10" Air Valves and Actuators	12	EA	$200.00	$2,400
Remove Existing 8" Air Valves and Actuators	24	EA	$150.00	$3,600
New 8" Butterfly Valves and Actuators	24	EA	$11,500.00	$276,000
New 10" Butterfly Valves and Actutors	12	EA	$12,500.00	$150,000
Remove and Replace 18" BFV & Actuator	1	EA	$20,000.00	$20,000
Replace Air Piping Mechanical Couplings	20	EA	$3,500.00	$70,000
Subtotal				$522,000
Undeveloped Design Detail(25%)				$131,000
Construction Subtotal W/Contingencies				**$653,000**
General Conditions, Mobilization (5%)				$33,000
Sales Tax Allowance (5%)				$34,000
Overhead & Profit (15%)				$108,000
Bonds & Insurance (2%)				$17,000
Total Construction Cost				**$845,000**
Engineering, Admin., Legal, Permitting (24%)				$203,000
Total Project Cost				**$1,048,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Aeration Basins (18C)

Task: Electrical Conduit, Junction Boxes, and Wiring Replacement

Priority: High

Existing Condition:

1. Electrical PVC conduit is expanding and contracting due to weather.
2. There is corrrosion on the electrical junction boxes and supports.

Recommendation:

1. Replace the electrical junction boxes, support systems, and PVC Conduit.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace weather proof junction boxes	16	EA	$1,200.00	$19,200
Replace Elect. Conduit/Supports & Wiring	1,200	LF	$51.00	$61,200
Subtotal				$81,000
Undeveloped Design Detail(25%)				$21,000
Construction Subtotal W/Contingencies				**$102,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$17,000
Bonds & Insurance (2%)				$3,000
Total Construction Cost				**$132,000**
Engineering, Admin., Legal, Permitting (24%)				$32,000
Total Project Cost				**$164,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Aeration Basins (18C)

Task: Replace Lighting and DO Sensor Conduit and Wiring.

Priority: Medium

Existing Condition:

1. Lighting is outdated and inefficient
2. There is corrrosion on the DO Sensor conduit, boxes, and supports.

Recommendation:

1. Replace the lighting around the basins.
2. Replace the DO Sensor conduit, boxes, supports and cable

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Lighting	23	EA	$1,000.00	$23,000
Replace conduit for DO Sensors	1000	LF	$51.00	$51,000
Subtotal				$74,000
Undeveloped Design Detail(25%)				$19,000
Construction Subtotal W/Contingencies				**$93,000**
General Conditions, Mobilization (5%)				$5,000
Sales Tax Allowance (5%)				$5,000
Overhead & Profit (15%)				$15,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$120,000**
Engineering, Admin., Legal, Permitting (24%)				$29,000
Total Project Cost				**$149,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Aeration Basins (18C)

Task: Upgrade Aeration System to Fine Bubble System

Priority: High

Existing Condition:

1. Air diffusers are an older inefficient coarse bubble system.

Recommendation:

1. Replace the air diffuser system with a fine bubble aeration system.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Aeration Diffusers	1	LS	$50,000.00	$50,000
New Fine Bubble Aeration Equipment	6	EA	$225,000.00	$1,350,000
Subtotal				$1,400,000
Undeveloped Design Detail(25%)				$350,000
Construction Subtotal W/Contingencies				**$1,750,000**
General Conditions, Mobilization (5%)				$88,000
Sales Tax Allowance (5%)				$92,000
Overhead & Profit (15%)				$290,000
Bonds & Insurance (2%)				$44,000
Total Construction Cost				**$2,264,000**
Engineering, Admin., Legal, Permitting (24%)				$543,000
Total Project Cost				**$2,807,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Aeration Basin (18C)

Task: Concrete Basin Rehabilitation

Priority: Medium

Existing Condition:

1. Unable to completely drain the basins without sump pumps
2. There is minor craking of concrete on the basin floors and walls.

Recommendation:

1. Repair concrete basin floors and grout slope for better draining.
2. Repair concrete wall surfaces.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Repair and Grout Slope Basin Floors (Avg 2")	450	CY	$500.00	$225,000
Basin Wall Concrete Repairs (Upper 2 ft)	9804	SF	$37.50	$367,650
Subtotal				$593,000
Undeveloped Design Detail(25%)				$149,000
Construction Subtotal W/Contingencies				**$742,000**
General Conditions, Mobilization (5%)				$37,000
Sales Tax Allowance (5%)				$39,000
Overhead & Profit (15%)				$123,000
Bonds & Insurance (2%)				$19,000
Total Construction Cost				**$960,000**
Engineering, Admin., Legal, Permitting (24%)				$230,000
Total Project Cost				**$1,190,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Lime Feed System (18D)

Task: Replace Lime Feed System

Priority: Low

Existing Condition:

1. The existing lime feed system was installed in 2012 and is in good condition.

Recommendation:

1. Replace the lime feed system when it is at the end of its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace the lime feed system	1	LS	$500,000.00	$500,000
Subtotal				$500,000
Undeveloped Design Detail(25%)				$125,000
Construction Subtotal W/Contingencies				**$625,000**
General Conditions, Mobilization (5%)				$31,000
Sales Tax Allowance (5%)				$33,000
Overhead & Profit (15%)				$103,000
Bonds & Insurance (2%)				$16,000
Total Construction Cost				**$808,000**
Engineering, Admin., Legal, Permitting (24%)				$194,000
Total Project Cost				**$1,002,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: RAS Building (19)

Task: Replace Roof and HVAC System

Priority: High

Existing Condition:

1. The existing Roof System is the original, is in poor working condition, and not reliable.
2. The existing HVAC System is the original, is in poor working condition, inefficient, and not reliable.

Recommendation:

1. Replace the existing roof system including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	2,821	SF	$2.50	$7,053
Roof Insulation	7,053	SF	$4.38	$30,855
PVC Roof Membrane	28	SQ	$375.00	$10,579
Flashing	244	LF	$8.75	$2,135
Sealant & Caulking	705	SF	$3.13	$2,204
Replace Exhaust Fan	1	EA	$3,125.00	$3,125
Replace Fan	1	EA	$3,125.00	$3,125
Replace Electric MAU	1	EA	$55,000.00	$55,000
Replace Heat Recovery Unit	1	EA	$55,000.00	$55,000
Ductwork Replacement	1	LS	$12,000.00	$12,000
Subtotal				$182,000
Undeveloped Design Detail(25%)				$46,000
Construction Subtotal W/Contingencies				**$228,000**
General Conditions, Mobilization (5%)				$11,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$38,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$295,000**
Engineering, Admin., Legal, Permitting (24%)				$71,000
Total Project Cost				**$366,000**

Computed: KFN

Date: 10/3/2016

HDR Job No: 10028508

Checked: DVP

Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: RAS Building (19)

Task: Replace/Upgrade Electrical

Priority: High

Existing Condition:

1. Conduits, electrical and switchgear are showing signs of deterioration.
2. The Electrical transformers are in bad condition.

Recommendation:

1. Upgrade the electrical
2. Replace the electrical transformers.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Switchgear	1	LS	$10,000.00	$10,000
Replace Switchgear, Conduits and Wiring	1	LS	$250,000.00	$250,000
Replace the Transformers	2	EA	$25,000.00	$50,000
Subtotal				$310,000
Undeveloped Design Detail(25%)				$78,000
Construction Subtotal W/Contingencies				**$388,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$64,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$501,000**
Engineering, Admin., Legal, Permitting (24%)				$120,000
Total Project Cost				**$621,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: RAS Building (19)

Task: Miscellaneous Building Improvements

Priority: Medium

Existing Condition:

1. The exterior masonry sealant is severely deteriorated.
2. Building is showing signs of settlement.
3. Water intrusion into the drywell.
4. The grating on the northside of the building is severely bent. This poses a safety hazard.

Recommendation:

1. Mitigate building settlement and repair exterior masonry.
2. Replace sealant and backer rod throughout the building exterior.
3. Tuck point exterior masonry as required.
4. Seal the drywell to eliminate water intrusion.
5. Replace the grating on the northside of the building.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Mitigate Building Settlement	1	LS	$25,000.00	$25,000
Tuck-pointing	2,816	SF	$15.00	$42,240
Replace Sealant/Backer Rod in Masonry Jts	185	LF	$25.00	$4,624
Replace Grating on North Side of Building	710	SF	$40.00	$28,400
Seal Drywell to Eliminate Water Intrusion	132	GAL	$700.00	$92,400
Replace exterior double doors	1	EA	$8,000.00	$8,000
Subtotal				$201,000
Undeveloped Design Detail(25%)				$51,000
Construction Subtotal W/Contingencies				**$252,000**
General Conditions, Mobilization (5%)				$13,000
Sales Tax Allowance (5%)				$13,000
Overhead & Profit (15%)				$42,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$326,000**
Engineering, Admin., Legal, Permitting (24%)				$78,000
Total Project Cost				**$404,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: RAS Building (19)

Task: Replace the RAS and WAS Pumps

Priority: Medium

Existing Condition:

1. The RAS and WAS pumps are original.
2. There is a slight grinding/vibration in RAS Pump #3.

Recommendation:

1. Replace the RAS and WAS Pumps.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace RAS Pumps	5	EA	$25,000.00	$125,000
Remove and Replace WAS Pumps	2	EA	$20,000.00	$40,000
Subtotal				$165,000
Undeveloped Design Detail(25%)				$42,000
Construction Subtotal W/Contingencies				**$207,000**
General Conditions, Mobilization (5%)				$10,000
Sales Tax Allowance (5%)				$11,000
Overhead & Profit (15%)				$34,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$267,000**
Engineering, Admin., Legal, Permitting (24%)				$64,000
Total Project Cost				**$331,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Final Clarifiers (20)

Task: Replace Mechanisms and Rehabilitate the Concrete Basins.

Priority: Medium

Existing Condition:

1. The final clarifier mechanisms are old with corrosion.
2. The draft tubes provide suboptimal sludge removal.
3. Centerwell is outdated.
4. Weirs are hard to access for cleaning.
5. Have had past issues with foaming and rising sludge.
6. Moderate delamination of the parge/skin coating on the concrete tanks.
7. Concrete steps and sidewalks have settled and cracked.

Recommendation:

1. Construct in-board weirs mounted off external walls.
2. Replace draft tube mechanisms with updated removal system, such as Towbro sludge removal mechanisms.
3. Provide stainless steel mechanisms/components to minimize/eliminate corrosion.
4. Install state of the art flocculation centerwells with new mechanisms.
5. Install weir covers to control algae.
6. Recoat concrete surfaces of the clarifier basins.
7. Repair the damaged areas of the concrete walls and steps.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Construct new in-board weirs	1,452	CY	$1,000.00	$1,452,000
Replace the Mechanism Drives	4	EA	$60,000.00	$240,000
Spare Mechanism Drive	1	EA	$60,000.00	$60,000
Replace sludge collection mechanism & Weirs	4	EA	$230,000.00	$920,000
Restore Int./Ext. Concrete Surfaces (50%)	11,737	SF	$37.50	$440,137
Repair concrete steps	4	EA	$600.00	
Replace concrete sidewalks	2,200	SF	$10.00	
Subtotal				$3,113,000
Undeveloped Design Detail(25%)				$779,000
Construction Subtotal W/Contingencies				**$3,892,000**
General Conditions, Mobilization (5%)				$195,000
Sales Tax Allowance (5%)				$204,000
Overhead & Profit (15%)				$644,000
Bonds & Insurance (2%)				$99,000

Total Construction Cost	**$5,034,000**
Engineering, Admin., Legal, Permitting (24%)	$1,208,000
Total Project Cost	**$6,242,000**

Computed: KFN
Date: 10/3/2016
HDR Job No: 10028508

Checked: DVP
Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Final Clarifiers (20)

Task: Electrical Improvements

Priority: Medium

Existing Condition:

1. Electrical boxes on the walkways have severe surface corrosion.

Recommendation:

1. Replace the electrical boxes and conduit that have corrosion.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Electrical Boxes and Conduits	4	EA	$15,000.00	$60,000
Subtotal				$60,000
Undeveloped Design Detail(25%)				$15,000
Construction Subtotal W/Contingencies				**$75,000**
General Conditions, Mobilization (5%)				$4,000
Sales Tax Allowance (5%)				$4,000
Overhead & Profit (15%)				$12,000
Bonds & Insurance (2%)				$2,000
Total Construction Cost				**$97,000**
Engineering, Admin., Legal, Permitting (24%)				$23,000
Total Project Cost				**$120,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Splitter Manhole #2 (20A)

Task: Replace the Slide Gates and Rehabilitation the Concrete

Priority: Low

Existing Condition:

1. The existing four (4) slide gates are in good condition.
2. Existing conctete is in good condition.

Recommendation:

1. Replace the four (4) slide gates with new stainless steel slide gates.
2. Repair concrete surfaces.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 60" x 30" Slide Gates	4	EA	$40,000.00	$160,000
Repair Interior Concrete Surfaces (50%)	750	SF	$150.00	$112,500
Subtotal				$298,000
Undeveloped Design Detail(25%)				$75,000
Construction Subtotal W/Contingencies				**$373,000**
General Conditions, Mobilization (5%)				$19,000
Sales Tax Allowance (5%)				$20,000
Overhead & Profit (15%)				$62,000
Bonds & Insurance (2%)				$9,000
Total Construction Cost				**$483,000**
Engineering, Admin., Legal, Permitting (24%)				$116,000
Total Project Cost				**$599,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #2 (20B)

Task: Replace the Sluice Gates and Rehabilitation the Concrete

Priority: Low

Existing Condition:

1. The existing four (4) sluice gates are in good condition.
2. Existing conctete is in good condition.

Recommendation:

1. Replace the four (4) sluice gates with new stainless steel slide gates.
2. Repair concrete surfaces.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping	1	LS	$25,000.00	$25,000
Replace 30" Sluice Gates	4	EA	$30,000.00	$120,000
Repair Concrete Surfaces	300	SF	$150.00	$45,000
Subtotal				$190,000
Undeveloped Design Detail(25%)				$48,000
Construction Subtotal W/Contingencies				**$238,000**
General Conditions, Mobilization (5%)				$12,000
Sales Tax Allowance (5%)				$13,000
Overhead & Profit (15%)				$39,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$308,000**
Engineering, Admin., Legal, Permitting (24%)				$74,000
Total Project Cost				**$382,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Filter Building (21)

Task: Replace and Upgrade Electrical

Priority: High

Existing Condition:

1. There is surface rusting of electrical equipment due to building humidity.

Recommendation:

1. Replace electrical equipment, conduit and wiring.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Electrical	1	LS	$10,000.00	$10,000
Replace Electrical Equipment, Conduit and Wiring	1	LS	$150,000.00	$150,000
Subtotal				$160,000
Undeveloped Design Detail(25%)				$40,000
Construction Subtotal W/Contingencies				**$200,000**
General Conditions, Mobilization (5%)				$10,000
Sales Tax Allowance (5%)				$11,000
Overhead & Profit (15%)				$33,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$259,000**
Engineering, Admin., Legal, Permitting (24%)				$62,000
Total Project Cost				**$321,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Filter Building (21)

Task: Valve and Weir Improvements

Priority: High

Existing Condition:

1. Actuators for the filter function valves are old and original.
2. Elevation of bypass weir limits the amount of flow to the filters.

Recommendation:

1. Replace old original actuators on the filter function valves.
2. Adjust the bypass weirs to direct more flow to filters.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Valve Actuators	32	EA	$10,000.00	$320,000
Adjust Bypass Weir	1	LS	$25,000.00	$25,000
Subtotal				$345,000
Undeveloped Design Detail(25%)				$87,000
Construction Subtotal W/Contingencies				**$432,000**
General Conditions, Mobilization (5%)				$22,000
Sales Tax Allowance (5%)				$23,000
Overhead & Profit (15%)				$72,000
Bonds & Insurance (2%)				$11,000
Total Construction Cost				**$560,000**
Engineering, Admin., Legal, Permitting (24%)				$134,000
Total Project Cost				**$694,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Filter Building (21)

Task: Miscellaneous Building Improvements

Priority: Medium

Existing Condition:

1. Moderate cracking on inside face of SE wall.
2. Deteriorating exterior masonry sealant.
3. Deteriorating paint due to condensation and water intrusion around window.
4. Deteriorating wall paint finish in lower pipe gallery.
5. Exterior Doors are old and weathered.

Recommendation:

1. Repair masonry damage and tuck point.
2. Replace sealant and backer rod on all windows.
3. Repaint walls in the lower pipe gallery.
4. Replace the exterior doors.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Tuck-pointing	7,096	SF	$15.00	$106,440
Replace Sealant/Backer Rod in Masonry Jts	371	LF	$25.00	$9,282
Replace Sealant/Backer Rod at All Windows	16	EA	$400.00	$6,400
Repair Cracks Inside/Outside on SE Wall	500	SF	$75.00	$37,500
Repaint Wall in Lower Piping Gallery	4,775	SF	$0.65	$3,104
Replace Single Exterior Doors	1	EA	$4,000.00	$4,000
Replace Ext. Double Doors on North Side of Bld	1	EA	$8,000.00	$8,000
Subtotal				$175,000
Undeveloped Design Detail(25%)				$44,000
Construction Subtotal W/Contingencies				**$219,000**
General Conditions, Mobilization (5%)				$11,000
Sales Tax Allowance (5%)				$12,000
Overhead & Profit (15%)				$36,000
Bonds & Insurance (2%)				$6,000
Total Construction Cost				**$284,000**
Engineering, Admin., Legal, Permitting (24%)				$68,000
Total Project Cost				**$352,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Filter Building (21)

Task: Replace Roof and HVAC System

Priority: Low

Existing Condition:

1. The Roof System and HVAC System were replaced in 2012.

Recommendation:

1. Replace the roof system including the trim, coping, and flashing in 20 years when it has reached its useful life.
2. Replace the HVAC system in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	12,096	SF	$2.50	$30,240
Roof Insulation	30,240	SF	$4.38	$132,300
PVC Roof Membrane	121	SQ	$375.00	$45,360
Flashing	444	LF	$8.75	$3,885
Sealant & Caulking	3,024	SF	$3.13	$9,450
Replace HVAC Equipment	1	LS	$200,000.00	$200,000
Subtotal				$422,000
Undeveloped Design Detail(25%)				$106,000
Construction Subtotal W/Contingencies				**$528,000**
General Conditions, Mobilization (5%)				$26,000
Sales Tax Allowance (5%)				$28,000
Overhead & Profit (15%)				$87,000
Bonds & Insurance (2%)				$13,000
Total Construction Cost				**$682,000**
Engineering, Admin., Legal, Permitting (24%)				$164,000
Total Project Cost				**$846,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Filter Building (21)

Task: Filter Equipment Upgrades

Priority: Low

Existing Condition:

1. Improvements were made to the filters and fiter backwash pumps in 2012.

Recommendation:

1. Replace and updgrade filter equipment in 20 years when it has reached its useful life

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace/Upgrade Filter Bay Equipment	1	LS	$2,000,000.00	$2,000,000
Remove and replace backwash pumps	3	EA	$250,000.00	$750,000
Subtotal				$2,750,000
Undeveloped Design Detail(25%)				$688,000
Construction Subtotal W/Contingencies				**$3,438,000**
General Conditions, Mobilization (5%)				$172,000
Sales Tax Allowance (5%)				$181,000
Overhead & Profit (15%)				$569,000
Bonds & Insurance (2%)				$87,000
Total Construction Cost				**$4,447,000**
Engineering, Admin., Legal, Permitting (24%)				$1,067,000
Total Project Cost				**$5,514,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chemical Feed Building (22)

Task: Replace and Upgrade Electrical

Priority: High

Existing Condition:

1. Some outdated electrical conduit and wiring.
2. Electrical transformer is in bad condition with corrosion on the enclosure.

Recommendation:

1. Replace electrical conduit and wiring.
2. Replace and update electrical transformer.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Electrical	1	LS	$10,000.00	$10,000
Replace Electrical Transformer	1	LS	$15,000.00	$15,000
Replace Electrical Equipment, Conduit and Wiring	1	LS	$100,000.00	$100,000
Subtotal				$125,000
Undeveloped Design Detail(25%)				$32,000
Construction Subtotal W/Contingencies				**$157,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$26,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$203,000**
Engineering, Admin., Legal, Permitting (24%)				$49,000
Total Project Cost				**$252,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chemical Feed Building (22)

Task: Site Improvements

Priority: Medium

Existing Condition:

1. Concrete sidewalk is settling away from building.
2. Exterior stairs are deteriorated on north side of building.

Recommendation:

1. Replace sidewalks.
2. Rehabilitate exterior stairs

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Repair Concrete Around Stairway	1	EA	$600.00	$600
Replace Concrete Sidewalks	700	SF	$10.00	$7,000
Subtotal				$8,000
Undeveloped Design Detail(25%)				$2,000
Construction Subtotal W/Contingencies				**$10,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$2,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$14,000**
Engineering, Admin., Legal, Permitting (24%)				$3,000
Total Project Cost				**$17,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chemical Feed Building (22)

Task: Replace the Exterior Access Doors

Priority: Medium

Existing Condition:

1. The existing exterior access doors are old, weathered and in poor condition.

Recommendation:

1. Replace the existing exterior doors.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Doors	5	EA	$500.00	$2,500
New Double Door	1	EA	$8,000.00	$8,000
New Single Access Doors	3	EA	$4,000.00	$12,000
Subtotal				$23,000
Undeveloped Design Detail(25%)				$6,000
Construction Subtotal W/Contingencies				**$29,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$5,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$38,000**
Engineering, Admin., Legal, Permitting (24%)				$9,000
Total Project Cost				**$47,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chemical Feed Building (22)

Task: Replace Chemical Storage, Feed Equipment and Piping

Priority: Low

Existing Condition:

1. Sodium Hypochlorite and Sodium Bisulfite Storage and Feed Equipment were installed new in 2013.

Recommendation:

1. Plan for replacement of the chemical storage and feed equipment in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Replace Chemical Fill Stations	1	LS	$10,000.00	$10,000
Replace the SHY Storage Tanks and Piping	3	EA	$50,000.00	$150,000
Replace SB Storage Tanks and Piping	1	EA	$50,000.00	$50,000
Replace the SHY Feed Pumps and Piping	2	EA	$115,000.00	$230,000
Replace the SB Feed Pumps and Piping	1	EA	$115,000.00	$115,000
Replace the Transfer Pumps and Piping	2	EA	$45,000.00	$90,000
Subtotal				$645,000
Undeveloped Design Detail(25%)				$162,000
Construction Subtotal W/Contingencies				**$807,000**
General Conditions, Mobilization (5%)				$40,000
Sales Tax Allowance (5%)				$42,000
Overhead & Profit (15%)				$133,000
Bonds & Insurance (2%)				$20,000
Total Construction Cost				**$1,042,000**
Engineering, Admin., Legal, Permitting (24%)				$250,000
Total Project Cost				**$1,292,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chemical Feed Building (22)

Task: Replace Roof and HVAC System

Priority: Low

Existing Condition:

1. The Roof System and HVAC System were replaced in 2013.

Recommendation:

1. Replace the roof system including the trim, coping, and flashing in 20 years when it has reached its useful life.
2. Replace the HVAC system in 20 years when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	3,240	SF	$2.50	$8,100
Roof Insulation	8,100	SF	$4.38	$35,438
PVC Roof Membrane	32	SQ	$375.00	$12,150
Flashing	234	LF	$8.75	$2,048
Sealant & Caulking	810	SF	$3.13	$2,531
Replace Exhaust Fan	1	LS	$150,000.00	$150,000
Subtotal				$211,000
Undeveloped Design Detail(25%)				$53,000
Construction Subtotal W/Contingencies				**$264,000**
General Conditions, Mobilization (5%)				$13,000
Sales Tax Allowance (5%)				$14,000
Overhead & Profit (15%)				$44,000
Bonds & Insurance (2%)				$7,000
Total Construction Cost				**$342,000**
Engineering, Admin., Legal, Permitting (24%)				$82,000
Total Project Cost				**$424,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chlorine Contact Chamber (23)

Task: Effluent Meter Improvements

Priority: Medium

Existing Condition:

1. Existing meter is unreliable due to installation and location.
2. Foaming at Manhole #3.

Recommendation:

1. Install magnetic flow meter on the effluent line from the chlorine contact basin.
2. Remove Manhole #3.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Bypass Pumping or Piping	1	LS	$25,000.00	$25,000
Remove Existing Parshall Flow Meter	1	EA	$600.00	$600
Remove Manhole #3	1	EA	$1,000.00	$1,000
New Meter Vault	1	EA	$125,000.00	$125,000
Install Magnetic Flow Meter	1	EA	$175,000.00	$175,000
Subtotal				$327,000
Undeveloped Design Detail(25%)				$82,000
Construction Subtotal W/Contingencies				**$409,000**
General Conditions, Mobilization (5%)				$20,000
Sales Tax Allowance (5%)				$21,000
Overhead & Profit (15%)				$68,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$528,000**
Engineering, Admin., Legal, Permitting (24%)				$127,000
Total Project Cost				**$655,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chlorine Contact Chamber (23)

Task: Replace Existing Slide Gates, Covers, Walkways, and Analyzers.

Priority: Low

Existing Condition:

1. Existing Slide Gates are original installed in 1982.
2. Covers and Walkways were installed in 2014.
3. Flash mixer was installed in 2012.

Recommendation:

1. Install new slide gates.
2. Replace the covers and walkways when they have reached their useful life.
3. Replace the flash mixer when it has reached its useful life.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the 48" x 48" Slide Gates	4	EA	$45,000.00	$180,000
Remove and replace the flash mixer	1	EA	$30,000.00	$30,000
Remove and replace the covers	1	LS	$50,000.00	$50,000
Remove and replace the fiberglass walkways	1	LS	$50,000.00	$50,000
Remove and replace chlorine analyzers	2	EA	$10,000.00	$20,000
Subtotal				$330,000
Undeveloped Design Detail(25%)				$83,000
Construction Subtotal W/Contingencies				**$413,000**
General Conditions, Mobilization (5%)				$21,000
Sales Tax Allowance (5%)				$22,000
Overhead & Profit (15%)				$68,000
Bonds & Insurance (2%)				$10,000
Total Construction Cost				**$534,000**
Engineering, Admin., Legal, Permitting (24%)				$128,000
Total Project Cost				**$662,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Chlorine Contact Chamber (23)

Task: Expand Chlorine Contact Basin to Meet Future Conditions.

Priority: Low

Existing Condition:

1. Existing Contact Basin Does not have enough capacity to meet future flow projections.

Recommendation:

1. Duplicate Existing Chlorine Contact Basin.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Concrete Base Slab	350	CY	$750.00	$262,500
Concrete Walls	300	CY	$1,000.00	$300,000
Excavation	1,500	CY	$50.00	$75,000
Rock Excavation	1,500	CY	$89.00	$133,500
Backfilling	1,500	CY	$25.00	$37,500
Crushed Rock Base	60	TON	$26.00	$1,560
Dewatering	1	LS	$50,000.00	$50,000
Grating	645	SF	$40.00	$25,800
Guardrailing	330	LF	$45.00	$14,850
48" x 48" Slide Gates	4	EA	$45,000.00	$180,000
Flash mixer	1	EA	$30,000.00	$30,000
Covers	1	LS	$50,000.00	$50,000
Fiberglass walkways	1	LS	$50,000.00	$50,000
Chlorine analyzers	2	EA	$10,000.00	$20,000
Process Piping	1	LS	$300,000.00	$300,000
Subtotal				$1,531,000
Undeveloped Design Detail(25%)				$383,000
Construction Subtotal W/Contingencies				**$1,914,000**
General Conditions, Mobilization (5%)				$96,000
Sales Tax Allowance (5%)				$101,000
Overhead & Profit (15%)				$317,000
Bonds & Insurance (2%)				$49,000
Total Construction Cost				**$2,477,000**
Engineering, Admin., Legal, Permitting (24%)				$594,000
Total Project Cost				**$3,071,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Manhole #3 (23A)

Task: Rehabilitation Concrete Structure and Replace Grating

Priority: Low

Existing Condition:

1. The existing concrete, grating and handrailing are in good condition.

Recommendation:

1. Plan for rehabilitation fo the structure and replacement of the grating for the 20 year planning period.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Restore Interior Concrete Surfaces	240	SF	$37.50	$9,000
Remove and replace grating	36	SF	$40.00	$1,440
Subtotal				$10,000
Undeveloped Design Detail(25%)				$3,000
Construction Subtotal W/Contingencies				**$13,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$2,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$17,000**
Engineering, Admin., Legal, Permitting (24%)				$4,000
Total Project Cost				**$21,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Cascade Aerator (23B)

Task: Replace Existing Slide Gates, Aeration Equipment, and Repair Concrete.

Priority: Low

Existing Condition:

1. Existing Slide Gates are original installed in 1982.
2. Air piping and diffusers are original installed in 1982.
3. Concrete is in good condition with some deterioration.

Recommendation:

1. Replace the slide gates.
2. Replace the air piping and diffusers.
3. Repair deteriorated concrete surfaces.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the 48" x 48" Slide Gates	2	EA	$45,000.00	$90,000
Remove and replace the 48" x 36" Slide Gates	2	EA	$40,000.00	$80,000
Remove and replace the air header piping	1	EA	$50,000.00	$50,000
Remove and replace the diffusers	1	LS	$50,000.00	$50,000
Repair concrete surfaces	1	LS	$100,000.00	$100,000
Subtotal				$370,000
Undeveloped Design Detail(25%)				$93,000
Construction Subtotal W/Contingencies				**$463,000**
General Conditions, Mobilization (5%)				$23,000
Sales Tax Allowance (5%)				$24,000
Overhead & Profit (15%)				$77,000
Bonds & Insurance (2%)				$12,000
Total Construction Cost				**$599,000**
Engineering, Admin., Legal, Permitting (24%)				$144,000
Total Project Cost				**$743,000**

Computed: KFN

Date: 10/3/2016

HDR Job No: 10028508

Checked: DVP

Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: In-Plant Waste Pumping Building (24)

Task: Replace Building Roof and HVAC System

Priority: High

Existing Condition:

1. The existing Roof System is the original, is in poor working condition, and not reliable.
2. The existing HVAC System is the original, is in poor working condition, inefficient, and not reliable.

Recommendation:

1. Replace the existing roof system including the trim, coping, and flashing.
2. Replace and upgrade the existing HVAC System.

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Roof	987	SF	$2.50	$2,467
Roof Insulation	2,467	SF	$4.38	$10,792
PVC Roof Membrane	10	SQ	$375.00	$3,700
Flashing	126	LF	$8.75	$1,100
Sealant & Caulking	247	SF	$3.13	$771
Replace Exhaust Fan	1	EA	$3,125.00	$3,125
Replace Electric MAU	1	EA	$55,000.00	$55,000
Replace Heat Recovery Unit	1	EA	$55,000.00	$55,000
Ductwork Replacement	1	LS	$4,000.00	$4,000
Subtotal				$136,000
Undeveloped Design Detail(25%)				$34,000
Construction Subtotal W/Contingencies				**$170,000**
General Conditions, Mobilization (5%)				$9,000
Sales Tax Allowance (5%)				$9,000
Overhead & Profit (15%)				$28,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$220,000**
Engineering, Admin., Legal, Permitting (24%)				$53,000
Total Project Cost				**$273,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Inplant Pumping Building (24)

Task: Replace and Upgrade Electrical

Priority: High

Existing Condition:

1. Some outdated electrical conduit and wiring.

Recommendation:

1. Replace electrical conduit and wiring.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove Existing Electrical	1	LS	$10,000.00	$10,000
Replace Electrical Equipment, Conduit and Wiring	1	LS	$150,000.00	$150,000
Subtotal				$160,000
Undeveloped Design Detail(25%)				$40,000
Construction Subtotal W/Contingencies				**$200,000**
General Conditions, Mobilization (5%)				$10,000
Sales Tax Allowance (5%)				$11,000
Overhead & Profit (15%)				$33,000
Bonds & Insurance (2%)				$5,000
Total Construction Cost				**$259,000**
Engineering, Admin., Legal, Permitting (24%)				$62,000
Total Project Cost				**$321,000**

Computed:	KFN	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Inplant Pumping Building (24)

Task: Equipment and Piping Upgrades

Priority: Medium

Existing Condition:

1. The Non-Potable pumps and the In-Plant Waste pumps are original.
2. Corrosion if visible on all the In-Plant Waste Pumps.
3. Non-Potable Water Pumps are run continuously to prevent frequent cycling.
4. Non-Potable Water System Strainers are original.
5. There is water intrusion through the pipe link seals.
6. Piping, valves, and meters are old and outdated.

Recommendation:

1. Replace the Non-Potable pumps and the In-Plant Waste pumps.
2. Provide VFDs for both the Non-Potable and In-Plant Waste Pumps.
3. Replace the Non-Potable Water System Strainers.
4. Replace the valves and meters.
5. Sandblast and repaint existing piping.
6. Replace the existing pipe link seals.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and Replace NPW Pumps	3	EA	$15,000.00	$45,000
Remove and Replace NPW Strainers	2	EA	$12,000.00	$24,000
Constant Pressure System for the NPW Pumps	1	LS	$70,000.00	$70,000
Replace 10" NPW Flow Meter	1	EA	$10,000.00	$10,000
Remove and Replace Inplant Waste Pumps	3	EA	$25,000.00	$75,000
VFDs for the Inplant Waste Pumps	3	EA	$10,000.00	$30,000
Replace 10" Inplant Waste Flow Meter	1	EA	$10,000.00	$10,000
Update Controls	1	LS	$25,000.00	$25,000
Replace Valves	20	EA	$3,000.00	$60,000
Sandblast and Repaint Process Piping	1	LS	$20,000.00	$20,000
Remove and Replace Pipe Link Seals	6	EA	$2,000.00	$12,000
Subtotal				$381,000
Undeveloped Design Detail(25%)				$96,000
Construction Subtotal W/Contingencies				**$477,000**
General Conditions, Mobilization (5%)				$24,000
Sales Tax Allowance (5%)				$25,000

Overhead & Profit (15%)	$79,000
Bonds & Insurance (2%)	$12,000
Total Construction Cost	**$617,000**
Engineering, Admin., Legal, Permitting (24%)	$148,000
Total Project Cost	**$765,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

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Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Inplant Pumping Building (24)

Task: Miscellaneous Building Improvements

Priority: Medium

Existing Condition:

1. Drywell leaking through gap between floor and wall.
2. Exterior sealant severely deteriorated.
3. Moderate cracking on exterior face (SW corner).

Recommendation:

1 Repair brick, replace exterior sealant, and tuck point masonry

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Tuck-pointing	1,288	SF	$15.00	$19,320
Replace Sealant/Backer Rod in Masonry Jts	93	LF	$25.00	$2,334
Repair Brick on SW Corner of Bldg.	1	LS	$2,500.00	$2,500
Replace exterior double doors	1	EA	$8,000.00	$8,000
Subtotal				$33,000
Undeveloped Design Detail(25%)				$9,000
Construction Subtotal W/Contingencies				**$42,000**
General Conditions, Mobilization (5%)				$2,000
Sales Tax Allowance (5%)				$2,000
Overhead & Profit (15%)				$7,000
Bonds & Insurance (2%)				$1,000
Total Construction Cost				**$54,000**
Engineering, Admin., Legal, Permitting (24%)				$13,000
Total Project Cost				**$67,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equalization Basins (32)

Task: Replace the Grit Washer Equipment

Priority: Low

Existing Condition:

1. Grit Washer and Cyclones were installed in 2007.

Recommendation:

1. Plan for replacing the Grit Washer Including Cyclones and Classifier in 2027.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace the Grit Washers/Cyclones and Classifier	1	LS	$120,000.00	$120,000
Subtotal				$120,000
Undeveloped Design Detail(25%)				$30,000
Construction Subtotal W/Contingencies				**$150,000**
General Conditions, Mobilization (5%)				$8,000
Sales Tax Allowance (5%)				$8,000
Overhead & Profit (15%)				$25,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$195,000**
Engineering, Admin., Legal, Permitting (24%)				$47,000
Total Project Cost				**$242,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equalization Basins (32)

Task: Repair Concrete Surfaces.

Priority: Low

Existing Condition:

1. Concrete Surfaces are in good condition with only some minor defects.

Recommendation:

1. Over the next 20 years, the interior concrete surfaces of the clarifier and equalization basins may need to be restored.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Clarifier Concrete Wall Repair/Restoration	3420	SF	$20.00	$68,400
EQ Basin #1 Concrete Repair/Restoration	9150	SF	$20.00	$183,000
EQ Basin #2 Concrete Repair/Restoration	12350	SF	$20.00	$247,000
Subtotal				$499,000
Undeveloped Design Detail(25%)				$125,000
Construction Subtotal W/Contingencies				**$624,000**
General Conditions, Mobilization (5%)				$31,000
Sales Tax Allowance (5%)				$33,000
Overhead & Profit (15%)				$103,000
Bonds & Insurance (2%)				$16,000
Total Construction Cost				**$807,000**
Engineering, Admin., Legal, Permitting (24%)				$194,000
Total Project Cost				**$1,001,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equalization Basins (32)

Task: Piping and Centerwell Coating Restoration

Priority: Medium

Existing Condition:

1. Center Well of clarifier has rust – influent pipe has corrosion.
2. Bypass pipe and valve has corrosion.

Recommendation:

1. Sandblast and recoat the clarifier influent well and influent pipeRemove the ground cover and replace any damaged waterproofing membrane and the entire expansion joint system.
2. Sandblast and recoat the bypas pipe and valve.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sandblast and recoat centerwell	754	SF	$15.00	$11,310
Sandblast and recoat piping	150	SF	$15.00	$2,250
Subtotal				$14,000
Undeveloped Design Detail(25%)				$4,000
Construction Subtotal W/Contingencies				**$18,000**
General Conditions, Mobilization (5%)				$1,000
Sales Tax Allowance (5%)				$1,000
Overhead & Profit (15%)				$3,000
Bonds & Insurance (2%)				$0
Total Construction Cost				**$23,000**
Engineering, Admin., Legal, Permitting (24%)				$6,000
Total Project Cost				**$29,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equilization Basins (32)

Task: Building and Electrical Modifications

Priority: High

Existing Condition:

1. Electrical is outdated.
2. Concern over freezing in dump station with water continuously running.
3. Bottom channel of MCC is corroding.
4. Conduit supports on basin are corroding

Recommendation:

1. Extend building over dumping pit for freeze protection.
2. Replace bottom channel of MCC
3. Update light fixtures
4. Replace conduit supports in basins.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Expand Existing Building	2500	SF	$150.00	$375,000
Upgrade HVAC System	1	LS	$70,000.00	$70,000
Extend Electrical Room/Provide Exterior Exit	1	LS	$25,000.00	$25,000
Replace bottom channel of MCC	1	LS	$25,000.00	$25,000
Update Light Fixtures	1	LS	$25,000.00	$25,000
Replace conduit/supports and wiring in basins	1	LS	$25,000.00	$25,000
Subtotal				$545,000
Undeveloped Design Detail (25%)				$137,000
Construction Subtotal W/Contingencies				**$682,000**
General Conditions, Mobilization (5%)				$34,000
Sales Tax Allowance (5%)				$36,000
Overhead & Profit (15%)				$113,000
Bonds & Insurance (2%)				$17,000
Total Construction Cost				**$882,000**
Engineering, Admin., Legal, Permitting (24%)				$212,000
Total Project Cost				**$1,094,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equilization Basins (32)

Task: Construct Non-Potable Watermain to the EQ Basins

Priority: Low

Existing Condition:

1. Potable water is currently being used for washdown of the dumping pits.

Recommendation:

1. Construct non-potable watermain from the WRF to the Equalization Basins.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
8" C900 PVC Watermain	16120	LF	$100.00	$1,612,000
Directional Drill 8" Watermain	5000	LF	$225.00	$1,125,000
Subtotal				$2,737,000
Undeveloped Design Detail (25%)				$685,000
Construction Subtotal W/Contingencies				**$3,422,000**
General Conditions, Mobilization (5%)				$171,000
Sales Tax Allowance (5%)				$180,000
Overhead & Profit (15%)				$566,000
Bonds & Insurance (2%)				$87,000
Total Construction Cost				**$4,426,000**
Engineering, Admin., Legal, Permitting (24%)				$1,062,000
Total Project Cost				**$5,488,000**

Computed: KFN | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: DVP | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Equilization Basins (32)

Task: Expansion and Improvements

Priority: High

Existing Condition:

1. Existing septage dumping station and grit removal system is labor intensive.
2. Electrical is outdated.
3. Turn radius is insufficient for septage haulers.
4. Non-septage loads need separate location i.e. drying beds.
5. Drainage issues on northwest dump site.

Recommendation:

1. Automate Screening, Wash Water, Grit Removal, Grit Conveying.
2. Provide manifests
3. Sampling
4. Scale House for billing loads
5. Take out fence on NW side to expand access for larger trucks.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Automate Screening & Grit Removal System	1	LS	$25,000.00	$25,000
Septage Dumping Station Improvements	1	LS	$1,000,000.00	$1,000,000
Site Clearing	9.2	ACRE	$500.00	$4,600
Fence	2,200	LF	$30.00	$66,000
20' Manual Cantilever Gate	2	EA	$2,800.00	$5,600
Seeding and Fertilizing	9.2	ACRE	$500.00	$4,600
9" Erosion Control Wattle	2,000	LF	$4.00	$8,000
Equalization Basin Unclassified Excavation	70,000	CY	$4.00	$280,000
Waste Dirt to Soil	50,000	CY	$4.00	$200,000
Scarify and Compact	8,000	CY	$1.50	$12,000
Topsoil Placement	9,000	CY	$3.00	$27,000
Gravel Surfacing (Access Drives)	2,000	TON	$20.00	$40,000
Geotextile Fabric	4,000	SY	$4.50	$18,000
PCC Pavement	4,000	SY	$70.00	$280,000
Erosion Control Blanket	14,000	SY	$2.00	$28,000
Silt Fence	2,500	LF	$3.00	$7,500
Erosion Control Wattle-Straw	2,000	LF	$4.00	$8,000
Vehicle Tracking Control	1	EA	$2,500.00	$2,500

Geotextile Fabric - Pipe Outlets/Erosion Control	200	SY	$5.00	$1,000
Rip-Rap - Pipe Outlets/Erosion Control	200	TON	$30.00	$6,000
Overflow Sewer Pipe	200	LF	$150.00	$30,000
EQ Return Pipe	500	LF	$150.00	$75,000
Granular Embedment	1,000	TON	$15.00	$15,000
Pipe Foundation Material	400	TON	$20.00	$8,000
Gate Isolation Valve	1	EA	$15,000.00	$15,000
Bypass Pumping Gravity Sewer	1	LS	$20,000.00	$20,000
8" Non-Potable Water Line Relocation	700	LF	$40.00	$28,000
Electrical Service Relocation	1	EA	$7,500.00	$7,500
36" Storm Sewer Relocation (Including Boxes)	2,500	LF	$130.00	$325,000
Culvert	120	LF	$100.00	$12,000
60" Dia. Sanitary Sewer Manhole (8-Foot Depth	2	EA	$10,000.00	$20,000
Additional Vertical Manhole Feet	25	VF	$1,000.00	$25,000
Dewatering	1	LS	$19,300.00	$19,300
Reinforced Membrane Lagoon Liner System	40,000	SY	$15.00	$600,000
Flow Metering Control Structure	1	LS	$250,000.00	$250,000
Eq Basin Outlet MH Structure	1	LS	$10,000.00	$10,000
EQ Basin Overflow Structure	1	LS	$10,000.00	$10,000
Equalization Basin Inlet W/Inlet Gate	1	EA	$40,000.00	$40,000
Electrical and Controls	1	LS	$75,000.00	$75,000
Fiber Innerduct (Including Handholes)	500	LF	$5.00	$2,500
Subtotal				$3,612,000
Undeveloped Design Detail (25%)				$903,000
Construction Subtotal W/Contingencies				**$4,515,000**
General Conditions, Mobilization (5%)				$226,000
Sales Tax Allowance (5%)				$237,000
Overhead & Profit (15%)				$747,000
Bonds & Insurance (2%)				$115,000
Total Construction Cost				**$5,840,000**
Engineering, Admin., Legal, Permitting (24%)				$1,402,000
Total Project Cost				**$7,242,000**

Computed: KFN	**Date:** 10/3/2016	**HDR Job No:** 10028508
Checked: DVP	**Date:**	

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Civil/Sitework

Task: Concrete Sidewalk/Step Removal/Replacement & Widening.

Priority: Medium

Existing Condition:

1. The concrete sidewalks have several areas of settlement, cracking, and vertical and horizontal separation.
2. Narrow sidewalks make it difficult to clear snow with the City's UTV.
3. Steps in sidewalk at various locations also make it difficult to clear snow with the City's UTV.

Recommendation:

1. Remove and replace concrete sidewalks. Widen Sidewalks.
2. Remove steps, regrade, and replace with sidewalks.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove existing sidewalks and steps.	4,000	SY	$12.00	$48,000
Regrading to eliminate steps	1	LS	$15,000.00	$15,000
Scarify and recompact subgrade	4,000	SY	$1.00	$4,000
New Concrete Sidewalks	47,000	SF	$8.00	$376,000
Aggregatge Base Course	1,700	Tons	$14.00	$23,800
Subtotal				$467,000
Undeveloped Design Detail(25%)				$117,000
Construction Subtotal W/Contingencies				**$584,000**
General Conditions, Mobilization (5%)				$29,000
Sales Tax Allowance (5%)				$31,000
Overhead & Profit (15%)				$97,000
Bonds & Insurance (2%)				$15,000
Total Construction Cost				**$756,000**
Engineering, Admin., Legal, Permitting (24%)				$181,000
Total Project Cost				**$937,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Civil/Sitework

Task: Concrete Pavement Removal and Replacement

Priority: Medium

Existing Condition:

1. Concrete Pavement is in poor condition.

Recommendation:

1. Remove and replace concrete pavement.
2. Remove and replace concrete curb & gutter.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove existing pavement	29,000	SY	$12.00	$348,000
Remove existing curb & gutter	18,000	LF	$4.50	$81,000
Scarify and recompact subgrade	29,000	SY	$1.00	$29,000
Replace Concrete Pavement	29,000	SY	$50.00	$1,450,000
Aggregatge Base Course	9,200	Tons	$14.00	$128,800
Replace Curb & Gutter	18,000	LF	$18.00	$324,000
Subtotal				$2,361,000
Undeveloped Design Detail(25%)				$591,000
Construction Subtotal W/Contingencies				**$2,952,000**
General Conditions, Mobilization (5%)				$148,000
Sales Tax Allowance (5%)				$155,000
Overhead & Profit (15%)				$488,000
Bonds & Insurance (2%)				$75,000
Total Construction Cost				**$3,818,000**
Engineering, Admin., Legal, Permitting (24%)				$916,000
Total Project Cost				**$4,734,000**

Computed: KFN **Date:** 10/3/2016 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Site Electrical

Task: Replace Electrical Ductbank Loop

Priority: High

Existing Condition:

1. Electrical duct bank feed loop is original from 1984.
2. Half of the electrical feed loop has already been replaced.

Recommendation:

1. Remove and replace the last 1/2 of the electrical duct bank feed loop

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Remove and replace electrical feed loop	2,800	LF	$75.00	$210,000
Subtotal				$210,000
Undeveloped Design Detail(25%)				$53,000
Construction Subtotal W/Contingencies				**$263,000**
General Conditions, Mobilization (5%)				$13,000
Sales Tax Allowance (5%)				$14,000
Overhead & Profit (15%)				$44,000
Bonds & Insurance (2%)				$7,000
Total Construction Cost				**$341,000**
Engineering, Admin., Legal, Permitting (24%)				$82,000
Total Project Cost				**$423,000**

Appendix 3.C – Existing Facilities Condition Assessment Lift Station Review Power Point Presentation

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

HDR

CITY OF SIOUX FALLS WASTEWATER TREATMENT AND COLLECTION SYSTEM MASTER PLAN

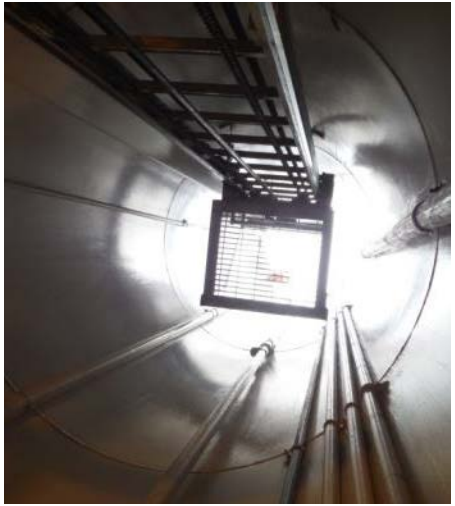
Lift Station Review

GENERAL CONCERNS WITH LIFT STATIONS AND WET WELLS

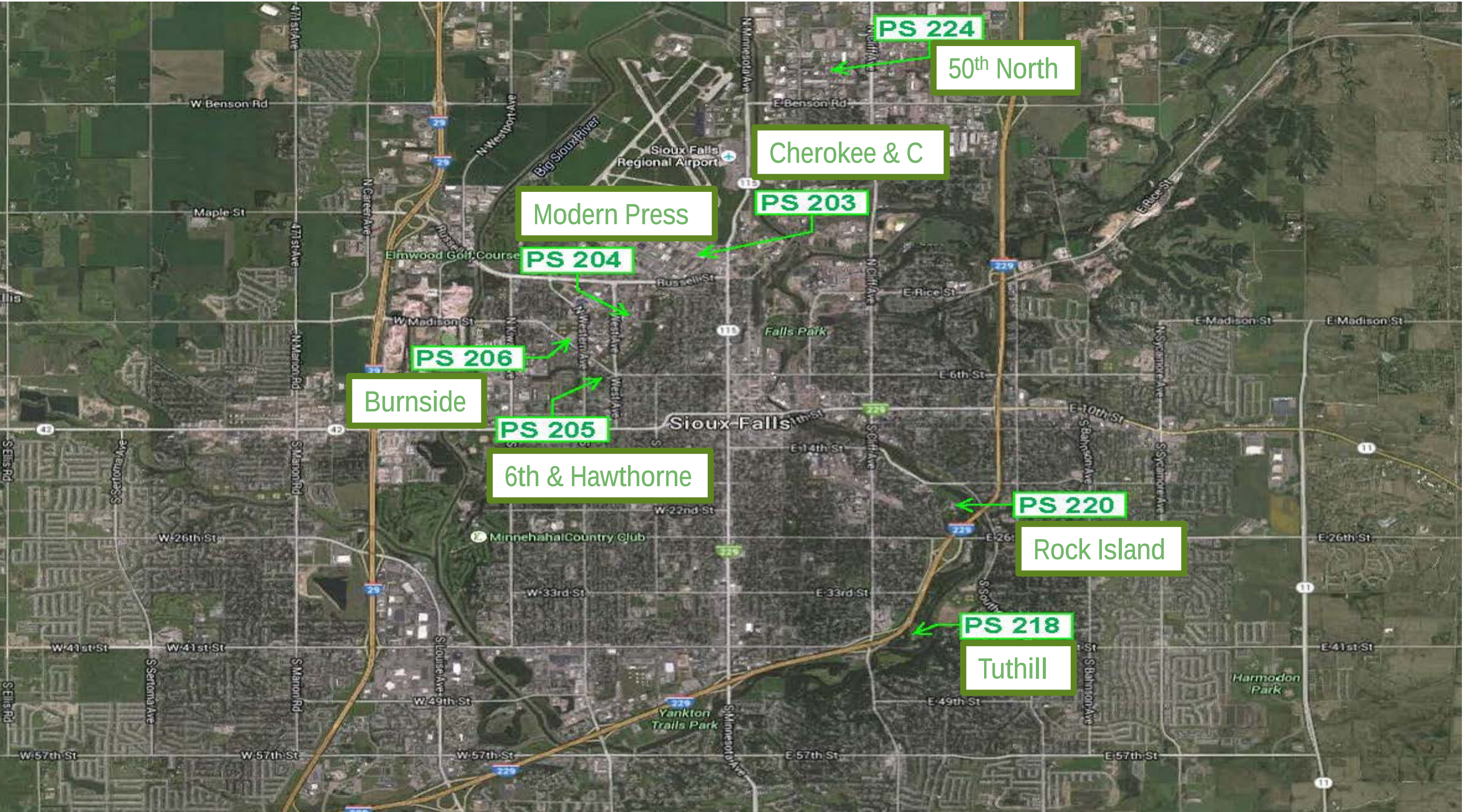
No Electrical Seal-Offs Between Wetwells and Control Panel

Deterioration of Roofing Material

Adequate Ventilation – Supply and Exhaust Fans - Current NFPA Requires 6 ACH in Pump Rooms. If not they are then Classified as Class 1 Division 2



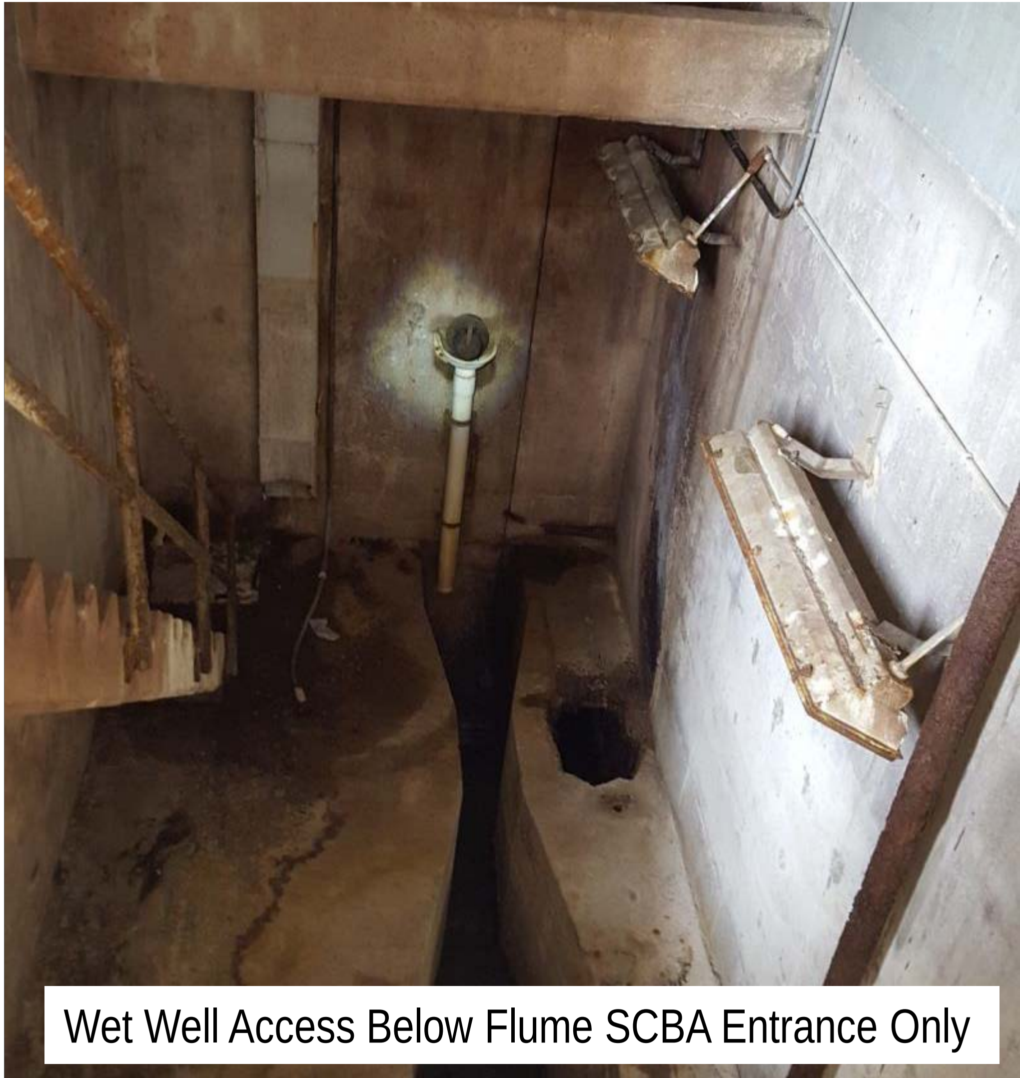
Safe Access to Pumping Rooms


PS 224
50th North
Cherokee & C
Modern Press
PS 203
PS 204
PS 206
Burnside
PS 205
6th & Hawthorne
PS 220
Rock Island
PS 218
Tuthill
Sioux Falls
Sioux Falls Regional Airport
Big Sioux River
Elmwood Golf Course
Falls Park
Minnehaha Country Club
Yankton Trails Park
Harmodon Park
W Benson Rd
E Benson Rd
Maple St
Russell St
E Rice St
W Madison St
E Madison St
E 6th St
E 10th St
E 14th St
W 22nd St
W 26th St
E 26th St
W 33rd St
E 33rd St
W 41st St
E 41st St
W 49th St
E 49th St
W 57th St
E 57th St

PS-203 CHEROKEE & “C”

ISSUES

Rusted and Corroded Conduits and Railings In Wetwell



Wet Well Access Below Flume SCBA Entrance Only

REMAINING LIFE

Pump Room Has Space for Expansion

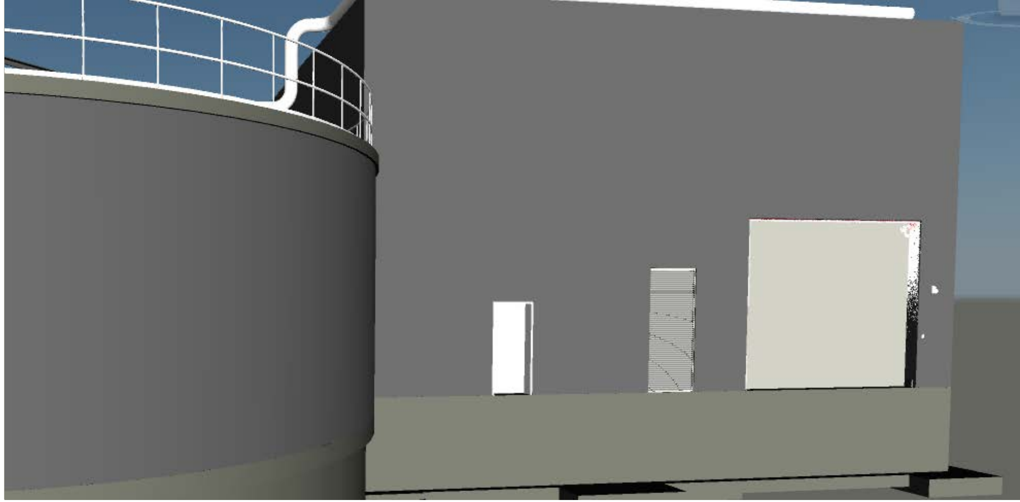
Structures are in Good Condition

SUGGESTED IMPROVEMENTS

- New Dual Wet Well with at Grade Access Hatches for Vactor Truck Cleaning
- Rehabilitate Pump Room
- Move Gen Set to “Old Wet Well” Room
- New Electrical Switchgear, Motor Control Center and VFD’s
- Supply and Exhaust HVAC System for Pumping Room and Main Floor Electrical/Control Area
- Pigging Station for the Dual Forcemains

NO AS-BUILT DOCUMENTATION

- How Do We Obtain Necessary Construction Documentation
- Laser Scan of Existing Facility



PS-204 MODERN PRESS
806 N WEST AVENUE

ISSUES

Dry Well (Pump Room) Access Via Manhole Steps

Transfer Switch and E-Gen Pigtail Below Grade

REMAINING LIFE

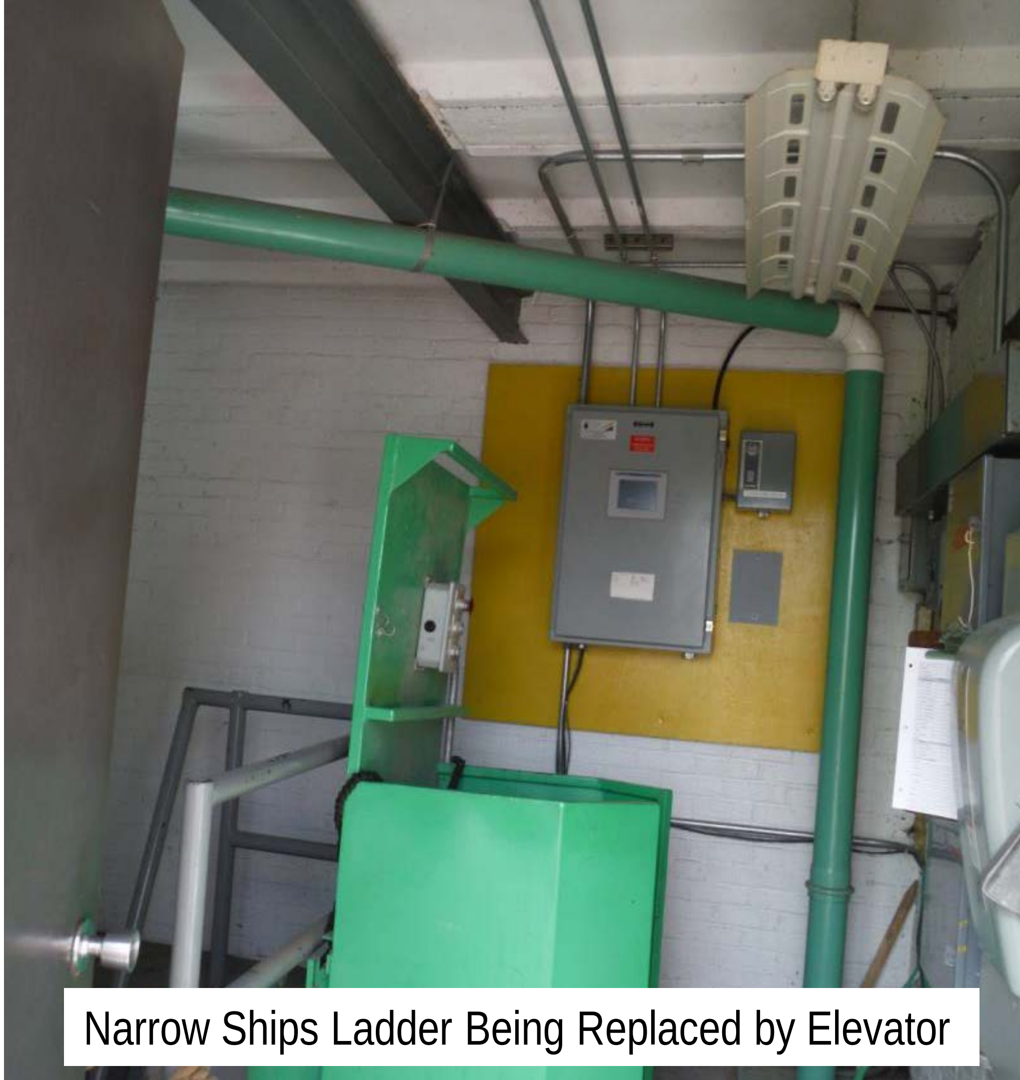
Pumps are in Good Condition

Flows are Low - Pumps Operate Infrequently

PS-205
6TH & HAWTHORNE

ISSUES

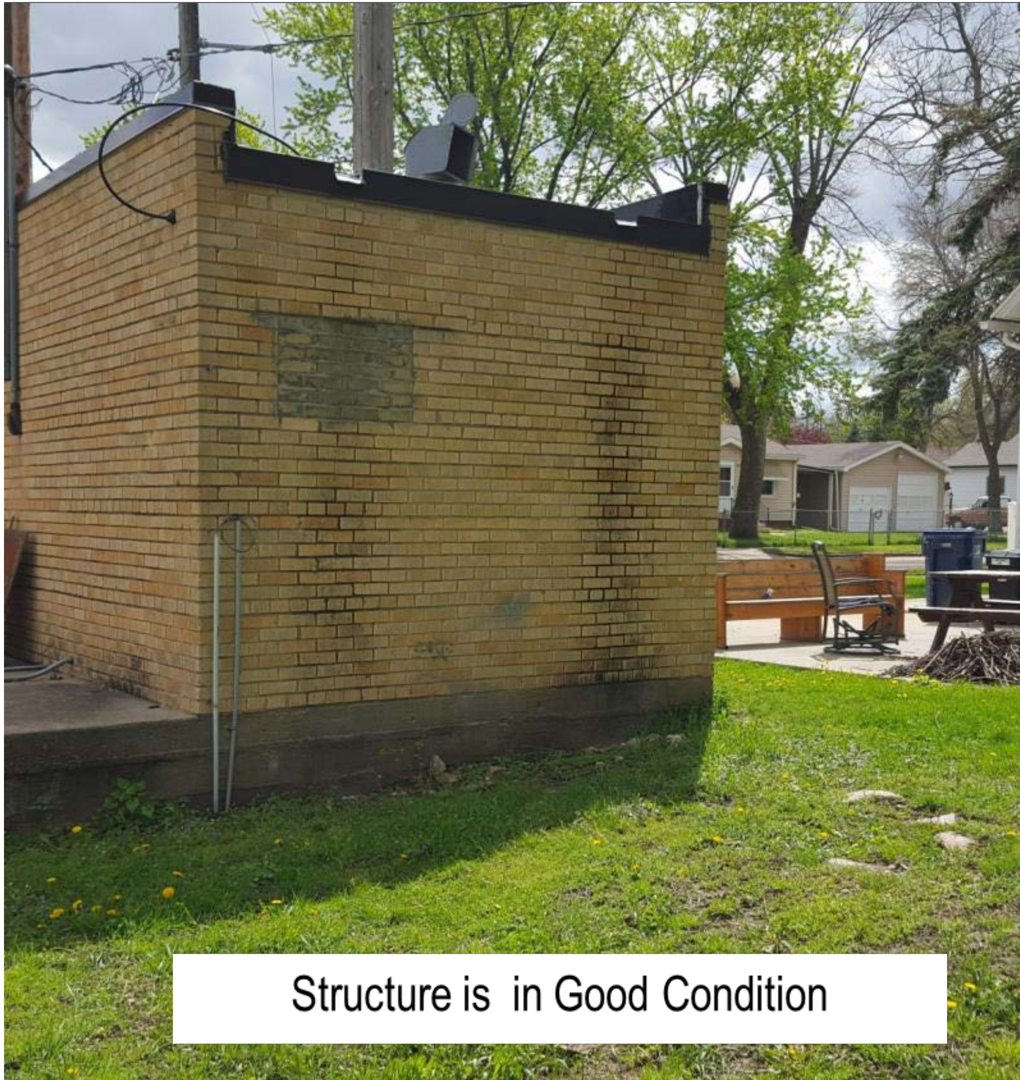
Tight Working Quarter



Narrow Ships Ladder Being Replaced by Elevator

REMAINING LIFE

Station Only Serves a Small Area with Minimal Flow. Pumps are in Good Condition



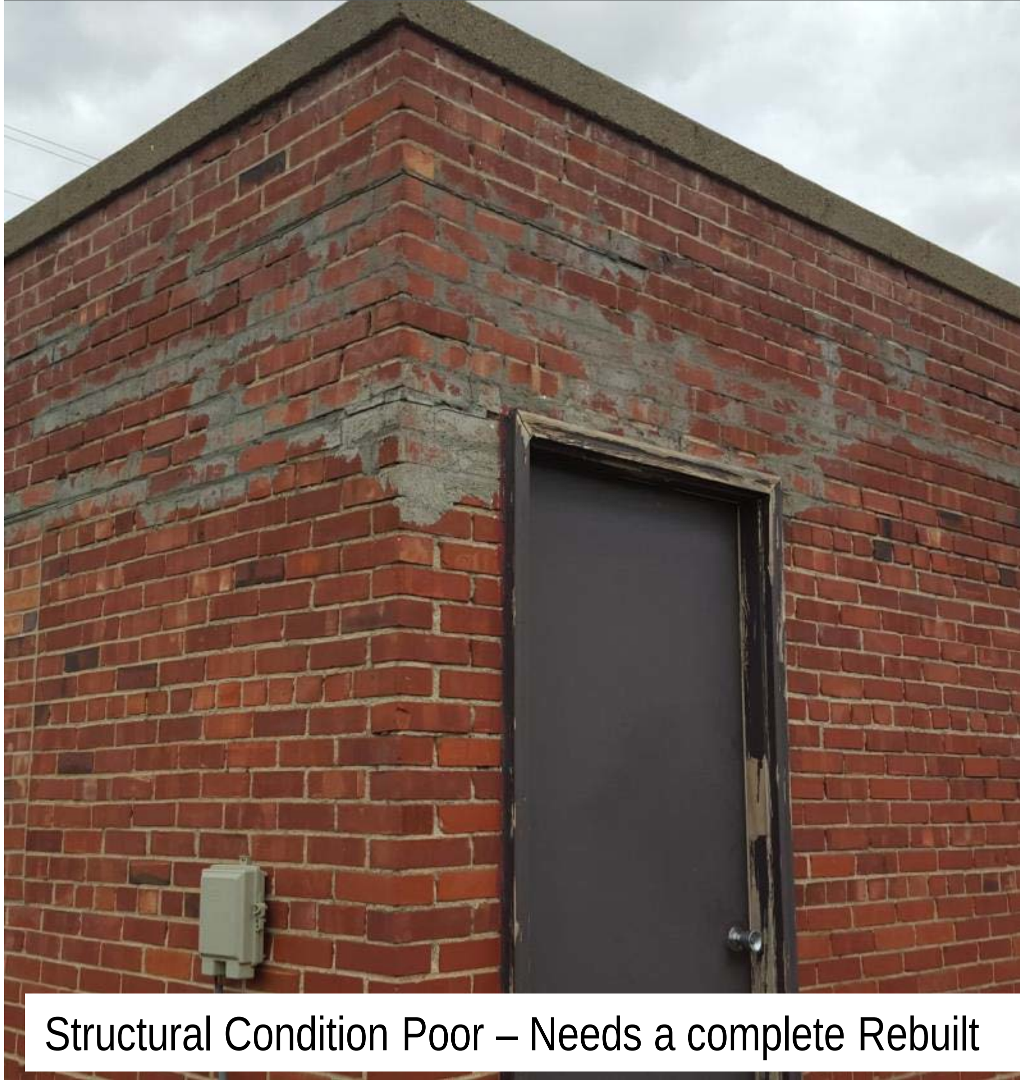
Structure is in Good Condition

PS-206 BURNSIDE
1800 BURNSIDE

ISSUES

Submerged Flow Meter

Deteriorated Bldg Interior and Roof



Structural Condition Poor – Needs a complete Rebuilt

REMAINING LIFE

Station Only Serves a Small Area with Minimal Flow. Pump No.1 is in Good Condition, Pump No. 2 has some potential bearing issues.

ATS – Controls Are Relatively New

PS-218 TUTHILL PARK
3500 S. BLAUVELT

ISSUES

Ventilation in Electrical Room and Connected Pump Room is Inadequate

Potential for Flooding

Seal Water Supply and Connections to Seals Should be Corrected

REMAINING LIFE

Facility is in Excellent Condition

Pumps Piping and Valves are in Excellent Condition

PS- 220 ROCK ISLAND
1260 S BLAUVELT

ISSUES

Deteriorated Interior Roof and Humidity

Flood Plain is 3 to 4 feet above Main Floor
New Meter Base is 32” above Main Floor

REMAINING LIFE

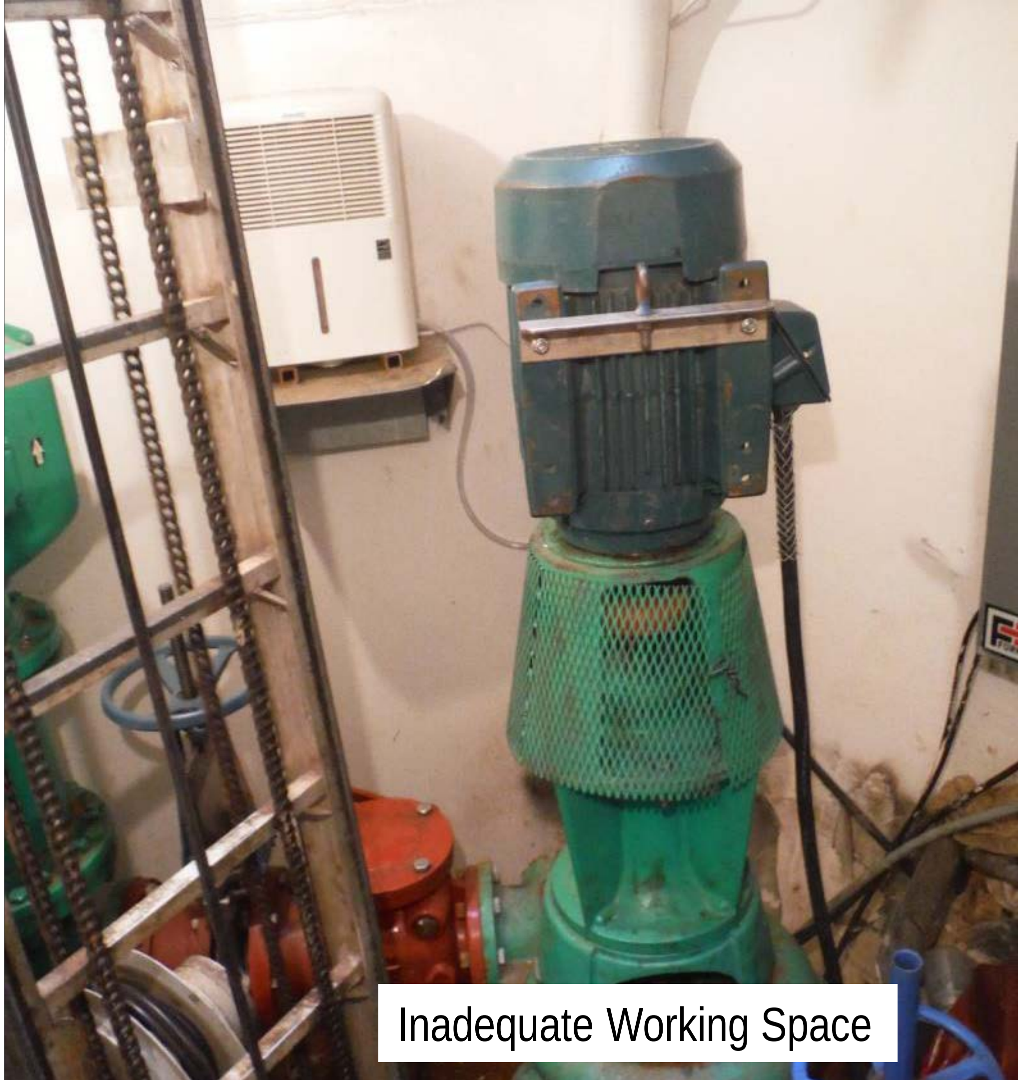
Station Only Serves a Small Area with Minimal Flow. Electrical and Controls are Relatively New.

Pumps are in Good Condition

PS- 224 50TH NORTH STREET

ISSUES

Pumps Plug-Cannot Run on VFD’s
Pump Number No. 2 Potential Bearing Issue
Only Access is down Elevator in Tubular Access Shaft



Inadequate Working Space

REMAINING LIFE

Easy Access and out of Flood Plain

ATS-Gen Set-VFDs are Relatively New

QUESTIONS - COMMENTS

Appendix 3.D – Existing Facilities Condition Assessment Water Reclamation Facility Review Power Point Presentation

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

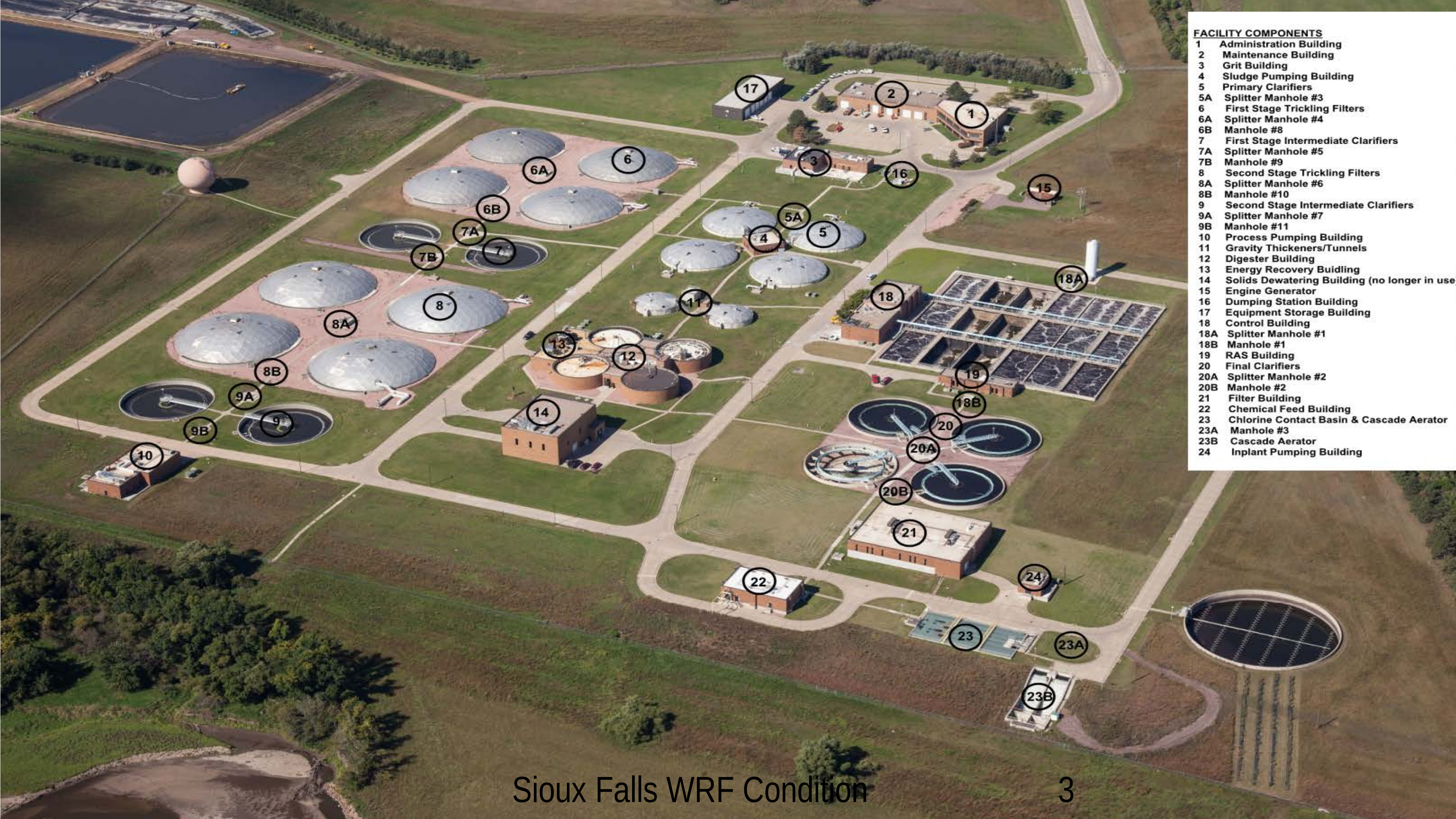
February 2018

HDR

CITY OF SIOUX FALLS WASTEWATER TREATMENT AND COLLECTION SYSTEM MASTER PLAN

Water Reclamation Facility Review

(Updates from the September 8th Review Meeting are in Green and Italicized).



FACILITY COMPONENTS

1	Administration Building
2	Maintenance Building
3	Grit Building
4	Sludge Pumping Building
5	Primary Clarifiers
5A	Splitter Manhole #3
6	First Stage Trickling Filters
6A	Splitter Manhole #4
6B	Manhole #8
7	First Stage Intermediate Clarifiers
7A	Splitter Manhole #5
7B	Manhole #9
8	Second Stage Trickling Filters
8A	Splitter Manhole #6
8B	Manhole #10
9	Second Stage Intermediate Clarifiers
9A	Splitter Manhole #7
9B	Manhole #11
10	Process Pumping Building
11	Gravity Thickeners/Tunnels
12	Digester Building
13	Energy Recovery Buidling
14	Solids Dewatering Building (no longer in use
15	Engine Generator
16	Dumping Station Building
17	Equipment Storage Building
18	Control Building
18A	Splitter Manhole #1
18B	Manhole #1
19	RAS Building
20	Final Clarifiers
20A	Splitter Manhole #2
20B	Manhole #2
21	Filter Building
22	Chemical Feed Building
23	Chlorine Contact Basin & Cascade Aerator
23A	Manhole #3
23B	Cascade Aerator
24	Inplant Pumping Building

MAINTENANCE BUILDING (2)

ISSUES

Roof – Age/Condition & Reliability

Mezzanine – Safety

HVAC – Age/Condition & Reliability

Mezzanine – Missing Ladder Rail and Toe Plate

SUGGESTED IMPROVEMENTS

- High Priority
  - Replace Roof System *and upgrade HVAC System*.
  - Replace missing ladder rail and toe plate at mezzanine

GRIT BUILDING (3)

ISSUES

- Age/Wear & Reliability of Blowers #1 and #3
- Deterioration of grit pump valves & piping.
- Deteriorated concrete around stairway railing
- Settling/separation of sidewalks & Stoops
- Age & Reliability of Roof, HVAC, and Electrical
- Damaged and missing brick
- *Electrical Seal-offs and NFPA 820 Code*









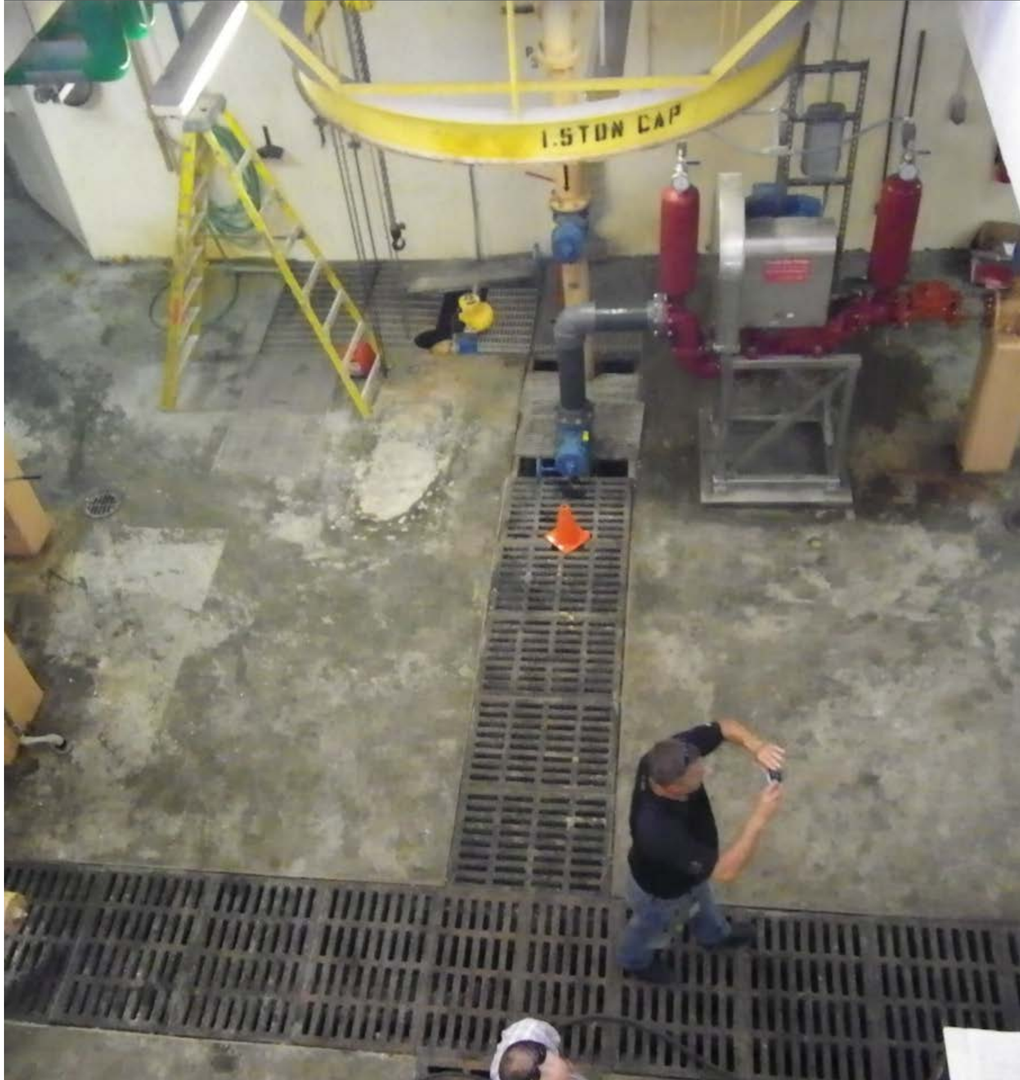

SUGGESTED IMPROVEMENTS

- High Priority
  - Replace concrete around stairway railing and replace sidewalks & stoops.
  - Replace roof system *and upgrade HVAC System in grit part of building*.
  - Repair brick and roof access ladder.
  - Upgrade electrical in grit part of building
  - *Check impact of improvements on code issues.*
- Medium Priority
  - Replace Blower #1 and #3
  - Rehab piping and replace valves.
  - Repair concrete floor at overhead door of Screen Room.

SLUDGE PUMPING BUILDING (4)

ISSUES

- Conduits, electrical and utility boxes are showing signs of deterioration.
- Lacking heat at times due to competing heat requirements on hot water system.
- *Condensation issue in building.*



SUGGESTED IMPROVEMENTS

- High Priority
  - Upgrade Electrical
- Medium Priority
  - Evaluate capacity of hot water heating system.
  - *Evaluate supplemental heating source – possibly natural gas.*

PRIMARY CLARIFIERS (5)

ISSUES

- Cracks/deterioration of concrete surfaces.
- Age/wear and reliability of mechanisms.
- Worn seals around observation windows of catwalks.
- Corrosion and operation of telescoping and drain valves.
- Corrosion on electrical conduit and boxes.
- Missing down-leads on lighting protection system.
- Slide gates in Splitter MH #3 difficult to operate.









SUGGESTED IMPROVEMENTS

- High Priority
  - Replace window systems on the catwalks.
  - Repair the lightning protection system.
  - *Replace all the conduit and associated electrical equipment between Sludge Pumping and the access platforms.*
- Medium Priority
  - Replace the clarifier mechanism drives *and provide a spare drive* .
  - Evaluate replacement or rehab of sludge collection equipment.
  - If still used, replace the scum telescoping valves. Replace the drain valves
  - Replace the slide gates in Splitter MH#3.
  - Restore interior & exterior concrete surfaces.
  - Review NFPA 820 to see if the Odor Control is compliant with the current NFPA standards.

FIRST STAGE TRICKLING FILTERS (6)

ISSUES

- Effluent gates of TFs – unable to operate
- Slide gates of Splitter MH#4 - difficult to operate
- Steps at MH#8 – difficult to clear snow

SUGGESTED IMPROVEMENTS

- Medium Priority
  - Replace Slide Gates in Splitter MH#4 Slide Gates.
  - Evaluate grading options or sidewalk configurations to eliminate sidewalk steps.
  - *Replace effluent gates on the 1st Stage TFs.*

FIRST STAGE INTERMEDIATE CLARIFIERS (7)

ISSUES

- Mechanism drives – age & reliability.
- Ground eroded under humus drain valve.
- Discoloration of exterior concrete walls.
- Corrosion of electrical boxes and conduit.
- Slide gates in Splitter MH#5 and MH #9 are difficult to operate.





SUGGESTED IMPROVEMENTS

- *High Priority*
  - *Replace electrical boxes and conduit.*
- Medium Priority
  - Replace mechanism drives
  - Fill and grade under valve supports
  - Replace slide gates in Splitter MH#5 and MH#9.

SECOND STAGE TRICKLING FILTER (8)

ISSUES

- Effluent valves are difficult to operate
- Slide gates in Splitter MH#6 are difficult to operate.
- Sidewalks settling around MH#10.

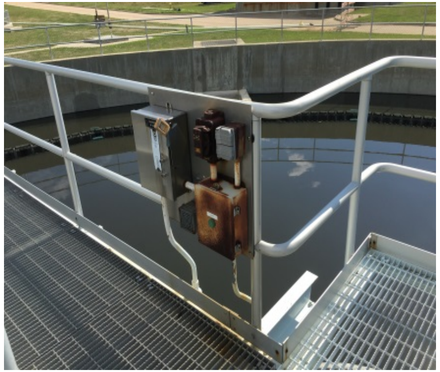
SUGGESTED IMPROVEMENTS

- Medium Priority
  - Replace the slide gates in Splitter MH #6.
  - Replace sidewalk around MH#10.
  - *Replace the effluent valves on the 2nd Stage TFs.*

SECOND STAGE INTERMEDIATE CLARIFIER (9)

ISSUES

- Mechanism drives – age & reliability.
- Discoloration of exterior concrete walls.
- Deterioration of concrete at guardrail posts
- Corrosion of electrical boxes and conduit
- Slide gates in Splitter MH#7 and MH #11 are difficult to operate
- Concrete cracking and settling around Splitter MH#7 and MH#11.
- Steps at Splitter MH#7 make clearing snow difficult.



SUGGESTED IMPROVEMENTS

- *High Priority*
  - *Repair concrete at guardrail posts*
  - *Replace electrical boxes and conduit.*
- Medium Priority
  - Replace mechanism drives
  - Replace slide gates in Splitter MH#7 and MH#11
  - Replace cracked & settled sidewalks
  - Evaluate grading options or sidewalk configurations to eliminate sidewalk steps.

PROCESS PUMPING (10)

ISSUES

- Recirculation pumps are original.
- Humus piping is thin from wear.
- Exterior north doors do not shut properly.
- Exterior/interior masonry sealant is deteriorated
- Rear exit is missing stoop and stairs.
- Interior paint is deteriorated due to water intrusion around windows.
- Leaking *from wetwell* into drywell.
- Corrosion on electrical j-box near entrance.

SUGGESTED IMPROVEMENTS

- *High Priority*
  - *Repair leaking from wetwell to drywell.*
  - *Replace electrical conduit and junction box near entrance.*
- Medium Priority
  - Replace humus line – glass lined pipe
  - Repair or replace doors on north side.
  - Replace sealant and backer rod in masonry joints
  - Tuck point masonry.
  - Install landing and stairs at the rear exit for safety reasons.
  - Replace sealant and backer rod on all windows.

GRAVITY THICKENERS/TUNNELS (11)

ISSUES

- Metal deterioration on thickener mechanism.
- Pitting/deterioration of thickener tank walls.
- Exposed aggregate on exterior thickener walls.
- Stair and landing on Thickener #2 sways
- Deterioration/corrosion of piping in tunnel.
- Tunnel floor is completely wet.
- Severe water damage at south end of tunnel.
- Roofing and scupper failing at Exit Stair Tower.
- Significant corrosion of conduits at the thickener platform.
- Corrosion on electrical conduit in Tunnel.






SUGGESTED IMPROVEMENTS

- High Priority
  - Replace thickener mechanisms.
  - Repair stairs and landing at Thickener #2
  - Install drainage system to divert water away from tunnel walls.
  - At exit stair tower of tunnel replace brick and tuck point.
  - Replace roof and install new scupper/flashing at exit stair tower.
  - Replace/repair electrical conduit at thickener platform and in Tunnel.
  - *Restore interior/exterior concrete surfaces of thickeners.*
  - *Rehab supports for odor control blowers.*
  - *Sandblast and recoat piping.*

DIGESTER BUILDING (12)

ISSUES

- Upgrades to digester facility are being done current CIP.

ENERGY RECOVERY (13)

ISSUES

- Boilers and Boiler Pumps are outdated.
- Room has a common wall with the digester, which is an NFPA 820 issue.
- Roof system is being replace under current CIP.
- Roof exhaust fans #3 & #4 are original.
- *Issues with operation, function, and size of door on south side of building.*

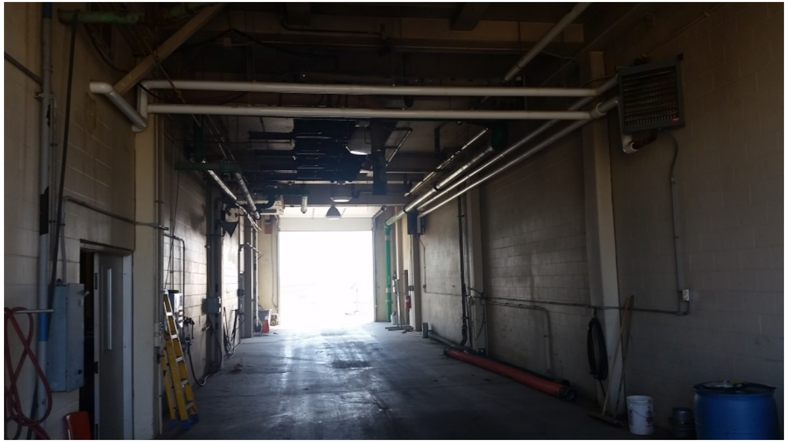
SUGGESTED IMPROVEMENTS

- High Priority
  - Replace boilers and boiler pumps.
  - Replace older roof exhaust fans.
  - *Evaluate replacement of south door with new roll-up door.*

SOLIDS DEWATERING (14)

ISSUES

- Roof is original – concern due to age/condition & Reliability.
- HVAC is outdated – concerns due to age & reliability.
- Switchgear damaged by water (roof leak).



SUGGESTED IMPROVEMENTS

- Identify what needs to be included in the future dewatering project.
- *Make sure updates include replacement of existing MCC.*
- *Improvements will be tied to FOG Project.*

ENGINE GENERATOR AND UTILITY SERVICE ENTRANCE (15)

ISSUES

- Muffler/exhaust is rusty.
- Rust on the enclosure.
- Rust/discoloration of concrete support slab.
- Step up to enclosure has no hand rail or platform creating and unsafe condition.
- Deteriorate pavement – low spots, worn surface.
- Generator room extremely hot.
- *Generator redlines if two aeration blowers are operating.*

SUGGESTED IMPROVEMENTS

- Medium Priority
  - Install utility bypass for service reliability.
  - EPA emissions upgrades required to run the generator to feed back to the utility.
  - Replace pavement.
  - Remove rust spots from enclosure.
  - *Verify Generator meets future capacity requirements.*

DUMPING STATION (16)

ISSUES

- *Dumping station at WRF to be maintained for backup.*

SUGGESTED IMPROVEMENTS

- *Medium Priority*
    - *Continue to maintain dumping station.*

EQUIPMENT STORAGE BUILDING (17)

ISSUES

- Original metal roof installed in 1995.
- Limited office space *for 21 persons*.
- *There are no shower and locker room facilities for personnel.*
- HVAC has old tube heaters that soot.

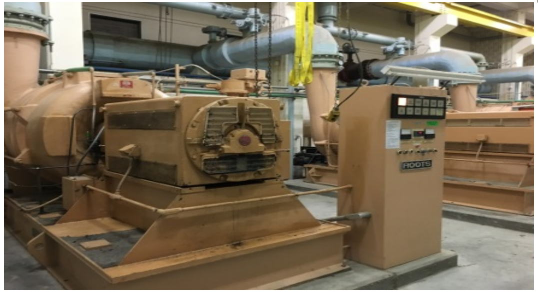
SUGGESTED IMPROVEMENTS

- High Priority
  - Update HVAC system.
  - Expand office area into SW corner of Building *and add shower and locker room facilities*.
- Medium Priority
  - *Address when replacement of the metal roof should be replaced.*

CONTROL UNIT (18)

ISSUES

- Water ponds in NE area of bldg and runs into blower room.
- Blowers use a large amount of energy.
- Deterioration of ext. bldg sealant and backer rod .
- Old and outdated control system.
- HVAC is old and unreliable.
- Original pad mounted switches and transformers show deterioration of enclosures.
- Location of switchgear is a potential hazard at overhead door.



SUGGESTED IMPROVEMENTS

- High Priority
  - Re-grade NW side of bldg to reduce water ponding – possibly install intake and tie into storm sewer.
  - *Replace /upgrade entire HVAC system.*
  - *Replace and relocate switchgear – Group with new blowers and fine bubble aeration system.*
- Medium Priority
  - Replace blowers with more efficient blowers.
  - Remodel interior for more efficient use of space.
  - Tuck point brick.
  - Replace all exterior masonry sealant and backer rod.
  - Update control system.

AERATION BASIN (18C)

ISSUES

- Water splashes out of Splitter MH#1 during high flows.
- Mineral (calcium) buildup on grating of MH#1.
- Corrosion on air header piping and leaking at couplings.
- Basin air piping and valves leak.
- Unable to drain basins without sump pump.
- Minor cracking of concrete on the basin floors and walls.
- PVC electrical conduit is expanding and contracting due to weather.
- Corrosion on the electrical j-boxes and supports.






SUGGESTED IMPROVEMENTS

- *High Priority*
  - *Replace air valves and actuators.*
  - *Replace electrical j-boxes, support systems and PVC conduit.*
- Medium Priority
  - Evaluate raising walls of Splitter MH#1 and MH#1.
  - Evaluate updating the aeration system with fine bubble aeration.
  - Repair concrete basin floors and grout slope for better draining.
  - Repair concrete wall surfaces.

RAS BUILDING (19)

ISSUES

- RAS and WAS pumps are original.
- Slight grinding/vibration in RAS Pump #3
- Wet Well has limited capacity.
- Building showing signs of settlement.
- Roof is original.
- Grating on north side of building is bent.
- Moderate cracks on interior masonry.
- Exterior sealant is deteriorated.
- Water intrusion into drywell
- HVAC is original
- Electrical Transformers are in bad condition.

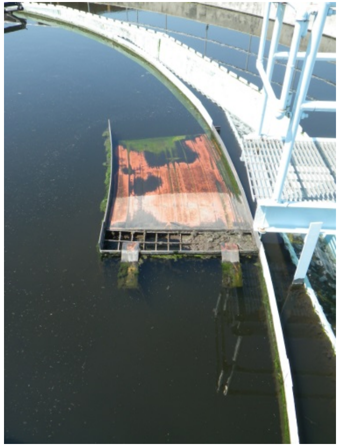
SUGGESTED IMPROVEMENTS

- High Priority
  - Upgrade electrical.
  - Determine what needs to be done for nutrient removal.
  - *Replace roof system and* replace/upgrade HVAC System.
- Medium Priority
  - Check wet well capacity.
  - Replace RAS and WAS pumps.
  - Seal drywell to eliminate water intrusion.
  - Mitigate building settlement and repair exterior masonry.

FINAL CLARIFIERS (20)

CONTINUING ISSUES

- Mechanisms old with corrosion.
- Draft tubes provide suboptimal sludge removal.
- Center well is outdated.
- *Weirs* are hard to access for cleaning.
- Past issues with floating/rising sludge.
- Concrete steps and sidewalks have settlement.
- Moderate delamination of the parge/skin coating on the concrete tanks.



SUGGESTED IMPROVEMENTS

- Medium Priority
  - Perform hydraulic analysis to evaluate relocation of the launders and add baffles.
  - Consider in-board weirs mounted off external walls.
  - Replace mechanism with stainless steel mechanism/components.
  - Replace draft tube mechanism with update removal system.
  - Install weir covers to control algae.
  - Repair and recoat concrete surfaces.

FILTER BUILDING (21)

ISSUES

- *Issues with elevation of bypass weir.*
- Valve actuators are original.
- Deteriorating masonry grout on south side exterior concrete wall *– this has been fixed*.
- Moderate cracking on inside face of SE wall.
- Deteriorating exterior masonry sealant.
- Deteriorating paint due to condensation and water intrusion around window.
- Deteriorating wall paint finish in lower pipe gallery.
- Surface rusting of electrical equipment due to building humidity.

SUGGESTED IMPROVEMENTS

- High Priority
  - Update electrical conduit and wiring.
- Medium Priority
  - *Adjust bypass weirs to direct more flow to filters.*
  - Replace valve actuators.
  - Repair masonry damage and tuck point.
  - Replace sealant and backer rod on all windows.
  - Repaint walls in the lower pipe gallery.

CHEMICAL FEED BUILDING (22)

ISSUES

- Concrete sidewalk is settling away from Bldg.
- Exterior stairs are deteriorating on north side of building.
- Corrosion on pad mounted transformer.
- Issues overriding PLC on Chem Feed Pumps.
- Some outdated electrical conduit and wiring.

SUGGESTED IMPROVEMENTS

- High Priority
  - Update electrical conduit and wiring.
  - *Update electrical transformer.*
  - *Review PLC Override Issue on Chemical Feed Pumps with Manufacturer to correct problem.*
- Medium Priority
  - Replace sidewalks.
  - Rehabilitate exterior stairs.

CHLORINE CONTACT BASIN AND CASCADE AERATOR (23)

ISSUES

- Effluent meter – unreliable due to installation/location.
- Additional capacity required for future.
- Foaming at MH#3 Structure.

SUGGESTED IMPROVEMENTS

- Medium Priority
  - Expand contact basin for future capacity.
  - Change effluent meter to partial flow mag.
  - Determine if MH#3 structure can be eliminated.

IN-PLANT PUMPING (24)

ISSUES

- NPW and In-Plant Waste Pumps are original.
- Corrosion visible on In-Plant Waste Pumps.
- NPW pumps run continuously.
- NPW strainers are original.
- Water intrusion through link seals.
- Drywell leaking through gap between floor and wall.
- Exterior sealant severely deteriorated.
- Moderate cracking on exterior face (SW corner).
- HVAC is original and unreliable.
- Plumbing is original.
- Roof is original and is unreliable.






SUGGESTED IMPROVEMENTS

- High Priority
  - Replace/upgrade HVAC system
  - Replace roof system.
  - Update electrical.
- Medium Priority
  - Replace NPW and In-Plant Waste Pumps.
  - Install constant pressure NPW system with VFDs.
  - Add VFDs to In-Plant Waste Pumps.
  - Replace/update NPW strainers.
  - Replace pipe link seals.
  - Repair brick, replace exterior sealant, and tuck point masonry.

EQUALIZATION BASIN (32)

ISSUES

- Labor intensive.
- Electrical is outdated.
- Turn radius is insufficient.
- Non-septage loads need separate location i.e. drying beds.
- Drainage issues on northwest dump site.
- Corrosion on center well of clarifier.
- Corrosion on bypass pipe and valve.
- Concern over freezing in dump station with water continuously running.
- Bottom channel of MCC is corroding.
- Conduit supports on basin are corroding.

SUGGESTED IMPROVEMENTS

- High Priority
  - Extend building over dumping pit for freeze protection.
  - Replace bottom channel of MCC
  - Update light fixtures
  - Replace conduit supports in basins.
  - Automate Screening, Wash Water, Grit Removal, Grit Conveying.
  - Provide manifests
  - Sampling
  - Scale House for billing loads
  - Take out fence on NW side to expand access for larger trucks.
- Medium Priority
  - Construct non-potable water line.
  - Sandblast and recoat piping valves and other metal surfaces with corrosion.

GENERAL OPTIMIZATION RECOMMENDATIONS

- See table on next slide.

Priority	Assessment Category	Opportunity	Opportunity Description	Cost
High	Vulnerability	SCADA	Address high-risk areas for instruments via SCADA only and provide hard-wired alarms for influent screening, aeration blowers, and Disinfection.	$102,000
Medium	Operational Capabilities and Procedures	Operations Manuals	Development of a facility level Electronic O&M Manual is recommended. A digital intranet based manual should be considered to facilitate continuous update and central access to SOP's and equipment manuals.	$200,000
Medium	Operational Capabilities and Procedures	SCADA	Update the SCADA / Information Technology Master Plan to improve control capabilities of existing processes and meet future demands of new treatment technologies. An important part of the SCADA Master plan should be a well-defined controls philosophy based on a Failure Mode Effects Analysis of each unit process. Currently only monitoring failures. Facility has Siemen's smart MCC(s) but not using to diagnose problems.	$50,000
Medium	Maintenance Procedures	Equipment Asset Management Software Updates (EAM)	Consider developing an EAMs system to better manage renewal decisions. There are several short term alternatives to implement this initiative either by; enhancing the current CMMS system to include EAM features described earlier or implementing a separate EAMs system such as AWWA's Plant Infrastructure Manager or HDR's AM Tools that are based on an MS Access database.	$50,000
Low	Operational Capabilities and Procedures	SCADA/ Remote Operations	Include remote capabilities via SCADA to ensure process function and limit trips to the plant. Cost will be dependent on amount of control required.	$125,000
Low	Maintenance Procedures	Computerized Maintenance Management Software (CMMS)	Migrating the asset database should be straightforward. Implementation is estimated to be $50,000 subject to final negotiations and changes to the scope of work. The licensing for a model includes an annual cost of $15-30K assuming 20 individual users.	$50,000
Low	Operational Capabilities and Procedures	On-line Monitoring	Implement additional on-line metering possibilities i.e. sludge blanket, ammonia, TSS.	$100,000

QUESTIONS - COMMENTS

Appendix 3.E – Existing Facilities Hydraulic Capacity Technical Memorandum and Equalization Assessments

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

HDR

SIOUX FALLS COLLECTION AND WRF MASTER PLAN
SIOUX FALLS, SOUTH DAKOTA

Hydraulic Model Schematic:
Aeration Basin Inlet to WRF Effluent
31.5 MGD Flow

CITY OF SIOUX FALLS
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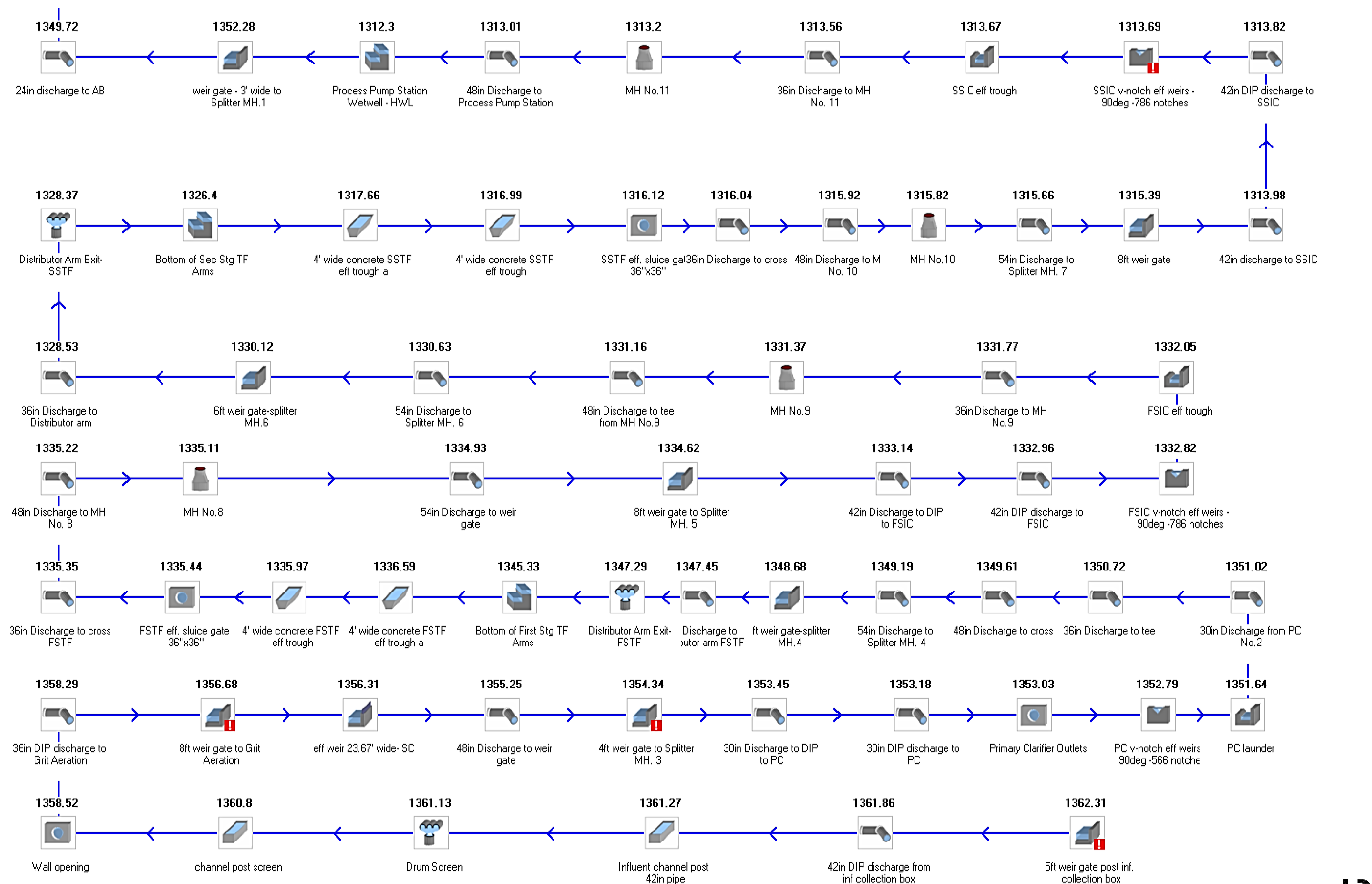
SHEET NO.
E-1



SIOUX FALLS COLLECTION AND WRF MASTER PLAN
SIOUX FALLS, SOUTH DAKOTA

Hydraulic Model Schematic:
WRF Influent to Aeration Basin Inlet
31.5 MGD Flow

CITY OF SIOUX FALLS
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HDR

SHEET NO.
E-2

City of Sioux Falls Water Reclamation Facility
Hydraulic Model Summary

Process	Manhole Number	Location	Weir elevation	Top of wall elevation	27 MGD Influent Flow			40 MGD Influent Flow			50 MGD Influent Flow			Remarks
					Modeled Water Surface Elevation	Freeboard ft	Freeboard to weir/outlet invert ft	Modeled Water Surface Elevation	Freeboard ft	Freeboard to weir/outlet invert ft	Modeled Water Surface Elevation	Freeboard ft	Freeboard to weir/outlet invert ft	
New influent box				1369.75	1361.91	7.84		1363.10	6.65		1365.15	4.60		
Drum screens		Upstream of drum screens		1363.96	1360.91	3.05		1361.54	2.42		1363.35	0.61		
		Downstream of drum screens		1363.96	1360.64	3.32		1361.09	2.87		1362.71	1.25		
Aerated grit		Upstream of inlet splitter box weir		1361.56	1356.60	4.96		1356.89	4.67		1358.29	3.27		
		Grit inlet splitter weir	1355.25				-1.02			-1.18			-2.91	Submerged weir may result in an uneven flow split.
		Aerated grit basin		1361.56	1356.27	5.29		1356.43	5.13		1358.16	3.40		
		Grit effluent weir	1355.82				0.89			-0.14			-2.31	Effluent weir submerges a flows approaching 40 MGD.
		Downstream of effluent weir		1361.56	1354.93	6.63		1355.96	5.60		1358.13	3.43		
Primary clarifiers	Split MH 2	Upstream of weir		1357.06	1354.22	2.84		1354.61	2.45		1356.56	0.50		The primary clarifier splitter box becomes freeboard limited at flows approaching 40 MGD
		Primary clarifier inlet splitter weir	1353.21				-0.08			-0.64			-3.25	Submerged weir may result in an uneven flow split.
		Downstream of weir		1357.06	1353.29	3.77		1353.85	3.21		1356.46	0.60		
		Primary clarifier		1357.50	1352.78	4.72		1352.82	4.68		1354.90	2.60		
		Primary clarifier V-notch weir	1352.63				1.10			-0.06			-2.26	
		Primary clarifier effluent launder		1357.50	1351.53	5.97		1352.69	4.81		1354.89	2.61		
		Primary clarifier effluent box		1357.50	1350.40	7.10		1352.43	5.07		1354.66	2.84		
First stage trickling filters	4	Upstream side of influent splitter box weir		1353.86	1348.62	5.24		1348.82	5.04		1349.19	4.67		
		First stage TF inlet splitter weir	1347.85				0.40			0.23			-0.85	
	4	Downstream side of influent splitter box weir		1353.86	1347.45	6.41		1347.62	6.24		1348.70	5.16		
		First stage TF outlet port inverts	1336.03				-0.53			-0.62			-1.50	A negative freeboard value indicates that water is backing up into the trickling filter underdrain system
		Effluent channel		1348.60	1336.56	12.04		1336.65	11.95		1337.53	11.07		
		Effluent box on the N/E trickling filter		1348.60	1335.19	13.41		1336.13	12.47		1337.56	11.04		
First stage intermediate clarifier	5	Upstream of splitter box weir		1338.04	1334.53	3.51		1334.82	3.22		1335.63	2.41		
		First stage TF clarifier inlet splitter weir	1333.53				0.47			-0.07			-1.74	
	5	Downstream of splitter box weir		1338.04	1333.06	4.98		1333.60	4.44		1335.27	2.77		
		Upstream of the clarifier v-notch effluent weir		1336.00	1332.81	3.19		1333.11	2.89		1334.53	1.47		
		First stage TF clarifier V-notch weir	1332.64				0.92			-0.46			-1.88	
		First stage TF clarifier effluent launder		1336.00	1331.72	4.28		1333.10	2.90		1334.52	1.48		
		Effluent box		1336.00	1331.34	4.66		1332.93	3.07		1334.41	1.59		
Second stage trickling filter	6	Upstream of splitter box weir		1334.27	1330.06	4.21		1330.26	4.01		1330.42	3.85		
		Second stage TF inlet splitter weir	1329.32				0.81			0.70			-0.12	
	6	Downstream of splitter box weir		1334.27	1328.51	5.76		1328.62	5.65		1329.44	4.83		
		Second stage TF outlet port inverts	1317.05				-0.58			-0.67			-1.22	A negative freeboard value indicates that water is backing up into the trickling filter underdrain system
		Effluent channel		1329.50	1317.63	11.87		1317.72	11.78		1318.27	11.23		
		Effluent box		1329.50	1315.87	13.63		1316.89	12.61		1318.32	11.18		
	10	Combined effluent box		1329.50	1315.65	13.85		1316.41	13.09		1317.60	11.90		
Second stage intermediate clarifier	7	Upstream of splitter box weir		1319.21	1315.30	3.91		1315.71	3.50		1316.54	2.67		
		Second stage TF clarifier inlet splitter weir	1314.34				0.52			-0.61			-1.91	
	7	Downstream of splitter box weir		1319.21	1313.82	5.39		1314.95	4.26		1316.25	2.96		
		Upstream of the clarifier v-notch effluent weir		1319.50	1313.59	5.91		1314.49	5.01		1315.56	3.94		
		Second stage TF clarifier V-notch weir/launder	1313.43				0.06			-1.05			-2.12	
		Second stage TF clarifier launder		1319.50	1313.37	6.13		1314.48	5.02		1315.55	3.95		
		Effluent box		1319.50	1313.26	6.24		1314.37	5.13		1315.46	4.04		
	11	Combined effluent box		1318.08	1312.98	5.10		1313.78	4.30		1314.55	3.53		
Process pump station		Upstream of Parshall flume		1320.50										
		Perpendicular channel on the south end of the wetwell		1320.50										
Aeration basin splitter box	Split MH 1	Upstream of weir gate		1355.06	1352.20	2.86		1352.45	2.61		1352.74	2.32		
		Aeration basin inlet splitter weir	1351.35				1.99			0.94			-0.56	
	Split MH 1	Downstream of weir gate		1355.06	1349.36	5.70		1350.41	4.65		1351.91	3.15		
Aeration basins		First aeration basin cell		1351.89	1349.04	2.85		1349.70	2.19		1350.44	1.45		Ten States Standards requires a minimum of 1.5 feet freeboard in aeration basins
		Last aeration basin cell - upstream of weir		1351.89	1348.90	2.99		1349.48	2.41		1350.14	1.75		
		Aeration basin effluent weir	1348.72				0.06			-0.74			-1.40	
		Effluent channel - downstream of effluent weir		1351.89	1348.66	3.23		1349.46	2.43		1350.12	1.77		
Final clarifiers	1	Box upstream of splitter box		1350.54	1347.77	2.77		1348.36	2.18		1348.85	1.69		
		Upstream of splitter box weir		1350.01	1347.20	2.81		1347.40	2.61		1347.54	2.47		
		Final clarifier inlet splitter weir	1346.1				0.98			0.81			0.60	
		Downstream of splitter box weir		1350.01	1345.12	4.89		1345.29	4.72		1345.50	4.51		
		Upstream of effluent weir		1346.50	1344.90	1.60		1344.92	1.58		1344.99	1.51		
		Final clarifier V-notch weir	1344.77				1.28			0.96			-0.18	
		Final clarifier launder		1346.50	1343.49	3.01		1343.81	2.69		1344.95	1.55		
		Effluent box		1346.50	1341.99	4.51		1343.36	3.14		1344.83	1.67		
	2	Combined effluent box		1346.50	1341.78	4.72		1342.91	3.59		1344.14	2.36		
Filtration		Filter influent channel		1344.09	1341.27	2.82		1341.81	2.28		1342.46	1.63		
		Filter inlet weir	1340.28											
		Clearwell (elevation to bottom of beams)		1332.50	1330.63	1.87		1330.82	1.68		1330.95	1.55		
		Clearwell effluent weir	1330.00		1330.63									
Chlorine contact chamber		Upstream of inlet weir		1330.50	1327.67	2.83		1328.11	2.39		1328.50	2.00		
		Chlorine contact inlet weir	1324.5				-3.00			-3.29			-3.54	Submergence of the chlorine contact inlet weir may result in an uneven flow split.
		Upstream of effluent weir		1329.23	1327.50	1.73		1327.79	1.44		1328.04	1.19		
		Chlorine contact effluent weir	1326.55				0.71			0.19			-0.30	
		Downstream of effluent weir		1329.23	1325.84	3.39		1326.36	2.87		1326.85	2.38		
		Downstream of the Parshall flume		1329.23	1324.70	4.53		1325.78	3.45		1326.85	2.38		
	3	Effluent manhole		1328.00	1324.41	3.59		1325.15	2.85		1325.85	2.15		
Post aeration		Cascade aerator inlet box		1327.00	1323.95	3.05		1324.12	2.88		1324.48	2.52		

Notes:
This model needs to be calibrated against actual measured water surface elevations.

City of Sioux Falls Water Reclamation Facility
Water Surface Elevation Measurements

Process	Manhole Number	Number of Units in Service	Location	Field Measurement *feet*	Time of Field Measurement	Measurement Description	Slab Elevation (measured)	Measured Water Surface Elevation (29 Datum)	Modeled Water Surface Elev. at 31.5 MGD - NOT CALIBRATED	Remarks
Influent Parshall flume		1								Reading on the tape on the channel wall = 30 MGD
Drum screens		3	Upstream of drum screens - 1st measurement	2.64	1:10 pm	Headworks floor to the water surface.	1363.96	1361.32	1361.13	
			Upstream of drum screens - 2nd measurement	2.49	1:12 pm	Headworks floor to the water surface.	1363.96	1361.47	1361.13	
			Downstream of drum screens - 1st measurement	2.73	1:15 pm	Headworks floor to the water surface.	1363.96	1361.23	1360.80	
			Downstream of drum screens - 2nd measurement	2.85	1:16 pm	Headworks floor to the water surface.	1363.96	1361.11	1360.80	
Aerated grit			Upstream of inlet splitter box weir	4.72		Top of grit basin cover to water surface.	1361.56	1356.84	1356.68	
			Aerated grit basin	5.15	3:00 pm	Top of grit basin cover to water surface.	1361.56	1356.41	1356.31	
			Downstream of effluent weir	6.24		Top of grit basin cover to water surface.	1361.56	1355.32	1355.25	
Primary clarifiers	Split MH 2		Upstream of weir	2.50	2:50 pm	Top of wall to water surface.	1357.06	1354.56	1354.34	
			Downstream of weir - east side of box	3.08		Top of wall to water surface.	1357.06	1353.98	1353.45	
			Downstream of weir - west side of box	2.96		Top of wall to water surface.	1357.06	1354.10	1353.45	
		4	Primary clarifier effluent box	6.11		Top of wall to water surface.	1357.50	1351.39	1351.20	
First stage trickling filters	4	3	Upstream side of influent splitter box weir	4.50	1:20 pm	Top of influent splitter box wall to the water surface.	1353.86	1349.36	1348.86	
	4		Downstream side of influent splitter box weir	4.83	1:22 pm	Top of splitter box wall to the water surface.	1353.86	1349.03	1347.79	
			Effluent box on the N/E trickling filter	13.92	1:30 pm	Top of effluent box wall to the water surface.	1348.60	1334.68	1335.62	
First stage intermediate clarifier	5	2	Upstream of splitter box weir	3.56		Top of splitter box wall to the water surface.	1338.04	1334.48	1334.62	
	5		Downstream of splitter box weir	4.48		Top of splitter box wall to the water surface.	1338.04	1333.56	1333.14	
			Effluent box	4.40		Top of effluent box wall to the water surface.	1336.00	1331.60	1331.98	
			Effluent box	4.38		Top of effluent box wall to the water surface.	1336.00	1331.62	1331.98	
Second stage trickling filter	6	3	Upstream of splitter box weir	4.13		Top of splitter box wall to the water surface.	1334.27	1330.14	1330.33	
	6		Downstream of splitter box weir	4.75	1:40 pm	Top of splitter box wall to the water surface.	1334.27	1329.52	1328.87	
			Effluent box on the N/E trickling filter	13.79		Top of effluent box wall to the water surface.	1329.52	1315.73	1316.21	
	10		Combined effluent box	10.08		Top of effluent box wall to the water surface.	1329.52	1319.44	1315.82	
Second stage intermediate clarifier	7		Upstream of splitter box weir	3.90		Top of splitter box wall to the water surface.	1319.21	1315.31	1315.39	May be backed up higher than typical because of high flows and how the Process Pump Station is currently operated.
	7		Downstream of splitter box weir	4.60	1:45 pm	Top of splitter box wall to the water surface.	1319.21	1314.61	1313.98	
		2	Upstream of the clarifier v-notch effluent weir	7.37		Top of walkway to the water surface.				Water surface was at the top of the v-notch weir plates.
			Effluent box	6.13		Top of effluent box wall to the water surface.	1319.50	1313.37	1313.56	
	11		Combined effluent box	5.10		Top of effluent box wall to the water surface.	1318.08	1312.98	1313.20	Air was observed gurgling out of pipe, indicating a possible air restriction.
Aeration basin splitter box	Split MH 1		East end - upstream of weir gate	2.20		Top of wall to water surface.	1355.06	1352.86	1353.05	
	Split MH 1		East end - downstream of weir gate	4.02		Top of wall to water surface.	1355.06	1351.04	1352.26	
	Split MH 1		West end - upstream of weir gate	3.50	2:36 pm	Top of wall to water surface.	1355.06	1351.56	1353.05	
	Split MH 1		West end - downstream of weir gate	5.33		Top of wall to water surface.	1355.06	1349.73	1352.26	
Aeration basins		4	First aeration basin cell	3.72		Top of wall to water surface.	1351.89	1348.17	1349.92	
			Last aeration basin cell - upstream of weir	2.95	2:30 pm	Top of wall to water surface.	1351.89	1348.94	1349.61	
			Effluent channel - downstream of effluent weir	3.31		Top of wall to water surface.	1351.89	1348.58	1349.25	
Final clarifiers	1		Box upstream of splitter box	2.90		Top of wall to water surface.	1350.54	1347.64	1347.94	
		4	Upstream of splitter box weir	2.89		Top of wall to water surface.	1350.01	1347.12	1347.26	
			Downstream of splitter box weir	3.29	2:20 pm	Top of wall to water surface.	1350.01	1346.72	1345.17	
			Upstream of effluent weir	1.50		Top of wall to water surface.	1346.45	1344.95	1344.91	
			Effluent box (SE clarifier)	4.56		Top of wall to water surface.	1346.45	1341.89	1342.36	
	2		Combined effluent box	4.67		Top of wall to water surface.	1346.44	1341.77	1342.08	
RAS pump station			RAS flow meters		2:25 pm	Meter reading.				RAS flow meter readings: 2,680 gpm, 2,970 gpm, 2,940 gpm, 2,890 gpm
			Wetwell			Level reading.				6.0 ft depth reading
Filtration			Filter influent channel	2.65	2:13 pm	Top of wall to water surface.	1344.09	1341.44	1341.42	
Chlorine contact chamber			Upstream of effluent weir	1.66		Top of wall to water surface.	1329.23	1327.57	1327.83	
			Downstream of effluent weir	2.30	2:05 pm	Top of wall to water surface.	1329.23	1326.93	1326.61	
			Downstream of the Parshall flume	3.20		Top of wall to water surface.	1329.23	1326.03	1325.04	
	3		Effluent manhole	3.33		Top of wall to water surface.	1328.01	1324.68	1324.65	
Post aeration			Cascade aerator inlet box	2.63		Top of wall to water surface.	1327.02	1324.39	1324.10	

General Notes:

1. Field water surface elevation measurements were taken by Mike Johnson and Keith Carruthers on May 2, 2016.
2. The influent flow reading at the time of the measurements was 31.5 MGD.
3. Three First Stage Trickling Filters, three Second Stage Trickling Filters and three Aeration Basins were in service. All other processes units were online
4. Visual Hydraulics software was used to model the plant hydraulics. As-recorded construction drawings were used to obtain model inputs
5. There are several discrepancies between the actual measured water surface elevations and the model elevations. This may be due to air trapped in the pipe or variances between the actual plant components and those shown on the as-recorded drawings. The model was not calibrated to adjust for these discrepancie

City of Sioux Falls Wastewater Master Plan

Hydraulics Summary

1. Summary of the Hydraulics Analysis that was conducted:

   A hydraulic profile of the Sioux Falls Water Reclamation Facility was constructed using Visual Hydraulics modeling software. This was a shop drawing-level analysis of the existing facility using as-recorded plans, specifications and equipment shop drawings to obtain dimensions and elevations for model inputs.

   To check the accuracy of the hydraulic model, actual water surface elevations were measured in the field. Measurements were taken on May 2, 2016 when the recorded influent flow was 31.6 MGD. This flow is high above the annual average flow to the plant. Water surface elevations were recorded on this day, under high flow conditions, in an attempt to better identify bottlenecks in the facility's unit processes and piping.

   Several locations in the WRF were identified as having less hydraulic capacity than was calculated by the hydraulic model. These discrepancies were noted, but for the current planning-level study, the model was not calibrated to rectify the discrepancies. The locations in which the measured hydraulic capacity most deviated from the actual measured capacity include the following:
   - Primary clarifiers splitter box and inlet piping
   - Trickling filter inlet and outlet piping
   - Intermediate clarifier outlet piping
   - Final clarifier inlet piping

   Most of the buried gravity process pipe connecting unit processes at WRF was installed at a downward slope. Air can get trapped in piping installed in this manner, and it may be the cause of some of the discrepancies between the measured and modeled hydraulic capacities.

2. Action Items:

   The following is a list of action items related to the Water Reclamation hydraulics.
   - The existing 36-inch grit basin influent pipe needs to be upsized in order to accommodate future flows.
   - The water surface elevation in the primary clarifier splitter box is freeboard limited at flows approaching 40 MGD. Considerations should be made to raise the walls of this structure.
   - The gravity filter influent channel overflow weir will need to be raised in the future. Currently, the weir will be overtopped at flows approaching 48 MGD.

Alternatively, this weir could be replaced with an adjustable weir gate to allow for bypass directly to the chlorine contact basins in the future.

- During the future design of the facility expansion, the hydraulic model should be calibrated against actual recorded water surface elevations to ensure accurate hydraulic capacities and water surface elevations.

Appendix 5.A – Modeled Sewer Collection System

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

DATA SOURCE: City of Sioux Falls Utility Data (Feb. 2016)

SIOUX FALLS SANITARY COLLECTION SYSTEM OVERVIEW MAP

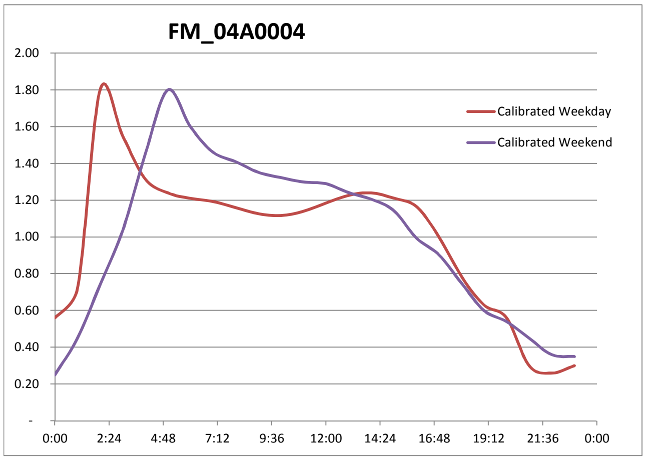
HDR

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_3\OVERVIEWMAP_ARCH_E.MXD - USER: JECHRIST - DATE: 1/24/2017

Appendix 5.B – Calibrated Dry-Weather Diurnal Patterns

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018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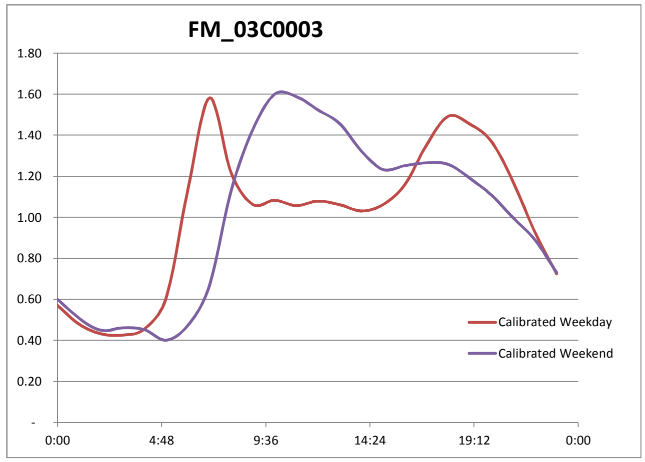
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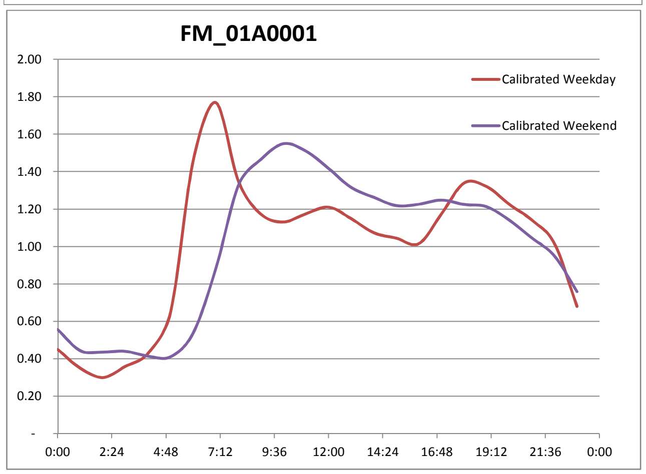
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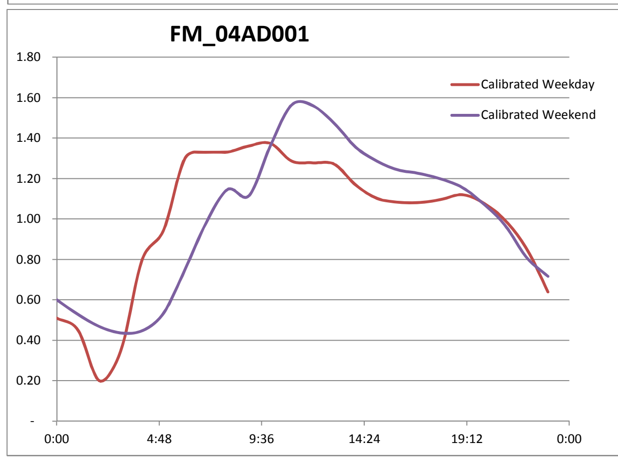
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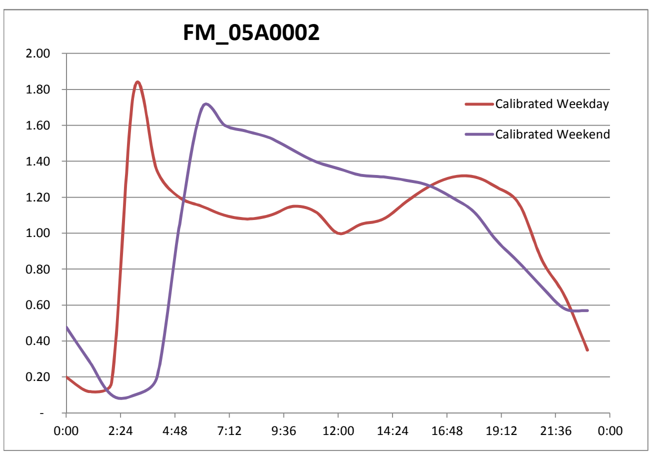
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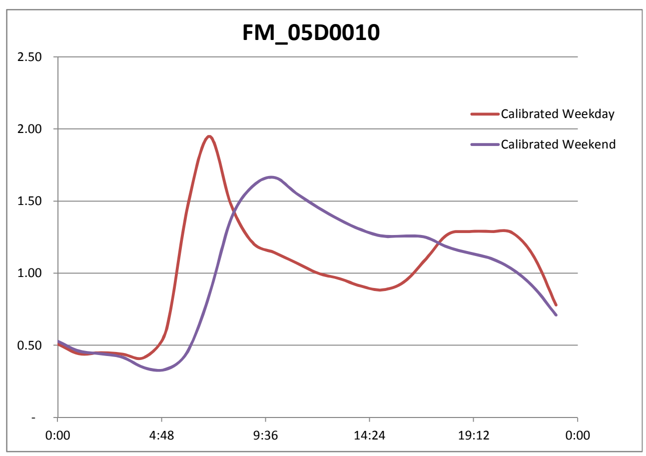
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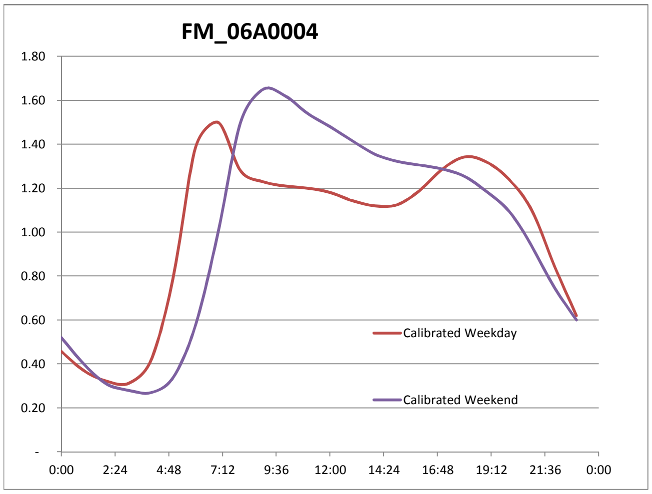
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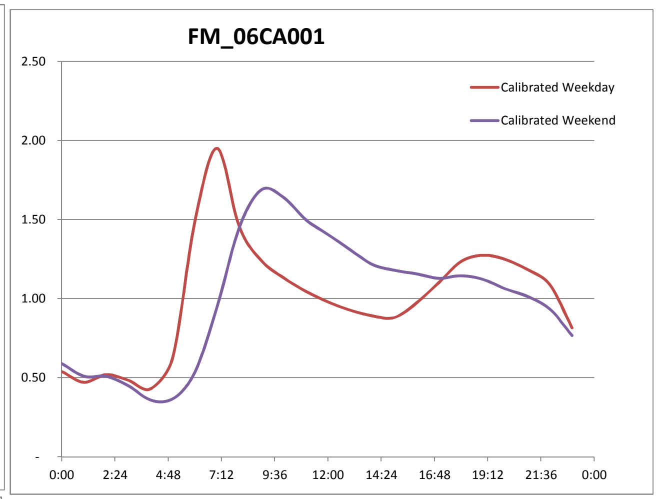
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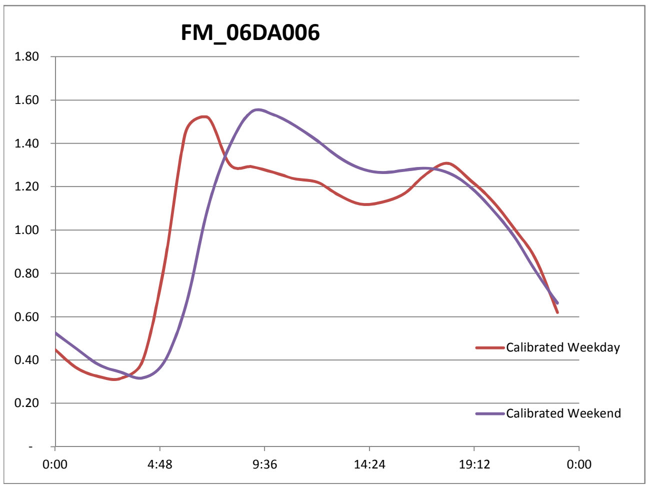
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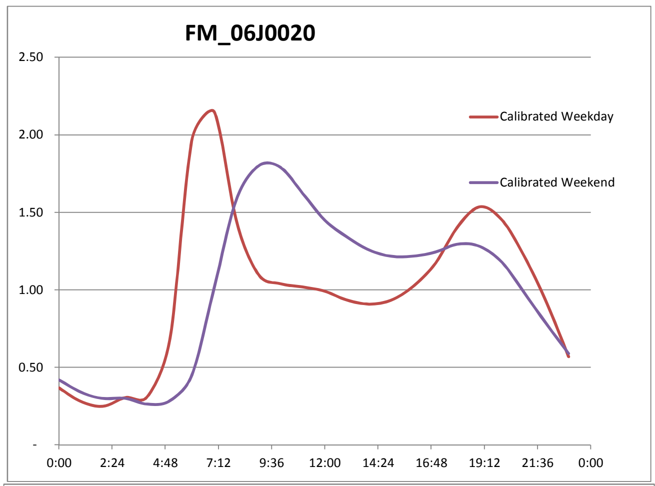
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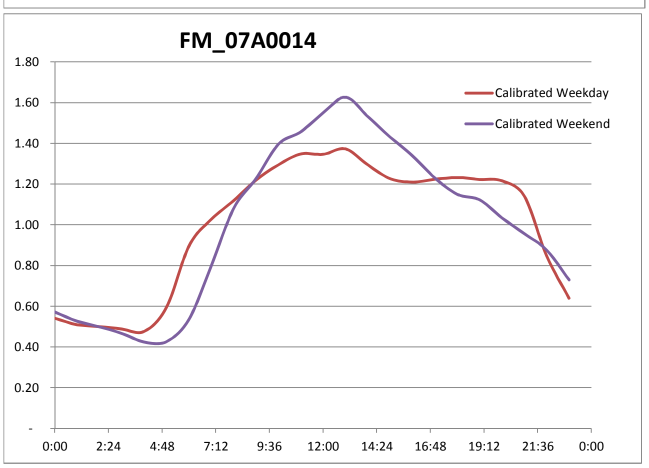
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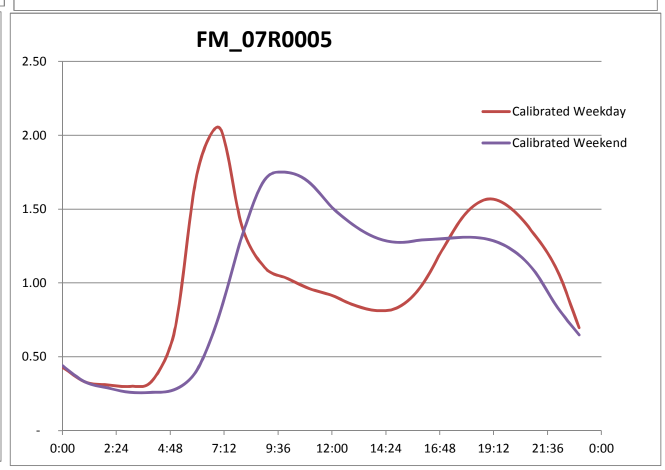
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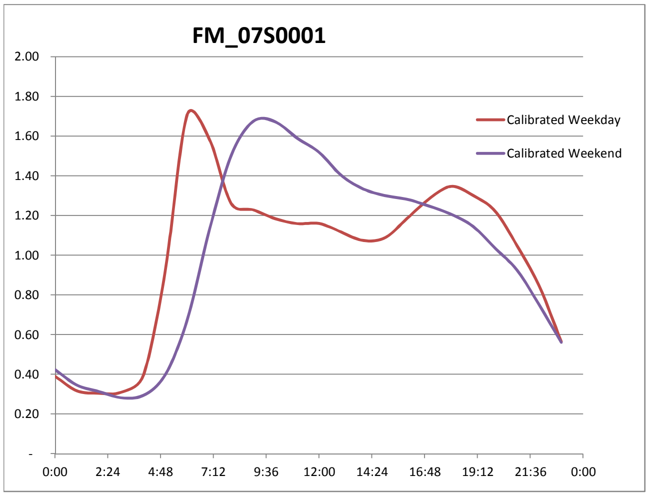
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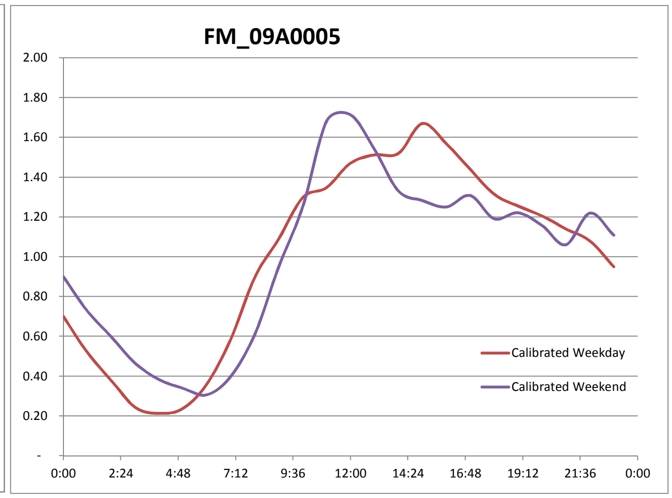
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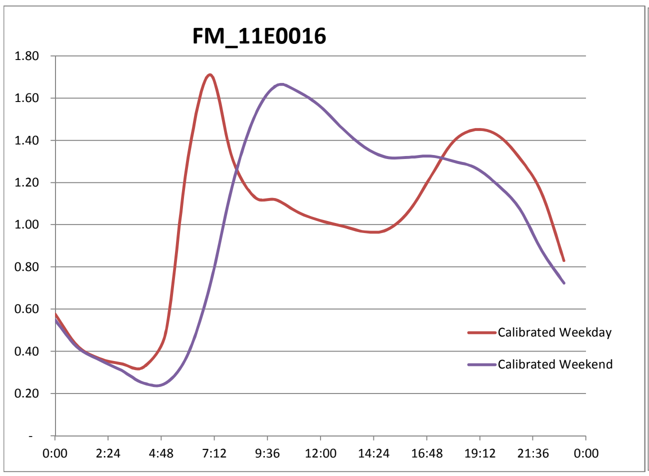
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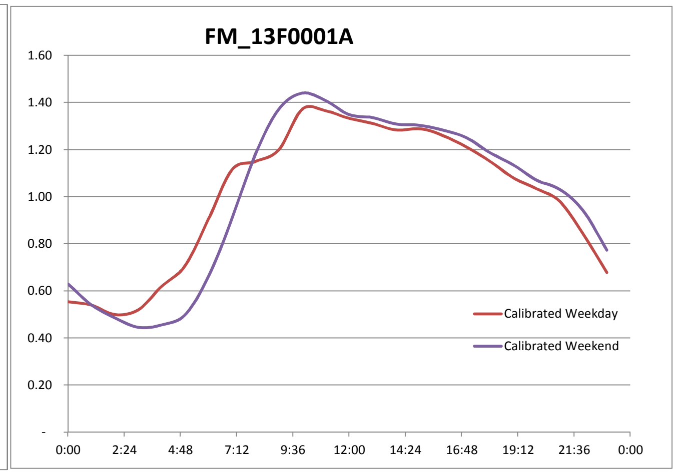
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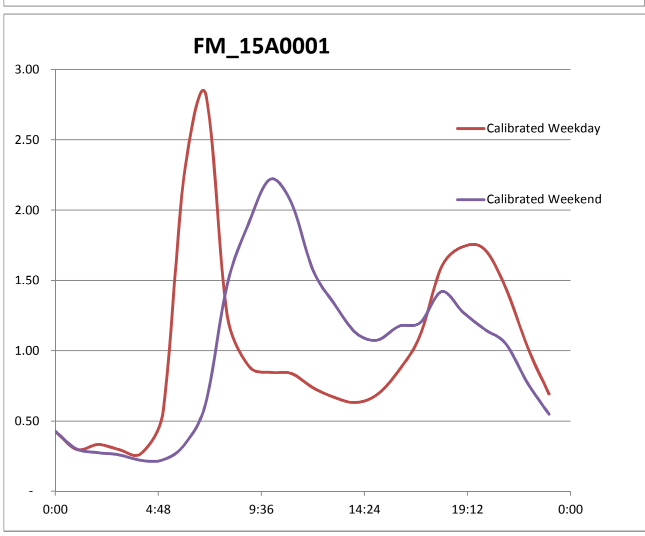
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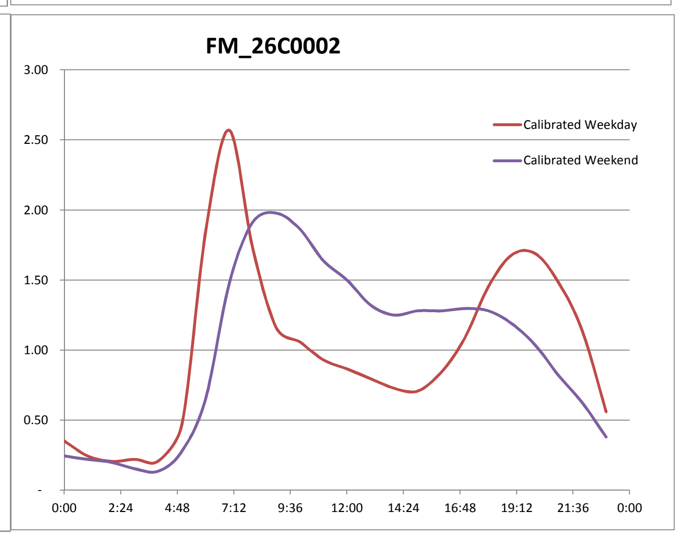
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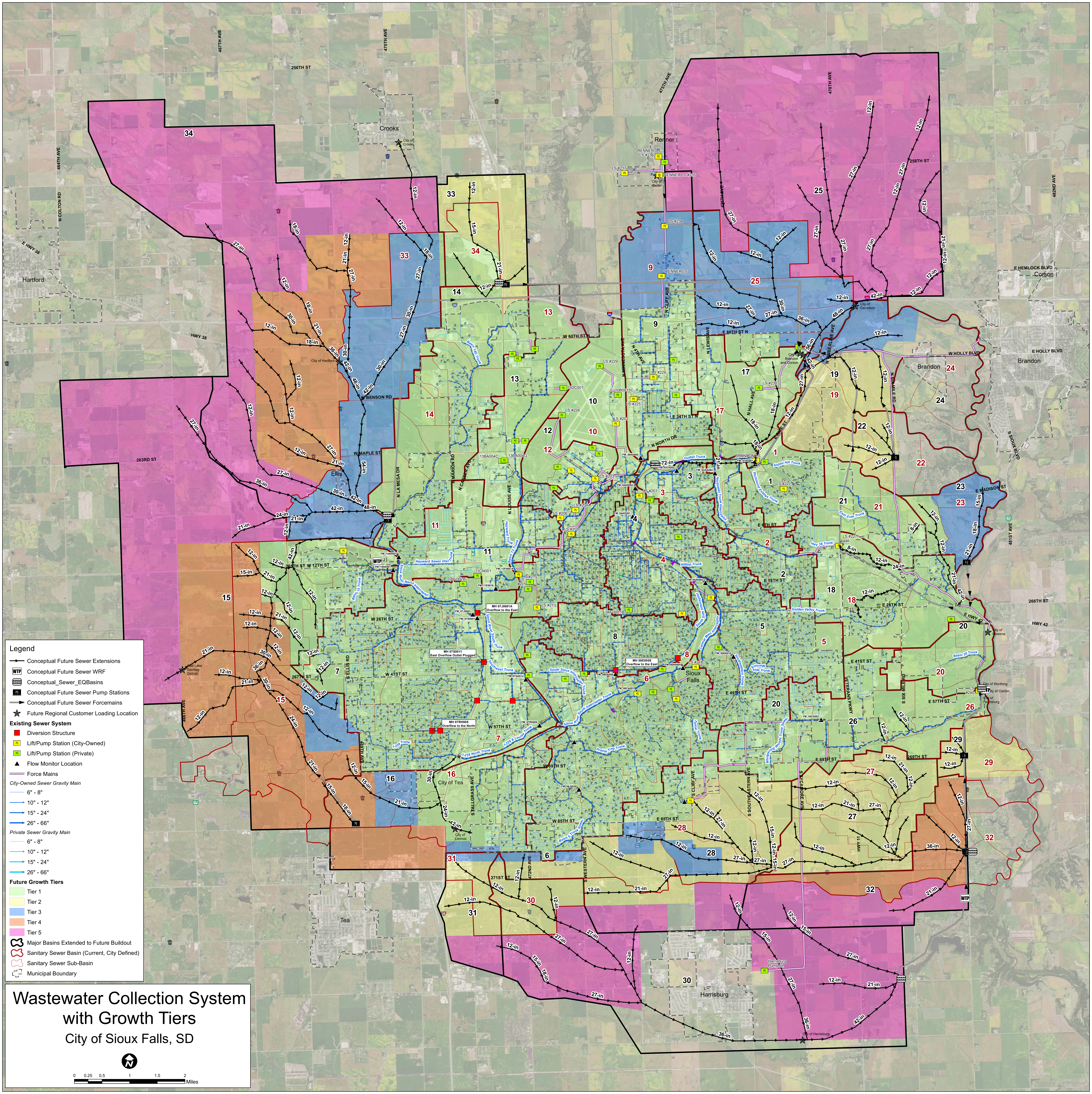
Appendix 5.C – Growth Tier Boundaries and Future Sanitary Sewer Extensions

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018



Legend
Conceptual Future Sewer Extensions
Conceptual Future Sewer WRF
Conceptual_Sewer_EQBasins
Conceptual Future Sewer Pump Stations
Conceptual Future Sewer Forcemains
Future Regional Customer Loading Location
Existing Sewer System
Diversion Structure
Lift/Pump Station (City-Owned)
Lift/Pump Station (Private)
Flow Monitor Location
Force Mains
City-Owned Sewer Gravity Main
6" - 8"
10" - 12"
15" - 24"
26" - 66"
Private Sewer Gravity Main
6" - 8"
10" - 12"
15" - 24"
26" - 66"
Future Growth Tiers
Tier 1
Tier 2
Tier 3
Tier 4
Tier 5
Major Basins Extended to Future Buildout
Sanitary Sewer Basin (Current, City Defined)
Sanitary Sewer Sub-Basin
Municipal Boundary
Wastewater Collection System with Growth Tiers
City of Sioux Falls, SD
0 0.25 0.5 1 1.5 2 Miles

Appendix 7.A – Treatment Planning Workshop #1

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

03 Regulatory Framework

Planning Effluent Quality Basis Discussion

- Design Winter Temp: 9.5 degrees Celsius
- BOD Effluent Requirement: 6 mg/l.
- Ammonia:
  - » Winter Maximum Daily Ammonia Limit: Targeted effluent of 1.5 to meet 2 mg/l.
  - » Summer Maximum Daily Ammonia Concentration: Targeted of 0.7 mg/l to meet 1 mg/l.
- Total Nitrogen Removal (For Expected future EPA enforcement limits)
  - » Effluent TN goal to meet 8 mg/l with a 10 mg/L effluent limit.
- Future total phosphorus (TP)
  - » Goal of 1 mg/l monthly average.

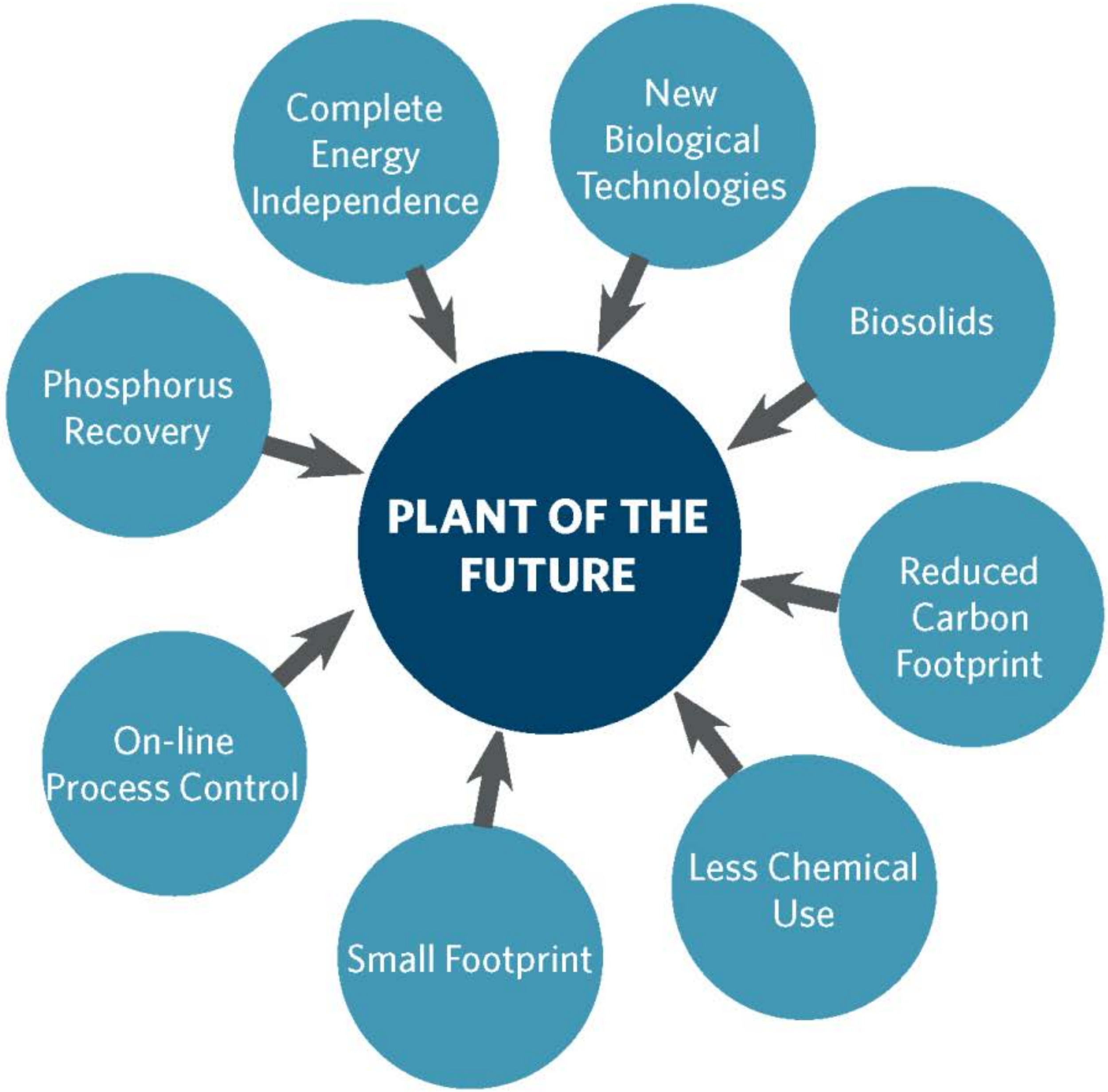
Nutrient Removal Levels

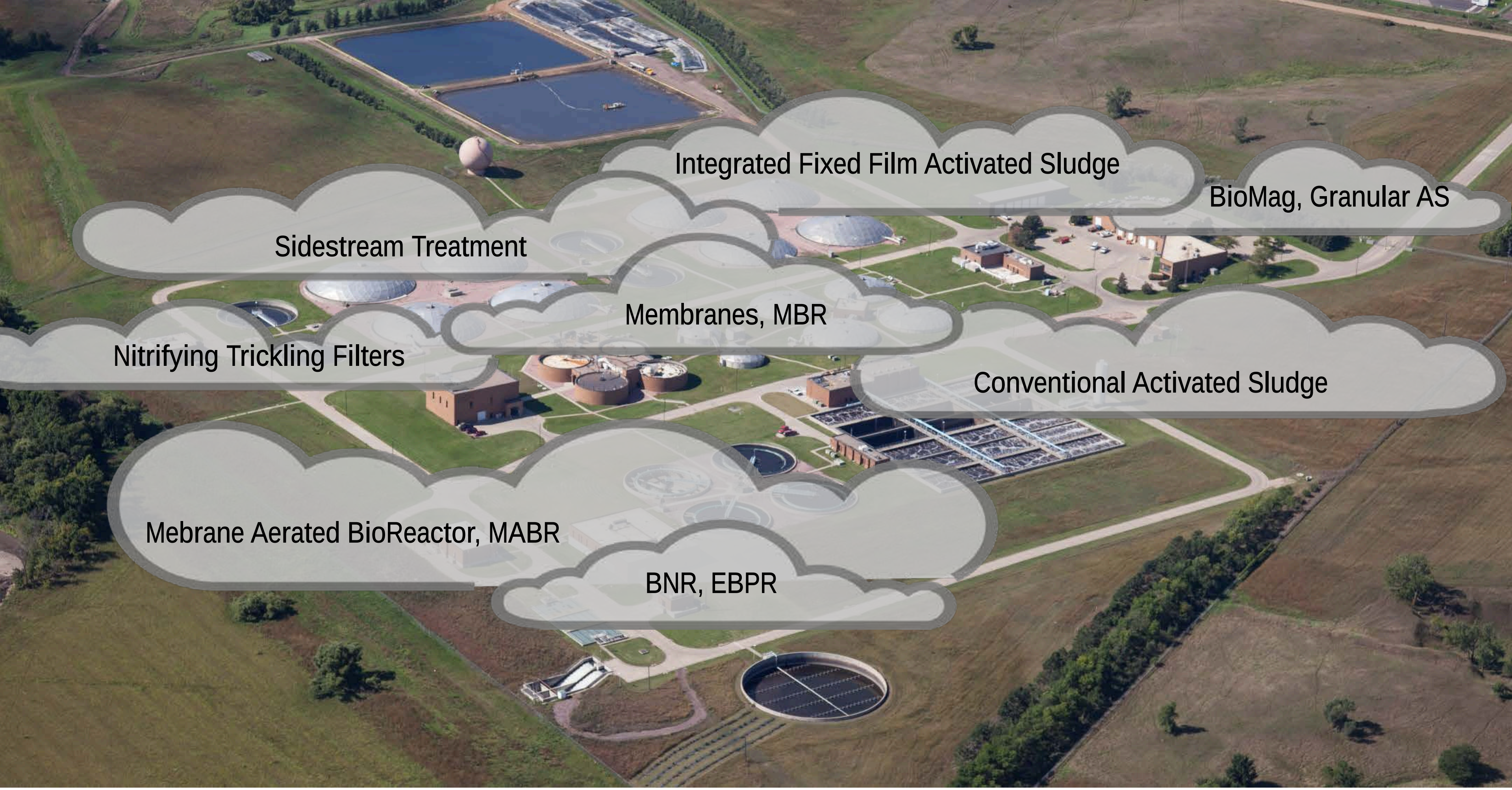
LEVEL 1 IS PLANNED FOR
AS OF 2026 PERMIT CYCLE

Nutrient Removal Treatment Levels				
Level	NH4-N mg/l	TN mg/l	TP mg/l	Comment
Cur	3.5-7.5	n.a.	n.a.	Secondary Treatment with Ammonia Daily Max
1	1-2	10	1	Achievable with conventional nutrient removal technologies. Chemical addition or filtration is typically not required.
2	1-2	3	0.3	Enhanced removal requires tertiary treatment and chemical addition to achieve low concentrations.

LEVEL 2 WILL BE PLANNED FOR
AS FUTURE AS IS BEYOND
20-YEAR PLANNING PERIOD

04 Liquid Stream Process


Complete Energy Independence
New Biological Technologies
Biosolids
Phosphorus Recovery
PLANT OF THE FUTURE
Reduced Carbon Footprint
On-line Process Control
Less Chemical Use
Small Footprint



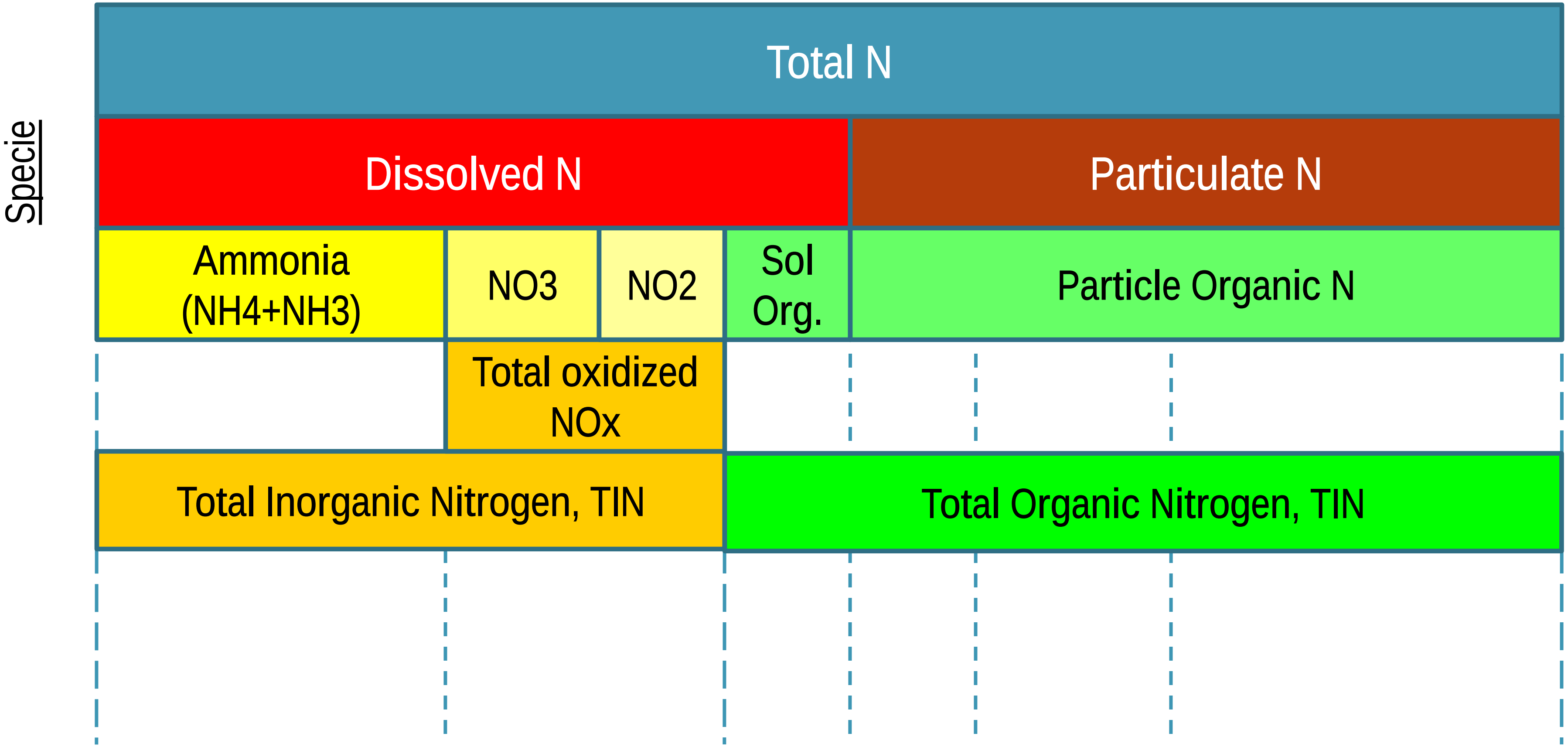
A Wide Range Of Alternatives Exist For the WRF Long-term Solution

HDR’s approach addresses today’s issues and maintains flexibility for the future.

Alternatives Development & Evaluation

Nitrogen Removal

Nitrogen Species



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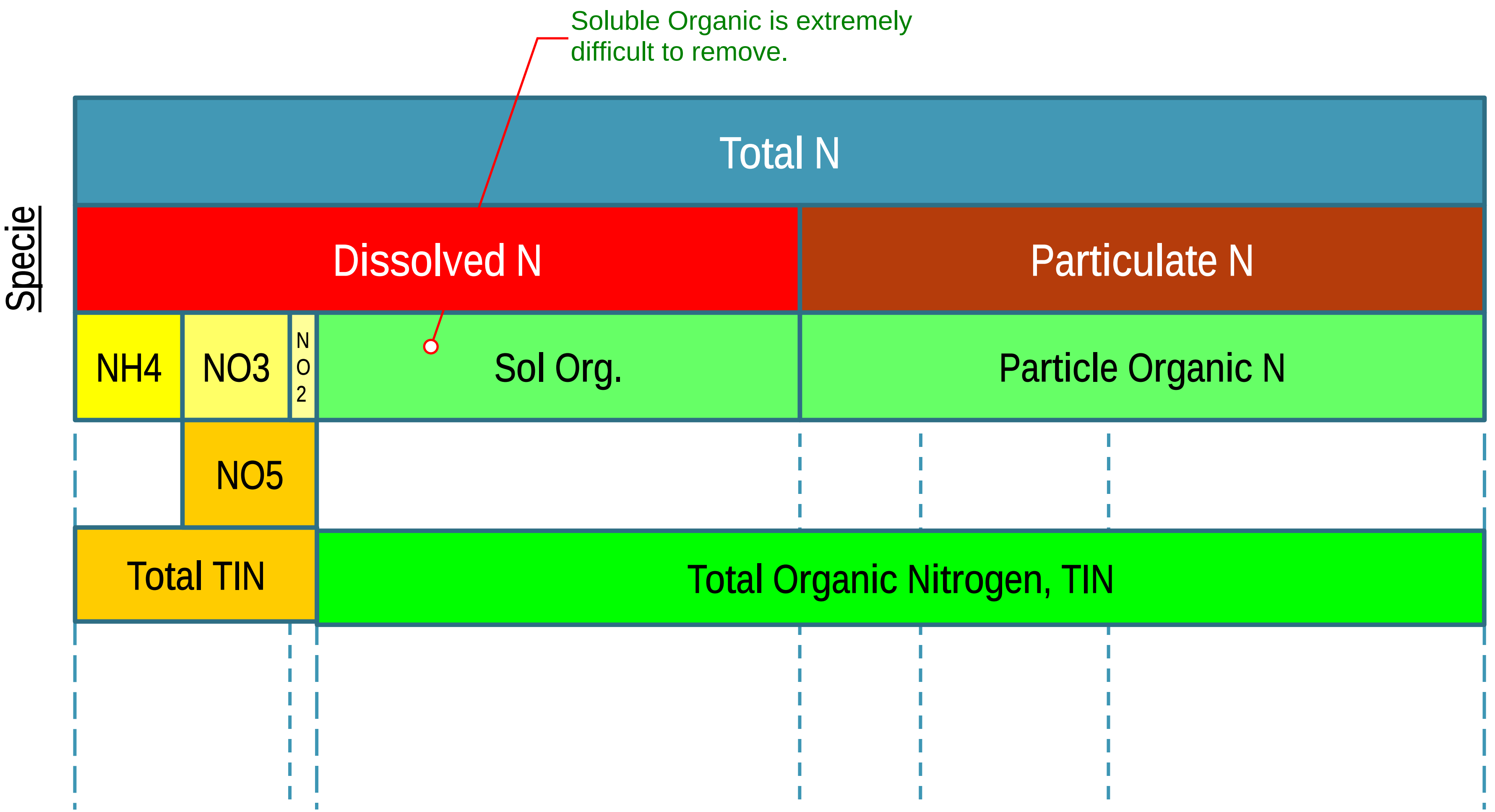
Effluent Nitrogen Distribution



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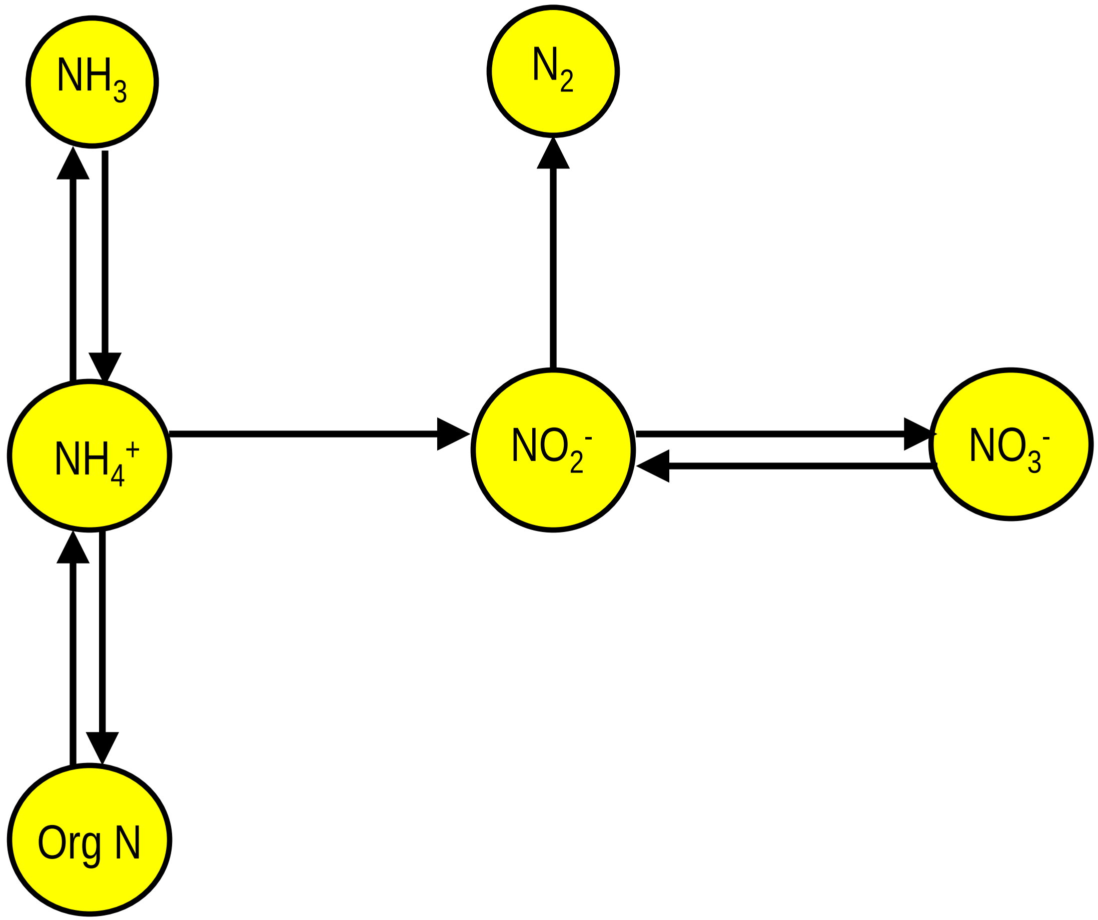
Nitrogen Cycle

Nitrogen Transformations

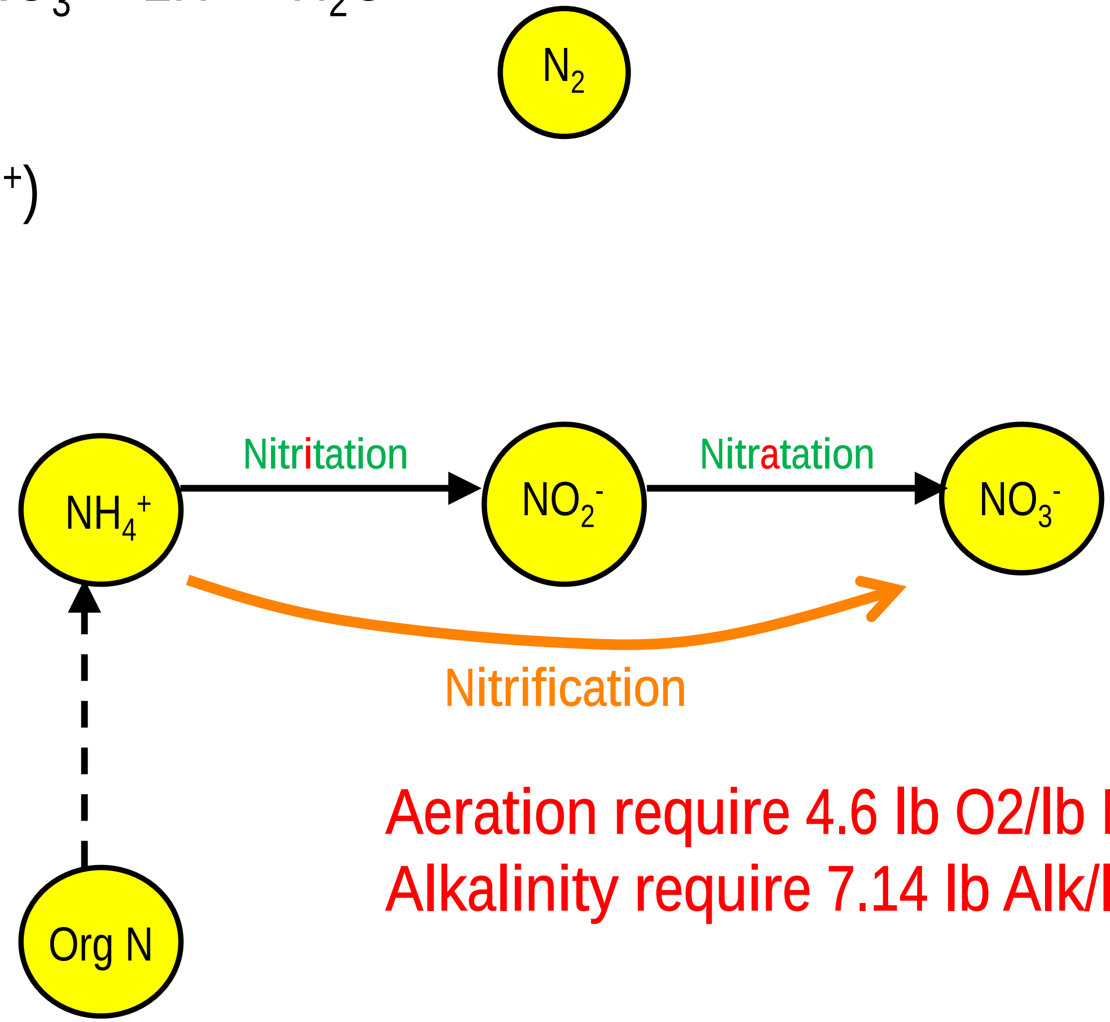


Nitrogen Transformations – Nitrification

$NH_4^+ + 2O_2 \rightarrow NO_3^- + 2H^+ + H_2O$

Add Oxygen

Produce Acid (H^+)



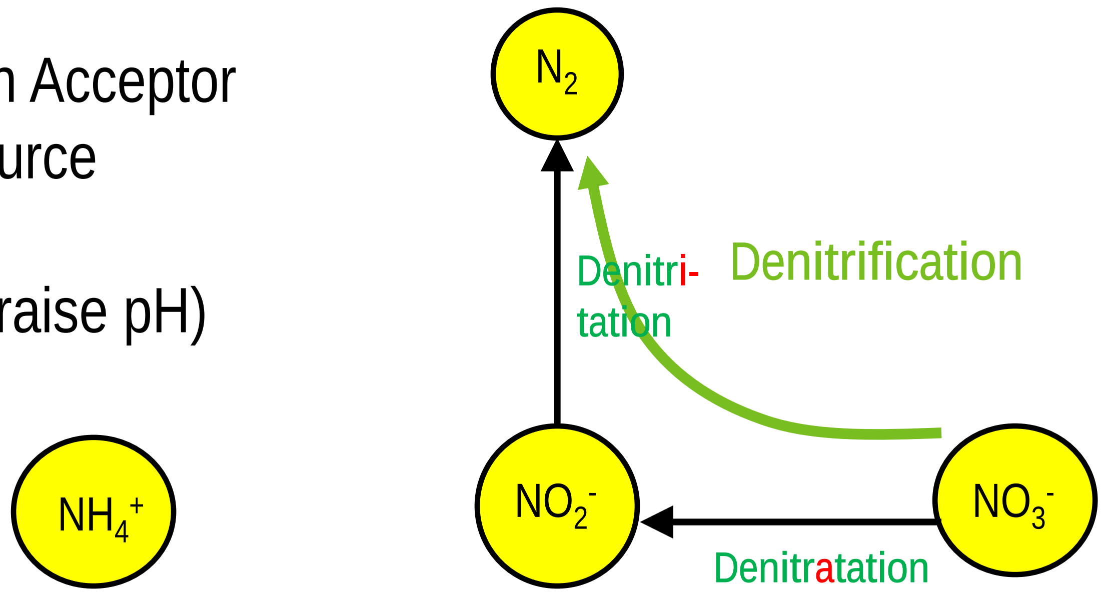
Aeration require 4.6 lb O2/lb N

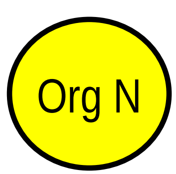
Alkalinity require 7.14 lb Alk/lb N

Nitrogen Transformations – Denitrification

$$6NO_3^- + 5CH_3OH + 6H^+ \rightarrow 3N_2 + 5CO_2 + 13H_2O$$

- Require Electron Acceptor
  - → Organic Source
- Require NO DO
- Consume acid (raise pH)

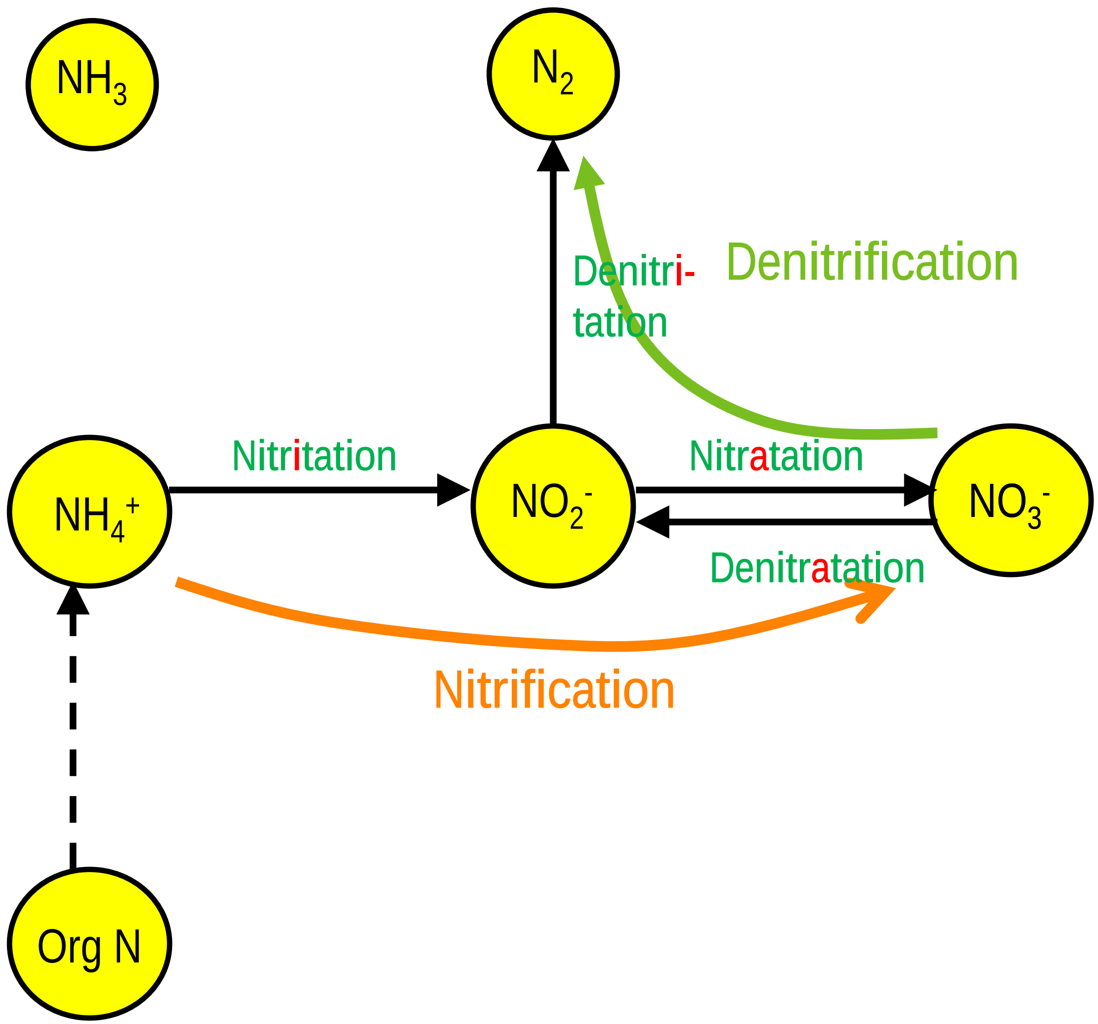




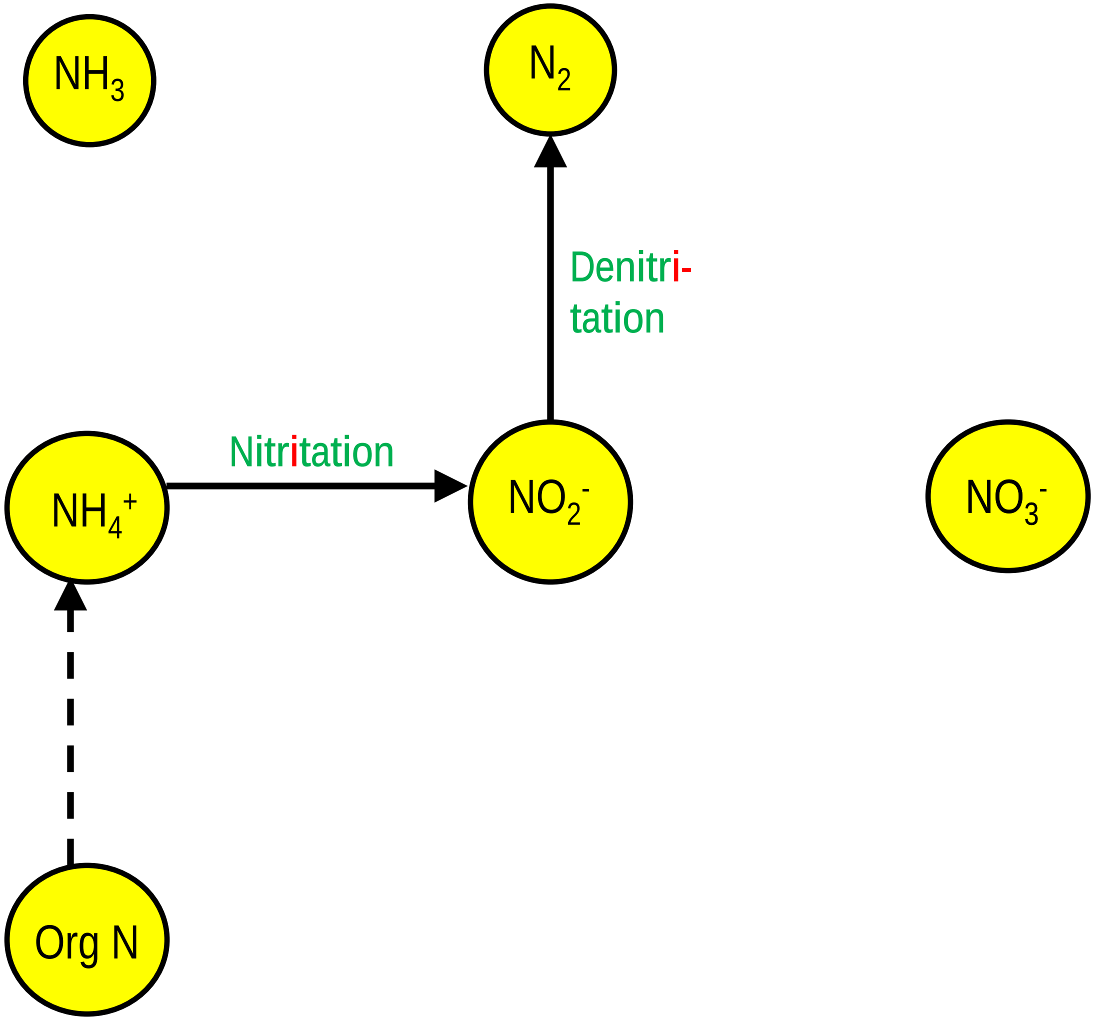
Aeration "return" 2.8 lb O2/lb N

Alkalinity return 3.57 lb Alk/lb N

Nitrogen Transformations – Nitrification/Denitrification

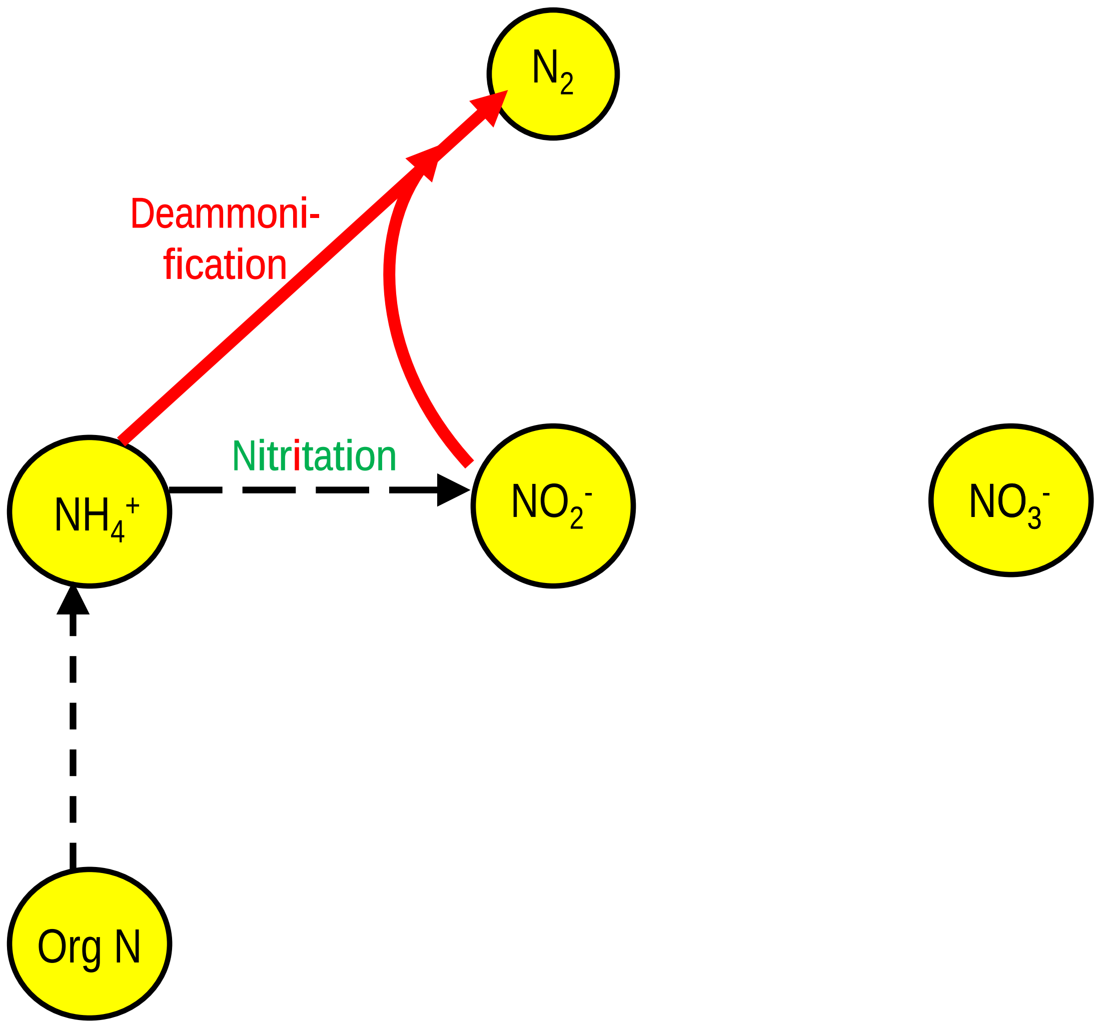


Nitrogen Transformations – Shortcut Nitrogen removal



Nitrogen Transformations – Anammox

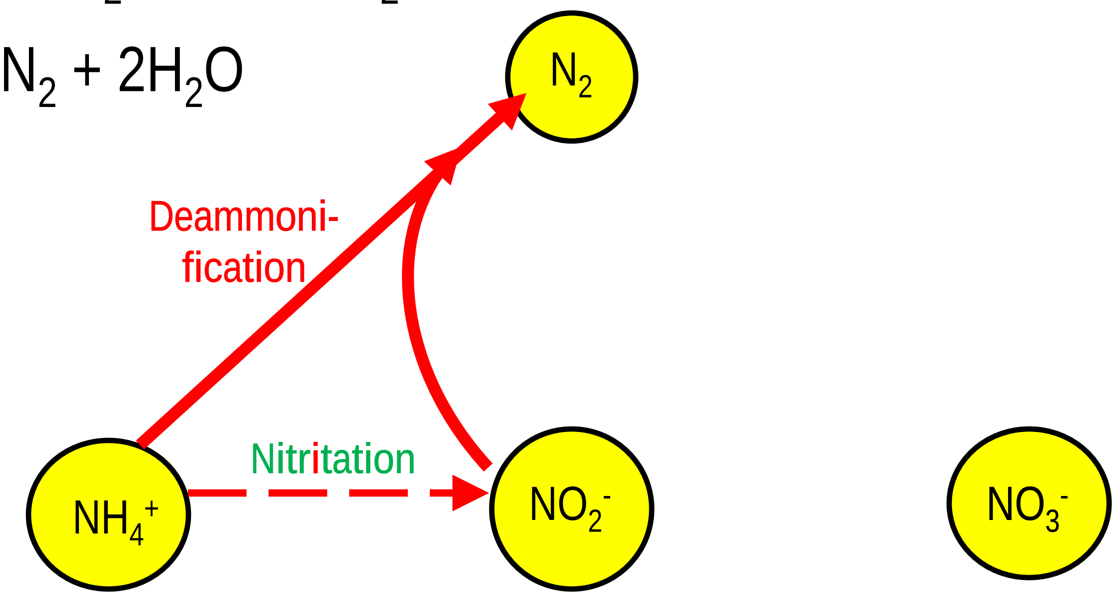
$$1.0\ NH_4^+ + 1.32\ NO_2^- + 0.066\ HCO_3^- + 0.13\ H^+ \rightarrow 1.02\ N_2 + 0.26\ NO_3^- + 0.066\ CH_2O_{0.5}N_{0.15} + 2.03\ H_2O$$



Nitrogen Transformations – Deammonification

$NH_4^+ + 1.5O_2 \rightarrow NO_2^- + 2H^+ + H_2O$

$NH_4^+ + NO_2^- \rightarrow N_2 + 2H_2O$



$$1.0\ NH_4^+ + 0.804\ O_2 + 0.071\ HCO_3^- \rightarrow \mathbf{0.436\ N_2} + 0.111\ NO_3^-$$
$$+\ 0.009\ C_5H_7O_2N + 0.028\ CH_2O_{0.5}N_{0.15} + 1.038\ H^+ + 1.46\ H_2O$$

Aeration demand ~ half

Carbon required ~ zero

Alkalinity required ~ zero

Comparison between Deammonification, Nitrite Shunt, and Conventional Nitrification/Denitrification (~90% N removal)

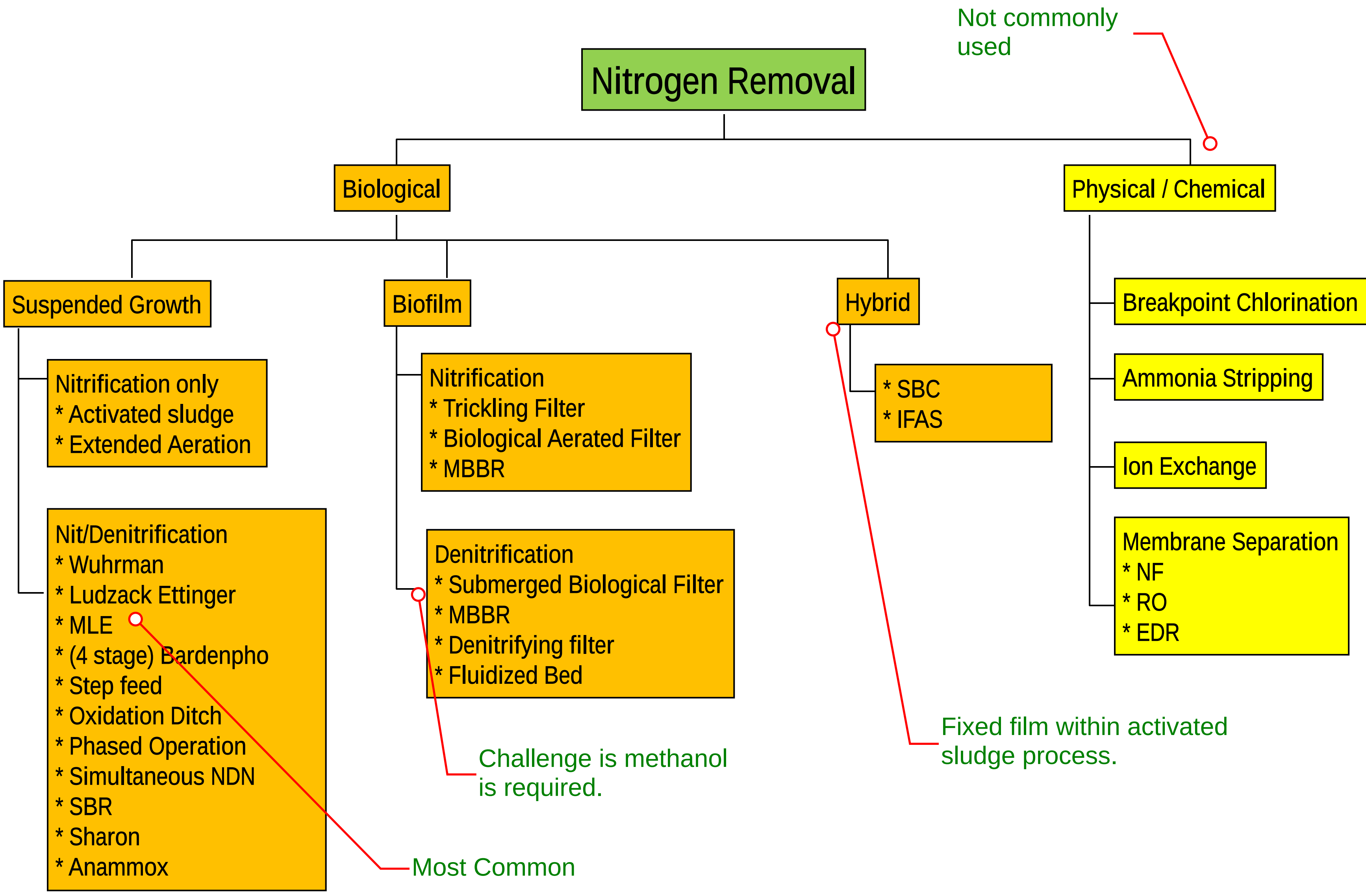
Benefit is low oxygen demand, no COD demand and low biomass production.

Parameter	Deammoni-fication	Nitrite Shunt	Nitrification/ Denitrification
Oxygen demand (1)	1.84	2.65	3.3
Acetate-COD demand (2)	0	4.5	6.6
Biomass production (3)	0.12	1.5	1.93

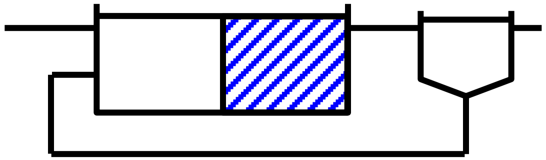
1) g O_2/g NH_4-N removed
2) acetate COD/g NO2-N removed
3) g biomass VSS/g NH4-N removed

Nitrogen Removal Options

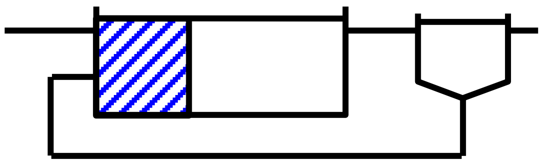
Nitrogen Removal Processes



Nitrogen Removal Processes - Classic Zoned

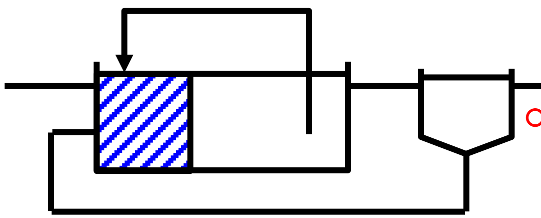


Wuhrman



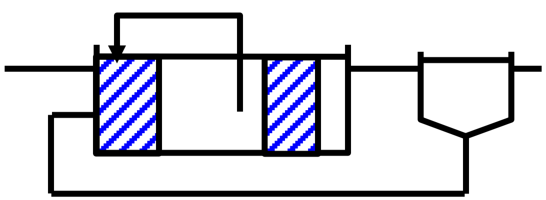
Ludzack-Ettinger

Effluent
NH4 < 1
TN < 10

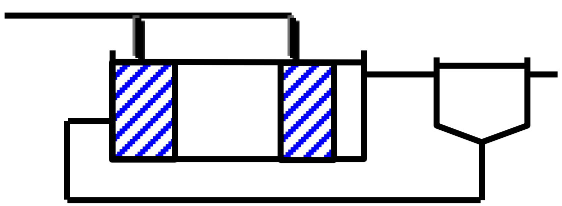


MOST COMMON

Modified Ludzack Etinger



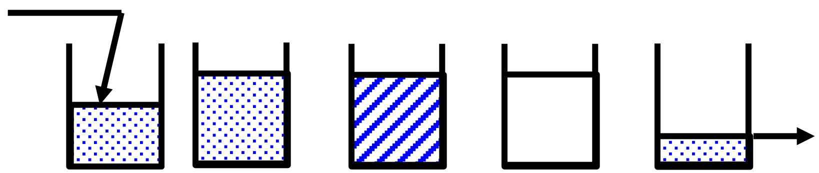
Bardenpho (4 stage Phoredox)



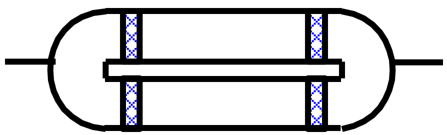
Step Feed

Nitrogen Removal Simultaneous

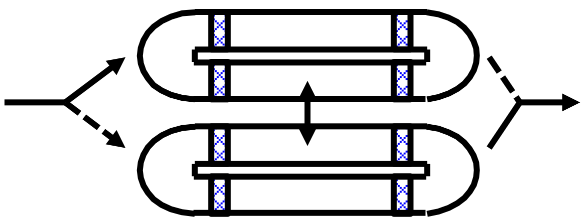
Effluent
NH4 < 4
TN < 6



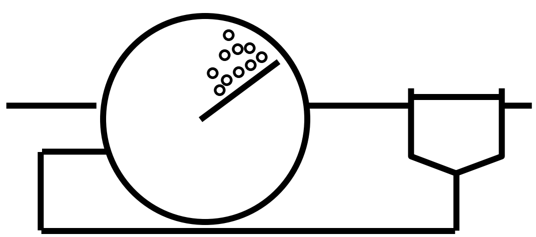
SBR



Oxidation Ditch

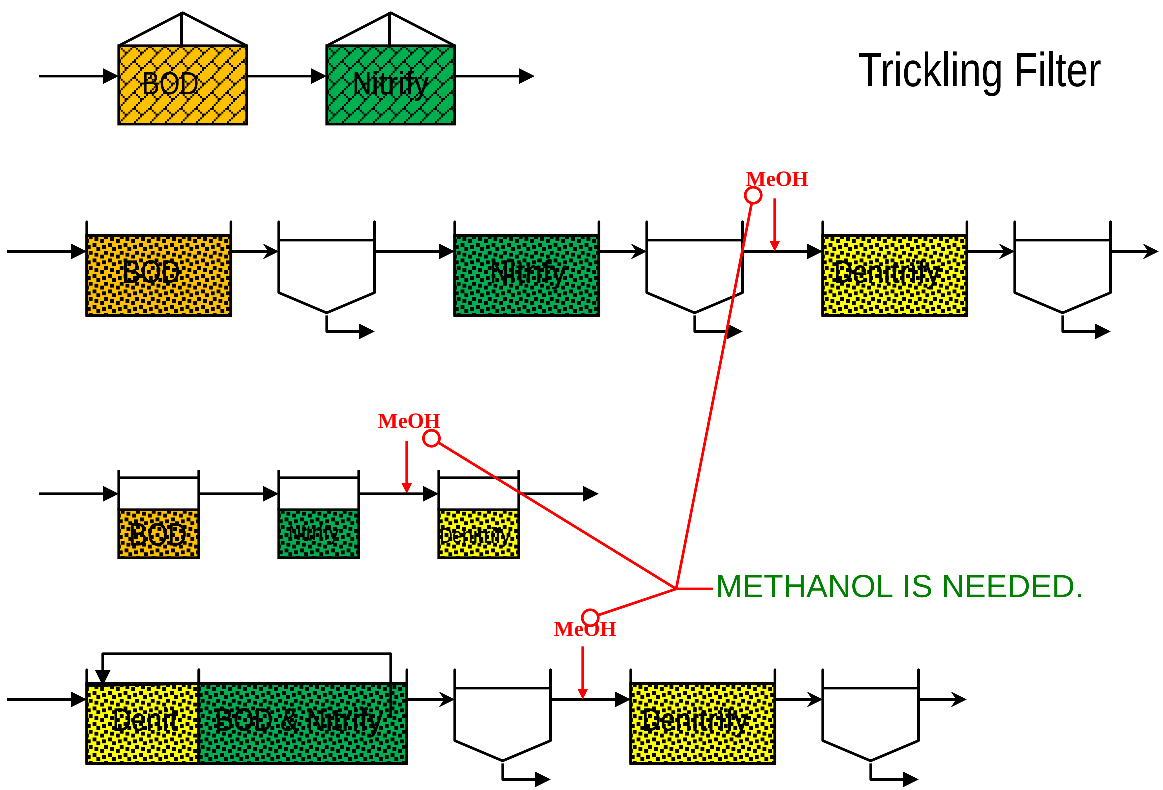


Biodenitro
– Cyclic Aeration



Schreiber

Nitrogen Removal – Fixed Film



Trickling Filter

MBBR

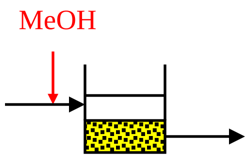
BAF – Biologically Active Filter

MBBR (2)

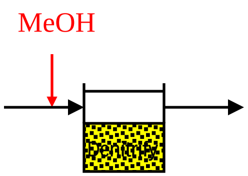
Effluent
NH4 ~ Varies
NO3 < Varies

Tertiary Nitrogen Removal Options

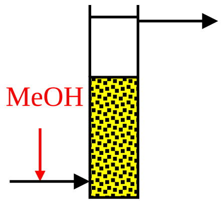
Effluent
NH4 ~ Same
NO3 < Controlled



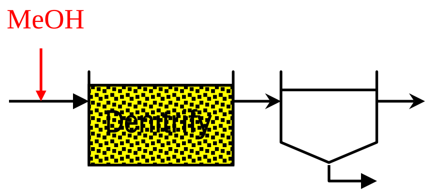
Filter



BAF – Biologically Active Filter

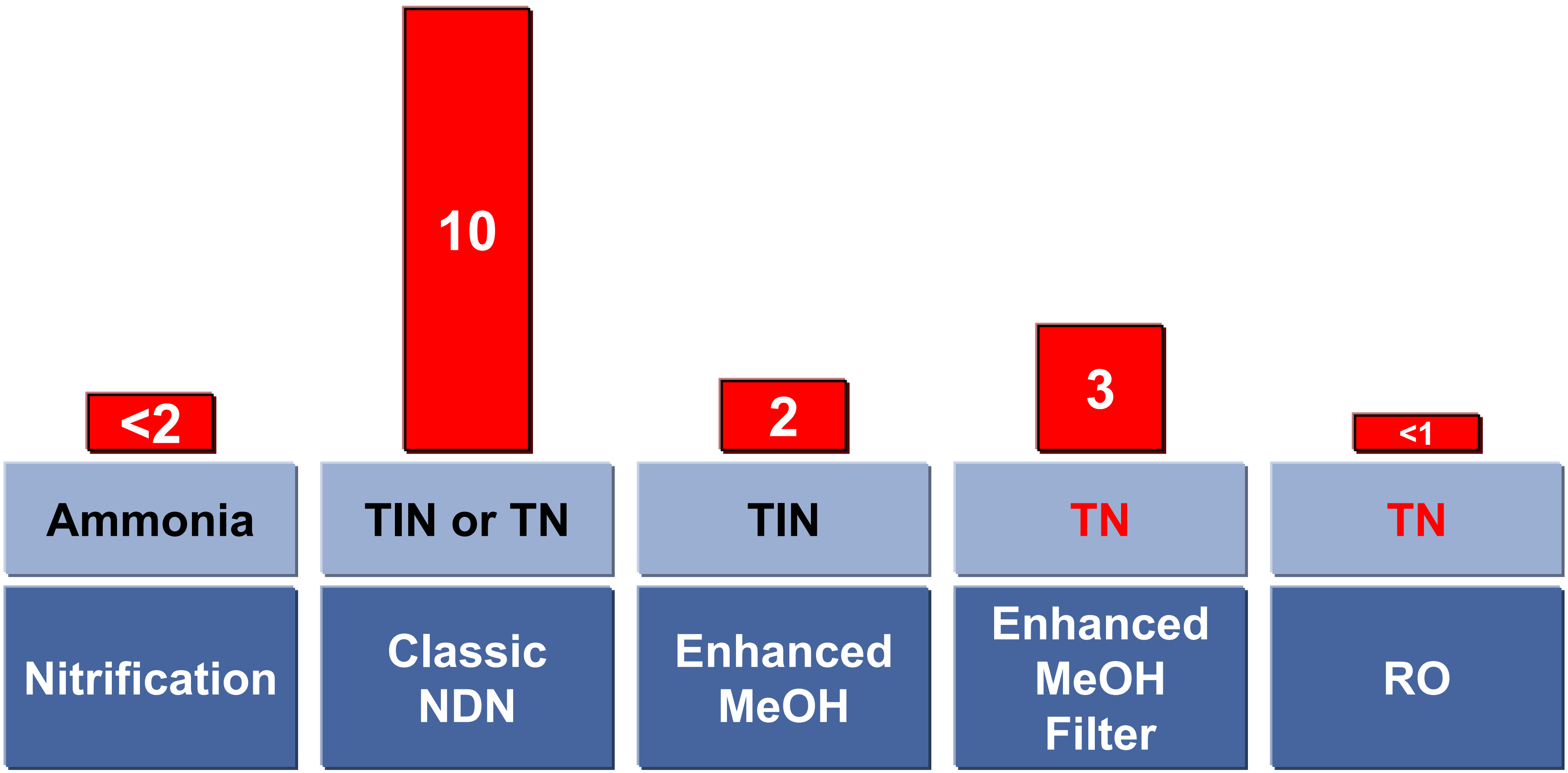


Fluidized Bed



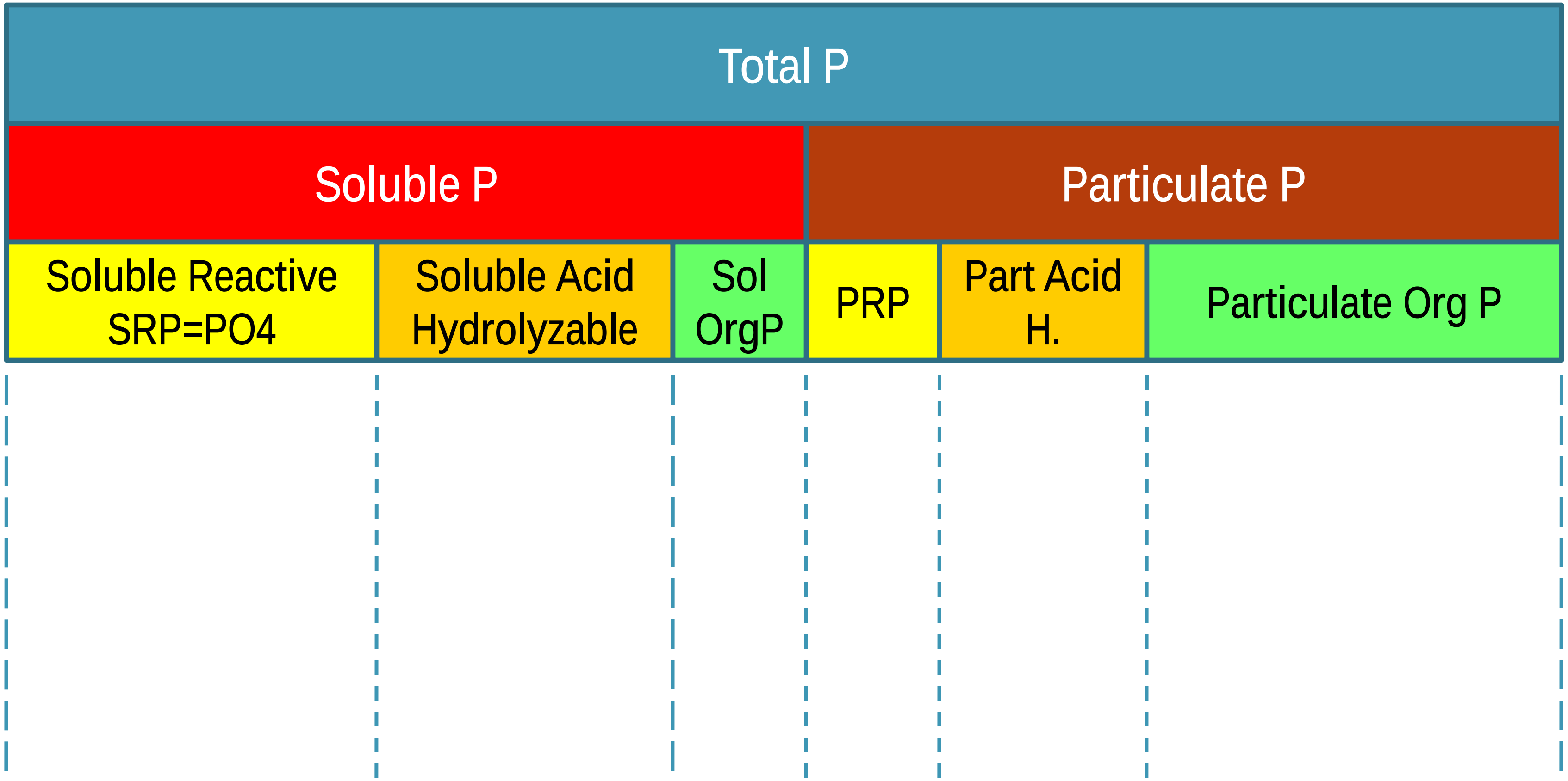
MBBR

Breakpoints in Nitrogen Removal



Biological Phosphorus Removal

Phosphorus Species Simple



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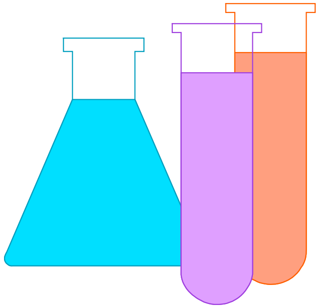
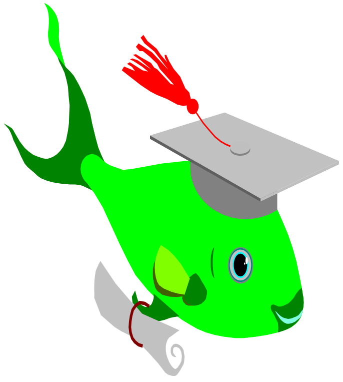
Phosphorus Treatment Options





Chemical

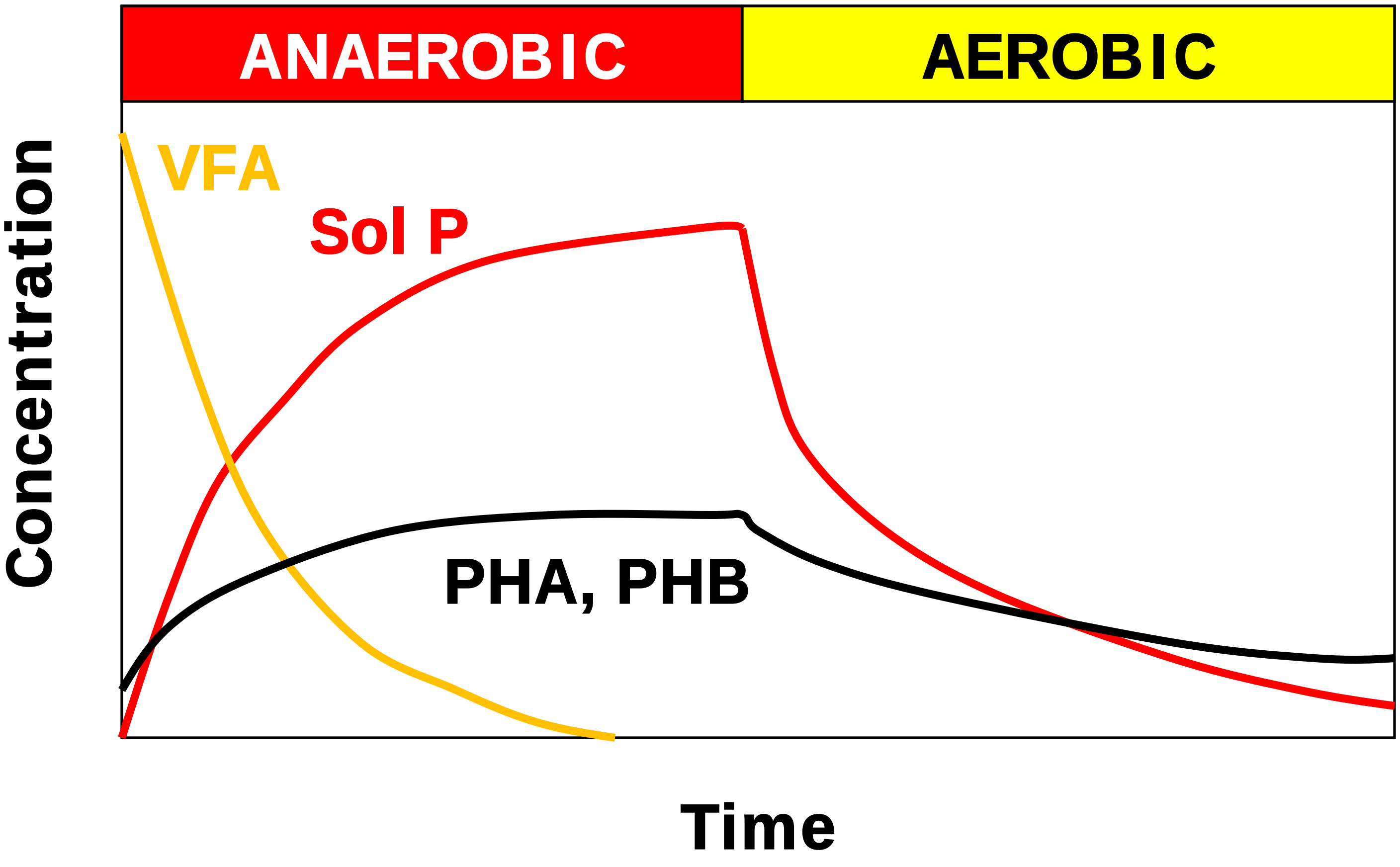
Biological

Must be converted to Particulate

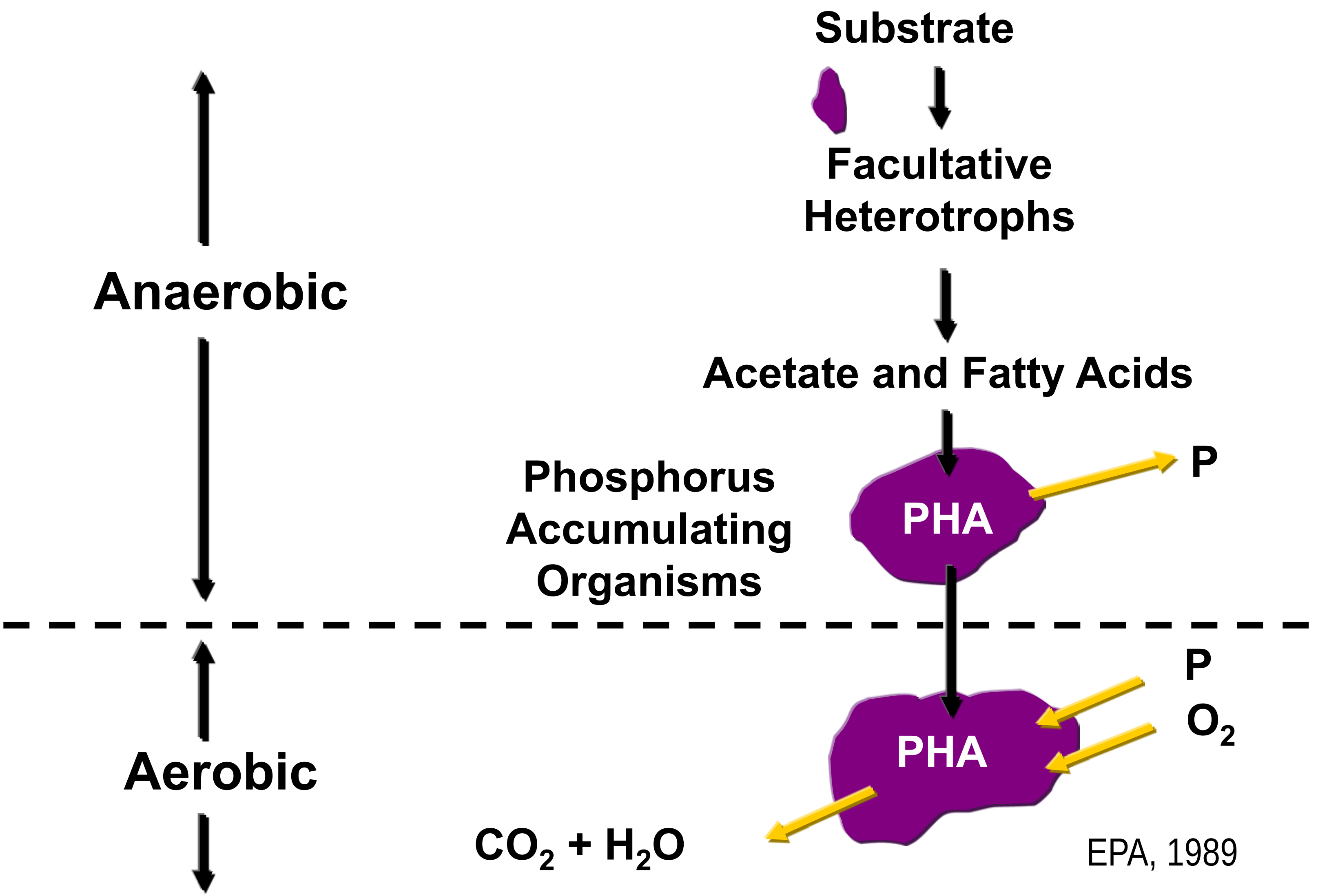
Enhanced Biological Phosphorus Removal (EBPR)

- Discovery in 1960’s-1970’s that, under some conditions, activated sludge will accumulate phosphorus in excess of normal biological requirements
- Called “Luxury Uptake”
- Long debated if this is a chemical or biological phenomenon – Biological action now proven

EBPR Biochemistry Model



Phosphorus Removal Mechanism



EPBR Biochemistry

Anaerobic Reaction:

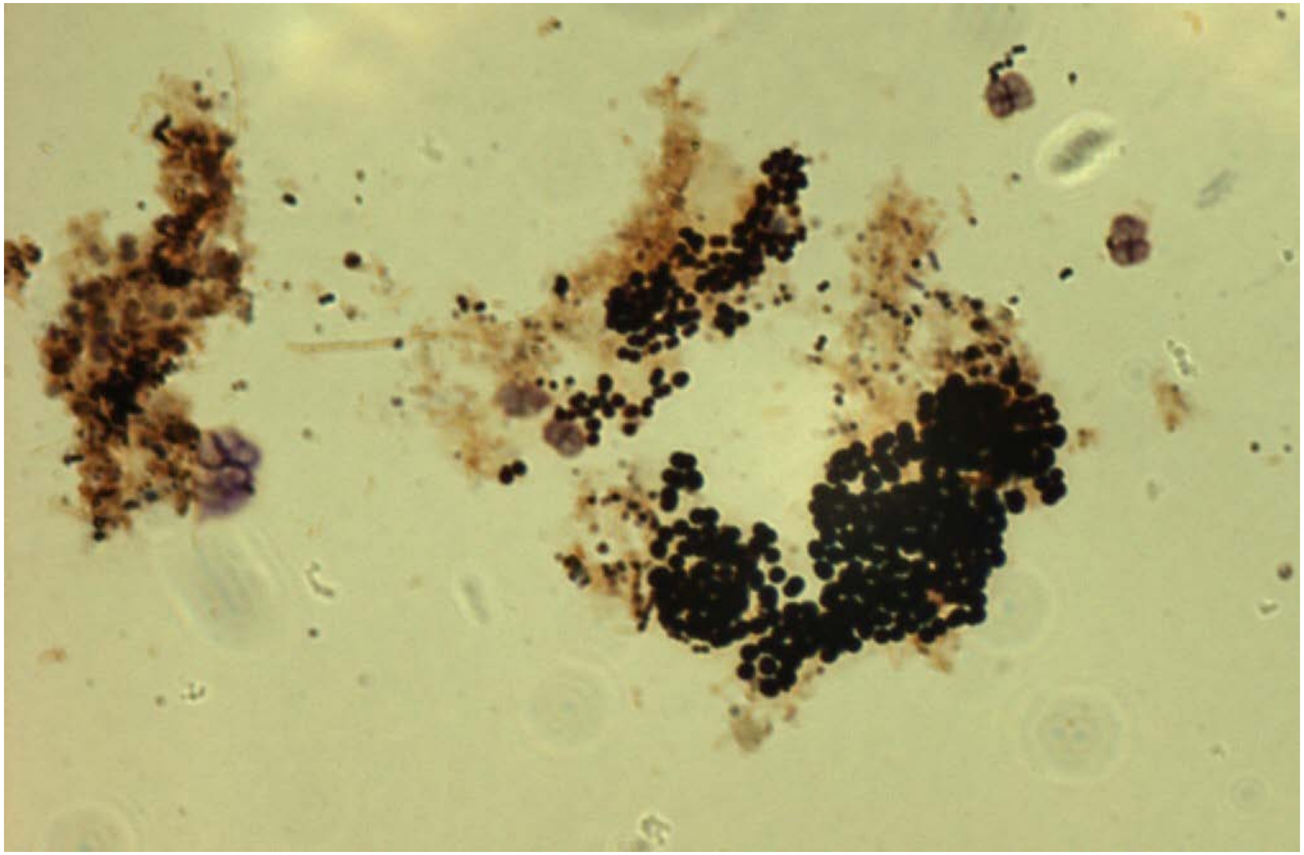
$$\text{VFAs} + \text{ATP} + \text{NAD} + \underline{\text{Glycogen}} + \underline{\text{PolyP}}$$
$$\rightarrow$$
$$\underline{\text{PHAs}} + \text{NADH} + CO2 + \text{ADP} + P_{ion} + Mg^{++} + K^{+}$$

Aerobic Reaction:

$$\underline{\text{PHAs}} + \text{DO} + \text{ADP} + \text{NADH} + P_{ion} + Mg^{++} + K^{+}$$
$$\rightarrow$$
$$\text{Cells} + \text{ATP} + \text{NAD} + \underline{\text{PolyP}} + \underline{\text{Glycogen}} + CO2 + H2O$$

Cellular Components

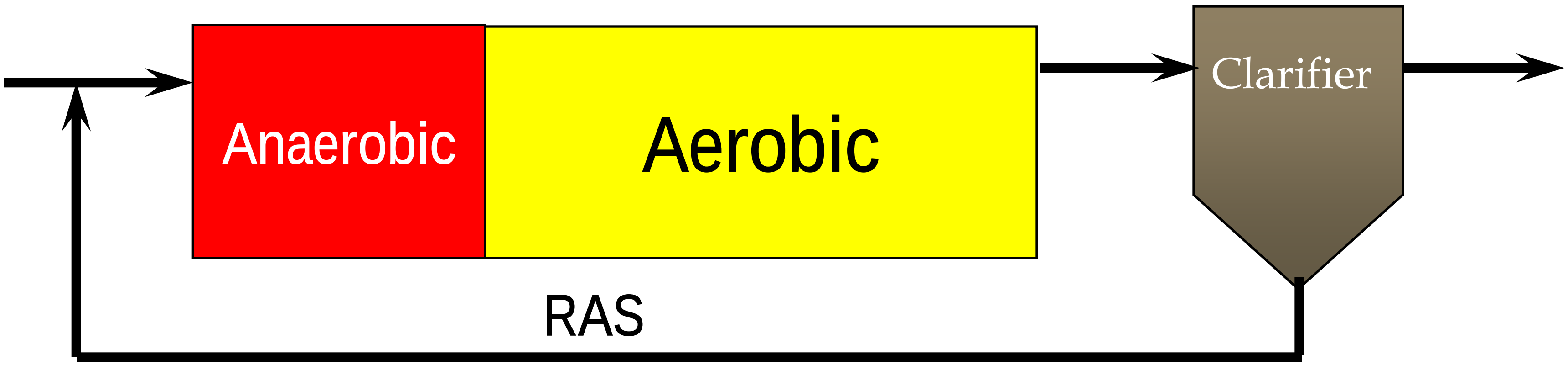
Neisser Stain

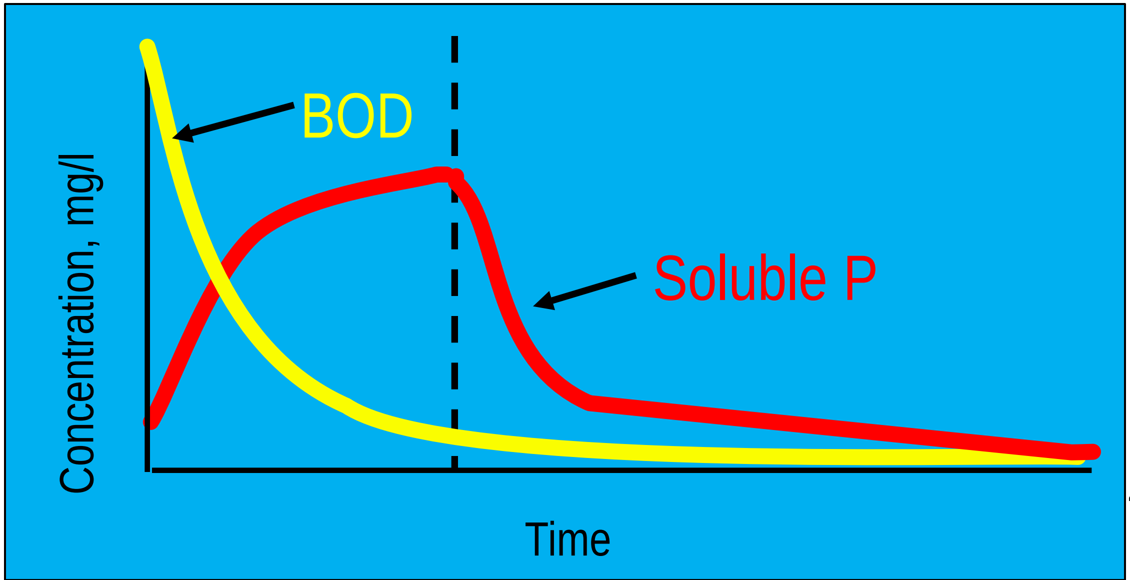


EBPR Requirements

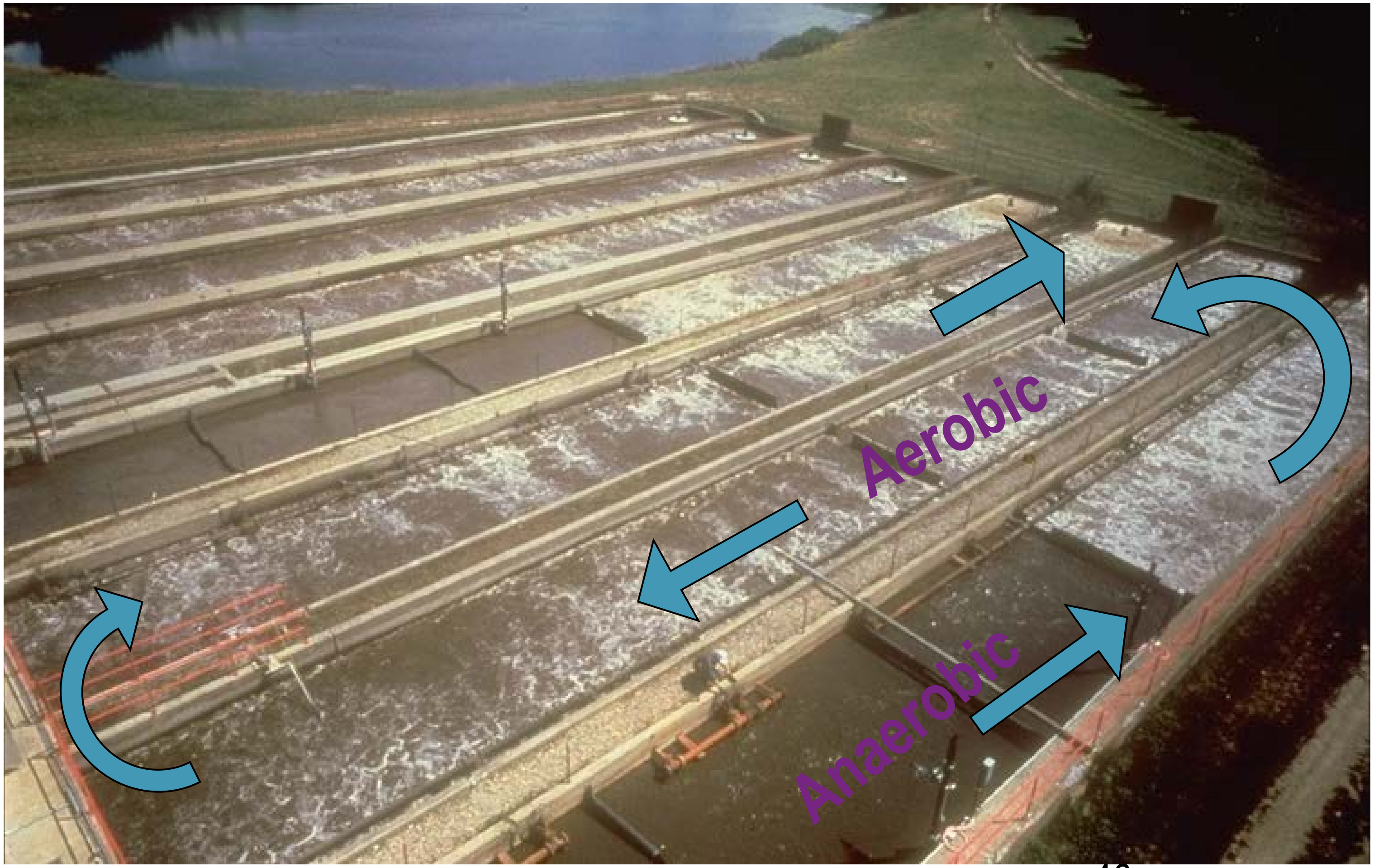
- Anaerobic/aerobic sequence
- Adequate supply of volatile fatty acids (VFAs) in anaerobic zone
- No free oxygen
- No bound oxygen (nitrate)

Biological Phosphorus Removal

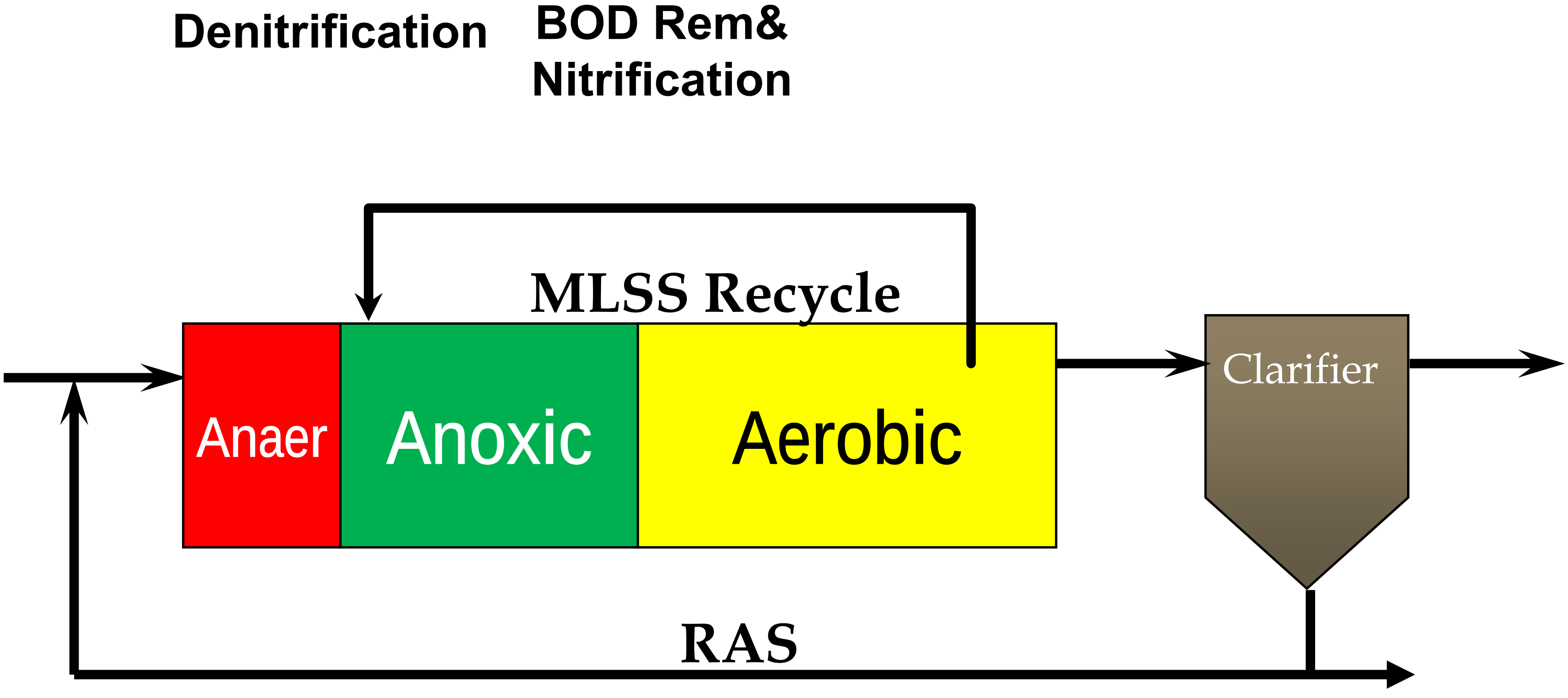




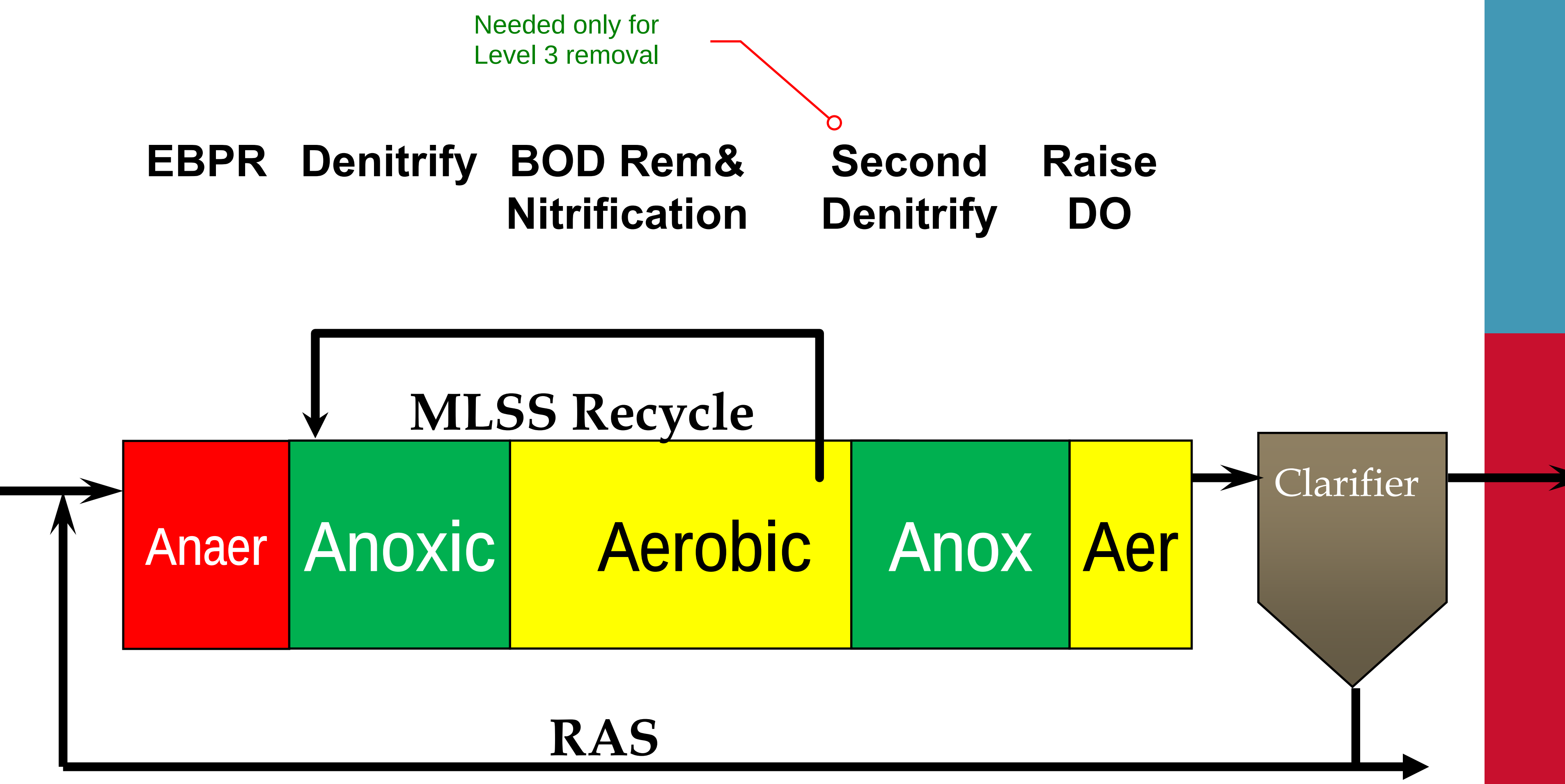
Pontiac, MI. AO process for P removal



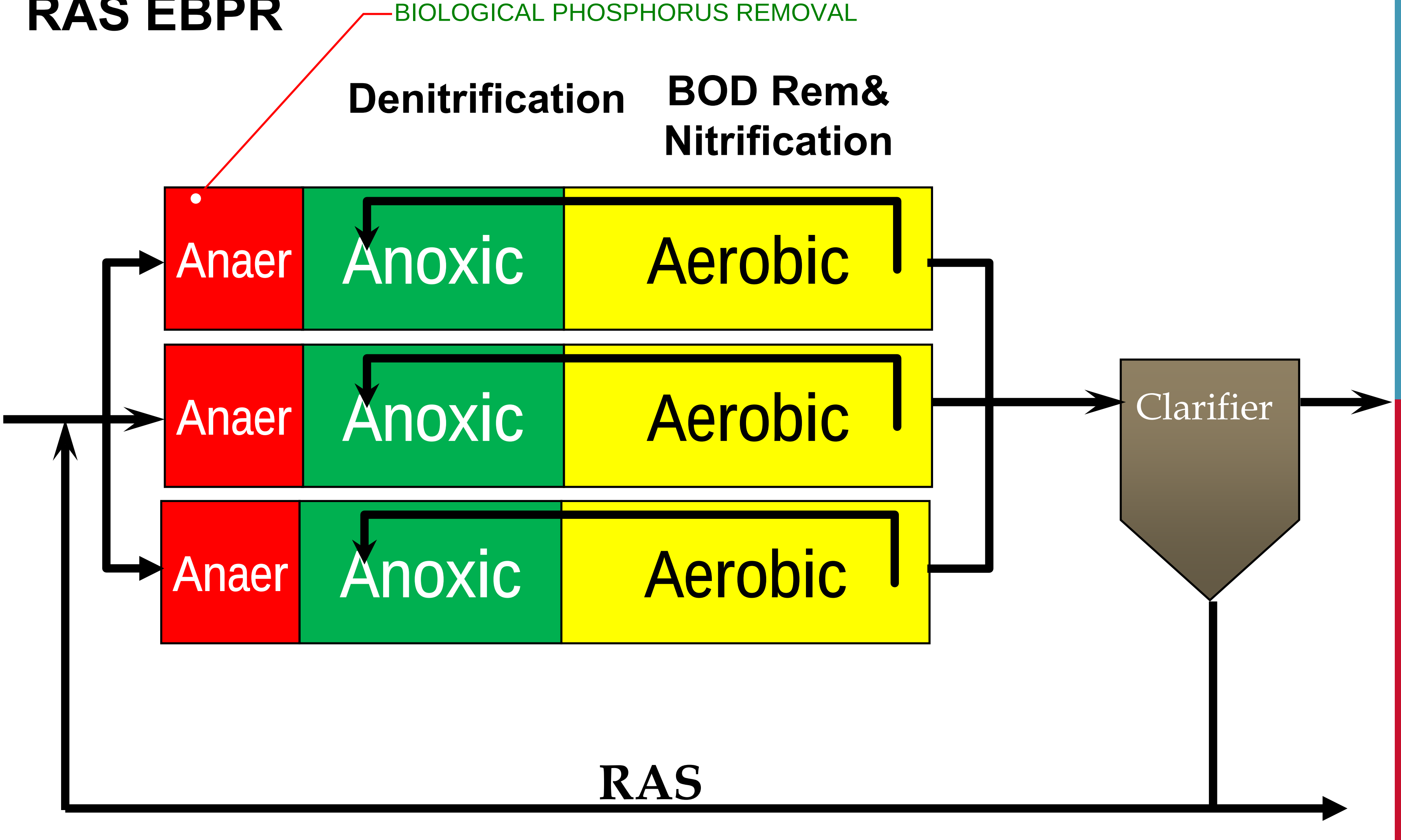
Modified Ludzack Ettinger (MLE) System



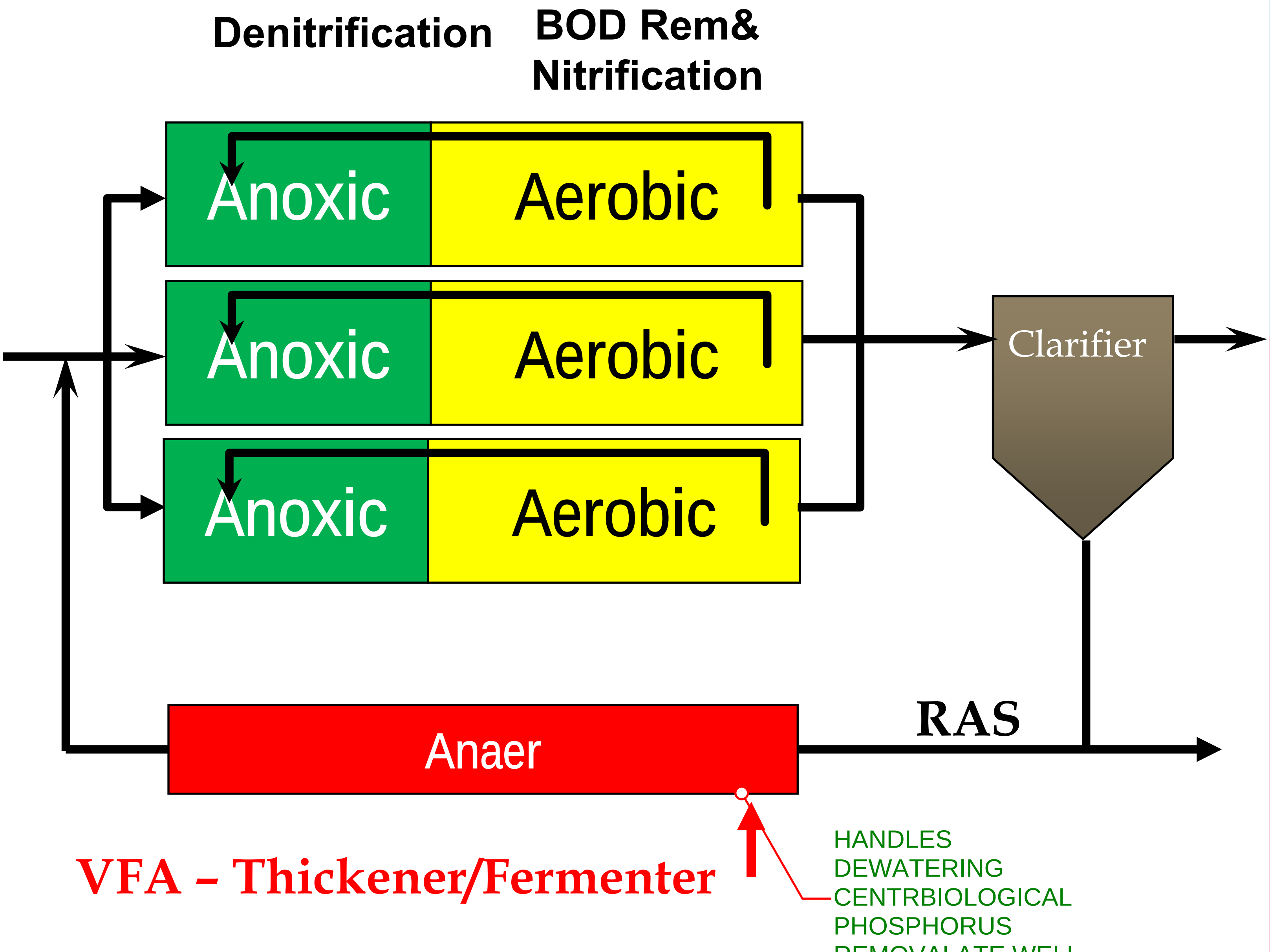
5-stage Bardenpho



RAS EBPR


BIOLOGICAL PHOSPHORUS REMOVAL
Denitrification
BOD Rem&
Nitrification
Anaer
Anoxic
Aerobic
Anaer
Anoxic
Aerobic
Anaer
Anoxic
Aerobic
Clarifier
RAS

RAS EBPR


Denitrification
BOD Rem&
Nitrification
Anoxic
Aerobic
Anoxic
Aerobic
Anoxic
Aerobic
Clarifier
RAS
Anaer
VFA – Thickener/Fermenter
HANDLES
DEWATERING
CENTRBIOLOGICAL
PHOSPHORUS

Chemical Phosphorus Removal

Metal salt reaction with phosphorus

The following illustrates a "stoichiometric reaction" of Al^{+++} or Fe^{+++} with P, But actual P removal mechanism is related to hydroxide formation.

$$Al_2(SO_4)_3 \cdot 14H_2O + 2H_3(PO_4) = 2Al(PO_4) + 3H_2SO_4 + 18H_2O$$

$$FeCl_3 + H_3(PO_4) = Fe(PO_4) + 3HCl_3$$

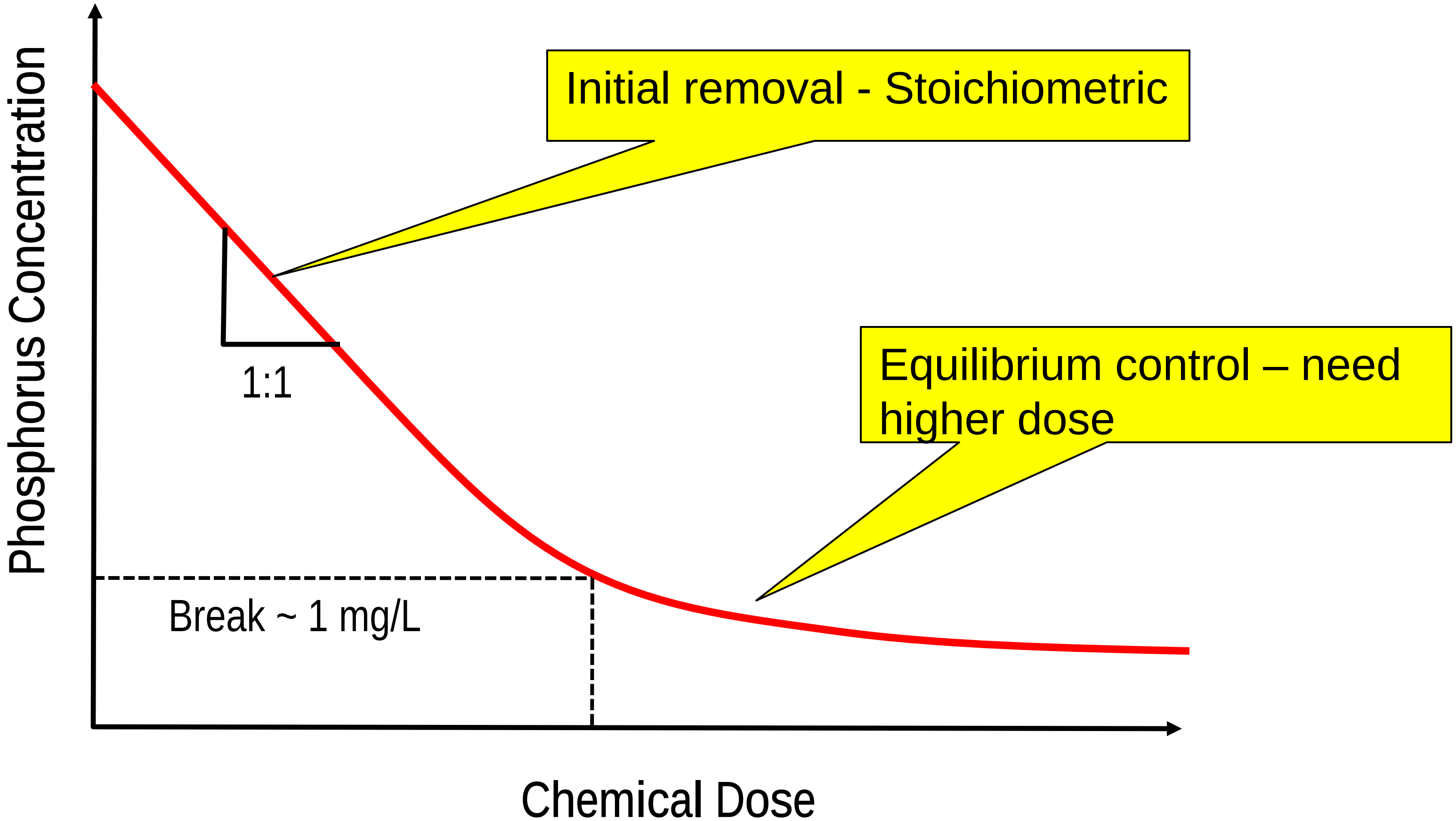
In above 1 mole of P uses 1 mole of Al or 1 mole of Fe

1 mole of Al or Fe produces 3 equivalents of acid as H_2SO_4 or HCl_3

Alkalinity used per millimole = 150 mg/L as CaCO3
Or 0.25 g alkalinity per g of Alum and 0.92 g alkalinity per g of ferric chloride for the phosphorus precipitation stoichiometry

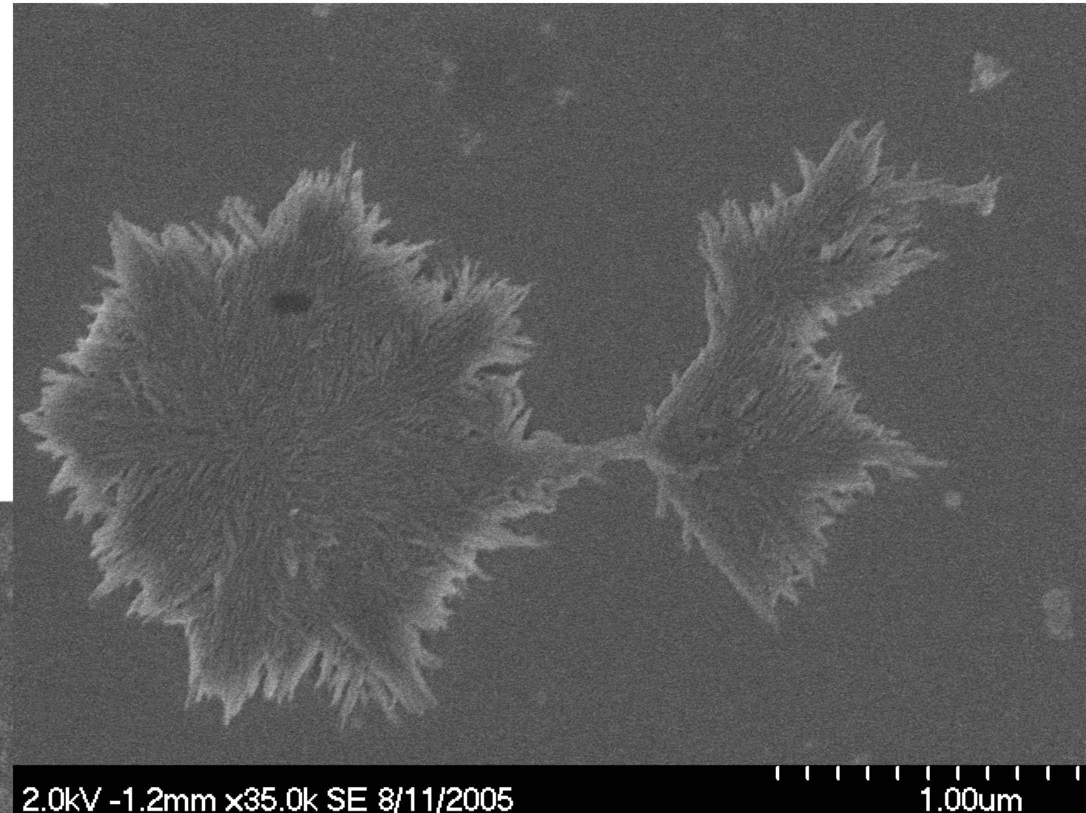
Phosphorus Removal

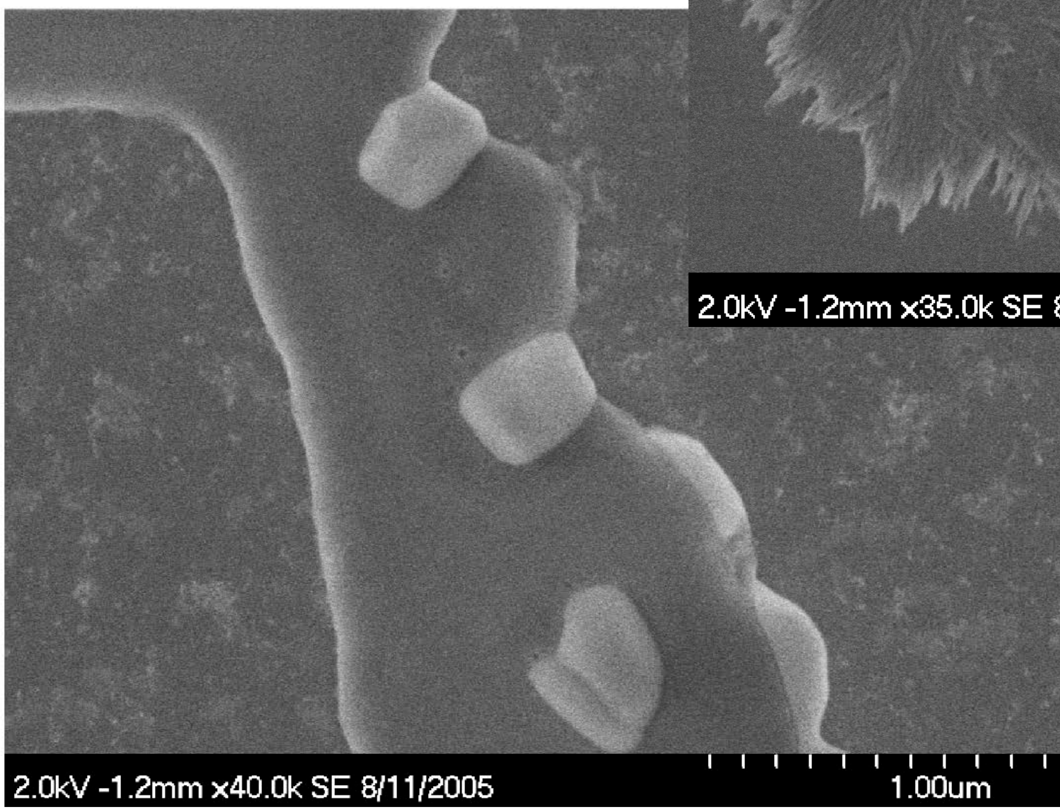
ONCE BOUND CHEMICALLY, IT STAYS BOUND
GOOD FOR GETTING RID OF IN SOLIDS BUT NOT
BENEFICIAL FOR PHOSPHORUS RECOVERY.



Photomicrographs of Phosphate Precipicants

pH 7-->

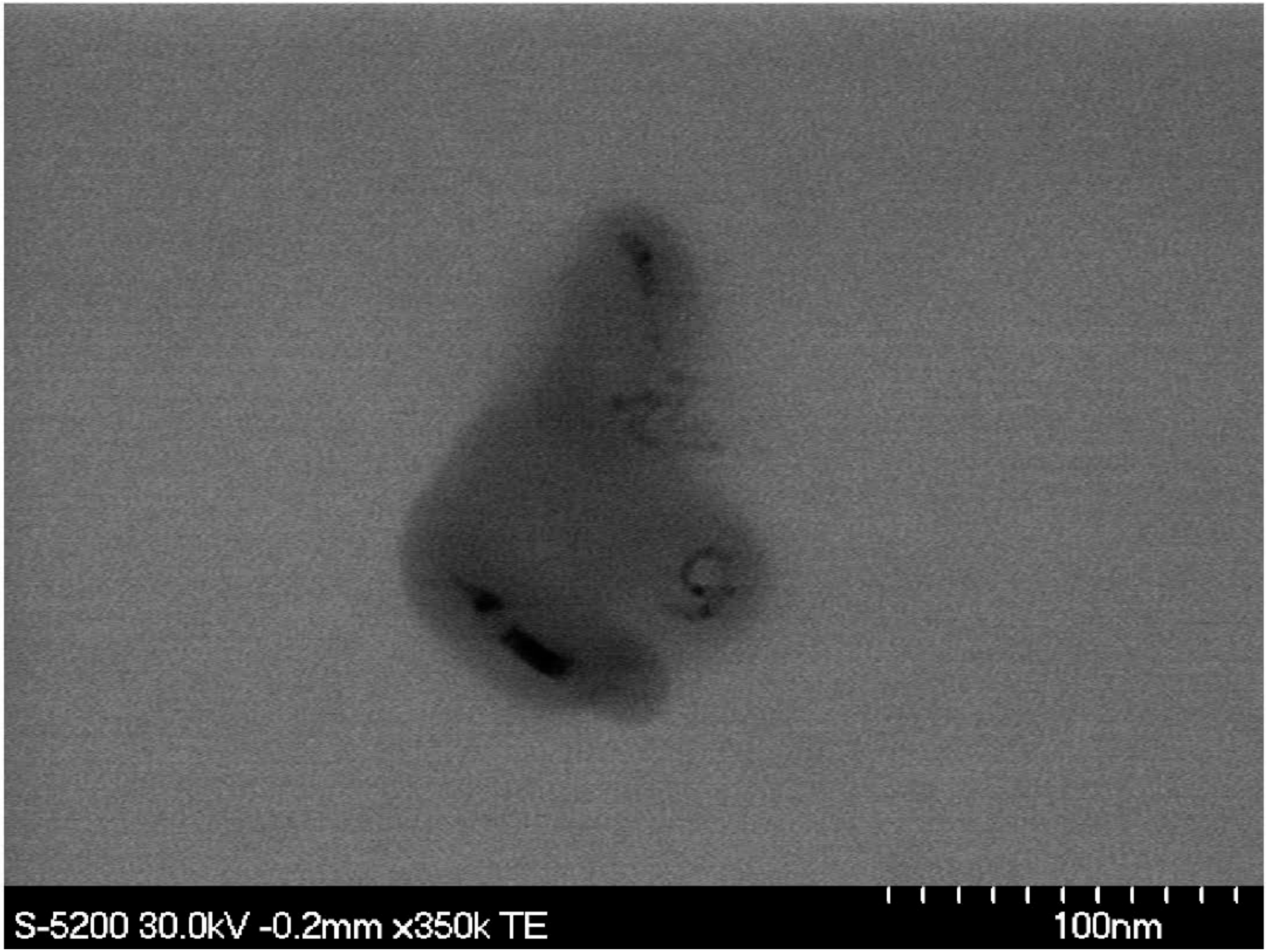




← pH 3

Scott Smith, Wilfrid Laurier University

Fresh HFO



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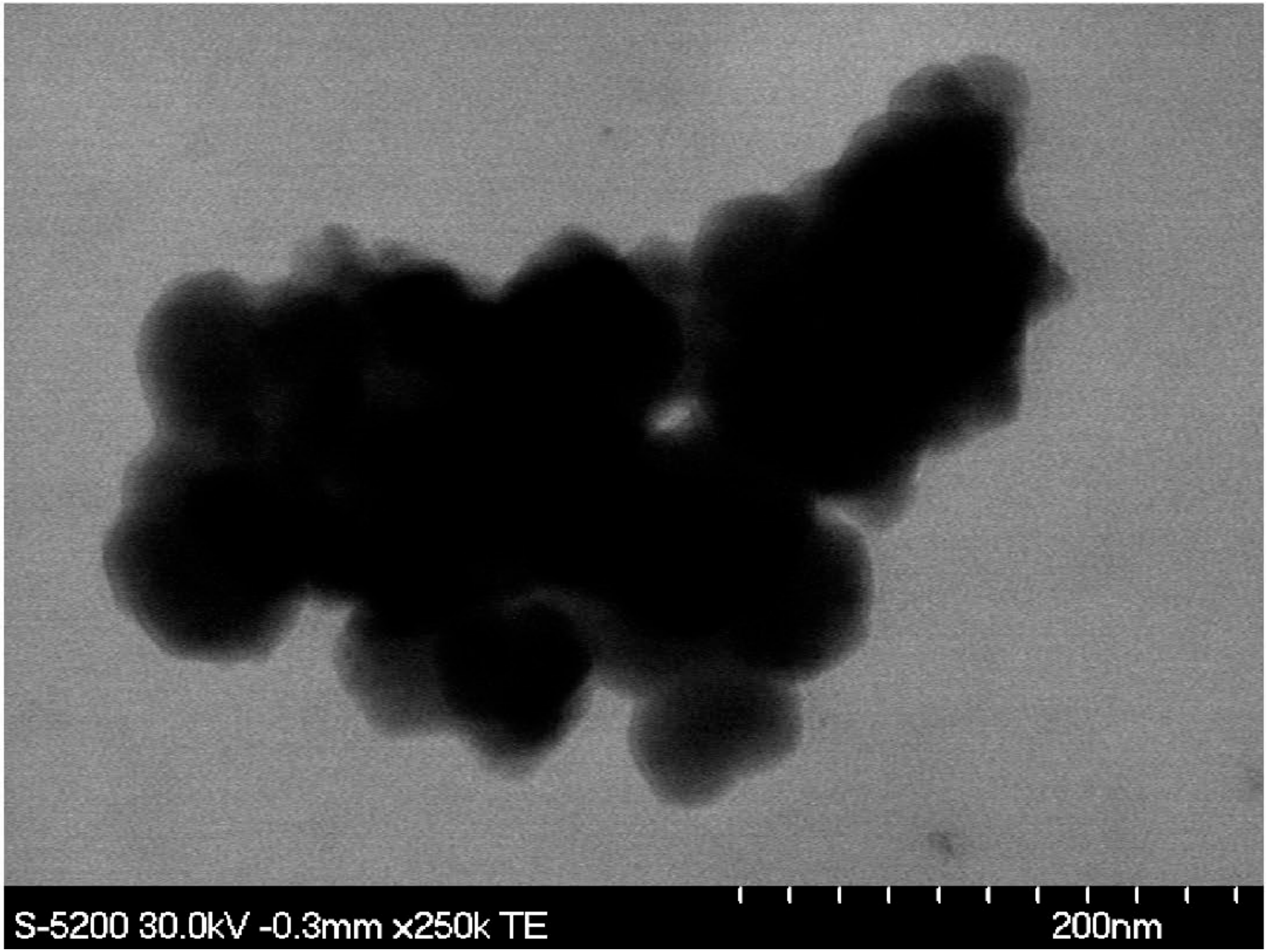
Young HFO



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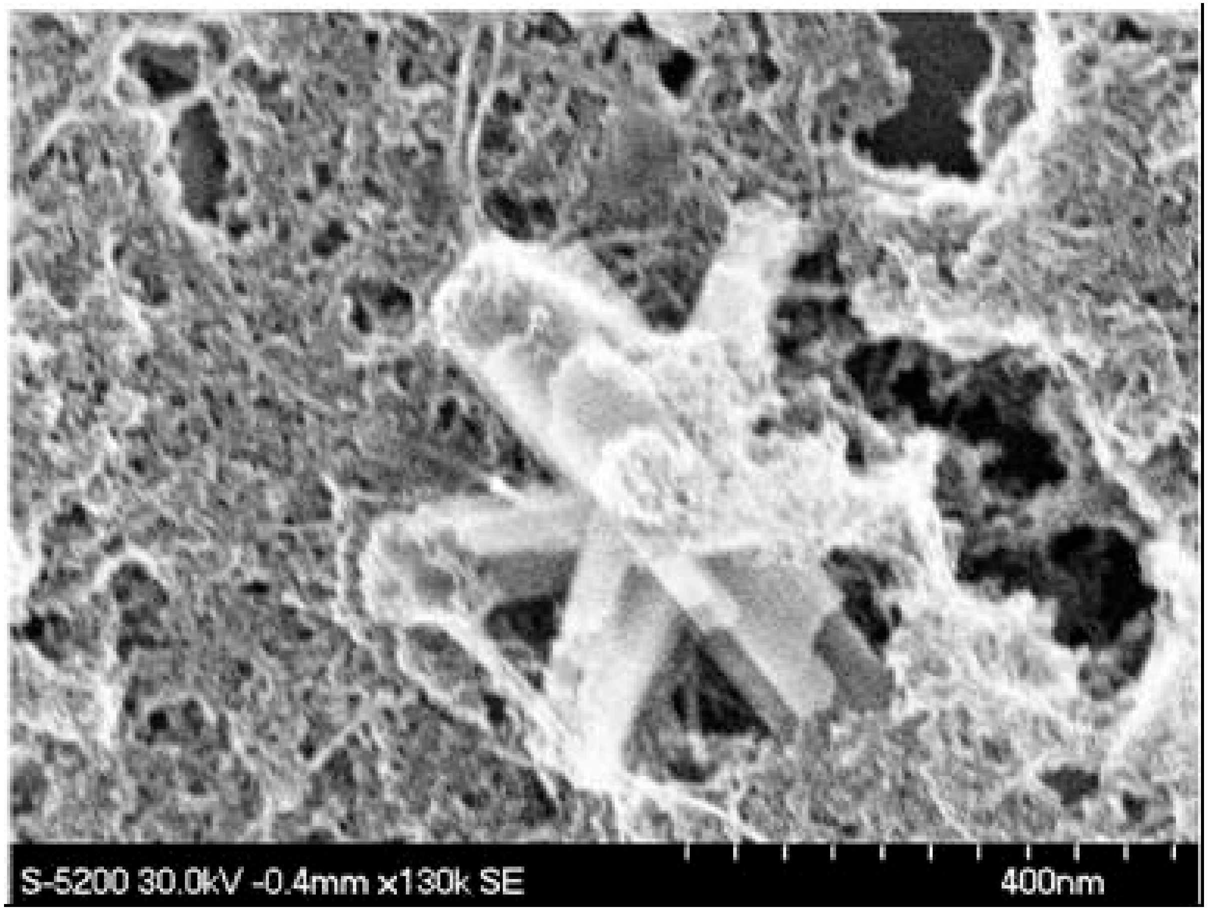
Aged HFO



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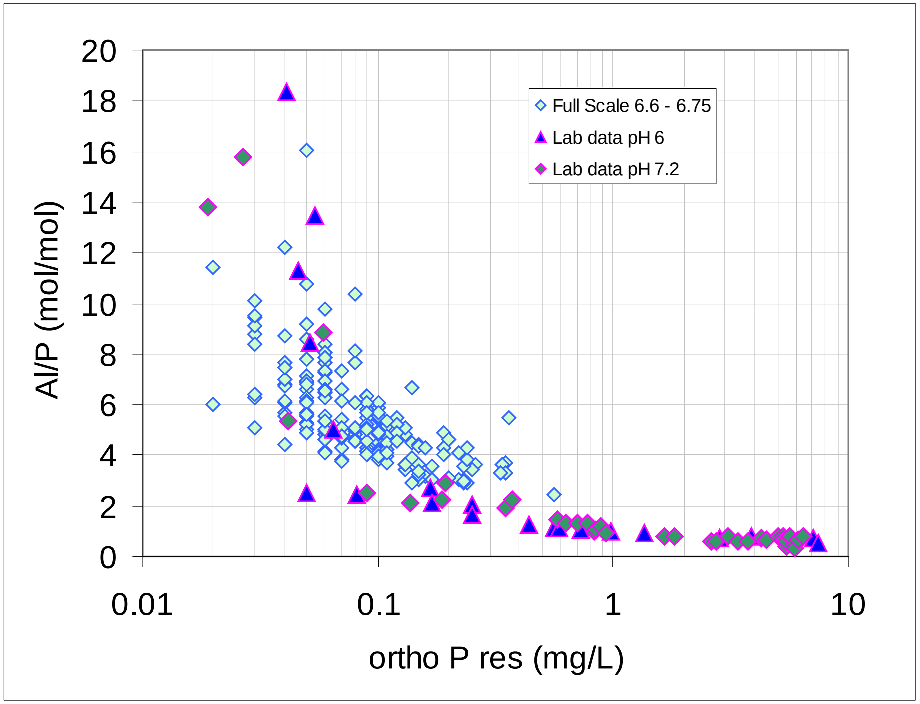
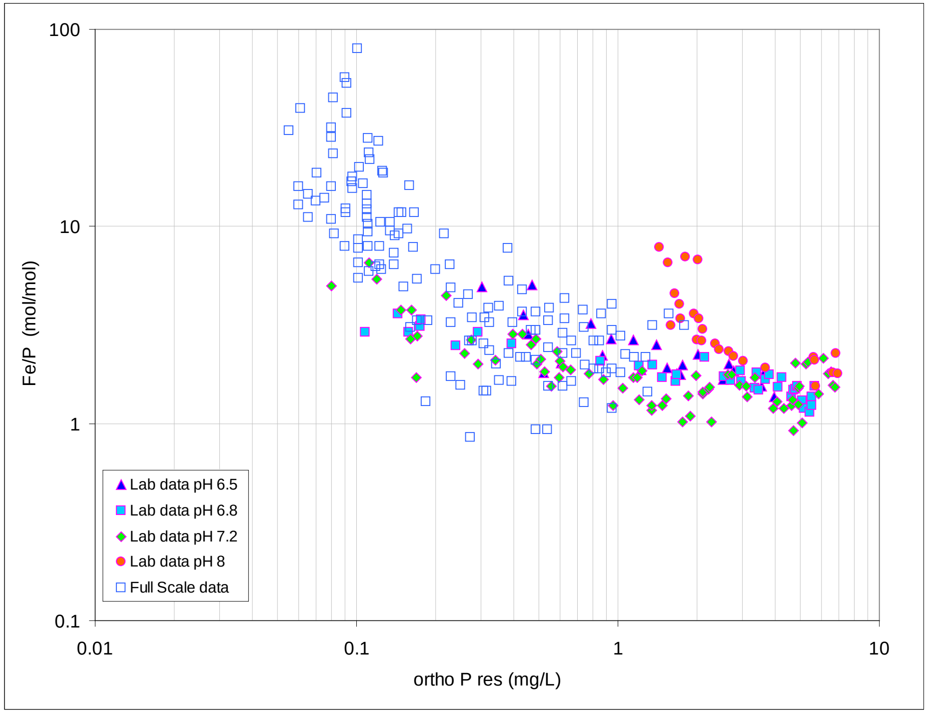
$FePO_4$ precipitant

After 4 days.
Hard !!

Scott Smith, Wilfrid Laurier University

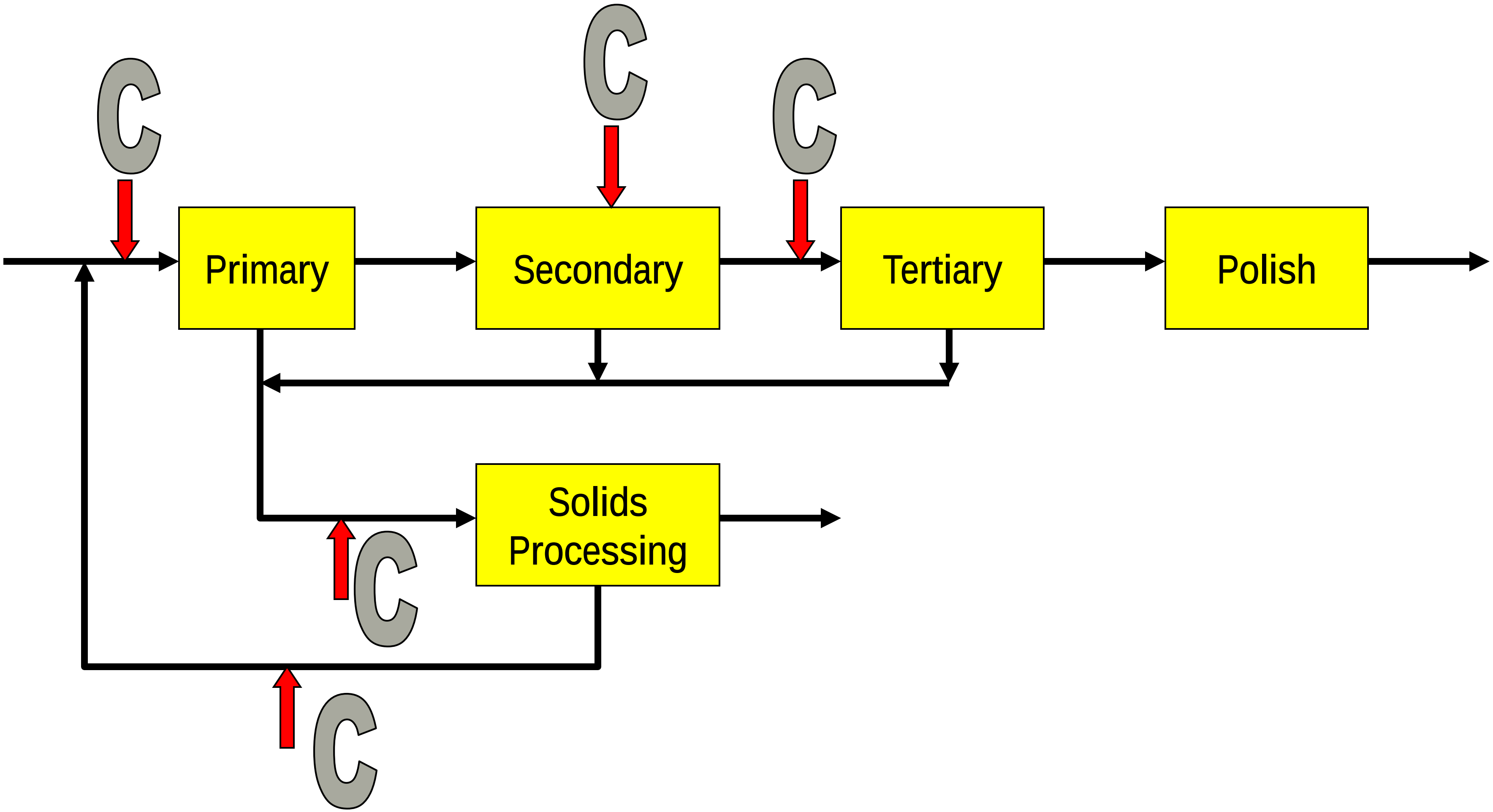
Molar Dose Ratio From Tests





Slav Hermanowicz, Chemical Fundamentals of Phosphorus Precipitation,
WERF Boundary Condition Workshop, Washington DC, 2006

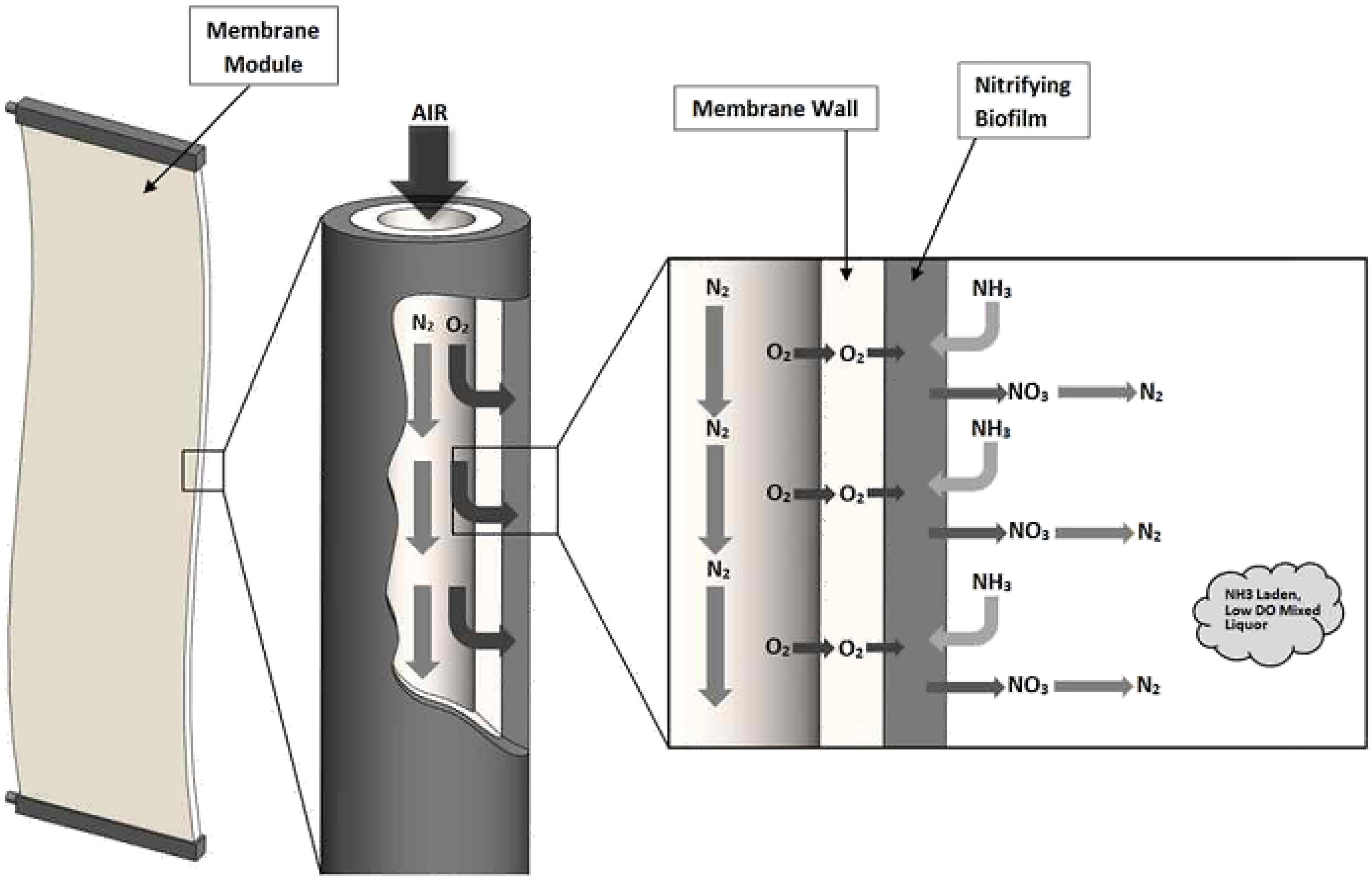
Typical Chemical Treatment Opportunities



Membrane Aerated BioReactor (MABR)

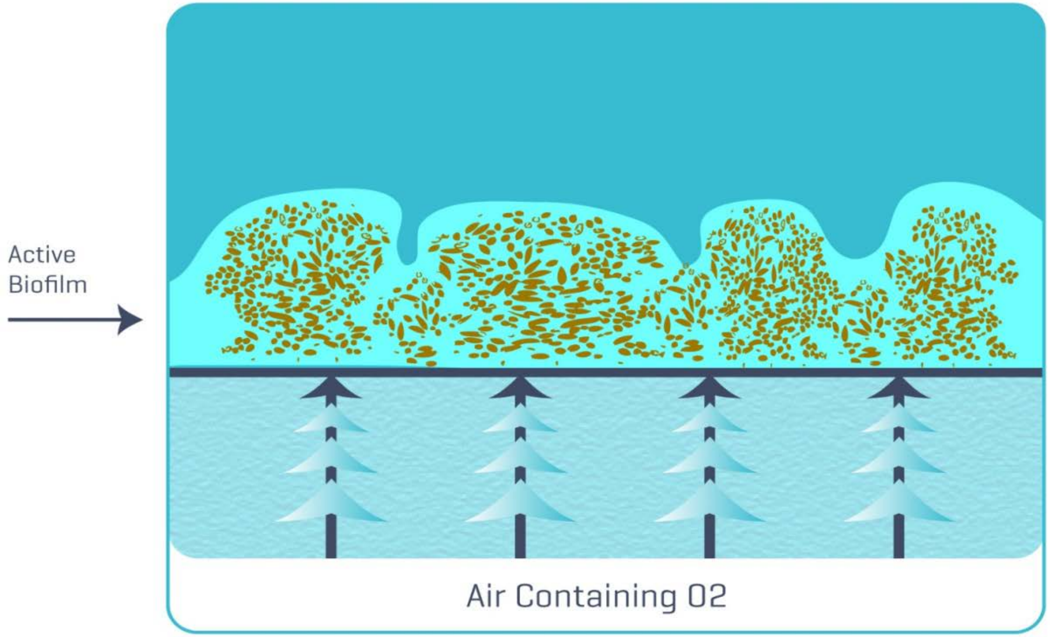
NEWER TECHNOLOGY
WITH HIGH OXYGEN
TRANSFER EFFICIENCY.

ZeeLung operation

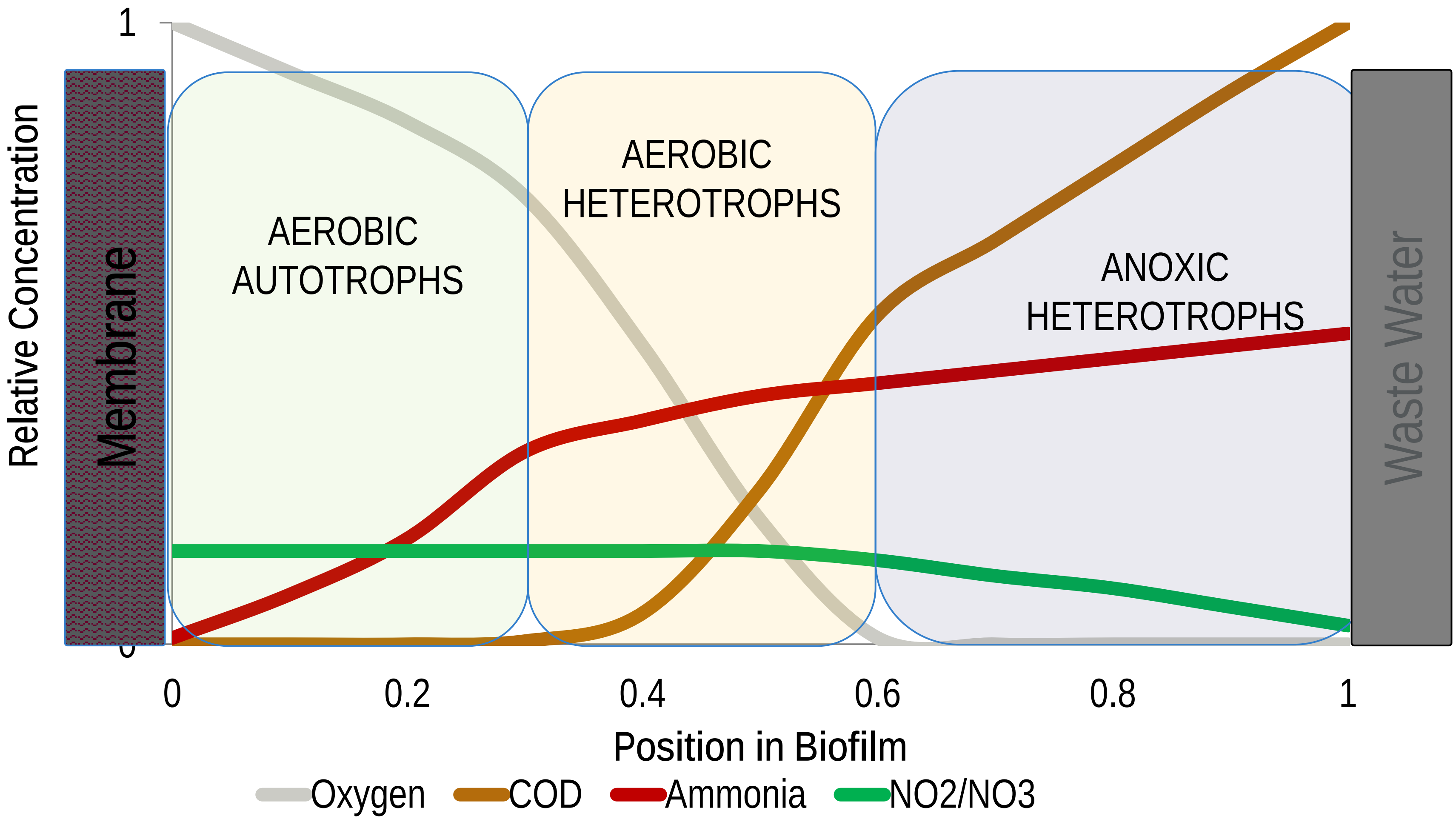


Membrane Aerated Biofilm Reactor (MABR)

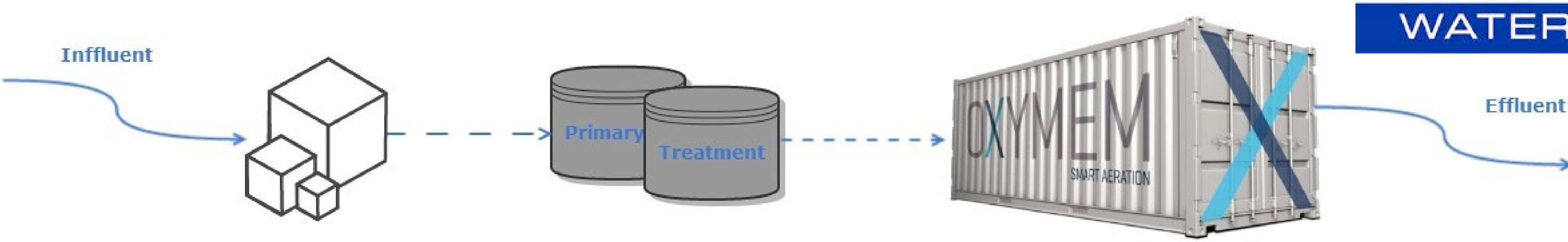
- Use Air or Pure Ox to feed the membranes
- Grow biofilm on membranes
- High oxygen
  transfer and energy efficiency
- High biomass levels
- Secondaries not required???



MABR Concentration Profile



OXYMEM: 2014 (GEN II)



Demonstrator (Oxy-500)

Dec 2014: 50m^3/day (13,000 GPD)

- COD<40mg/l
- BOD<5mg/l
- N-NH_4<1mg/l
- TSS<30mg/l
- Sludge yield <0.2Kg TSS/Kg COD

COD > 5g/m^2 day

N-NH_4 >0.5g/m^2 day

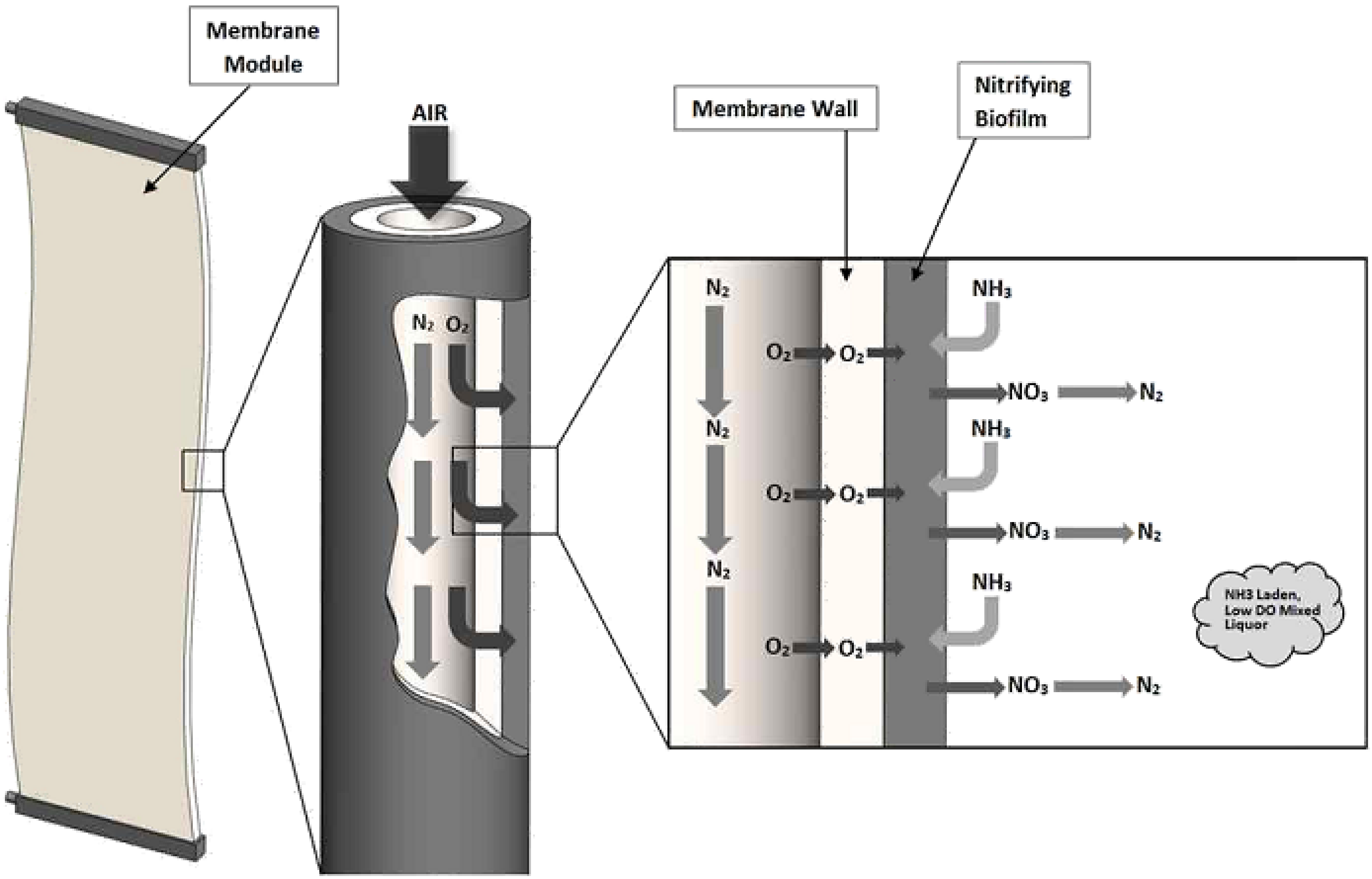
ZeeLung 500 product

ZeeLung cassette

ZeeLung fiber

Based on ZW500D platform
40 m² (430 ft²) module
48M cassette
System tie-points:
- Process air 1″
- Mixing/scouring air 3″
- Condensate removal ½″

ZeeLung operation



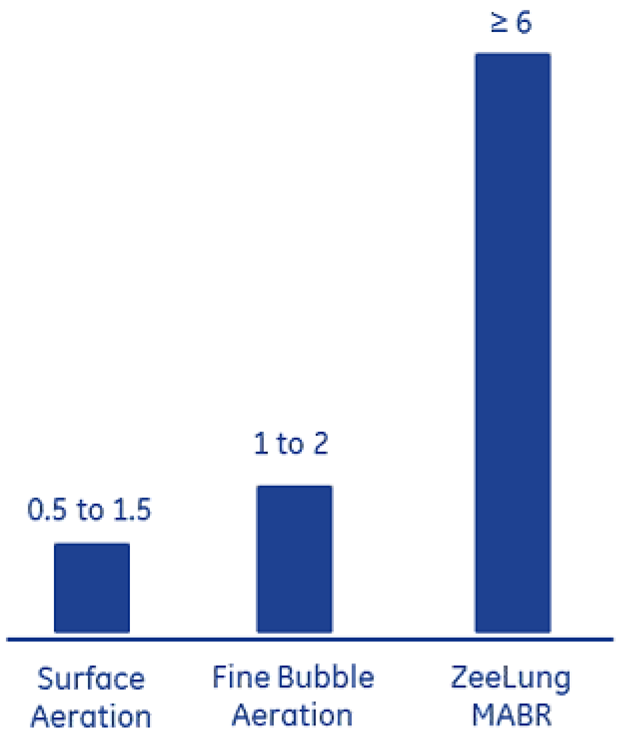
ZeeLung reduces the energy for aeration by 4X

Aeration efficiency, kg O_2/kWh

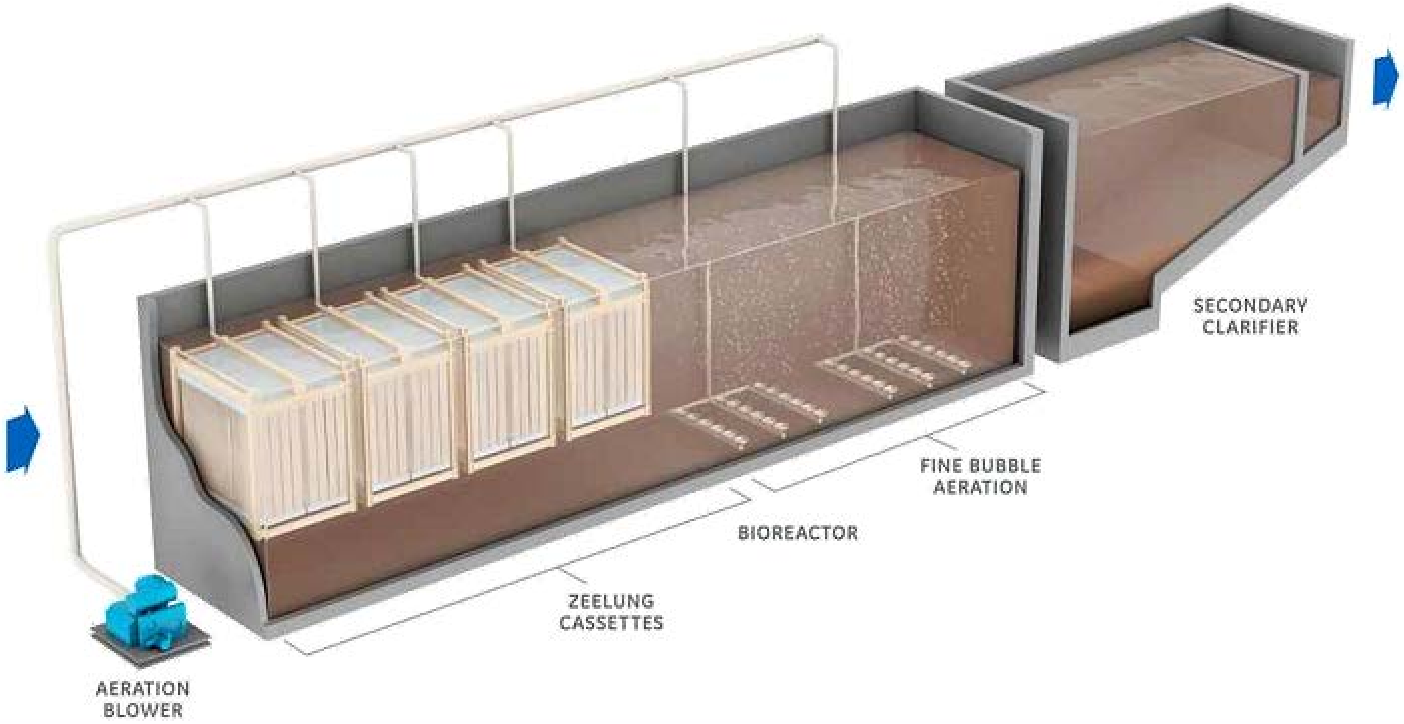
Conventional aeration is inefficient and the largest energy consumer

ZeeLung aeration efficiency is 4X fine bubble aeration

Energy savings determined by % of oxygen demand supplied by ZeeLung



ZeeLung cassettes are installed in the bioreactor



Increase biomass inventory in existing volume
Enables nutrient removal & capacity expansion

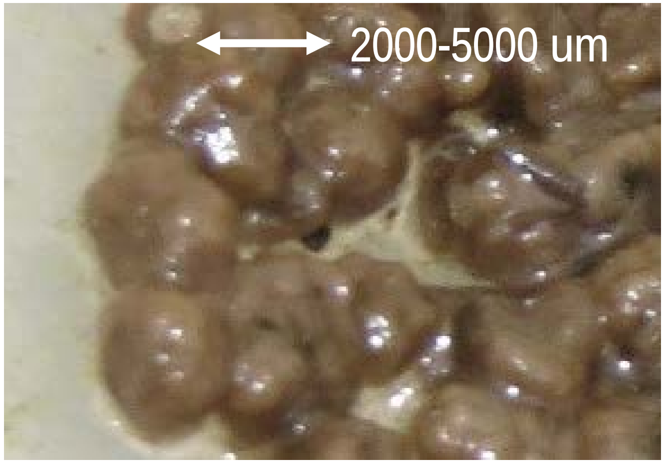
 

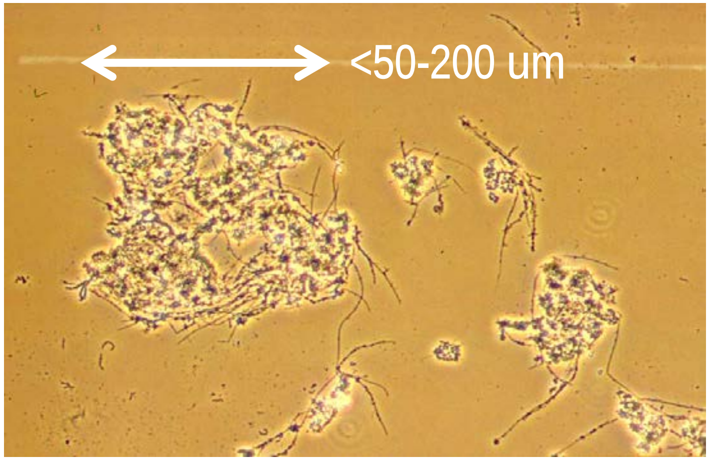
Granular Activated Sludge
Nereda

NEWER TECHNOLOGY WITH
VERY SMALL FOOTPRINT.

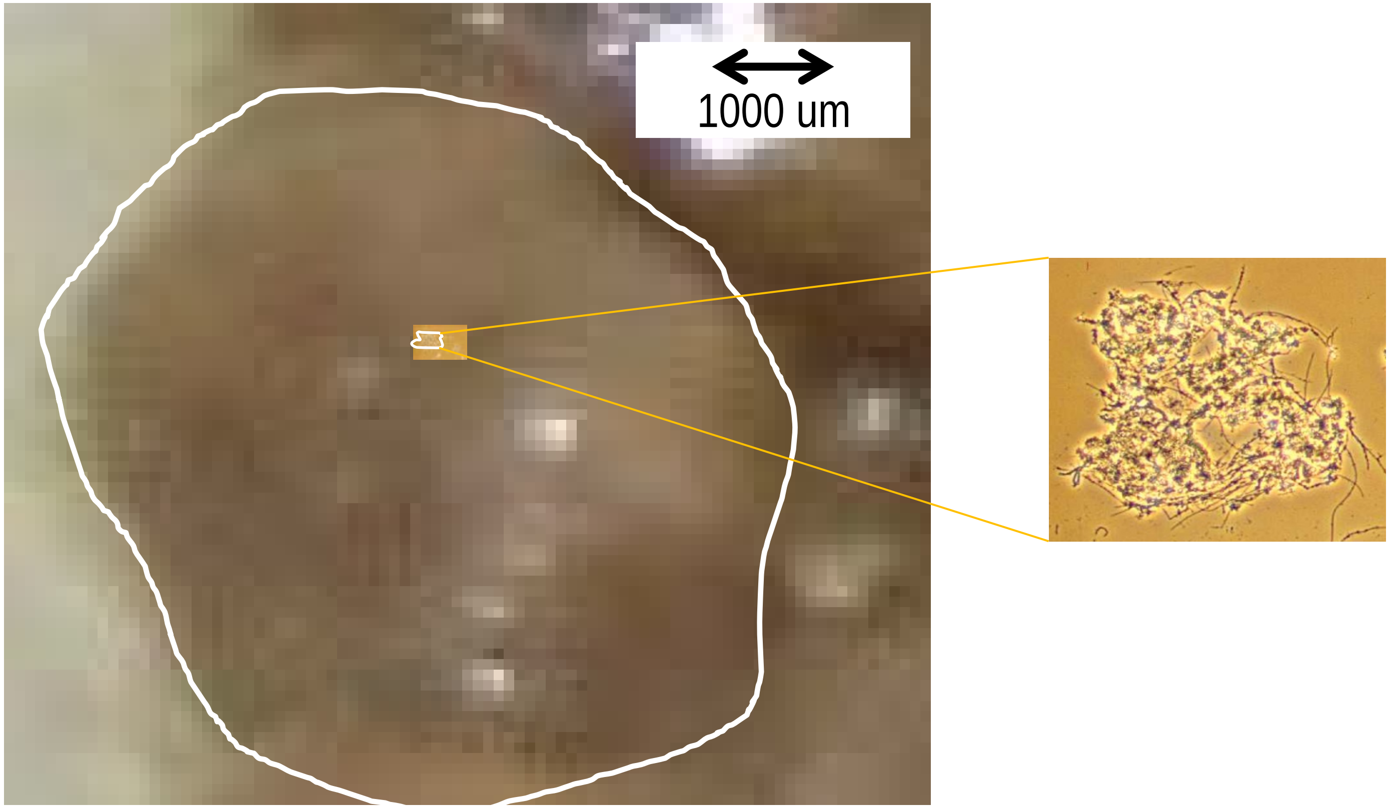
What is Granular Activated Sludge?

- Biological process where biomass is grown in granules as opposed to flocs
- Granule is loosely defined as particles > 200 um size
  - Typically dense particles
  - Pictures blow – Granules larger

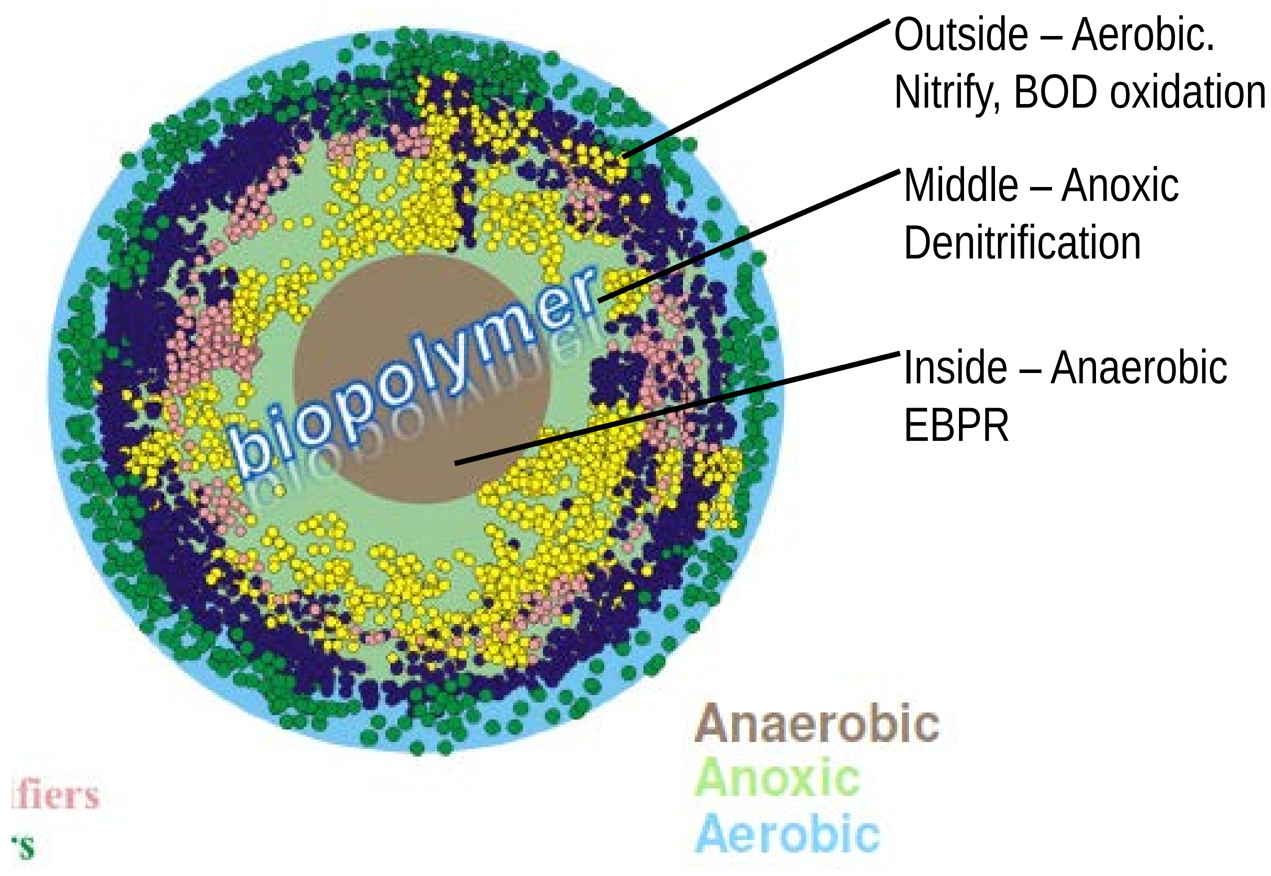




What is Granular Activated Sludge?



One Granule – many Microenvironments



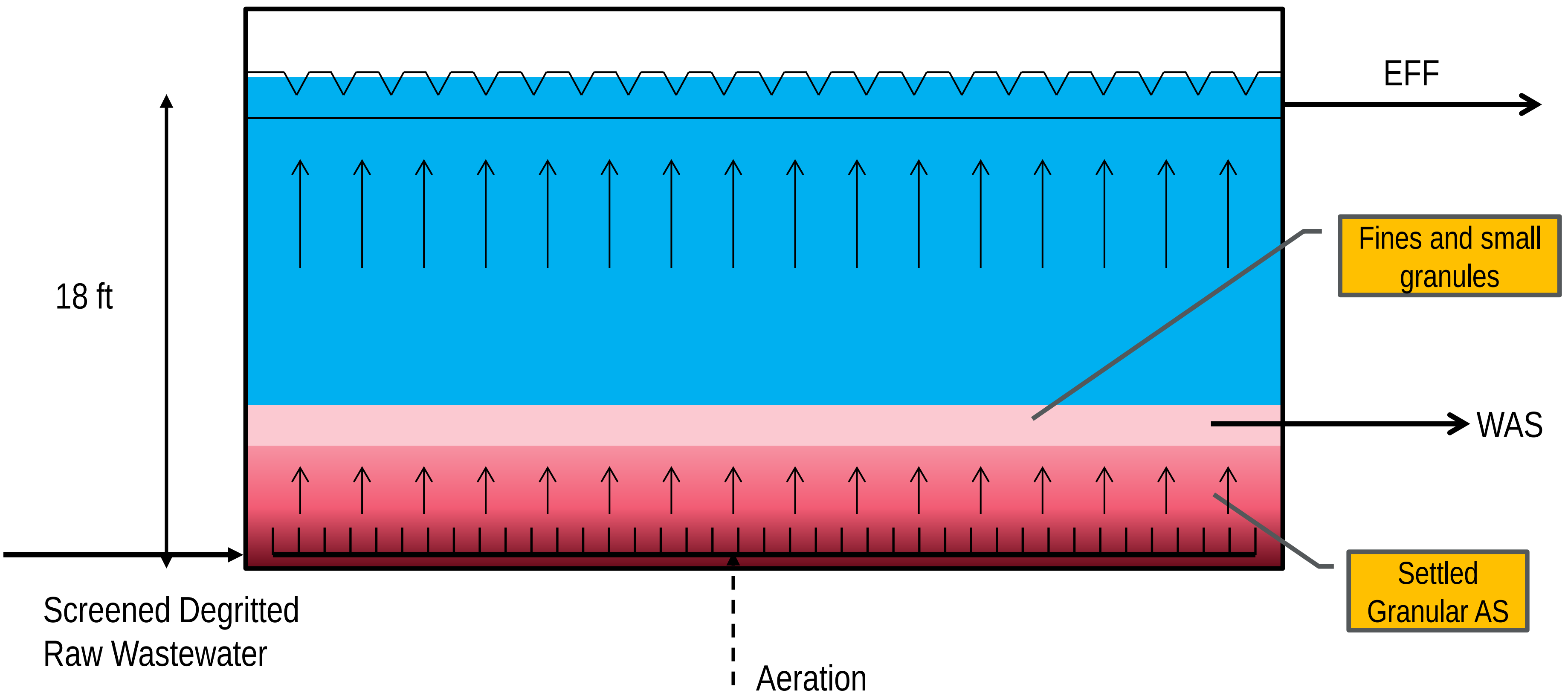
Courtesy Delft University of Technology

Marie Winkler

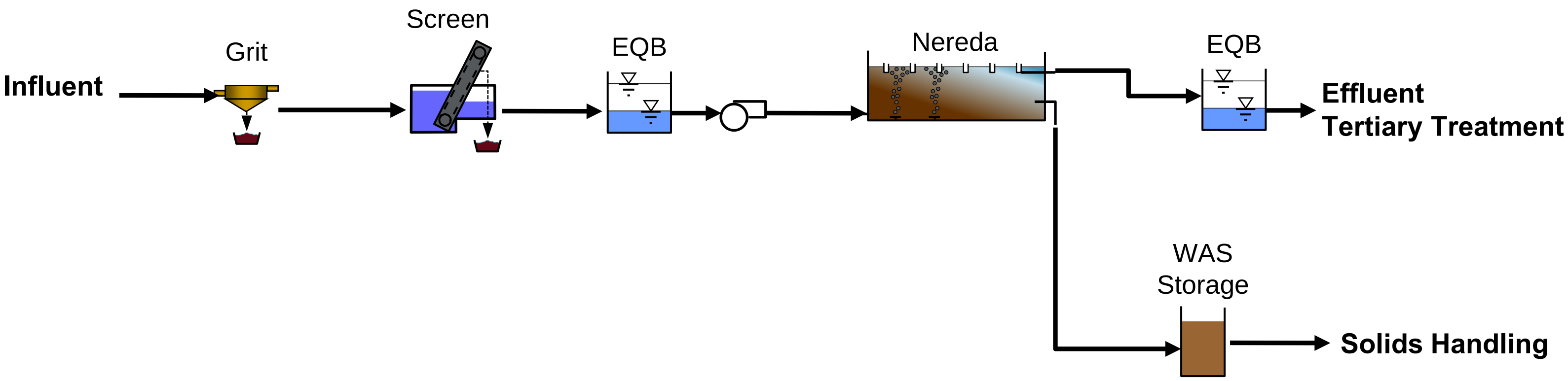
GrAS Processes

- Nereda
  - “SBR” style operation
  - Developed in University of Delft (Mark van Loosdrecht)
  - License holder Royal HaskoningDHV
- University Washington
  - Nitrification and Denitrification GrAS
  - Laboratory batch reactor
- WERF GrAS Research
  - Several elements
  - Geared towards application in standard flow through AS process

Nereda Reactor

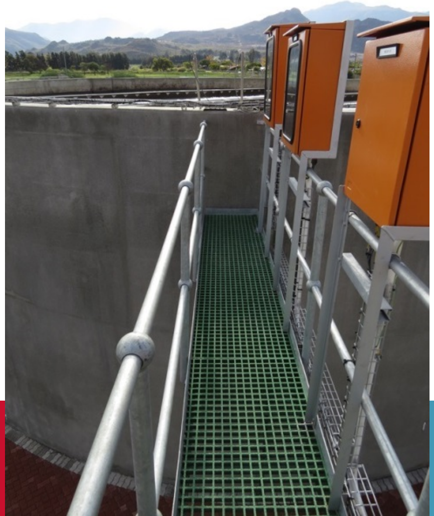


Process Flow Diagram - Nereda



Gansbaai - 5 MLD

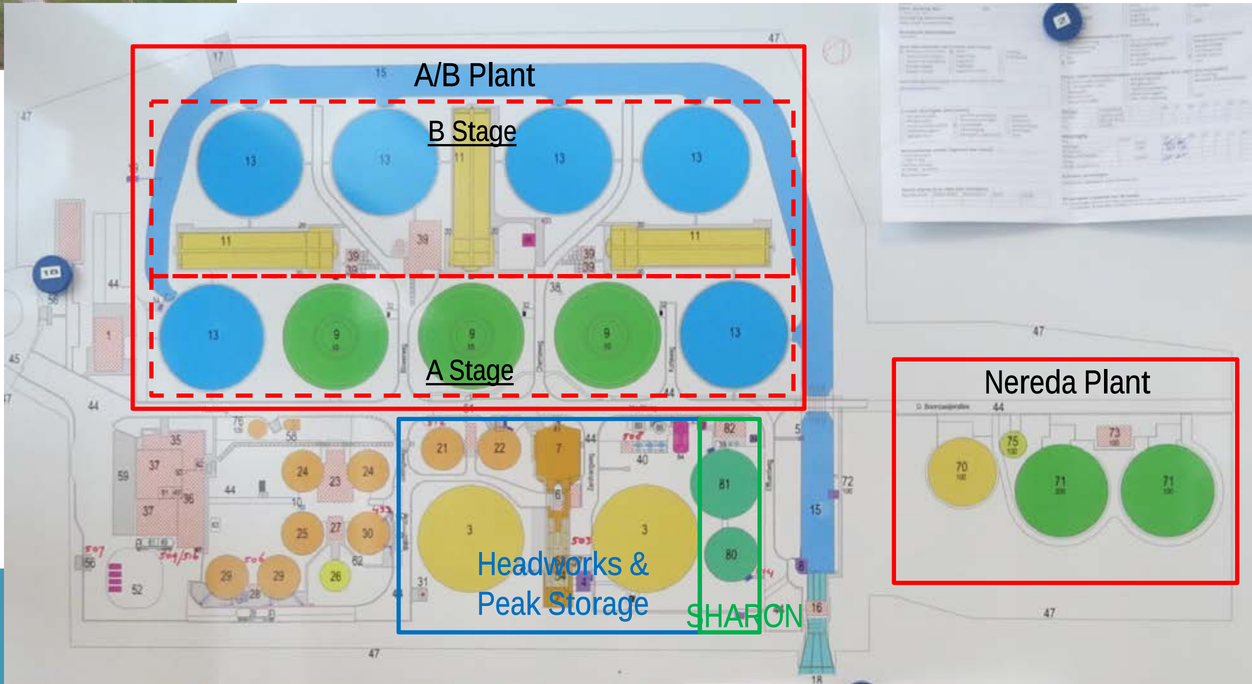
Wemmershoek – 5 MLD



Garmerwolde – 30 MLD (~8 mgd)

Design for 40/60 flow split; operate 50/50 split

Energy cost for Nereda is about 50% of AB Process
Operating costs is even lower (no chemicals)

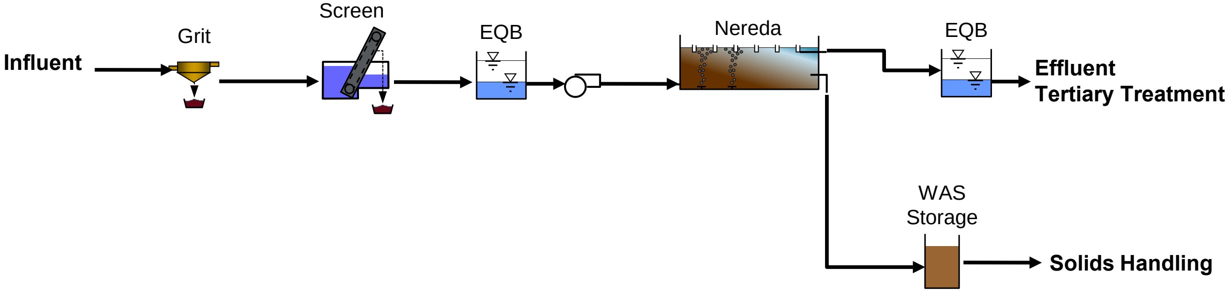



sc1000
4,630 mg TSS/L
0.2 mg NO3-N/L
1.29 mg NH4-N/L
0.26 mg PO4-P/L
LANGE

DC Water - Blue Plains Current

DC Water – Blue Plains with Nereda

Nereda Overview



Alternatives for Sioux Falls

Treatment Goals – FOR THIS PRESENTATION

- Design Winter Temp: 9.5 degrees Celsius
- BOD Effluent Requirement: 6 mg/l.
- Ammonia:
  - Winter Maximum Daily Ammonia Limit: Targeted effluent of 1.5 to meet 2 mg/l.
  - Summer Maximum Daily Ammonia Concentration: Targeted of 0.7 mg/l to meet 1 mg/l.
- Total Nitrogen Removal (For Expected future EPA enforcement limits)
  - Effluent TN goal to meet 8 mg/l with a 10 mg/L effluent limit.
- Future total phosphorus (TP)
  - Goal of 1 mg/l monthly average

Key Decision Points

- The Role of the Trickling filters
- Approach to Phosphorus Removal
  - Chemical removal
  - Biological removal
- Wet weather/peak flow operation
- Ability to implement project in phases

Nutrient Removal Levels

EXPECTED AT 10-15 YEARS.

Nutrient Removal Treatment Levels				
Level	NH4-N mg/l	TN mg/l	TP mg/l	Comment
Cur	3.5-7.5	n.a.	n.a.	Secondary Treatment with Ammonia Daily Max
1	1-2	10	1	Achievable with conventional nutrient removal technologies. Chemical addition or filtration is typically not required.
2	1-2	3	0.3	Enhanced removal requires tertiary treatment and chemical addition to achieve low concentrations.

FUTURE.

Process Approach/Philosophy

- Typical most economic sequence:
  - Make maximum use of existing facilities
  - Upgrade existing facilities
  - Repurpose existing facilities
  - Integrate new facilities
- Start with the end in mind
  - Develop process scheme along same sequence
  - Build what is required now
  - Provide avenue to meet future requirements (permit or growth)

Process Options – Trickling Filter Options

- BOD removal option

REVIEW AS AN OPTION TO TREAT HIGH BOD INDUSTRIAL LOADS.

  - Effective for BOD reduction
  - Detrimental for nutrient reduction;
    - Result in need to add carbon – Methanol, MicroC, other
- Nitrify
  - Reduces loading treating PE – small flow
  - Integrated with AS (Ashley Muller processes)
  - Tertiary nitrification/denitrification
- ~~Wet Weather treatment~~

ELIMINATED AS AN OPTION.

  - ~~Maintain TF for wet weather~~
    - ~~Operate as nitrifying low rate process year round~~

Process Options – Trickling Filter Options

Team Decision is to maintain trickling filters until the nutrient removal phased improvements. Capacity will be allotted to future high BOD type waste streams.

- BOD removal option
  - Effective for BOD reduction
  - Detrimental for nutrient reduction;
    - Result in need to add carbon – Methanol, MicroC, other
- Nitrify
  - Reduces loading treating PE – small flow
  - ~~Integrated with AS (Ashley Muller processes)~~
  - ~~Tertiary nitrification/denitrification~~
- Wet Weather treatment
  - ~~Maintain TF for wet weather~~
    - ~~Operate as nitrifying low rate process year round~~

Process Options – Modify Existing Activated Sludge

Level 1

- Single stage NDN
  - MLE – nitrogen
  - Step feed – nitrogen
- AO – P
- Chemical P – primary
- A2O – P and N
- UCT/mUCT/VIP – P and N

REVIEW AS
OPTION WITH
CHEM-P AND BIO-P

Level 2

- Dual stage NDN
  - 4 stage Bardenpho – nitrogen
- Add Tertiary Denite
- AO plus Filter
- Chem P plus Filter
- Add second stage Denit & Filter
- Tertiary Denit Filter

Either chemical or biological phosphorus removal can be added in most cases

Process Options – New/Emerging Technologies

- Modify existing AS to new modified higher rate. This can be:
  - MABR
  - IFAS
- Add new technology – in parallel or replace
  - Granular Activated Sludge
  - MABR (Membrane aerated bioreactor)
  - MBR
  - Other

ELIMINATED AS OPTION

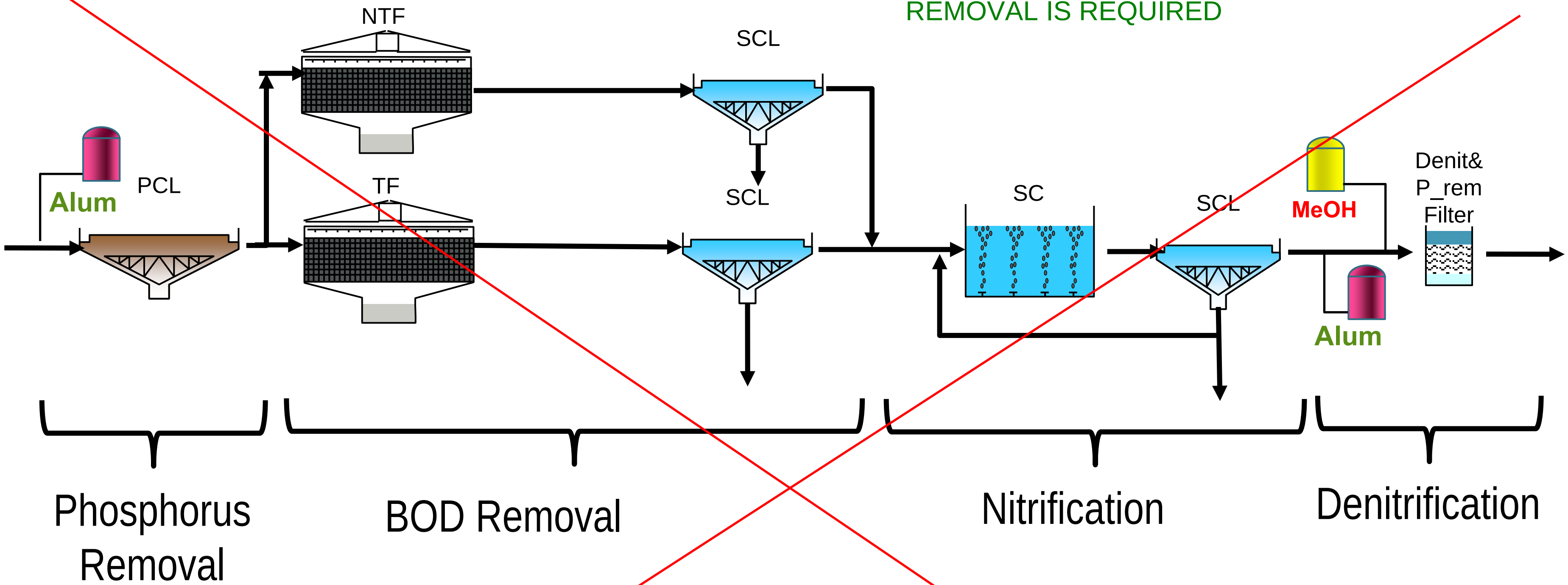
INCLUDE AS PARALLEL TECHNOLOGY AND OPTION AS PART OF EXISTING

Sioux Falls Process Flow Diagrams

Show layout for Level 2 (with Level 1 building)

Trickling Filter Option in Mainstream

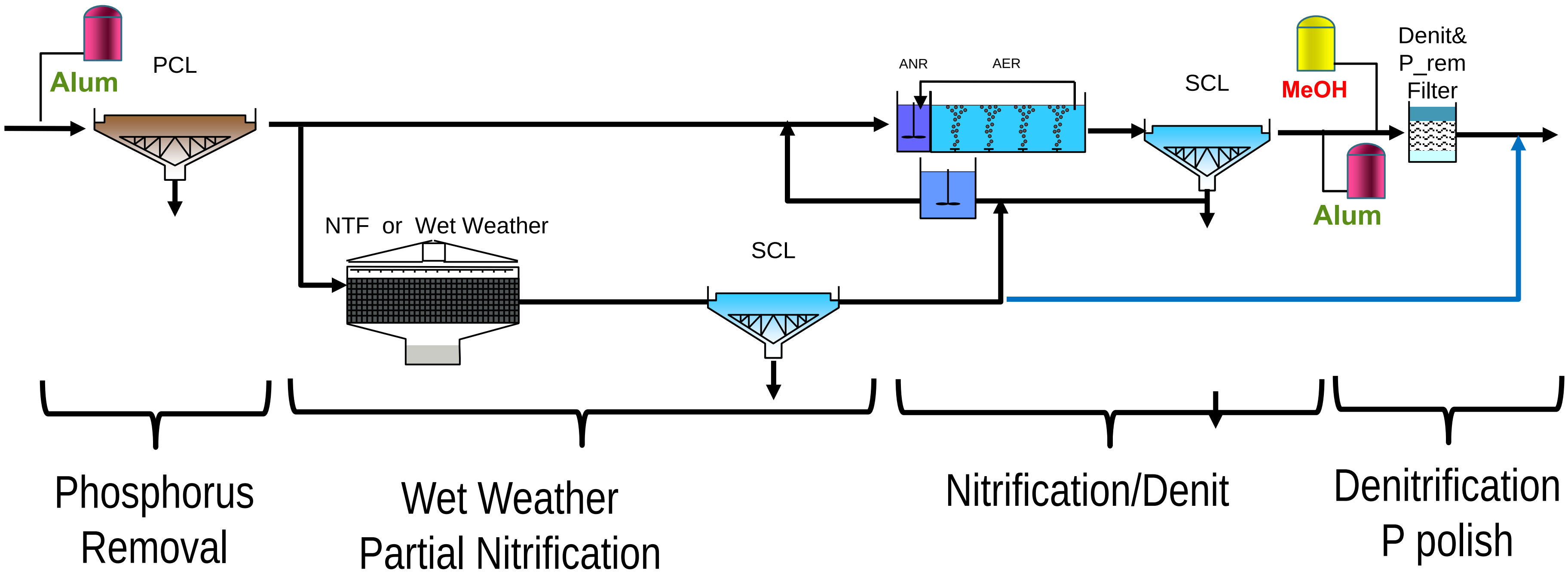
MAINTAIN UNTIL NUTRIENT
REMOVAL IS REQUIRED



- Separate Stages for BOD, N, P removal
- High chemical addition required (alum and MeOH)
- Level 1 & 2 add Alum, Denit Filter, MeOH

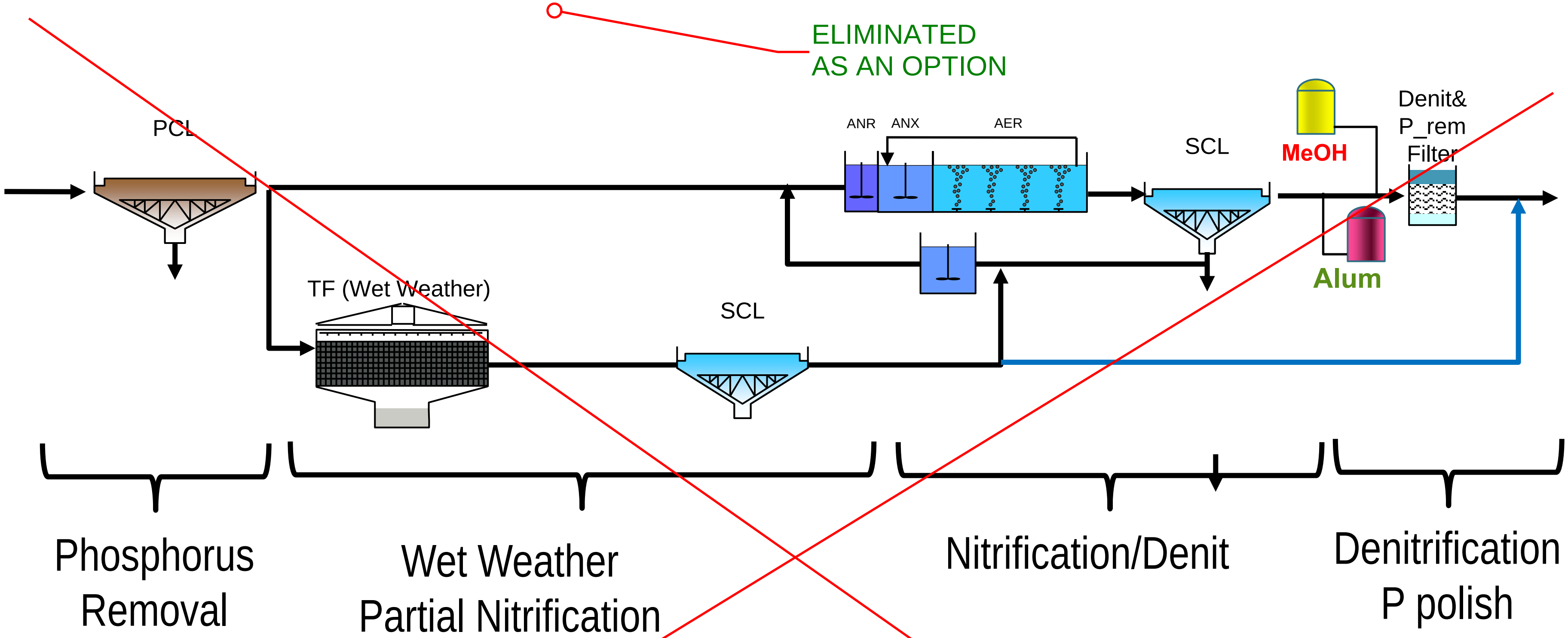
Trickling Filter Option – ~~Nitrify/Wet Weather~~

INDUSTRIAL APPLICATION ONLY



- ~~Integrate NTF into BNR and Wet Weather~~
  - ~~Use RAS DeOx basin to remove DO from NTF~~
- ~~Chemical P removal/CEPT~~
- ~~<u>Level 2:</u> Tertiary denitrification filter and P removal~~

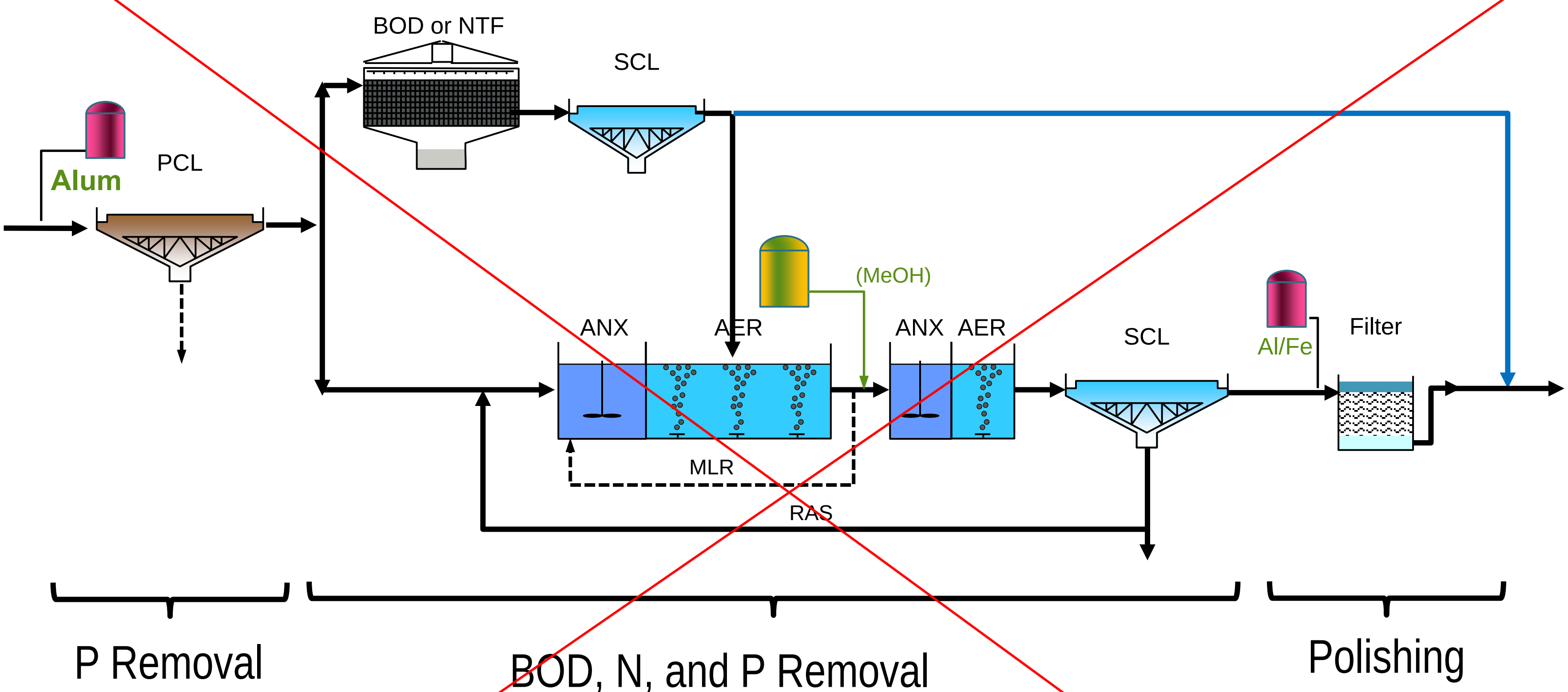
Trickling Filter Option – Nitrify-BioP/Wet Weather



- Integrate NTF into BNR and Wet Weather
    - Use RAS DeOx basin to remove DO from NTF
- EBPR
- <u>Level 2:</u> Tertiary denitrification filter and P removal

Blended Trickling Filter Activated Sludge Options - Parallel

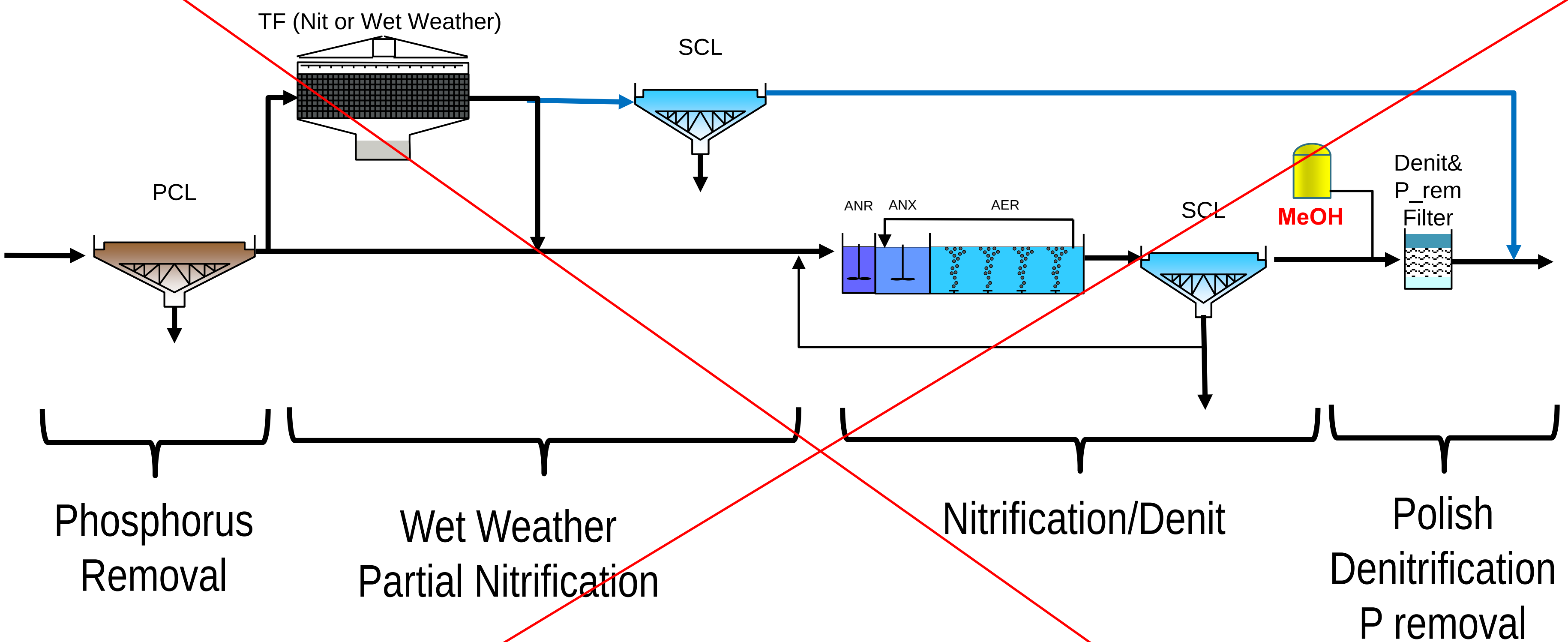
ELIMINATED
AS AN OPTION



- Split flow between TF and AS
    - TF in BOD mode or wet weather
- Chemical addition required/BioP mode also possible
- Fermenter may be required

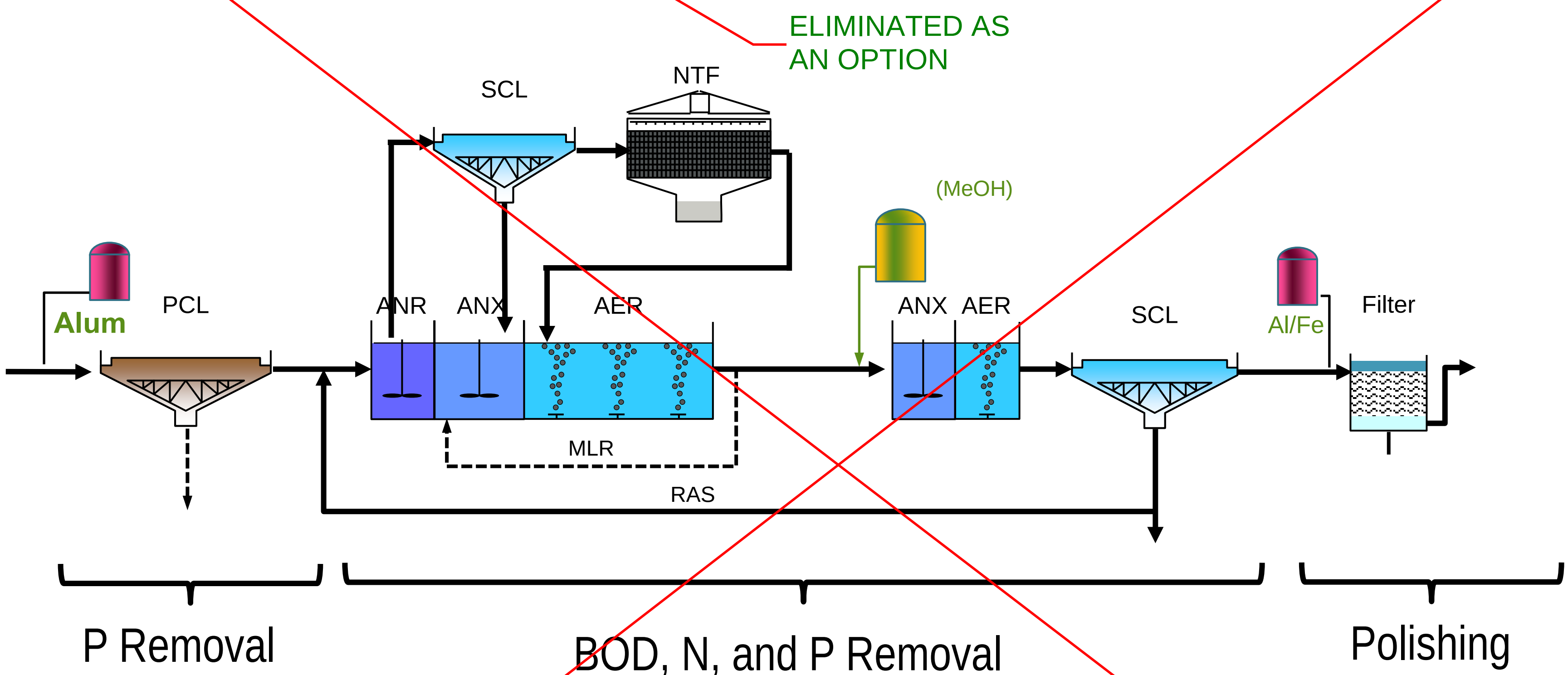
Trickling Filter Option – Nitrify-BioP/Wet Weather

ELIMINATED
AS AN OPTION



- Integrate TF into BNR and Wet Weather
- EBPR
- <u>Level 2:</u> Tertiary denitrification filter and P removal

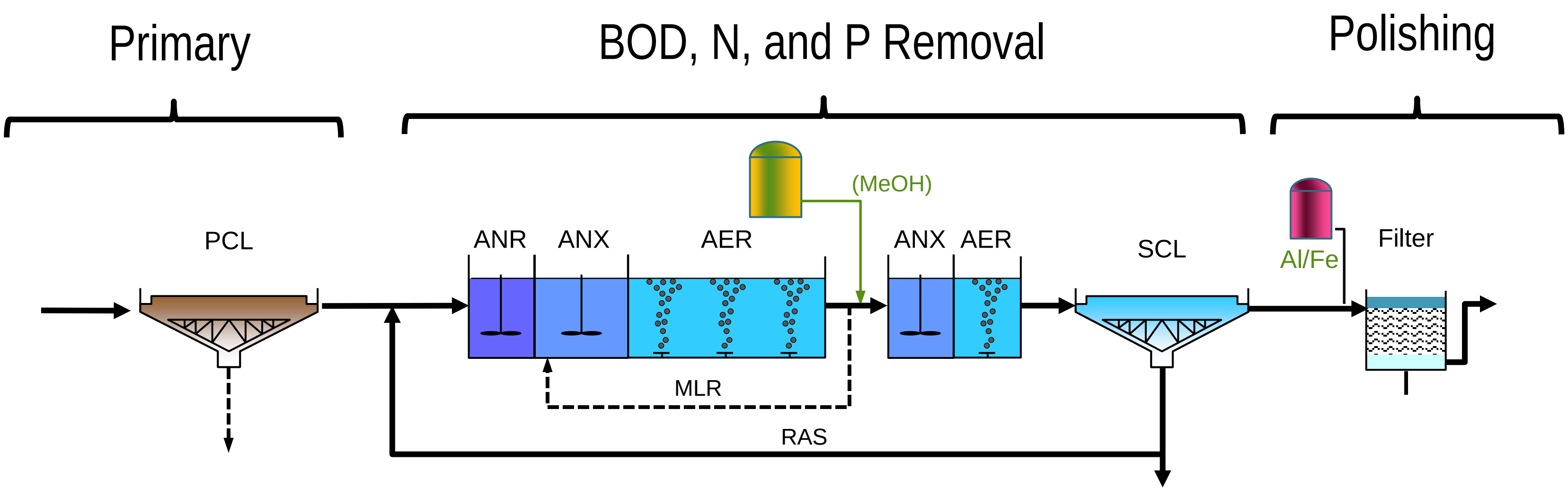
Blended Trickling Filter Activated Sludge Options – Integrated Option – Ashley Muller Process



- Integrate TF in AS flow scheme
- Chemical addition/fermenter may be required
- Not all TF's to be used
- Layout makes integration challenging
- <u>Level 2:</u> Second stage N removal; Effluent filter

Non Trickling Filter Option – Expand EBPR

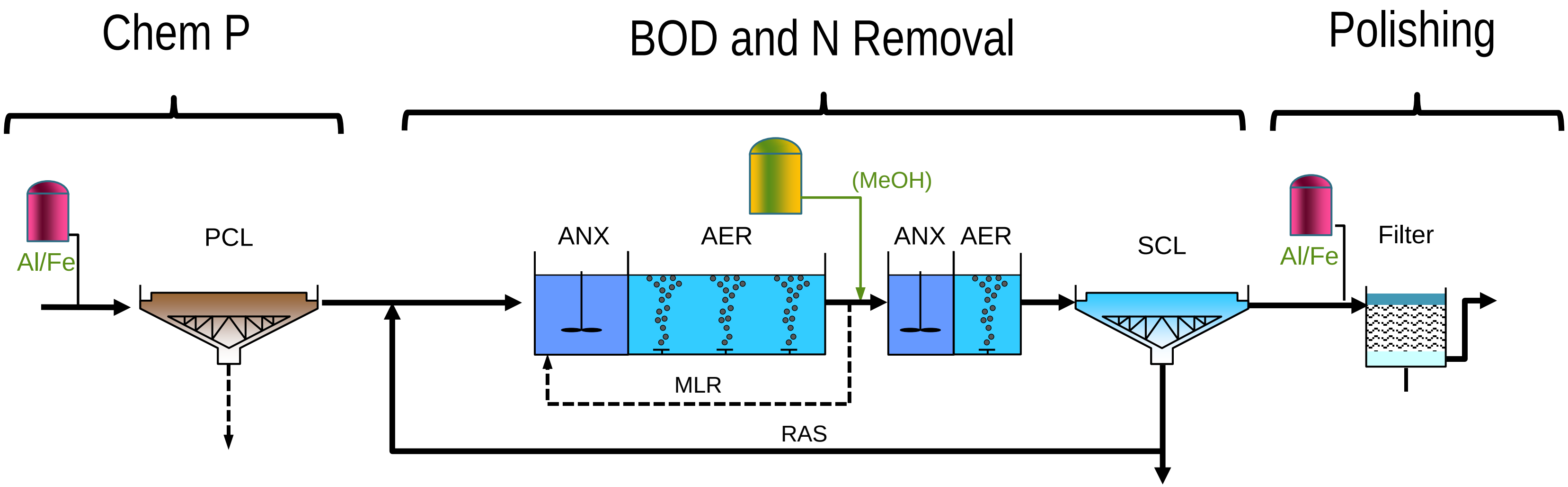
MAINTAIN AS AN OPTION WITH AND WITHOUT TREATMENT OF SIDE-STREAM



- Combined BOD, nitrogen, and phosphorus removal
- Chemical use lower
- All new facilities (reuse some existing structure)
- Chemical P removal in primary option remain
- <u>Level 2:</u> Second stage N removal; Effluent filter

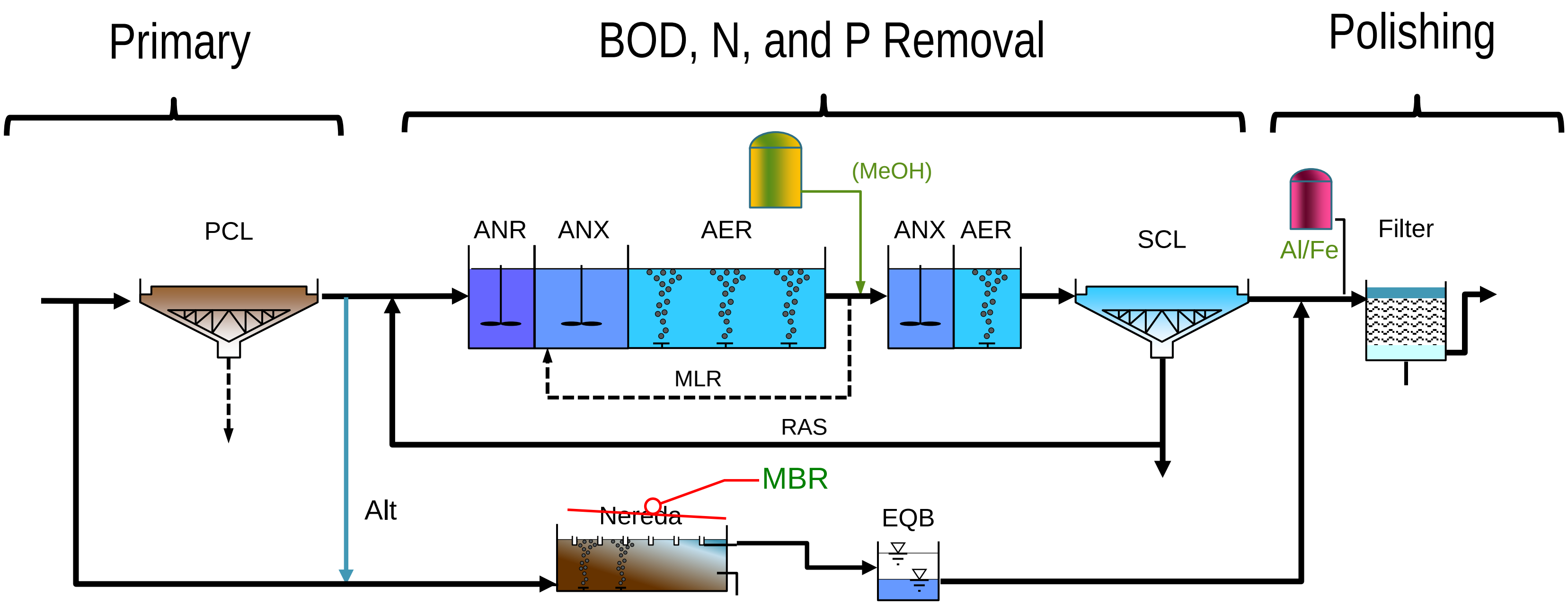
Non Trickling Filter Option – Expand ChemP

MAINTAIN AS AN OPTION WITH AND WITHOUT TREATMENT OF SIDE-STREAM



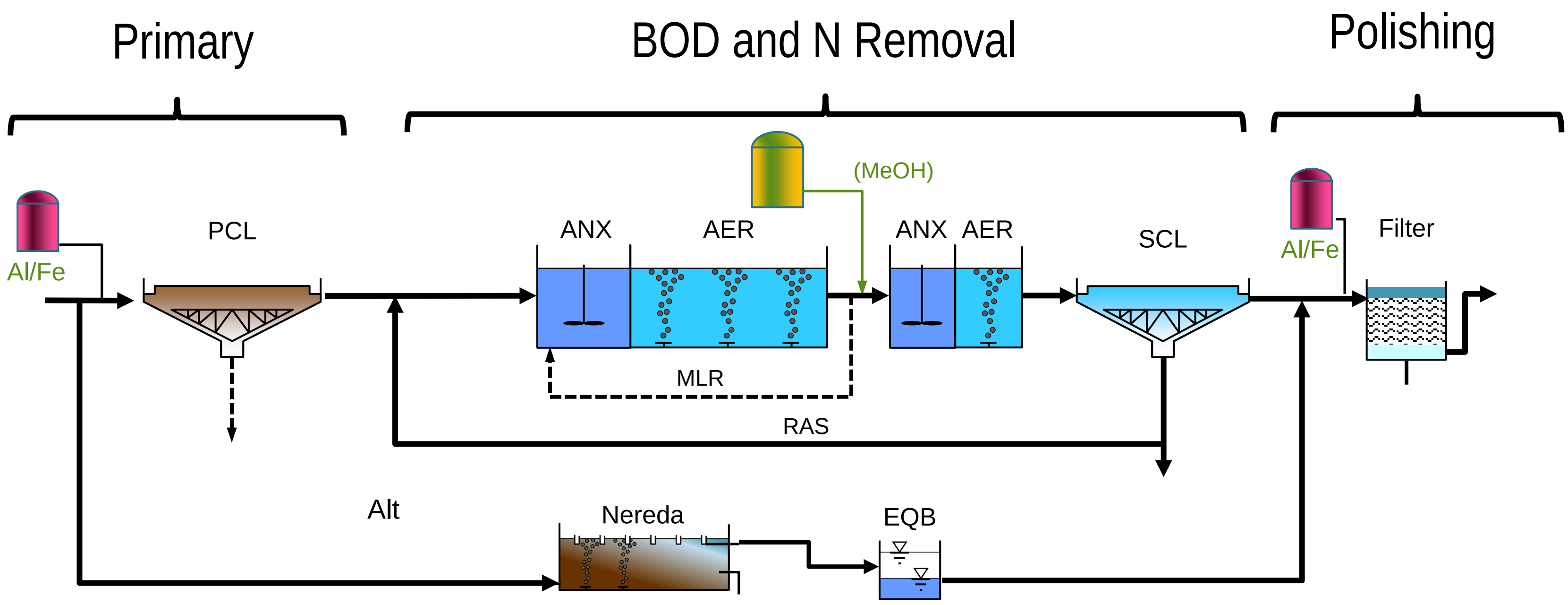
- Combined BOD, nitrogen, and phosphorus removal
- Chemical use higher – balance primary chem/BOD for denit
- All new facilities (reuse some existing structure)
- <u>Level 2:</u> Second stage N removal; Effluent filter

New Technology Option – EBPR



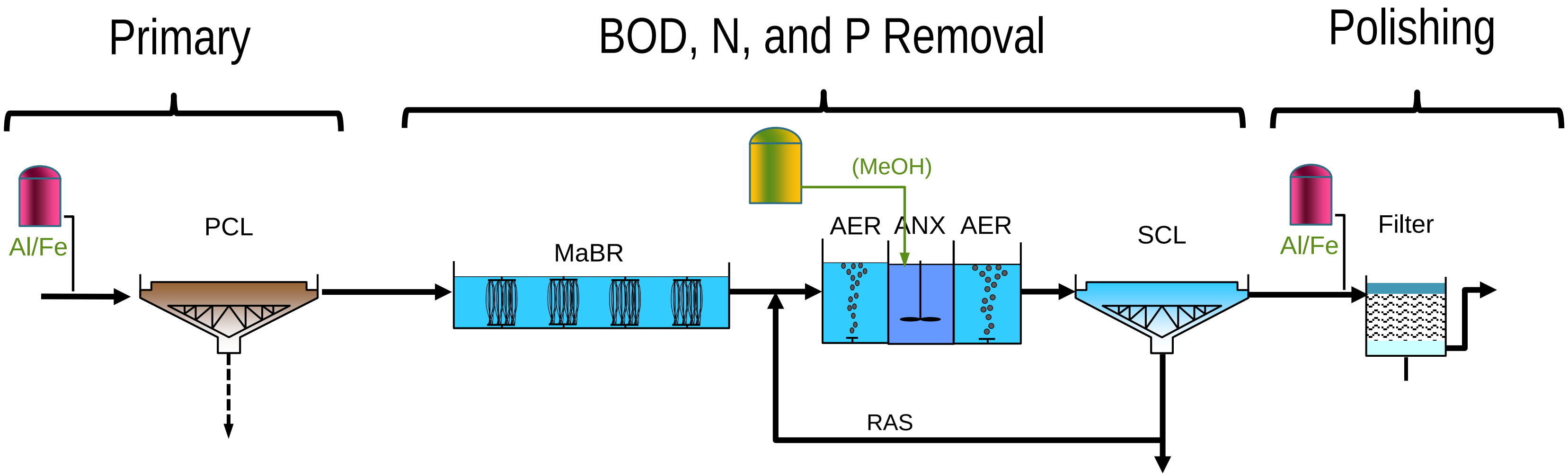
- Parallel new technology options: ~~Granular Sludge, MABR~~, MBR,
- Can retain TF for peak flow
- <u>Level 2:</u> Second stage N removal; Effluent filter

New Technology Option – Chem P



- Parallel new technology options: ~~Granular Sludge, MABR,~~ MBR,
- Can retain TF for peak flow
- <u>Level 2:</u> Second stage N removal; Effluent filter

New Technology Option – Replacement

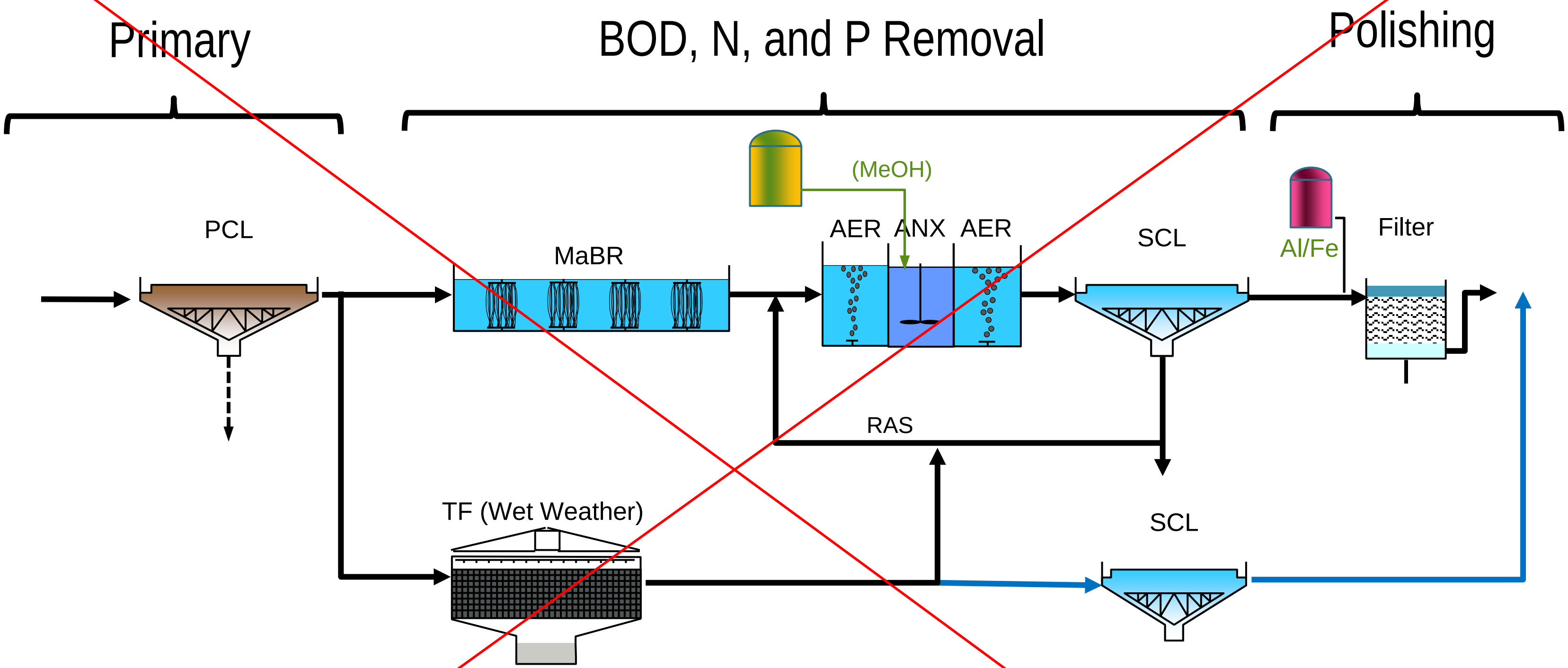


MBR

- Upgrade existing activated sludge with ~~new MABR~~ Technology
- Retrofit 3 or 6 of existing basins
- Energy savings can be achieved today
- Can retain TF for peak or BOD reduction
- <u>Level 2:</u> Tertiary Effluent filter

New Technology Option – Replacement with Wet Weather

ELIMINATED



- Upgrade existing activated sludge with new MABR Technology
- Retrofit 3 or 6 of existing basins
- Energy savings can be achieved today
- Retain TF for peak flow
- <u>Level 2:</u> Tertiary Effluent filter

Key Decision Points

CONTINUE TO UTILIZE AND PHASE OUT AS PART OF NUTRIENT PROJECT. AT THIS POINT CAPACITY COULD BE ALLOCATED TO INDUSTRY.

- What is the optimal Role of the Trickling filters?
- Approach to Phosphorus Removal
  - Chemical removal
  - Biological removal

EVALUATE BOTH -WILL DEPEND ON RATE OF RETURN OF PHOSPHORUS RECOVERY

- Wet weather/peak flow operation?

EQUALIZATION

- What are the phases for project implementation?

PHASE IN REGIONAL CUSTOMERS PER LOADING SLIDE.
AND PRELIMINARY DESIGN WILL BEGIN @ 2025 FOR NUTRIENTS

Process Options – Trickling Filter Options

FUTURE INDUSTRY

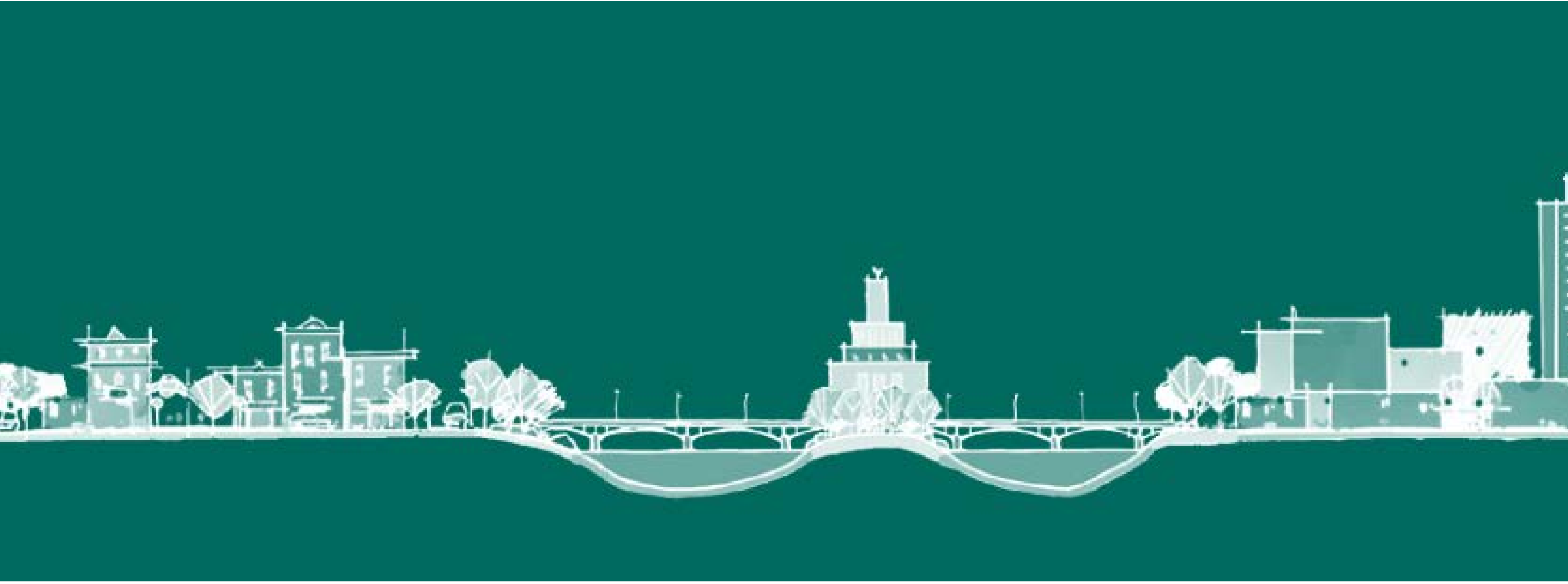
- BOD removal option
  - Effective for BOD reduction
  - Detrimental for nutrient reduction;
    - Result in need to add carbon – Methanol, MicroC, other
- Nitrify
  - Reduces loading treating PE – small flow
  - ~~Integrated with AS (Ashley Muller processes)~~
  - ~~Tertiary nitrification/denitrification~~
- Wet Weather treatment
  - Maintain TF for wet weather
    - Operate as nitrifying low rate process year round

ELIMINATED FROM ALTERNATIVES

Process Options – New/Emerging Technologies

- Modify existing AS to new modified higher rate. This can be:
  - ~~MABR~~
  - ~~IFAS~~

- Add new technology – in parallel or replace
  - ~~Granular Activated Sludge~~
  - ~~MABR (Membrane aerated bioreactor)~~
  - MBR
  - Other

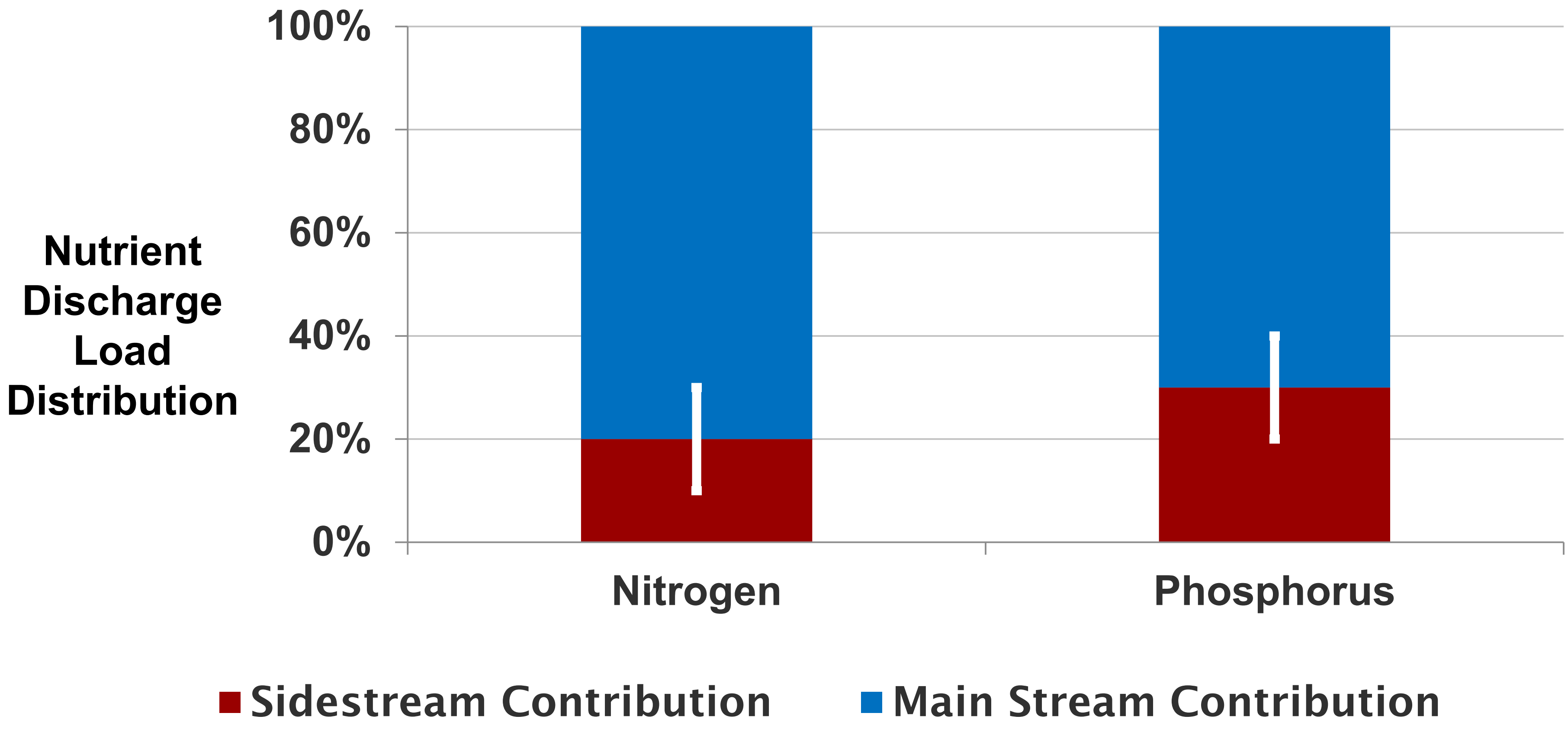


05 Solids Handling Discussion

Sidestream Characteristics

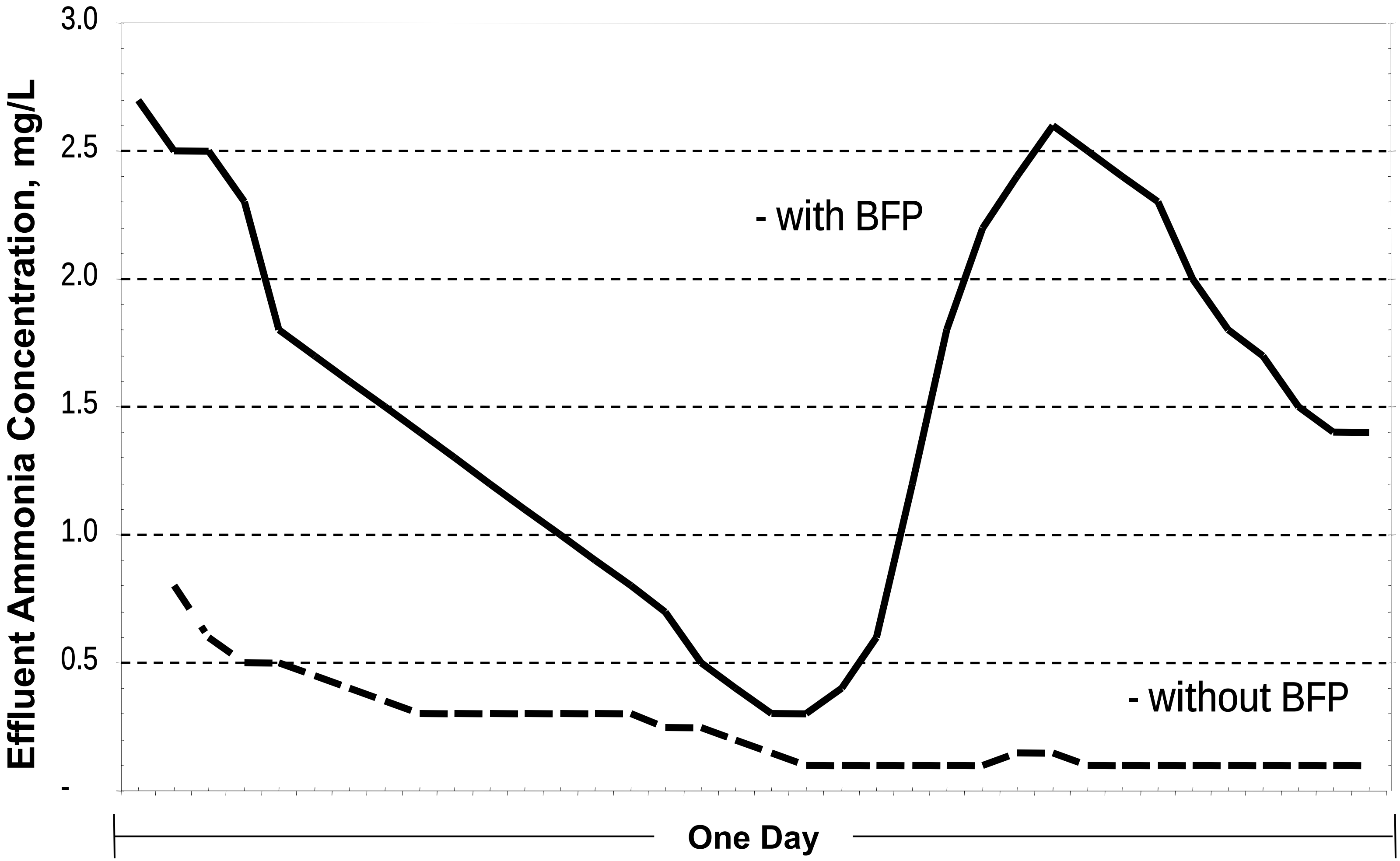
- Liquid stream from solids dewatering following anaerobic digestion
- High Nitrogen (750 – 2,500 mg N/L)
- High Phosphorus (50 – 500 mg P/L)
- Intermittent Flows common
  - Magnified with shift/intermittent operation
  - 3 d/wk; 5 hr/d = (7*24)/(3*5)
    = 11 times magnification
- Alkalinity: sufficient alkalinity to nitrify about 50% of the ammonia

Sidestream Contribution to Nutrient Loads



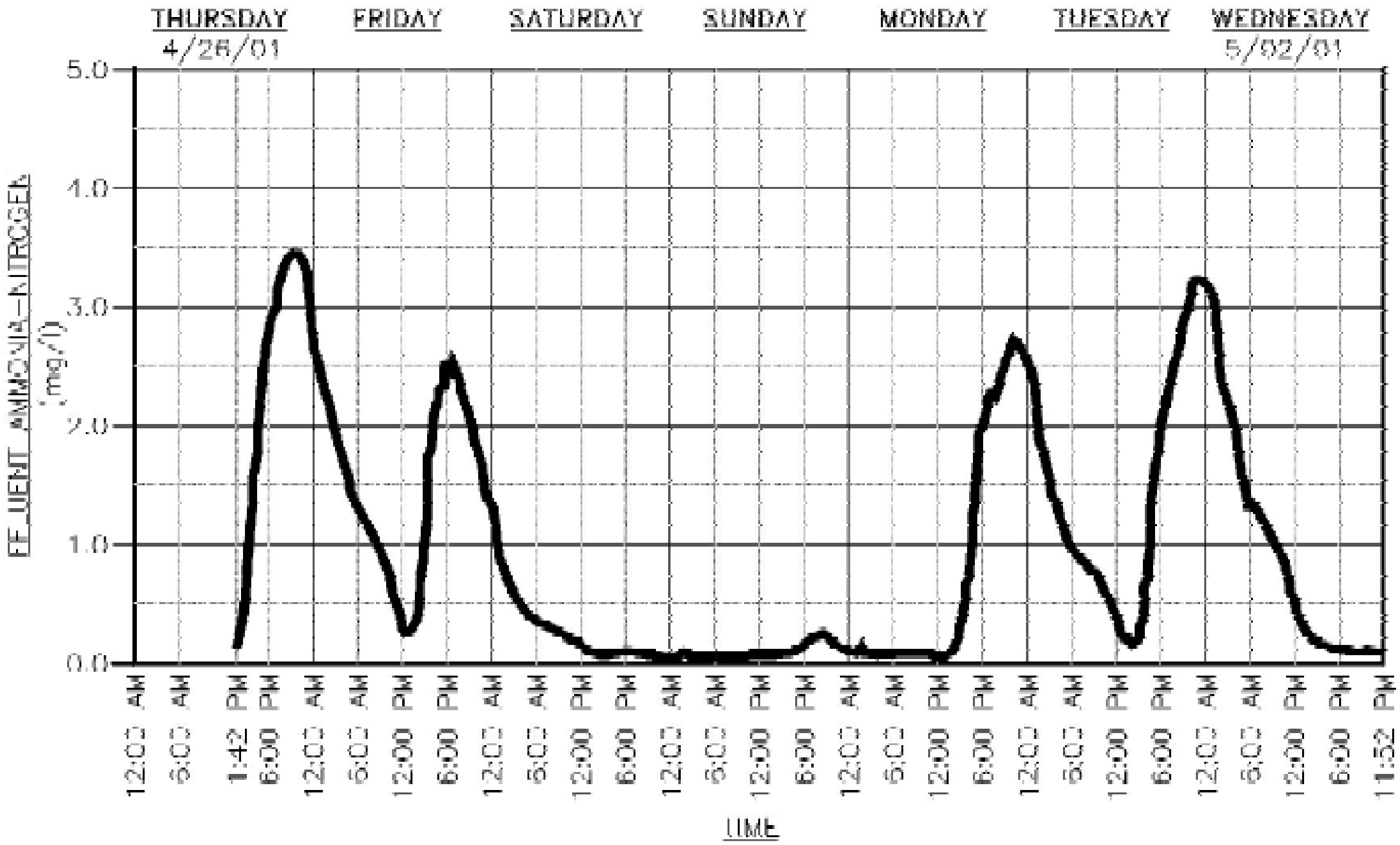
Solids from Satellite Treatment plant

Sidestreams Impact Effluent Ammonia



Measured Effluent Ammonia Demonstrates Challenge

Theresa Street WWTP, Lincoln, NE



Impact of Sidestream on Treatment Plant Performance

- Recycle streams impact process performance
  - Increase in N and P decrease the BOD/N and BOD/P ratio
  - Non-constant dewatering create slug loading

- Solids from Satellite plants magnify recycle impacts
  - Up to 39% of flow and biomass from Satellite
  - Lead to a 40% decrease in the BOD/N and BOD/P ratio
  - May require methanol addition in main stream process

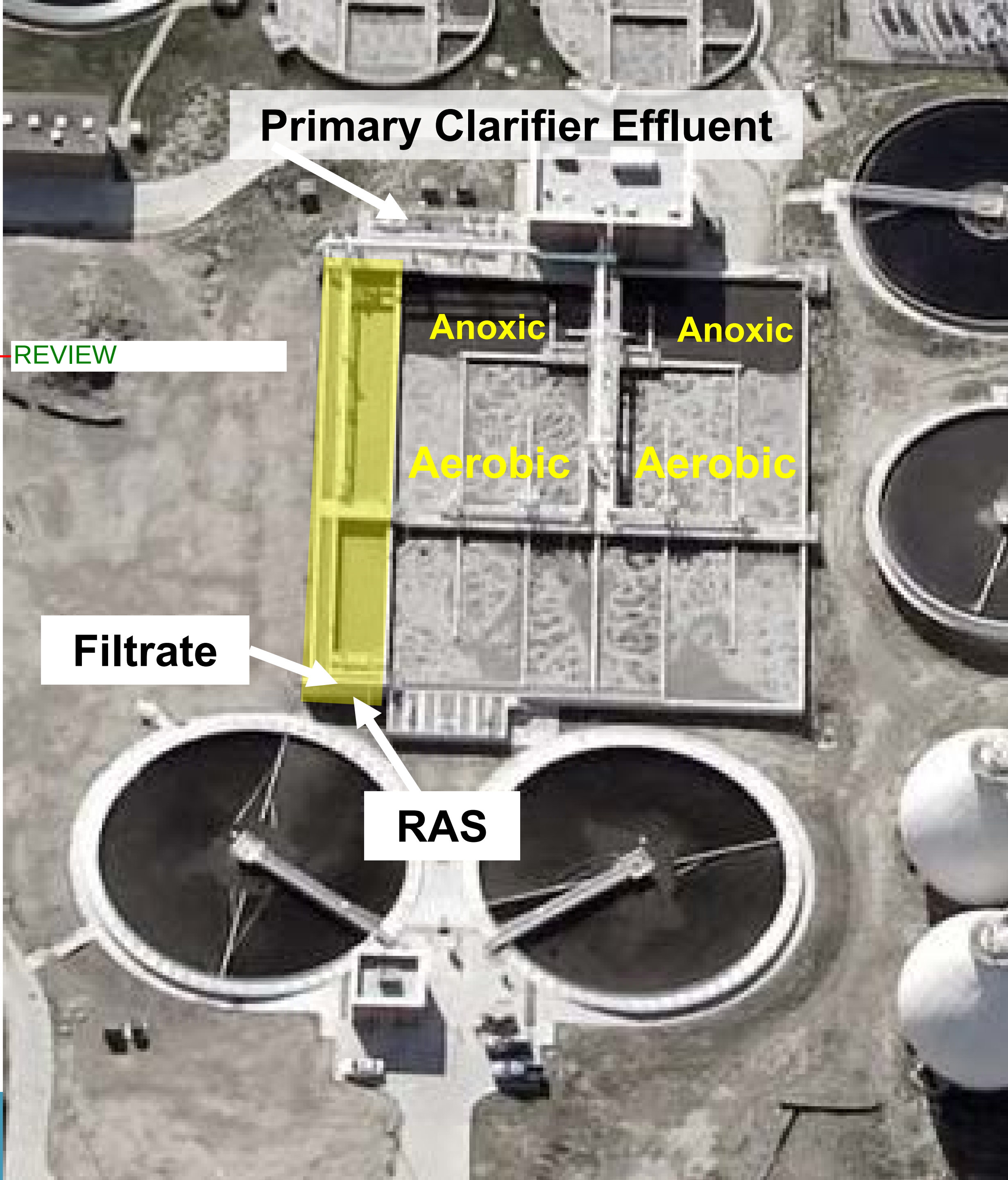
- Consider treating (managing) the sidestream directly

Sidestream Management Maximizes Use of Existing Facility

- Equalize
- Treat with Liquid Stream
- Separate Ammonia Treatment Facility
  - o Dedicated Plant
- Innovative Technologies
  - o Sharon/Anammox/CANDO/ BioZeolite
- Nutrient Recovery
  - o Crystallization
  - o Stripping/recovery

REVIEW

Theresa Street WWTP, Lincoln, NE



Deammonification Overview

Partial nitritation by AOB

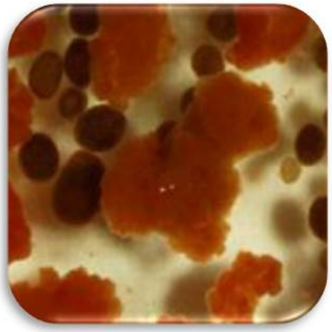
$$NH_4^+ + 1.5O_2 \rightarrow NO_2^- + H_2O + 2H^+$$

Anaerobic oxidation of NH_4^+ by anammox bacteria

$$NH_4^+ + NO_2^- \rightarrow N_{2(g)} + 2H_2O$$

Anammox bacteria

- Autotrophic, anaerobic
- Slow growing; 11 day doubling time at 30 - 35^{o}C



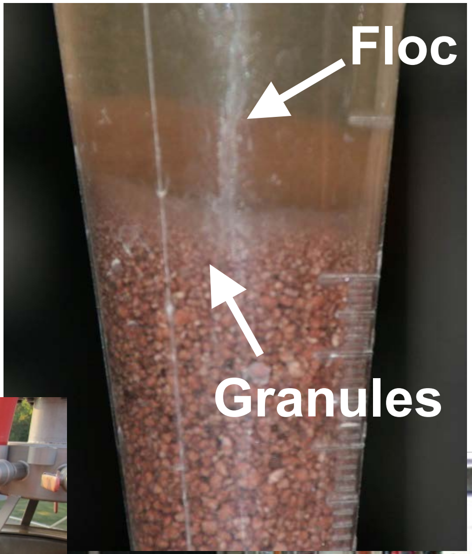
- Aggregate into granulated mass
- DO (non-detect)
- pH (neutral range)
- Nitrite (maintain < 40 mg/L)

Deammonification Process Control

REVIEW FOR APPLICABILITY

- Process essentials
  - Manage anaerobic & aerobic SRTs
  - Suppress NOB growth
  - Maintain alkalinity for AOB
- Control options
  - DO control
  - pH control (i.e. DEMON®)
  - Temperature
  - Free Ammonia
- Seed reactor to accelerate startup
- Achieves 90 - 95% NH_4^+ removal and 80 - 85% TN removal

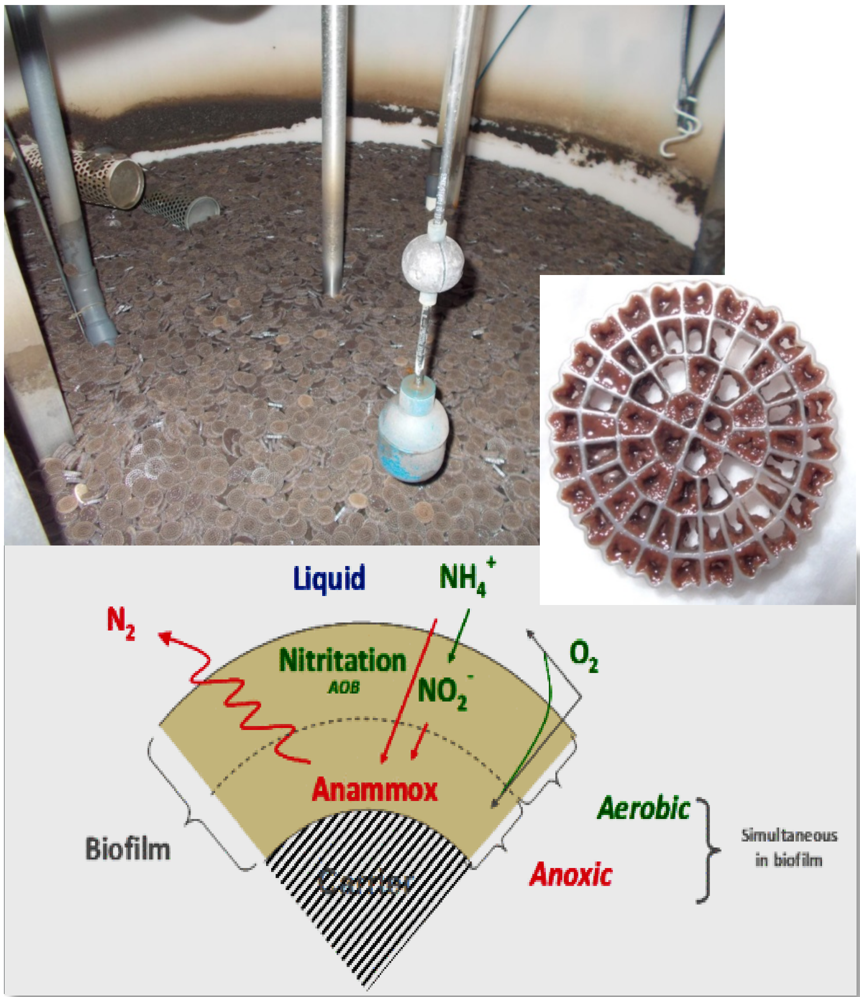
DEMON® Hydrocyclone



DEMON® Reactor at Strass WWTP

Deammonification Technologies

Attached Growth



Courtesy of AnoxKaldnes

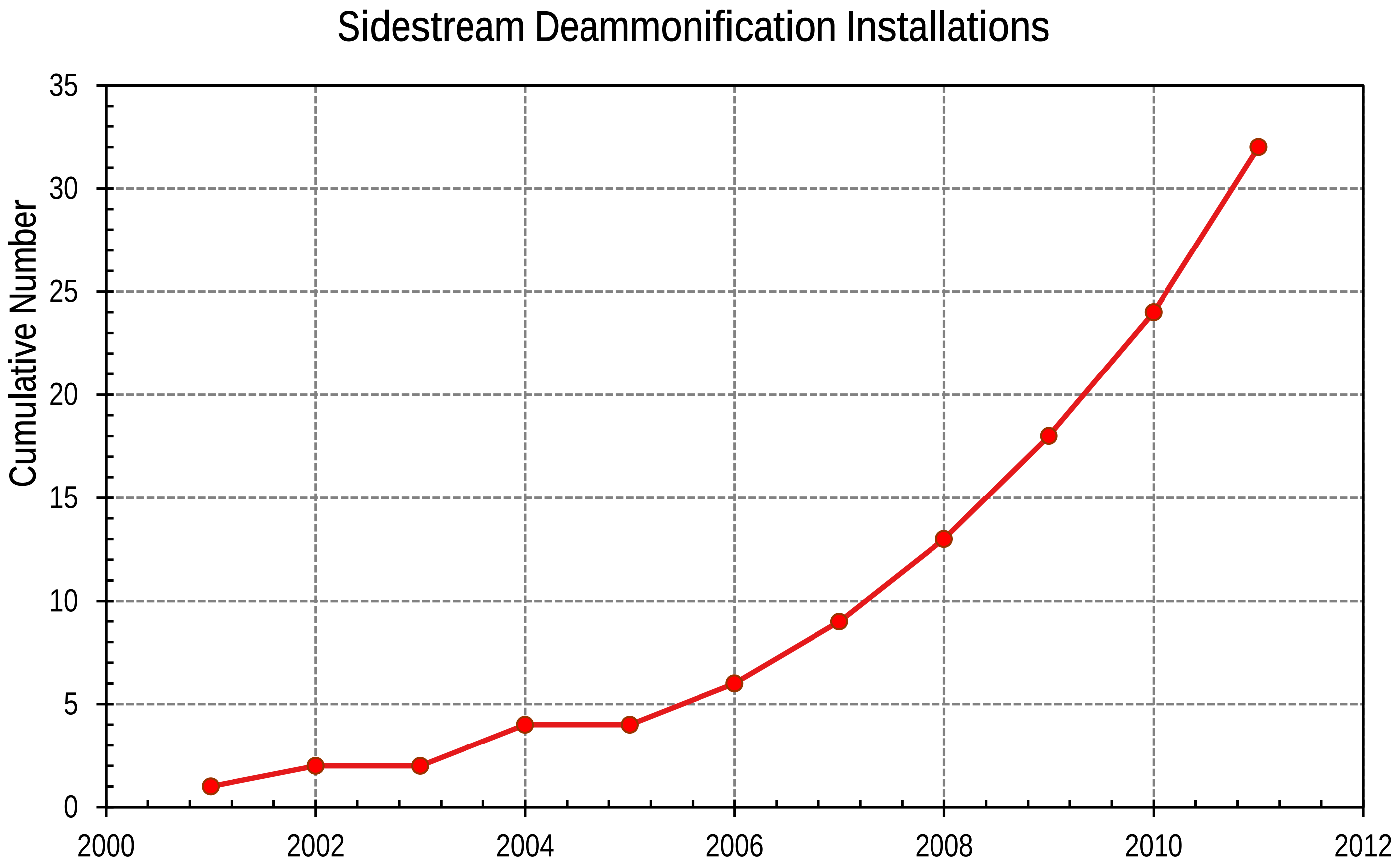
Suspended Growth

DEMON® hydrocyclone at HRSD York River

Granular

Rotterdam, Netherlands

Deammonification Installation Growth over 10 years



DETERMINE RATE
OF RETURN ON
INVESTMENT

Startup of the First Commercial Phosphorus Recycling Facility in the US at Durham AWWTP

CWEA 2010

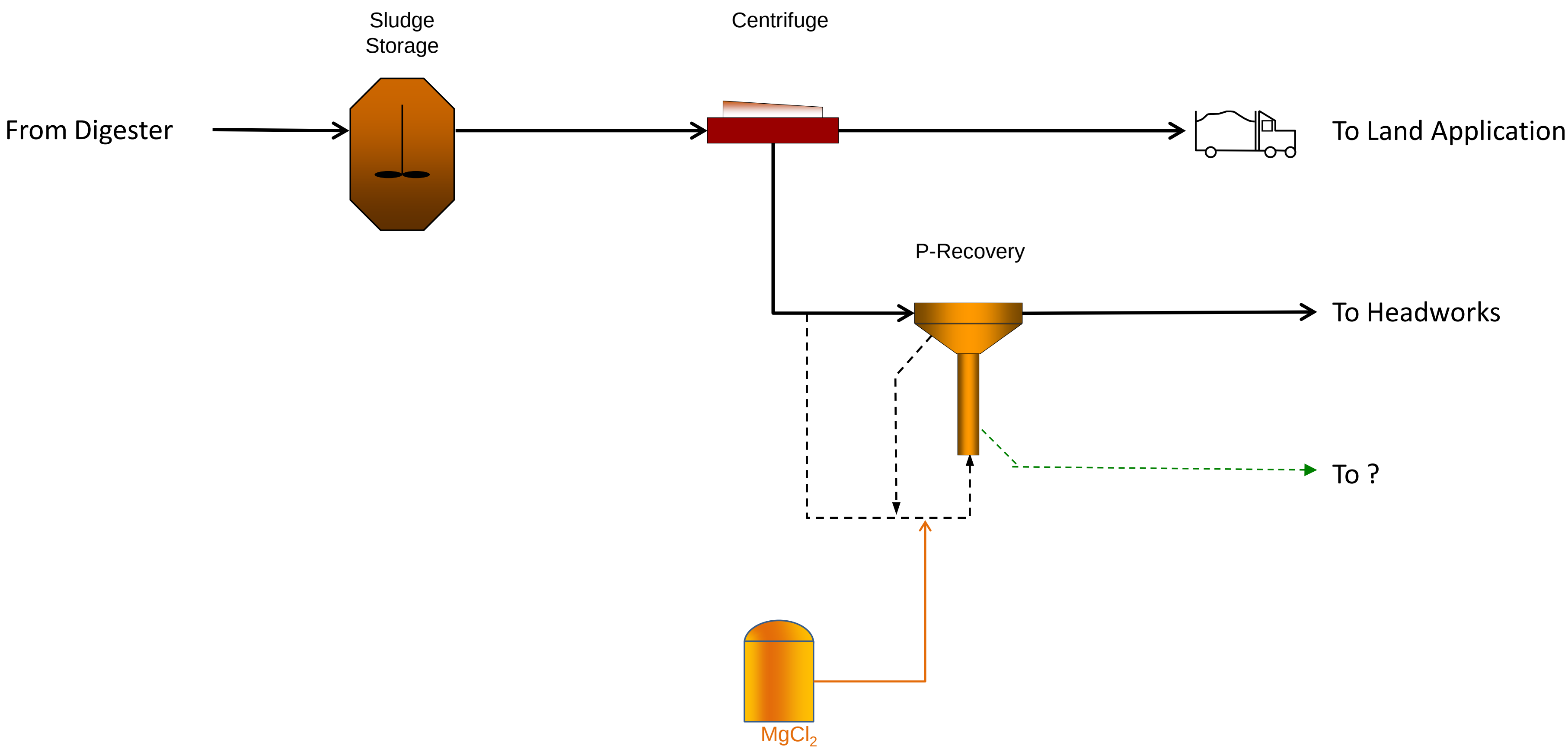
Mario Benisch PE, HDR Portland, OR

OSTARA
NUTRIENT RECOVERY TECHNOLOGIES INC.

HDR

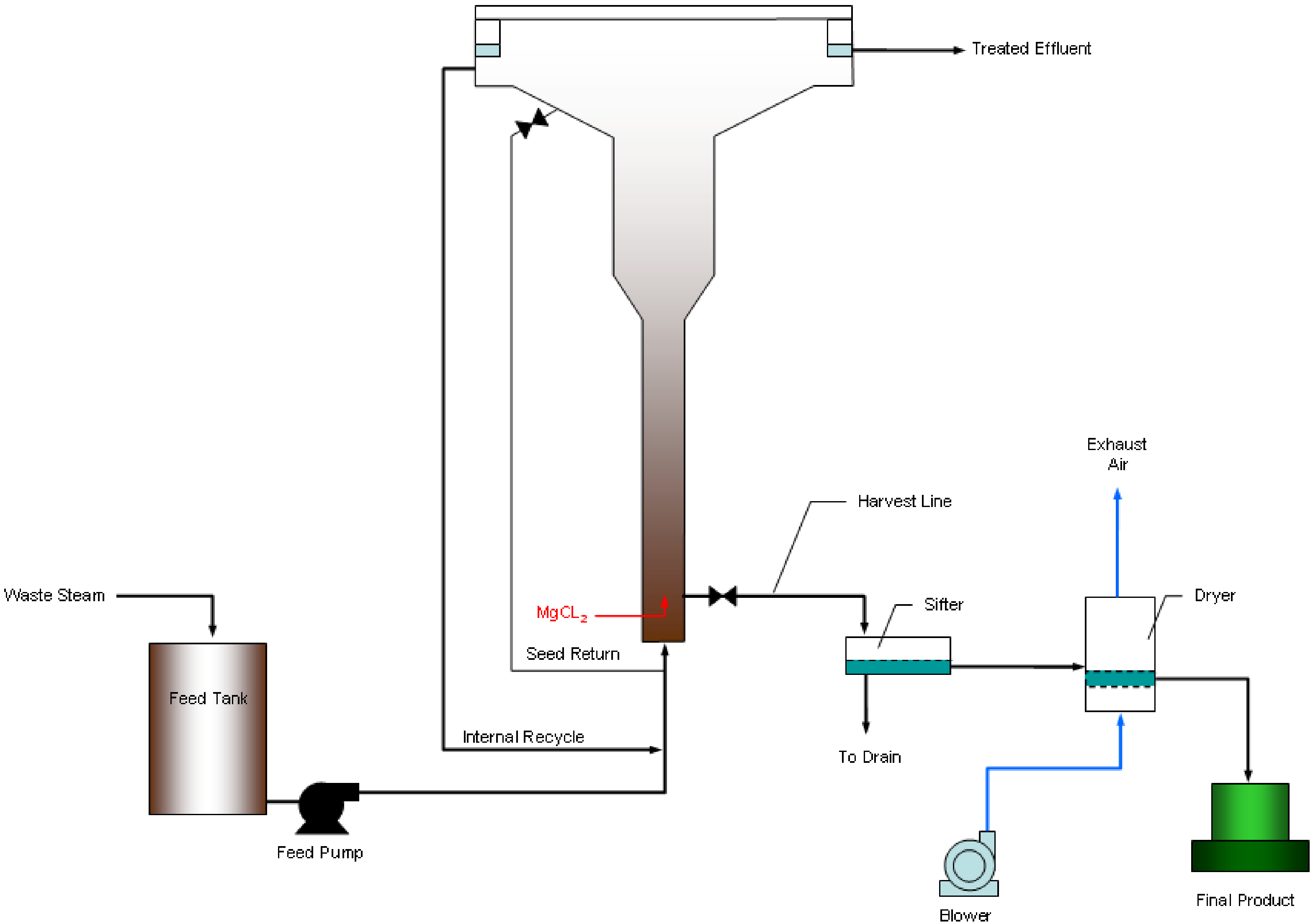
Clean Water Services

Centrate Recovery Process



P-Recovery

The Basics



Recovery From Centrate

Ostara - Pearl

DHV - Crystallactor

Paques - Phospaq

MFH

P-Recovery

Startup and Performance

P-Recovery

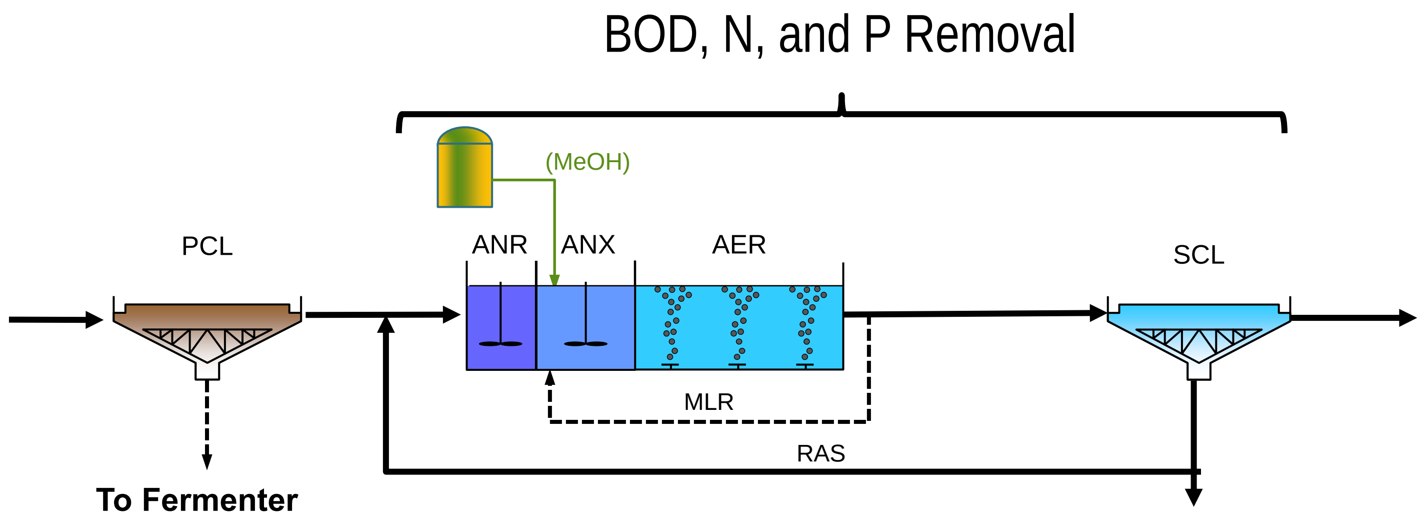
Startup and Performance

Trickling Filter Option

- Rehabilitate and replace media in all trickling filters
- Add tertiary filtration with methanol for denitrification
- Chemical phosphorus removal option required

BNR – Activated Sludge Level One (10 TN / 1 TP)

REVIEW FURTHER



- Combined BOD, nitrogen, and phosphorus removal
- Chemical use lower
- All new facilities (reuse some existing structures)
- Activated sludge options: Conventional, IFAS, MBR, MLE/Step/A2O/Bardenpho
- Chemical P removal in primary option remain

CITY OF SIOUX FALLS COLLECTION SYSTEM MASTER PLAN				
AGREEMENT: 16-3038			**MEETING DATE:**	
PROJECT/CIP: 23016			**Loading & Process Screening Workshop - 6/14/2016**	

Attended Meeting	CITY OF SIOUX FALLS CONTACT	ROLE	EMAIL ADDRESS	PHONE NUMBER
x	Ryan Johnson	Principal Engineer	rjohnson@siouxfalls.org	(605) 367-8641
x	Trent Lubbers	Long Range Planning Alternatives Programming	tlubbers@siouxfalls.org	(605) 367-8698
x	Mark Perry	WRF Superintendent	mperry@siouxfalls.org	(605) 367-8191 (605) 367-8188
x	Mark Hierholzer	WRF Operations	mhierholzer@siouxfalls.org	(605) 367-8193
x	Jesse Neyens	Industrial Pretreatment	jneyens@siouxfalls.org	
x	Philip Greenwood	Biosolids Coordinator	pgreenwood@siouxfalls.org	(605) 680-1431

	HDR CONTACT	ROLE	EMAIL ADDRESS	PHONE NUMBER
x	Dan Graber	Project Manager CIP and Master Plan Documentation	dan.graber@hdrinc.com	(605) 977-7767
x	JB Neethling	Process Evaluation	jb.neethling@hdrinc.com	(916) 871-4830
x	DelRon Peters	Process Evaluation Pump Station Assessment: Current Cost Estimation	delron.peters@hdrinc.com	(605) 977-7745

Appendix 7.B – Eastside Sanitary Sewer System Treatment, Pump Station and Force Main Evaluation

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

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1. Introduction

The 2002 City of Sioux Falls Sanitary Sewer Collection System Facilities Plan recommended the construction of the East Side Sanitary Sewer System (ESSS). The ESSS recommendation included a gravity system and a pump station with force main.

In 2004, a study was conducted to determine how to accommodate flows from the Eastside Sanitary Sewer System (ESSS). At that time, it was decided to construct a pump station (Pump Station 240) to initially pump wastewater to the Water Reclamation Facility (WRF) for treatment. It was decided that when the flows exceeded the capacity of the pump station, a satellite wastewater treatment facility (WWTF) (membrane bioreactor - MBR) would be constructed at the Pump Station 240 site. The wastewater would be treated at the new satellite WWTF with the treated water discharged to the Big Sioux River adjacent to the site. Biosolids generated by the MBR would be conveyed to the WRF for further treatment using the original Pump Station 240 pumps and force main.

This study was conducted to reevaluate current forcemain options that could be used to convey wastewater from Pump Station 240 to the existing WRF for treatment in lieu of constructing and treating at a satellite MBR plant once the capacity of Pump Station 240 is exceeded.

2. Flow Assumptions

The flows used for this evaluation were obtained from the City of Sioux Falls 2016 Master Plan. Flows are included for communities near Sioux Falls to account for regionalization. Table 1 contains a summary of the master plan projected flows that will enter Pump Station 240 in the years 2026 and 2036.

Table 1: Projected ESSS Flows Entering Pump Station 240 (MGD)

	2026 Projected Flows				2036 Projected Flows			
	Average Day	Max Month	Peak Day	Peak Hour	Average Day	Max Month	Peak Day	Peak Hour
Sioux Falls – Eastside	3.6	5.2	9.1	10.0	5.6	8.2	14.3	15.7
City of Harrisburg	0.8	0.9	1.1	2.1	1.1	1.3	1.7	3.1
City of Tea	1.0	1.2	1.5	2.8	1.4	1.7	2.2	4.0
City of Canton	0.0	0.0	0.0	0.0	0.4	0.4	0.5	1.0
City of Worthing	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.6
Total	5.4	7.4	11.8	15.0	8.8	12.0	19.0	24.5

It is expected that the cities of Harrisburg and Tea will connect to the City of Sioux Falls ESSS in 2021. The City of Canton is expected to connect in 2031, followed by the City of Worthing in 2036. A key assumption is that in accordance with the 2016 Master Plan, peak flows from regional customers will be limited to 1.5-times average day flow.

As shown in the table, the total peak hour of the wet-weather flow arriving at the Pump Station 240 is equal to 24.5 mgd.

3. Summary of Options

Two main options were evaluated.

- Option 1 involves building an MBR at the Pump Station 240 site as proposed in the Siting Study. Wastewater collected at Pump Station 240 would be treated in the MBR and discharged directly to the Big Sioux River adjacent to the pump station. New lift pumps would be installed in Pump Station 240 as a part of this option to feed the MBR. The existing pumps and 16-inch diameter force main would be used to convey solids generated by the MBR to the Water Reclamation Facility for treatment.

- Option 2 involves the construction of a new force main between Pump Station 240 and the existing Water Reclamation Facility (WRF). New pumps would be installed in Pump Station 240 and an equalization basin would be constructed adjacent to the pump station as part of this option. The WRF would be expanded to accommodate the future flows under this option. Option 2 was analyzed in two parts. First, an evaluation was conducted to determine the optimal force main diameter and required flow equalization basin sizing. Secondly, an analysis was conducted to determine the most effective alignment between Pump Station 240 and the WRF. The following is a summary of these two evaluations.

4. Option 2 Force Main Sizing Analysis:

Four (4) forcemain pipe diameter combinations were analyzed for adding capacity in addition to the existing 16-inch force main. The force main diameter alternatives evaluated include the following: 2A) one 24-inch force main, 2B) one 30-inch force main, 2C) one 36-inch force main or 2D) both a 24-inch and 30-inch force main routed together in parallel. The following Table 2 summarizes the capacities of each of these options. The minimum capacities are based on a minimum velocity of 2 ft/sec in order to keep solids in suspension. The maximum capacity is based on a maximum velocity of 4.5 ft/sec. In force mains of this length and static lift, power costs become excessive at velocities exceeding 4.5 ft/sec due to friction losses.

Table 2: Capacity of Each Force Main Size

Option	Sizing	Existing 16-inch force main capacity	Minimum Flow to WRF (2 ft/sec velocity)			Maximum Flow to WRF (4.5 ft/sec velocity)		
			New first force main in use	New second force main in use	All force mains in use	New first force main in use	New second force main in use	All force mains in use
		MGD	MGD	MGD	MGD	MGD	MGD	MGD
2A	One 24-inch diameter force main	3.5	4.35	NA	7.84	9.75	NA	13.24
2B **(Selected)**	One 30-inch diameter force main	3.5	6.75	NA	10.24	15.15	NA	18.64
2C	One 36-inch diameter force main	3.5	9.7	NA	13.19	21.85	NA	25.34
2D	One 24-inch & one 30-inch diameter force main	3.5	4.35	6.75	14.59	9.75	15.15	28.39

The Option 2A combination of a new 24-inch force main with the existing 16-inch force main has a maximum capacity of 13.2 MGD. This is less than the projected 2036 peak hour flow of 24.5 MGD. Therefore, equalization is required for this option. Similarly, equalization is required for the 30-inch diameter force main option 2B, since the combined capacity of the 30-inch and existing 16-inch force mains is 18.6 MGD, which is less than the required capacity of 24.5 MGD.

Equalization basin sizing for each pipe size option was based on the following projected 2036 hydrograph flow assumptions:

- Day 1: Constant average wet-weather flow from all regionalized communities (8.8 MGD total flow).
- Day 2: 24-hour peak wet-weather flow of 19.0 MGD.
- Days 3-4: Constant average wet-weather flow from all regionalized communities (8.8 MGD total flow).

It was also assumed that the existing 16-inch force main would convey 3.5 MGD during the duration of the storm event. The remainder of the flow would be conveyed by the new force main.

Table 3 summarizes the required equalization basin volumes for each force main size option.

Table 3: Equalization Basin Volumes Required for Each Force Main Size Option

Option	Equalization Volume Required at PS 240	
2A	One 24-inch diameter force main	6.0 MG
2B	One 30-inch diameter force main	1.0 MG
2C	One 36-inch diameter force main	0.0 MG
2D	One 24-inch and one 30-inch diameter force main	0.0 MG

An economic analysis was conducted to compare the force main size options combined with the required equalization.

Table 4 contains a cost comparison of the four force main options. A common alignment similar to the current Pump Station 240 force main alignment was assumed for each force main size option to provide an apples-to-apples comparison for this analysis. The table contains estimated costs for both a 20-year and 50-year present worth analysis. For the 20-year cost analysis, an average day flow of 5.4 MGD was assumed, which is the projected 2026 average day flow. For the 50-year cost analysis, an average day flow of 10.0 MGD was assumed, which is the projected 2040 average day flow.

All present worth costs presented in Table 4 were calculated at an interest rate of 3.5% and at an electricity cost of $0.07/kW-hr based on information from the utilities.

The costs presented in Table 4 are for force main diameter comparison purposes only and do not represent project costs (contingency, engineering, etc. are not included).

The One 24-Inch Force Main Option 2A 50-year present worth analysis was conducted assuming that both the existing 16-inch force main and future 24-inch force main are in use simultaneously at a combined average day flow rate of 16.7 MGD. This assumption was made because a single 24-inch pipe cannot accommodate 16.7 MGD without exceeding the maximum velocity of 4.5 ft/sec. All other present worth cost analyses were conducted assuming that only the new force main or force mains will be service.

Table 4: Force Main Size Cost Comparison

Parameter		Option 2A. One 24-inch force main	Option 2B. One 30-inch force main	Option 2C. One 36-inch force main	Option 2D. One 24-inch force main and one 30-inch force main
Equalization basin cost		$10,000,000	$2,400,000	$0	$0
Equalization basin pump station cost		$500,000	$250,000	$0	$0
Pump cost		$800,000	$800,000	$800,000	$800,000
Additional electrical equipment cost		$150,000	$210,000	$290,000	$165,000
Standby generator cost		$600,000	$840,000	$1,140,000	$660,000
Pipe installation costs ($/ft)		290	350	410	560
Pipe installation costs		$13,800,000	$16,600,000	$19,400,000	$26,600,000
Preliminary construction capital cost		$25,900,000	$21,100,000	$21,600,000	$28,200,000
20-year analysis: 5.5 MGD Average Day Flow	TDH (ft) at 5.4 MGD, Alignment 6	296	265	255	256
	Energy usage (kW-hr/day)	6,600	5,900	5,700	5,700
	Energy usage (kW-hr/yr.)	2,400,000	2,200,000	2,100,000	2,100,000
	Energy cost ($/yr.)	$170,000	$150,000	$150,000	$150,000
	20-year present worth power cost	$2,400,000	$2,100,000	$2,100,000	$2,100,000
	20-year present worth capital costs and power costs	$28,300,000	$23,200,000	$23,700,000	$30,300,000
	Equivalent annual 20-year cost for capital costs and power costs	$2,000,000	$1,600,000	$1,700,000	$2,100,000
50-year analysis: 10.0 MGD Average Day Flow	TDH (ft) @ 10.0 MGD, Align. # 6	335	300	270	271
	Energy usage (kW-hr/day)	13,900	12,400	11,100	11,200
	Energy usage (kW-hr/yr.)	5,100,000	4,500,000	4,100,000	4,100,000
	Energy cost ($/yr.)	350,000	320,000	280,000	290,000
	50-year present worth power cost	$8,200,000	$7,500,000	$6,600,000	$6,800,000
	50-year present worth capital costs and power costs	$34,100,000	$28,600,000	$28,200,000	$35,000,000
	Equivalent annual 50-year cost for capital costs and power costs	$1,500,000	$1,200,000	$1,200,000	$1,500,000

The maximum combined capacity of the existing 16-inch force main and a future 24-inch force main is 13.24 MGD at a maximum velocity of 4.5 ft/sec. Therefore, the one 24-Inch Force Main Option 2A does not have the capacity to accommodate the 50-year present worth average day flow of 15.5 MGD. The 50-year present worth analysis was still conducted at 15.5 MGD average day flow, therefore, the force main velocities are higher under this scenario than in the other present worth comparisons.

As shown in Table 4, the pipe diameter options with the lowest 20-year present worth costs are a single 30-inch and a single 36-inch at $23.2 million and $23.7 million, respectively. The 30-inch and 36-inch force main diameters also have the lowest present worth when analyzed over a 50-year cycle. The 30-inch diameter option and the 36-inch diameter option have a 50-year present worth value of $28.6 and $28.2 million, respectively.

The following is a summary of the advantages and disadvantages of each option.

4.1 2A) One 24-inch Diameter FM

Advantages

- Lowest force main cost.
- There is a relatively small flow range that is not covered under this scenario (3.5 MGD to 4.35 MGD). This range can be covered by a minor amount of pump cycling.
- There is an opportunity to phase the construction of this option. The equalization portion of the cost could be delayed to a later date when the flows increase to the point that the basin is required.

Disadvantages

- Highest 50-year present worth cost.
- A 6 million gallon equalization basin with equalization pump station is required at Pump Station 240, additional operation and maintenance requirements.
- Least capacity of the force main diameter options (13.2 MGD).
- Highest annual power cost due to higher head losses in piping.
- The capacity of the force main will limit future growth.

4.2 2B) One 30-inch Diameter FM

Advantages

- Lowest initial capital cost and present worth cost, similar to the 36-inch diameter option.
- Pipe installation and present worth cost isn’t significantly higher than the 24-inch diameter option.
- There is an opportunity to phase the EQ construction portion of this option.

Disadvantages

- A 1 million gallon equalization basin is required at Pump Station 240.

- The required velocity between 3.5 MGD and 6.5 MGD is not covered under this scenario. For flows within this range, the pump station pump may need to cycle on and off with only the new 30-inch force main in use to maintain the required minimum velocity.

4.3 2C) One 36-inch Diameter FM

Advantages

- An equalization basin is not required at Pump Station 240.
- Higher maximum capacity than the 24-inch diameter and 30-inch diameter options (25.3 MGD).
- Present worth cost not significantly higher than the 30-inch option.
- Power costs not significantly higher than the 30-inch option.

Disadvantages

- The required velocity between 3.5 MGD and 9.7 MGD is not covered under this scenario. For flows within this range, the pump station may need to cycle on and off with only the new 36-inch force main in use to maintain the required minimum velocity.
- The pipe installation costs are approximately $3 million higher than the 30-inch force main alternative.
- This option cannot be phased or broken into two or more projects over a period of time.

4.4 2D) One New 24-inch and One 30-inch Diameter FM

Advantages

- Since two additional force mains would be installed, there is added redundancy with this option.
- There is a relatively small flow range that is not covered under this scenario (3.5 MGD to 4.4 MGD). This range can be covered by a minor amount of pump cycling.
- An equalization basin is not required at Pump Station 240.
- Greatest capacity of all of the force main diameter options (28.4 MGD).
- Relatively low power costs.

Disadvantages

- This is the force main diameter option with the highest initial capital cost and the highest 20-year present worth cost. The initial force main capital cost is $10 million higher than Option 2B.

4.5 Force Main Sizing Recommendation

The 2B) 30-inch and the 2C) 36-inch force main options have the lowest 20-year present worth costs. The 36-inch force main would not require an equalization basin at Pump Station 240. The 30-inch force main would require an equalization basin, but it meets a larger range in flow on the low end, which leaves a smaller gap, compared to the 36-inch force main (a minimum of 6.75 MGD is required in the 30-inch to maintain minimum velocity and a minimum of 9.70 MGD is required in a 36-inch pipe to maintain the minimum velocity). Also, the equalization basin portion of the 30-inch force main option can be delayed. For these reasons, a 30-inch diameter force main is recommended and was assumed for the force main alignment comparison.

5. Option 2 Force Main Alignment Options

Six force main alignments between Pump Station 240 and the WRF were analyzed. Refer to Figures No. 1 and 2 for maps showing all six alignments.

Alignment 1 is similar to the alignment of the existing 16-inch force main, except that instead of being routed through Willow Run Golf Course, it follows Highway 42 south of the golf course. It then parallels the existing force main to the WRF. Alignment 1 is shown on Figure 3.

Alignment 2 follows the existing 16-inch alignment to the north of Pump Station 240 until it reaches Highway 42. From this point, it crosses the highway, crosses the Big Sioux River twice, and follows along the west side of the river to Holly Boulevard/Rice Street. The force main alignment then travels west along the north side of the Holly Boulevard/Rice Street, eventually paralleling the existing 16-inch alignment across the river to the WRF. Alignment 2 is shown on Figure 4.

Alignment 3 leaves the pump station and is travels straight west to Six Mile Road. The force main then follows Six Mile Road to the north, where it eventually meets the existing 16-inch alignment and follows it to the WRF. The Alignment 3 route is shown on Figure 5.

Alignment 4 follows the existing 16-inch force main alignment north out of the pump station to 41st Street, where it turns and travels west. It then jogs north and then west again to Six Mile Road in order to avoid a housing development. It follows Six Mile Road north a short distance and then travels west to Highway 11. It then follows Highway 11 north, and continues north along the future South Dakota Highway 100 alignment to Rice Street. At Rice Street, Alignment 4 parallels the existing force main alignment west to the WRF. Refer to Figure 6 for a drawing of the Alignment 4 route.

Alignment 5 is similar to Alignment 4 except that it travels south after leaving the pump station until it reaches 57th Street. It then follows 57th Street to the west to Highway 11. It follows Highway 11 north to the future SD Highway 100 alignment and then turns west to the WRF. Refer to Figure 7 for a drawing of the Alignment 5 route.

Alignment 6 is similar to Alignment 1, except it follows Highway 42 further to the west to the SD Highway 100 alignment. It follows the SD Highway 100 alignment north to the WRF, similar to Alignments 4 and 5. Refer to Figure 8 for a drawing of the Alignment 6 route.

The alignments of each option are shown graphically in the following figures. City of Sioux Falls Best Management Plan (BMP) pond locations are shown on these figures. Alignments were chosen to avoid the designated BMP areas.

Each alignment was evaluated based on several criteria, including force main length, static head, number of utility crossings, number of street crossings, pump horsepower required, number of river crossings and easement requirements. A comparison summary of the six alignment options evaluated is presented in the Table 5.

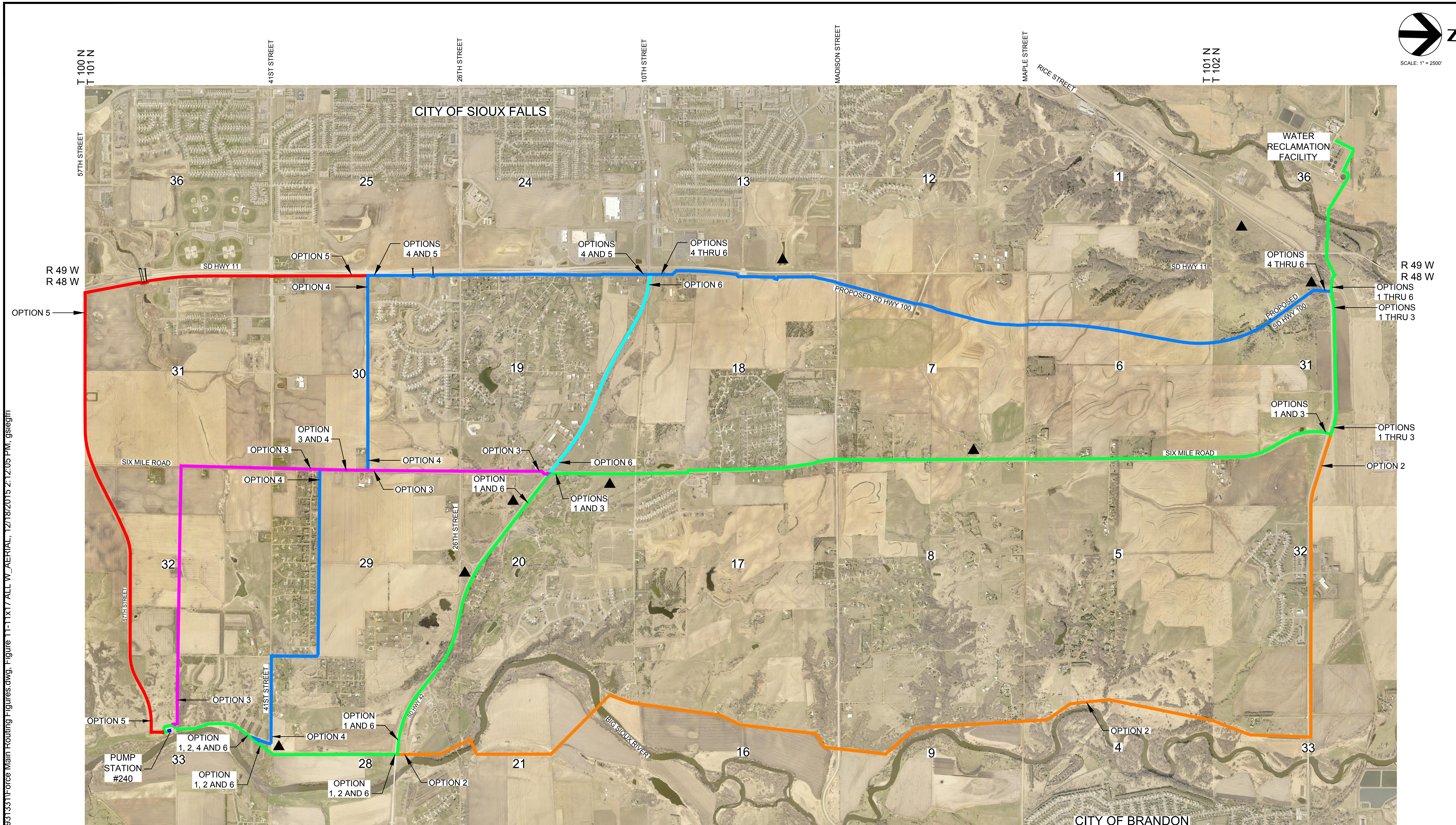

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FIGURE 1:
PUMP STATION 240 FORCE MAIN ROUTING
ALL ALIGNMENT OPTIONS - AERIAL

HDR

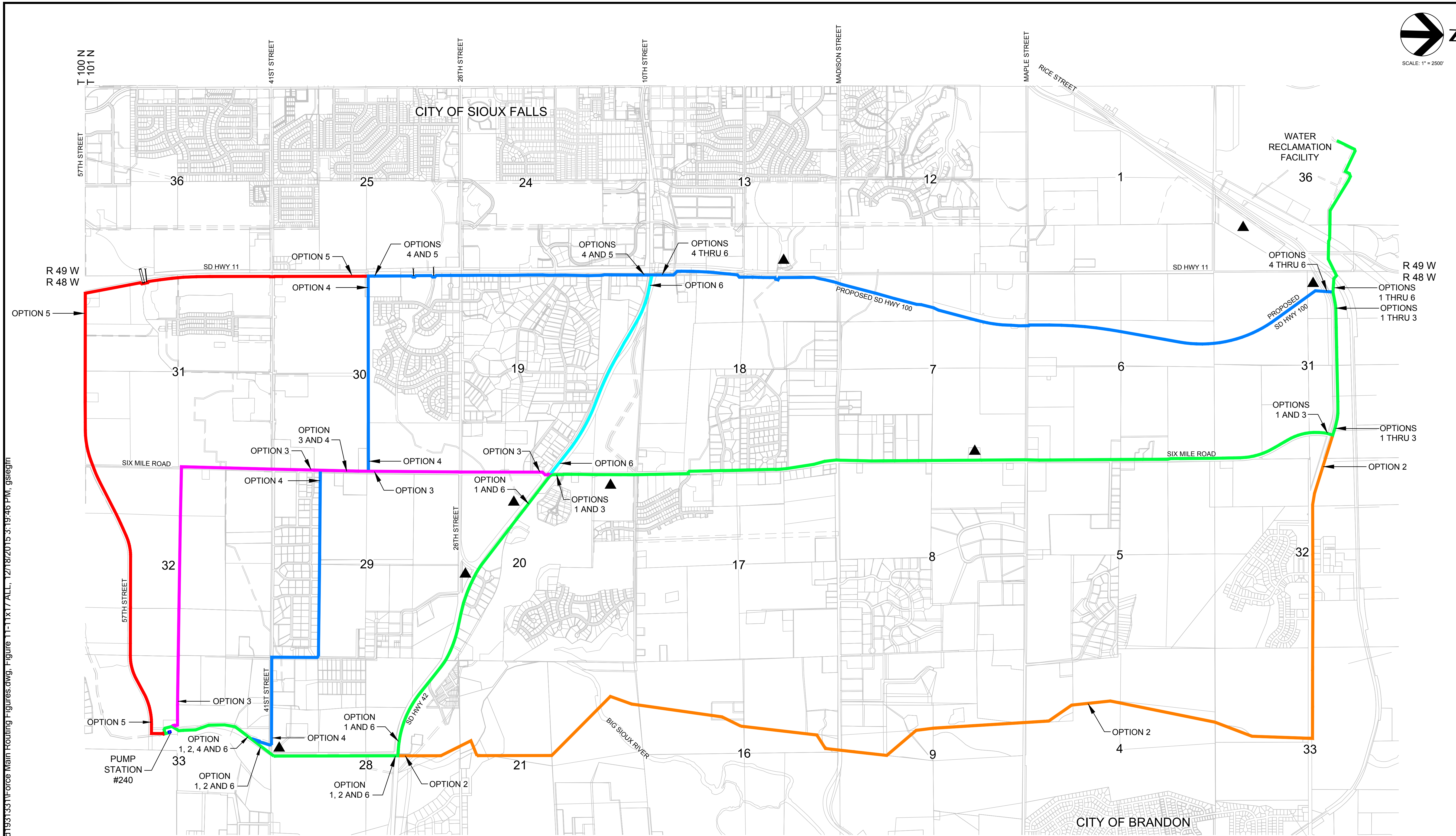

FIGURE 2:
PUMP STATION 240 FORCE MAIN ROUTING
ALL ALIGNMENT OPTIONS - NO AERIAL

▲ EXISTING BMP POND LOCATIONS

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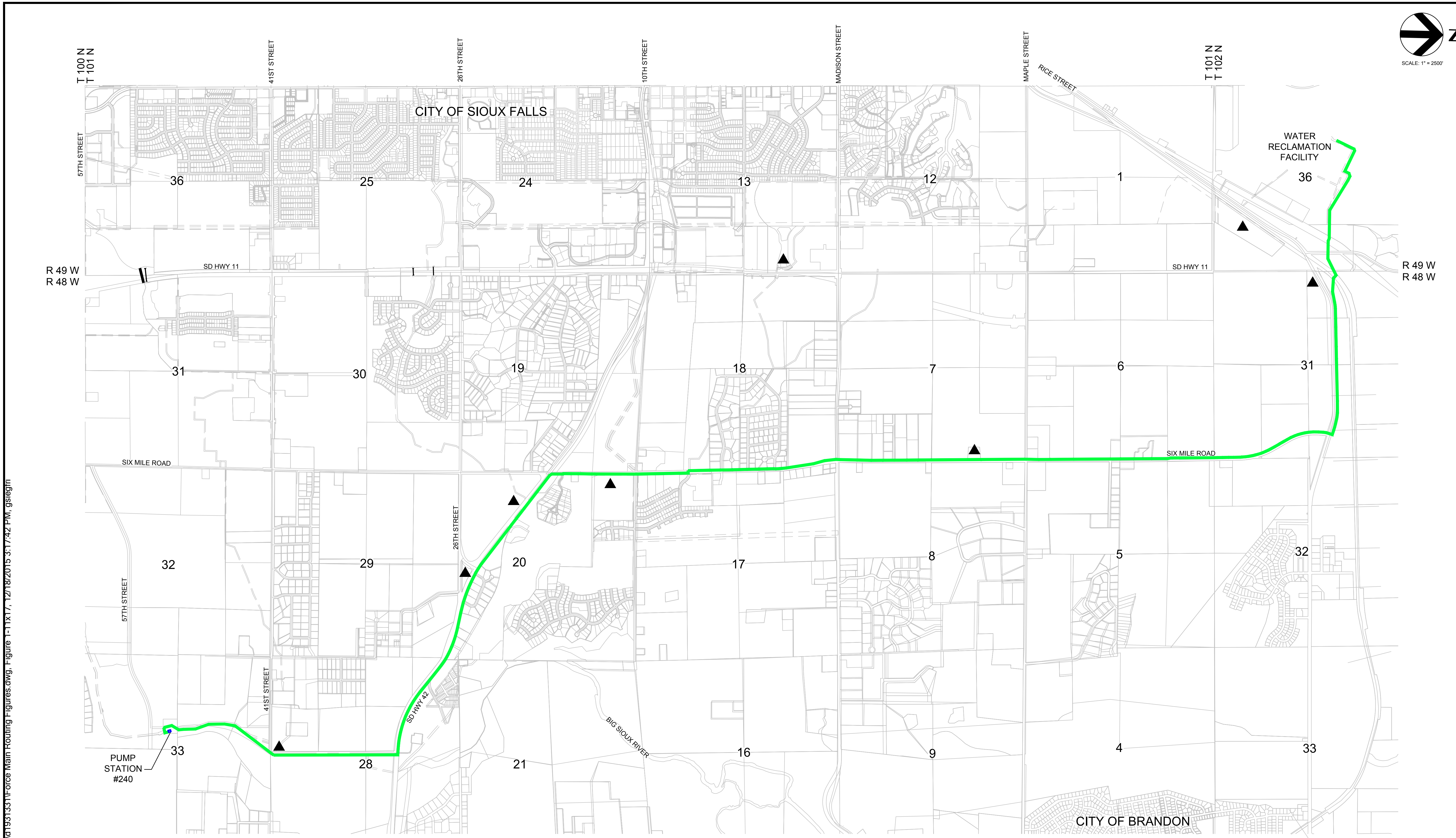

FIGURE 3:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 1

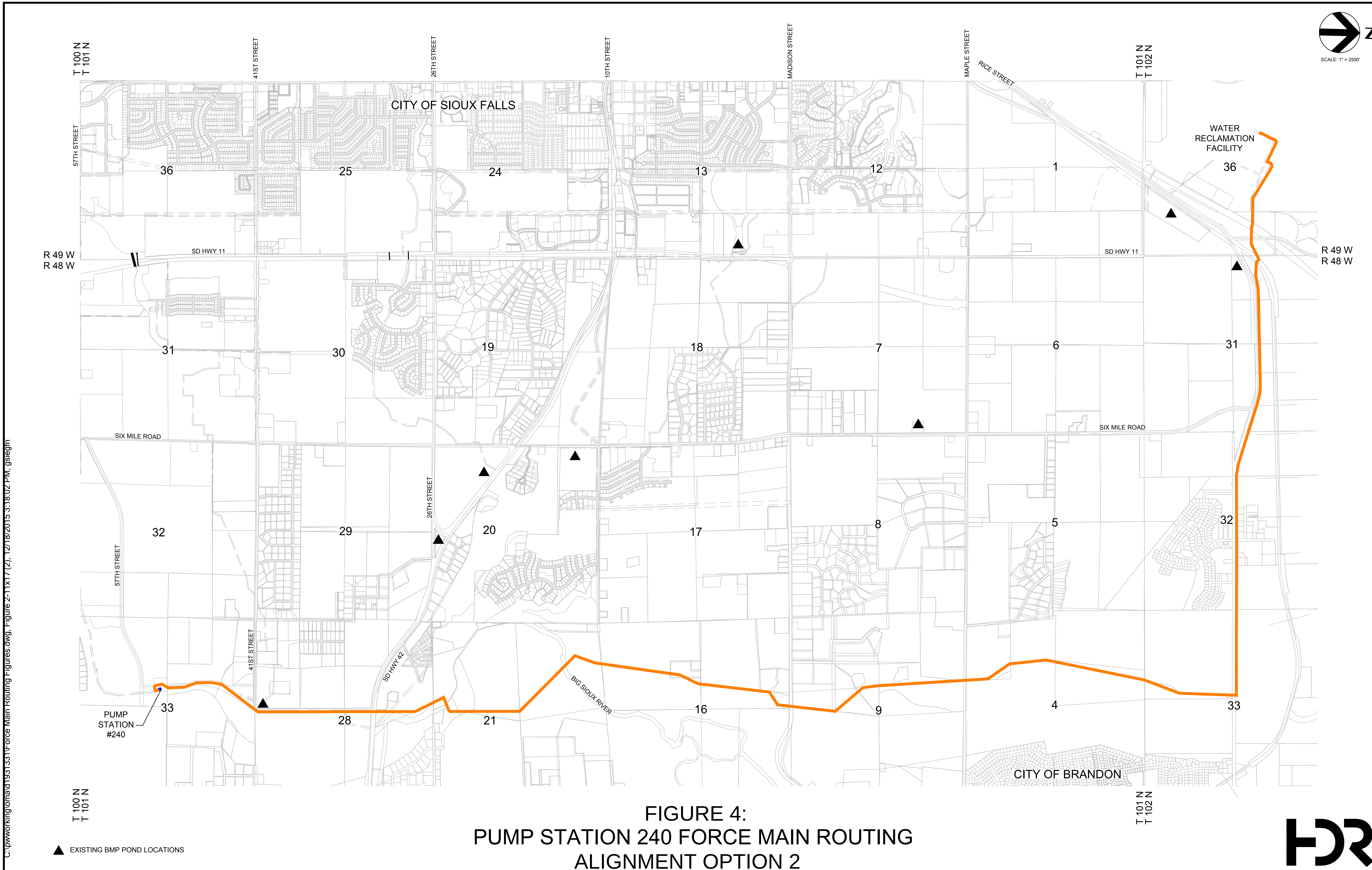

FIGURE 4:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 2

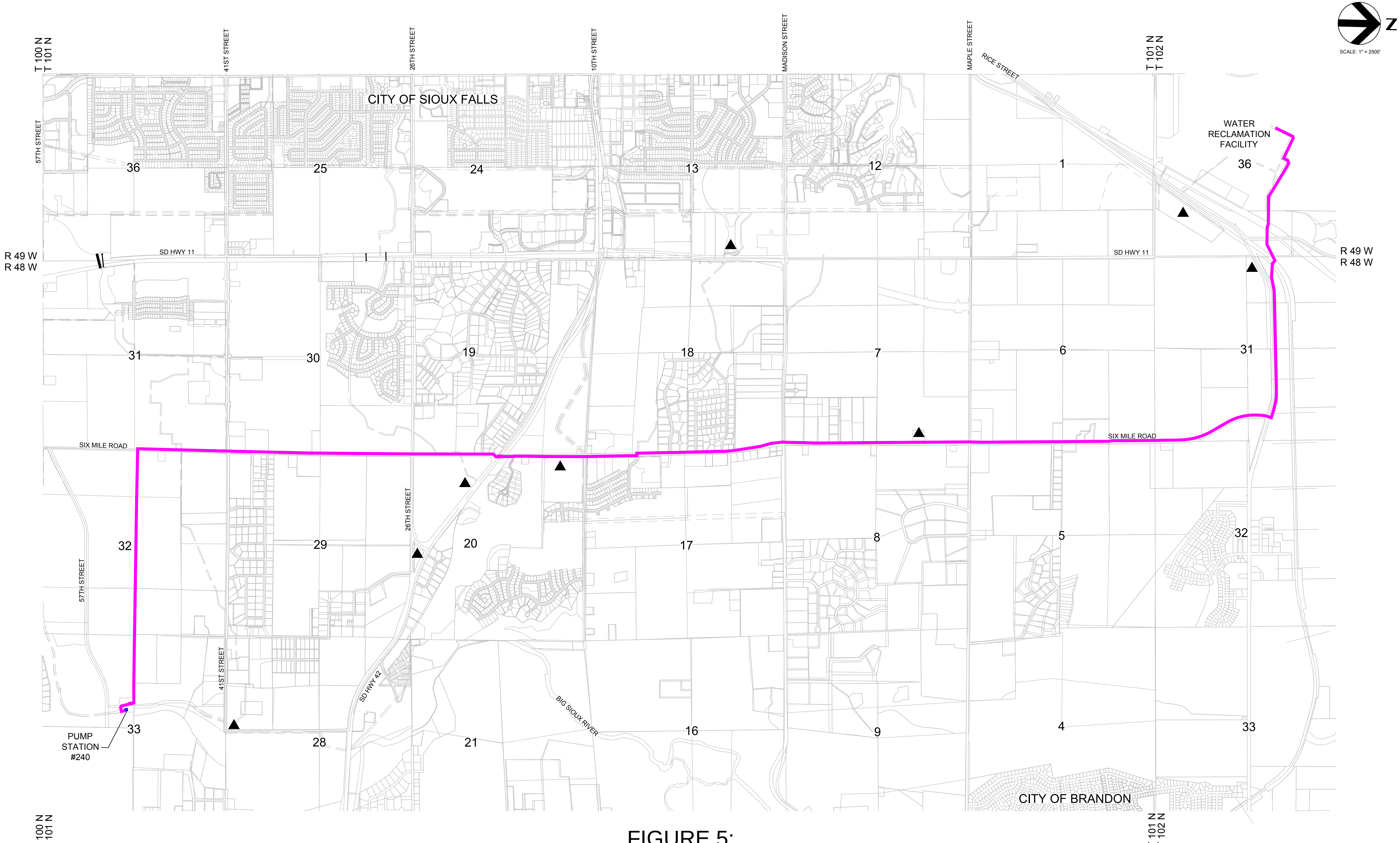

FIGURE 5:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 3

▲ EXISTING BMP POND LOCATIONS

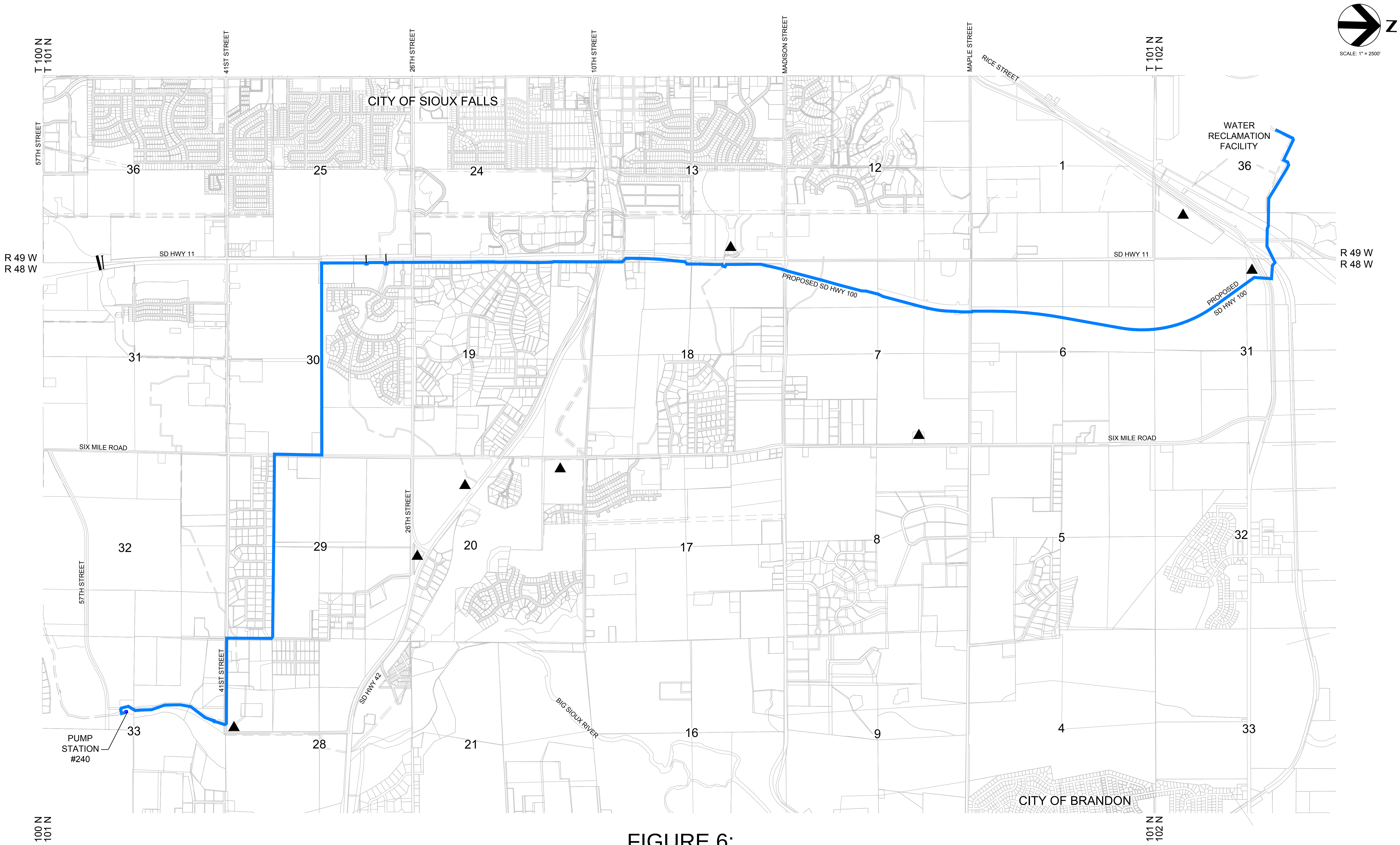

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FIGURE 6:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 4

▲ EXISTING BMP POND LOCATIONS

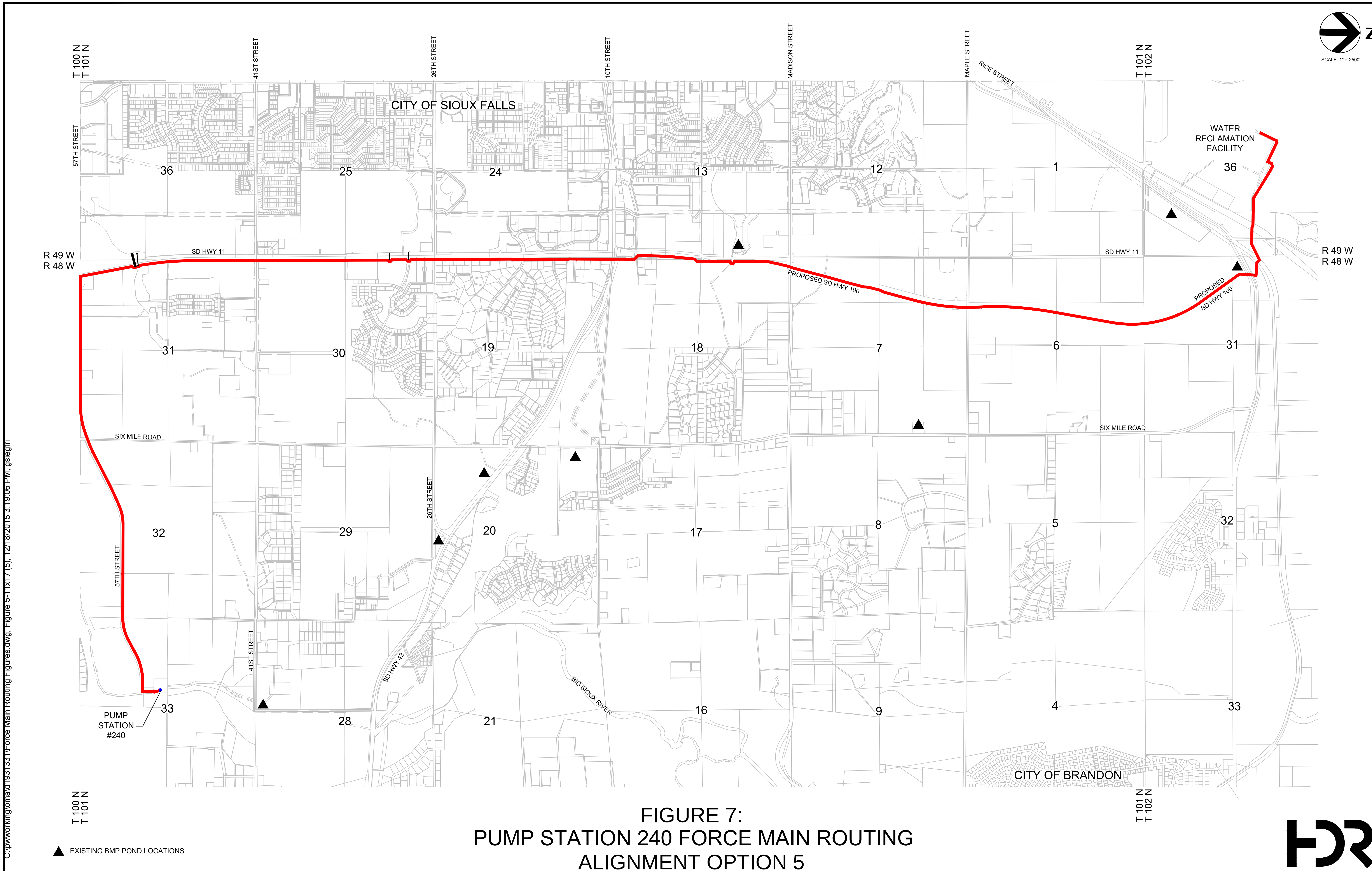

FIGURE 7:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 5

HDR

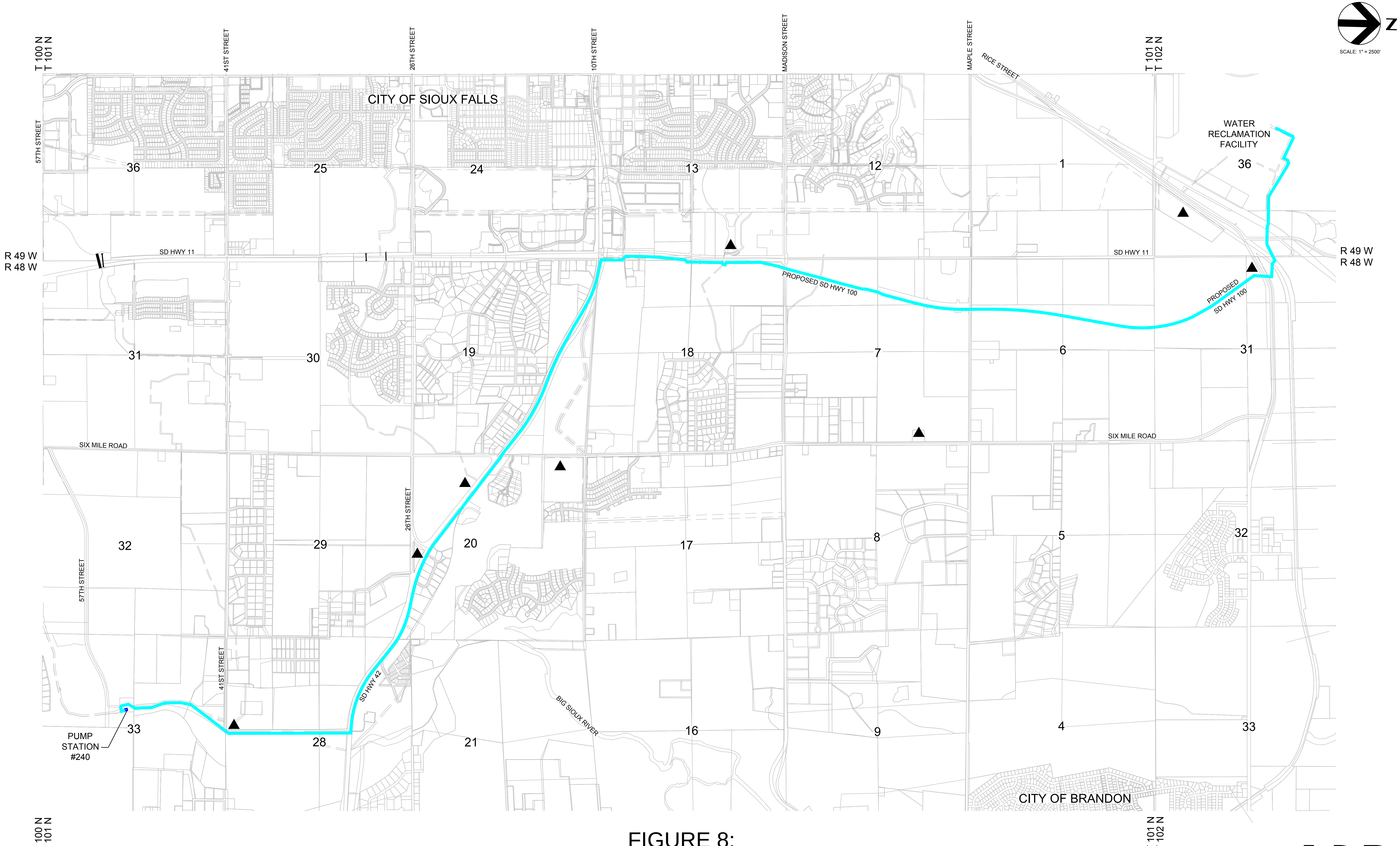

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FIGURE 8:
PUMP STATION 240 FORCE MAIN ROUTING
ALIGNMENT OPTION 6

▲ EXISTING BMP POND LOCATIONS

Table 5: Force Main Alignment Comparison

Description		Units	Alignment 1	Alignment 2	Alignment 3	Alignment 4	Alignment 5	Alignment 6
Forcemain length		ft	47,439	52,337	49,341	50,606	54,063	47,428
Difference in length between option and shortest option		ft	11	4,909	1,913	3,178	6,635	0
Force main high point elevation		ft	1,508	1,380	1,508	1,522	1,521	1,521
Static head from PS 240 to high point in FM		ft	245	117	245	259	258	258
Difference in elevation between option and lowest static head option		ft	128	0	128	142	141	141
Total length of private parcel crossings		ft	11,850	47,614	23,621	19,807	10,261	12,716
Total area of private parcel crossings easements		acres	11	44	22	18	9	12
Length of state park (S.P.) crossing		ft	0	8,195	0	0	0	0
Area of state park crossing easement		acres	0	7.5	0	0	0	0
Additional pump power required		hp	1,891	1,278	1,914	2,003	2,037	1,957
Number of air release MHs			24	26	25	25	27	24
Number of Crossings	Private parcels		9	34	11	7	8	11
	State park		0	1	0	0	0	0
	Watermain		8	1	15	29	30	19
	Sanitary sewer		5	4	7	7	6	10
	Storm sewer and culverts		6	0	18	39	37	39
	Box culvert		2	0	3	0	1	0
	Major street (paved)		6	4	9	7	7	8
	Minor street (unpaved)		5	0	6	10	12	9
	Driveway		21	3	26	12	6	3
	Parking lot		0	1	0	0	0	0
	Railroad		2	2	2	2	2	2
	River		1	3	1	1	1	1

The six initial alignments were discussed with City staff. Concerns were raised regarding Alignment 4 because of likely difficulties acquiring easements on property in the area. Alignment 5 followed existing right-of way, but was the longest of the six alignments and did not possess a clear benefit over the other options. For these reasons, Alignments 4 and 5 were eliminated from further consideration and were not evaluated beyond the initial routing phase.

Alignments 1, 2, 3 and 6 were evaluated in greater detail. This evaluation included an economic analysis of the initial capital costs and yearly operation and maintenance costs. The recommended 2B) 30-inch diameter forcemain was assumed for each of the forcemain routing alternatives. A desktop environmental and archeological review was also performed for the remaining four alignment options. Refer to Appendix A for a summary of this environmental review.

A review was performed on known bedrock depths along the alignments. Previous borings show relatively shallow bedrock in the area north of Pump Station 240 near Highway 42. The depth of bedrock in this area varies between 2 feet and 20 ft. Additional borings are recommended to determine the amount of rock that will need to be excavated for each alignment.

Table 6 contains a cost comparison of the four alignments under consideration. The table contains estimated costs for both a 20-year and 50-year present worth analysis. For the 20-year cost analysis, an average day flow of 5.4 MGD was assumed, which is the projected 2025 average day flow. For the 50-year cost analysis, the projected 2040 average day flow of 10.0 MGD was assumed.

All present worth costs presented in Table 6 were calculated at an interest rate of 3.5% and at an electricity cost of $0.07/kW-hr.

Table 6: Alignment Cost Comparison

Parameter		Alignment 1	Alignment 2	Alignment 3	Alignment 6
Equalization Basin Costs		$2,000,000	$2,000,000	$2,000,000	$2,000,000
Total cost of air release MHs		$4,300,000	$4,700,000	$4,500,000	$4,300,000
Pump cost		$800,000	$400,000	$800,000	$800,000
Additional electrical equipment cost		$210,000	$140,000	$210,000	$220,000
Standby generator cost		$850,000	$570,000	$860,000	$880,000
Total cost of river crossings		$300,000	$900,000	$300,000	$300,000
Total cost of utility crossings		$270,000	$50,000	$610,000	$1,070,000
Total cost of major street crossings		$600,000	$400,000	$900,000	$800,000
Total cost of easements		$170,000	$670,000	$330,000	$180,000
Pipe installation costs		$16,600,000	$18,300,000	$17,300,000	$16,600,000
Preliminary construction capital cost		$26,100,000	$28,130,000	$27,810,000	$27,150,000
Contingency percentage		25%	25%	25%	25%
Contingency amount		$6,530,000	$7,030,000	$6,950,000	$6,790,000
Construction capital cost with contingency		$32,600,000	$35,200,000	$34,800,000	$33,900,000
Engineering/design percentage		15%			
Engineering/design amount		$4,890,000	$5,280,000	$5,220,000	$5,090,000
Total construction capital cost		$37,500,000	$40,500,000	$40,000,000	$39,000,000
20-year analysis: 5.4 MGD Average Day Flow	Energy usage (kW-hr/day)	5,900	3,100	5,900	6,200
	Energy usage (kW-hr/yr.)	2,200,000	1,100,000	2,200,000	2,300,000
	Energy cost ($/yr.)	$150,000	$80,000	$150,000	$160,000
	20-year present worth power cost	$2,100,000	$1,100,000	$2,100,000	$2,300,000
	20-year present worth capital costs and power costs	$39,600,000	$41,600,000	$42,100,000	$41,300,000
	Equivalent annual 20-year cost for capital costs and power costs	$2,800,000	$2,900,000	$3,000,000	$2,900,000
50-year analysis: 10.0 MGD Average Day Flow	Energy usage (kW-hr/day)	12,400	7,300	12,900	12,900
	Energy usage (kW-hr/yr.)	4,500,000	2,700,000	4,600,000	4,700,000
	Energy cost ($/yr.)	$320,000	$190,000	$320,000	$330,000
	50-year present worth power cost	$7,500,000	$4,500,000	$7,500,000	$7,700,000
	50-year present worth capital costs and power costs	$45,000,000	$45,000,000	$47,500,000	$46,700,000
	Equivalent annual 50-year cost for capital costs and power costs	$1,900,000	$1,900,000	$2,000,000	$2,000,000

The following is a summary of the alignment routing along with advantages and disadvantages of each alignment.

5.1 Alignment 1

Routing

- North from the pump station to Highway 42, to Six Mile Road, then north to the WRF.

Advantages

- Lowest 20-year present worth value and lowest initial capital cost option.
- This is one of the shortest alignments, similar in length to Alignment 6.
- Highway 42 is scheduled to be reconstructed in the near future. There is a possibility that the construction of this force main could be coordinated with the reconstruction of Highway 42.
- Relatively few private parcel crossings compared to the other alignments.

Disadvantages

- Shallow bedrock is known to exist along the portion of the alignment north of the pump station. Additional soil borings are required to determine the extent of the required rock excavation.
- There is limited space available in the existing 16-inch force main easement; some additional easement may need to be acquired.
- High static head and power costs compared to Alignment 2.
- This alignment closely follows the current force main alignment. If one of the force mains was to be damaged, there is an increased likelihood the second becoming damaged. Some of the benefit of redundancy is lost by locating both force mains next to each other.

5.2 Alignment 2

Routing

- North from the pump station, crossing the Big Sioux River twice, then following the river north to Holly Boulevard/Rice Street, then west to the WRF.

Advantages

- Lowest 50-year present worth option.
- Lowest static head option
- Lowest power requirements.
- Possibly combine with the new proposed City of Brandon force main to share the cost of the segment that runs along the north side of Holly Boulevard.

Disadvantages

- This force main crosses through Big Sioux Recreation Area State Park. City has indicated that they would prefer not to have air release valves along the pipe within the state park because it will be difficult to access them. This would leave a relatively long stretch 8,200 feet without an air release valve.
- South Dakota Game, Fish & Parks has not been contacted to date regarding this path. Based on previous involvement with Game, Fish & Parks, they may be reluctant to allow any activity that involves tree removal within the park.
- A significant portion of the alignment does not follow existing roadways and is along the Big Sioux River. Therefore, there is an increased likely hood of the force main crossing through environmentally or archeologically sensitive areas.
- This alignment does not have good access from existing roadways for much of the alignment.
- This alignment has the most river crossings (three).
- Most parcel crossings, highest level of landowner coordination.
- Relatively long force main compared to the other alignments.
- Possibility of rock adjacent to Highway 42 and in the area along the river to the north of Highway 42.

5.3 Alignment 3

Routing

- West from the pump station to Six Mile Road, then following Six Mile Road north to the WRF.

Advantages

- One of the shorter alignments.
- The static head is lower than Alignment 6, similar to Alignment 1.
- This alignment is least likely to encounter bedrock during excavation.

Disadvantages

- Highest 20-year and 50-year present worth costs.
- High static head compared to Alignment 2.
- More utility crossings than Alignments 1 and 2.
- More parcel crossings than Alignments 1 and 6.

- The portion of the alignment to the west of Pump Station 240 is not near an existing roadway. Therefore, it may be difficult to access air release manholes in this area. An access path may be required along this portion of the alignment.

5.4 Alignment 6

Routing

- North from the pump station to Highway 42, then west along the highway to SD Highway 100; following the SD Highway 100 alignment north to the WRF.

Advantages

- This is one of the shorter options, similar in length to Alignment 1.
- Construction could be coordinated with the reconstruction of Highway 42 and the construction of Highway SD 100.
- One of the shorter lengths of private parcel crossings, similar to Alignment 1.

Disadvantages

- Present worth costs are greater than Alignments 1 and 2.
- Possibility of rock along Highway 42.
- Highest static of all the alignments.
- Relatively high power costs.

5.5 Recommendations – Force Main Alignment Options

Alignment 1 has the lowest capital cost, a relatively short length, and is accessible from existing roadways. Alignment 1 also has the lowest 20-year present worth cost at $39.6 million. The alignment with the next highest 20-year present worth cost is Alignment 6 at $41.3 million.

Alignment 1 and Alignment 2 each have a 50-year present worth cost of $45.0 million. The alignment with the next highest 50-year present worth cost is Alignment 6 at $46.7 million.

At this time, Alignment 2 has the most unknowns associated with it. It follows the river, which increased the likelihood of environmental and archeological restrictions. The alignment does not follow existing roadways for much of its length, and there will be limited access to it through the state park.

For these reasons, Alignment 1 was selected as the recommended alignment over Alignment 2.

5.6 Summary of Force Main Recommendations

In summary, the recommended option consists of a single 30-inch diameter force main (Option 2B) routed along Alignment 1 with a 1 MG equalization basin at Pump Station 240.

6. Option 1 (Satellite Treatment) and Option 2 (New Force Main & Treatment at WRF) Cost Comparison

An economic analysis was performed to compare Option 1 with Option 2. The following assumptions were made for this analysis:

- The Option 1 and 2 was obtained from 2016 Master Plan Chapter 7, Table 7.12 -Opinion of Comparative Costs for Phases 1 and 2. The comparison is between Alternatives 1-1, which were the recommended improvements for the WRF and Alternative 2-2, which includes the existing WRF, and new East Side MBR improvements.
- Half of the electricity used at the WRF is generated onsite due to increased delivery of fats, oils and grease (FOG).
- The O&M costs of Option 1 are 1% of the capital cost, and the O&M cost of Option 2 is 0.85% of the capital cost.
- Additional staffing for each option was estimated based on EPA staffing standards.
- Per the 2016 WRF Master Plan, at a minimum, the capacities of the following WRF processes would need major process modifications in order to accommodate the combined ESSS influent flow:
    - Activated sludge
    - Aeration System
    - Secondary Pumping
    - Final Clarifiers
    - Effluent Filters
    - Chlorine Contact Basin
    - Hydraulic Bottleneck-based process modifications

Table 7 contains planning level information on the initial capital costs, O&M costs and present worth costs for Options 1 and 2. The table references the total capital cost from 2016 Master Plan Table 7.12 -Opinion of Comparative Costs for Phases 1 and 2.

The Table 7 presents estimated costs for both a 20-year and 50-year present worth analysis. For the 20-year cost analysis, an average day flow of 5.4 MGD was assumed, which is the projected 2026 average day flow. For the 50-year cost analysis, an average day flow of 10.0 MGD was assumed, which is the projected 2040 flow rate.

All present worth costs presented in Table 7 were calculated at an interest rate of 3.5% and at an electricity cost of $0.07/kW-hr.

Table 7: Options 1 and 2 Comparison

	Description	Option 1: MBR at Pump Station 240	Option 2: 30-inch FM, Alignment 1
	Number of additional staff required	12	5
	MBR capital cost	$96,000,000	$0
	Capital cost of improvements at WRF	$0	$72,000,000
	Force main total capital cost	$0	$38,500,000
	Total preliminary project capital costs	$273,000,000	$271,900,000
	Electrical and maintenance costs to operate the WRF expansion treatment system ($/yr.)	0	0
	Electrical and maintenance costs to operate the MBR treatment system ($/yr.)	$960,000	$960,000
	Annual cost of additional staff ($/yr.)	$1,050,000	$440,000
	Annual renewal and replacement cost for treatment ($/yr.	$500,000	$400,000
20-year analysis: 6.8 MGD Average Day Flow	Pumping electrical costs ($/yr.)	$20,000	$200,000
	Total O&M Costs ($/yr.)	$2,500,000	$1,400,000
	20-year present worth O&M costs	$35,500,000	$19,900,000
	20-year present worth capital costs and O&M costs	$308,500,000	$291,800,000
	Equivalent annual 20-year cost for capital costs and O&M costs	$21,700,000	$20,500,000
50-year analysis: 16.7 MGD Average Day Flow	Pumping electrical costs ($/yr.)	$70,000	$680,000
	Total O&M Costs ($/yr.)	$2,600,000	$1,800,000
	50-year present worth O&M costs	$61,000,000	$42,200,000
	50-year present worth capital costs and O&M costs	$334,000,000	$309,400,000
	Equivalent annual 50-year cost for capital costs and O&M costs	$14,200,000	$13,200,000

The following is a summary of the advantages and disadvantages of each option:

6.1 Option 1: Construct an MBR at Pump Station 240

Advantages

- The 20-year and 50-year present worth costs are statistically the same as Option 2 with a slight edge to Option 2.
- Higher quality effluent.
- May delay some capital treatment costs at the existing WRF.

Disadvantages

- Higher yearly O&M and electricity costs.
- More staff is required is required to operate and maintain the system.
- Large initial capital expenditures.
- Two separate treatment facilities need to be operated and maintained.
- The City may have two different discharge permits.
- New treatment capacity is only available to a portion of the city.
- The solids generated in the MBR would need to be pumped to the WRF headworks for treatment. The solids may cause coloration of the WRF effluent, which may be difficult to remove.

6.2 Option 2: Install a 30-Inch Diameter Force Main, Expand the Capacity of WRF

Advantages

- New treatment capacity at constructed at WRF is available to treat flows from entire city, not just those collected at Pump Station 240.
- Less staff is required to operate and maintain the system.
- May delay the cost of treatment to fully utilize existing treatment.
- The 20-year and 50-year present worth costs are slightly higher than Option 1.

Disadvantages

- Need to obtain several miles of right-of-way.

6.3 Assessment Criteria and Recommendation

The assessment criteria and recommendations are intended to:

- Compare Option 1 (Satellite Treatment) and Option 2 (New Force Main & Treatment at WRF) costs by using Level 4 Costs.
- Evaluate by the use of a weighted decision matrix.

Level 4 Cost

Level 4 cost estimates represent a -30 to +50% ranges of costs for the facilities. (Estimates do not include costs for treatment and disposal of solids.)

Weighted Decision Analyses

The Weighted Decision is based on the following criteria, which were used to evaluate and compare the merits of the Option 1 (Satellite Treatment), and Option 2 (New Force Main & Treatment at WRF) alternatives. The weighted decision matrix criteria were selected based on a Decision Support System for Selection of Satellite vs. Regional Treatment for Reuse Systems developed by the WateReuse Foundation funded in part by the US Bureau of Reclamation along with several regional planning agencies.

- Affordability of Investment - the affordability of the capital investment that would be required to implement the alternative. An alternative with low capital cost would be scored higher than an alternative with high capital cost. Considers potential effects on sources of repayment (e.g. impact fees, capacity charges, user rates).
- Operational Affordability - the affordability of operating end maintaining the alterative. An alternative with low operation end maintenance (O&M) cost would be scored higher than an alternative with high O&M cost. Potential effects on sources of cost recovery (e.g. wastewater rates, reclaimed water rates) may factor into scoring.
- Life Cycle Affordability - the affordability of the total cost to develop and sustain the operation of the alternative over a period of 20 years (i.e. present worth of life cycle costs). An alternative with low life cycle cost would be scored higher then an alternative with high life cycle cost. Potential effects on sources for recovering both capital and operating costs (e.g. impact fees/ capacity charges, wastewater rates) may factor into scoring.
- Land Availability - the availability of land required for treatment and on-site plant storage facilities construction. An alternative requiring a substantial amount of new land in a highly developed area would score lower than an alternative that would make use of land and rights-of-way already owned.
- Ease of Development - the ease with which the alternative could be planned, designed, authorized, permitted, and constructed, including execution and implementation of necessary agreements. An alternative requiring few external approvals, support, or agreements with willing sellers of land and easements would score higher than an alternative with great institutional complexity, permitting challenges, and potential for legal action.

- Ease of Operation & Maintenance - the ease of operating and maintaining the alternative. An alternative whose operations would be mostly automated would score higher than one requiring a large number of on-site operations personnel to manage a highly complex system. The relative number of operations and maintenance personnel required and the degree of aptitude and training required by them may be factors in scoring.

- System Reliability: The expected consistency with which reclaimed water quality requirements would be met. An alternative whose product water is expected to easily meet regulatory criteria and customer expectations would score higher than one where there is a narrow margin between the treatment technology's capabilities and the regulatory requirement and whose users require relatively high product quality with little tolerance for variability. The size of the reclaimed distribution system and the potential for quality degradation during distribution may factor into scoring,

- Avoided Costs: The magnitude of avoided infrastructure investments that would otherwise be required If the alternative were not implemented. This could represent the cost of avoided expansion of a wastewater interceptor, pumping station, treatment plant or outfall. It might also represent the cost of an avoided treatment process upgrade to achieve a discharge requirement, or the avoided cost of developing a new increment of potable water supply.

- Community Acceptance: The extent to which the alternative would be expected to receive support or acceptance by the affected community. An alternative would be expected to score high where construction occurs in a sparsely populated area, above ground facilities are shielded from view or blend in with the surrounding neighborhood, rate impacts are modest, and consistent outreach has educated the community about the reasons for developing reclaimed water.

- Environmental Compatibility: The degree to which the alternative could be implemented without significant unmitigated environmental impacts to the natural and human environment. An alternative whose facilities would be constructed in a sensitive natural area providing habitat for rare species would be expected to score lower than an alternative where construction would occur in an already disturbed area with few natural values and where traffic, noise, odor, and air quality impacts would be mitigated.

- Other - user defined criteria not included above but important for comparing alternatives

Table 8 contains the weighted decision scoring followed by a description of how the scoring was arrived at. The weights add up to 100%. In addition, a weight is assigned to each criterion, between 1 and 5. A favorable score of 5 indicates that an alternative is extremely favorable, economical, or simple. A score of 1 is assigned to alternatives that are unfavorable, expensive, or institutionally or operationally complex. These scores represent quantitative values determined from qualitative the descriptions.

Table 8: Weighted Decision: Satellite Treatment versus Force Main & Treatment at WRF

	Weight	Satellite Facility (Option 1)		Existing WRF Facility with Force Main (Option 2)	
		Score (1-5) (5 is best)	Weighted Score	Score	Weighted Score
Affordability of Investment	15%	3	0.45	4	0.6
Operational Affordability	10%	2	0.2	5	0.5
Life Cycle Affordability	30%	4	1.2	4.5	1.35
Land Availability	0%		0		0
Ease of Development	10%	3	0.3	5	0.5
Ease of Operation & Maintenance	15%	2	0.3	5	0.75
System Reliability	0%		0		0
Avoided Costs	0%		0		0
Community Acceptance	10%	3	0.3	5	0.5
Environmental Compatibility	10%	3	0.3	4	0.4
Other	0%		0		0
Total	100%		3.05		4.6

Affordability of Investment:

The ability of the City to fund capital costs is a consideration as the investment depends on growth to pay for the cost of providing the necessary facilities and related service. Affordability of Investment was valued at 15% of the total decision. The total capital costs for Option 2 is 15% more than satellite facilities. However, the investment at the WRF allows for utilizing existing capacity and capital dollars spent can be applied to cost of service anywhere in the City. The satellite plant depends on growth tributary to the Eastside Sanitary Sewer System. Because the initial capital cost for the forcemain is less than building a MBR, and any capacity improvements at the WRF can be funded by growth anywhere in the City. Options 1 and 2 were assigned a score of 3 and 4, respectively.

Operational Affordability:

Operational Affordability was a key decision criterion. While operational costs are also addressed in the Life Cycle Affordability, Operational Affordability was assigned at 10% as operational affordability impacts annual budgeting, as it is approximately $1 million more annually to operate a separate Satellite Facility. Options 1 and 2 were assigned a score of 2 and 5, respectively.

Life Cycle Affordability:

Life Cycle Affordability (cost) was the most important criterion for the planning team. The planning team valued it at 30% of the evaluation. The total present worth costs for both options were similar ($308.5 million to $291.8 million) within the AACE Level 4 cost opinion ranges. Due to the slight savings, a score of 4.55 was given to Option 2, and 4 was given to the Option 1. However, based on the above life-cycle analysis, the two options are not significantly different. In other words, if the respective Option 1 and 2 projects were bid on different days, in hindsight, the selection could go either way.

Land Availability:
There is land available at both sites. The planning team determined that Land Availability was not an important criterion for evaluating the alternatives and gave the criterion a weight of 0%.

Ease of Development:
The planning team assigned a weight of 10% to Ease of Development. The team believed that expanding the existing WRF facility would be one of the easiest ways to increase capacity in its service area, however there are a significant number of easements required to construct the force main. The construction of a satellite facility would, similarly, be straightforward; however, the construction is in an area planned for high end residential and would require meetings with the public to address the nature of the exterior facade of the facility, maintenance vehicle access and odor control measures. Expansion of the WRF provides maximum flexibility regarding providing treatment capacity that can serve new development in any area of the City. A score of 5 was given to the existing WRF Option 2, and 3 was given to the Satellite Facility Option 1.

Ease of Operation & Maintenance:
The planning team assigned a weight of 15% to Ease of Operation and Maintenance. Because the satellite facility would require the City to operate two facilities, the satellite facility was not scored favorably. The WRF Option 2 was scored a 5, while the Satellite Facility Option 1 was scored a 2. Additionally, maintenance facilities would not be available at the satellite plant site, requiring transport to the WRF for maintenance.

System Reliability:
System Reliability was more important to the City than Ease of Development and Ease of Operation & Maintenance but not as important as Life Cycle Affordability. However, a weight of 0% was given to System Reliability as both alternatives were considered to have the same reliability.

Avoided Costs:
The Satellite Facility Option 1 would include eliminating the cost for a 30-inch force main. The planning team believed that capital costs for this infrastructure were sufficiently addressed in the Life Cycle Affordability. Avoided Costs were excluded from the evaluation by giving it a weight of 0%.

Community Acceptance:
Community Acceptance was important to planning team because it was concerned that the residents in the Satellite MBR service area might not view a “local” treatment facility favorably if a significant public outreach program was not initiated to increase the public's awareness of the impact to the immediate properties. A score of 10% was assigned to Community Acceptance and gave the WRF Option 2 and Satellite Facility Option 1 scores of 5 and 3, respectively.

Environmental Compatibility:
The planning team gave Environmental Compatibility a score of 10%. Based on the MBR Siting Study, the planning team believed WRF Option 2 was more environmentally responsible long-term and gave it a score of 4 compared with the Satellite MBR score of 3.

Recommendation based on Weighted Decision Results

Based on the scores and weights above, the Option 2 WRF (weighted score of 4.45) was preferred over the Satellite MBR Option 1 (weighted score of 3.35).

Therefore, the final recommendation is to implement Option 2 Existing WRF improvements to be continued through 2036 with the following action items:

- As the projected 20-year growth and resulting flows and loadings flows are approached, an East Side WRF would be reevaluated along with potential for additional equalization, a third forcemain.
- The forcemain alignment and associated right-of-way needs to be further evaluated as part of preliminary design.
- A safety factor should be applied to the equalization volume to address the storm of record.
- As the projected 20-year flows and loadings are approached, an East Side treatment plant should be reevaluated.
- Also, note that the 50-year equalization volume was calculated to be 2.1 million gallons.

Appendix A
Environmental Review

Memo

Date:	11/25/2015
Project:	City of Sioux Falls – ESSS Pump Station 240 Force Main
From:	Jill Rust, HDR
To:	Mike Johnson, HDR
Subject:	Environmental Overview –Options 1,2,3 & 6

The following evaluation provides an overview of potential environmental resources that may be encountered along each option identified for the project. The options include 1, 2, 3, and 6. Options 4 & 5 are no longer being considered, and therefore were not evaluated.

This environmental resource overview includes the following resources:

- Potential for cultural resources (archeological and historic resources)
- Water quality
- Floodplain
- Fish, wildlife and vegetation, including state and federally listed species
- Recreational resources
- Wetlands and waters of the U.S.

Environmental Summary:

Cultural Resources: Work along the Big Sioux River and any associated bluffs have a higher chance of encountering archaeological resources. A Level I Cultural Survey (Records Search) is necessary to determine known sites along any of the project options. However, because several of the options are located along the Big Sioux River, it is recommended that a cultural resources survey be completed in the field (Level III Cultural Survey) to determine if there are cultural resources on site that have not been previously identified. If a federal nexus is a part of the project, it is likely a cultural resources survey will be required. A cultural resources survey can identify potential sites and allow design to avoid, minimize and, if required, mitigate. If no federal nexus is a part of the project, the City may want to complete a survey to reduce the risk of encountering cultural resources during construction, which can significantly delay completion the work.

The Eastern and Ellis railroad exists at the north end of the project for all options. The railroad is a recorded archeological site and will require coordination with the State Historic Preservation Office (SHPO), if a federal nexus is a part of the project. Additionally, a past record search of the area done for the Sewer Membrane Bioreactor project, potential cultural resource sites were identified within 1 mile of that project's study area (within 1 mile from the S ½ of Section 33, T 101N R48W). All project options fall within this 1 mile radius.

Water Quality: Water quality will be a concern for any crossings of the Big Sioux River, if a Section 404 permit from the U.S. Army Corps of Engineers (USACE) is needed. All options cross the Big Sioux River at least once.

Floodplain: If any structures or fill occurs within floodplains, impacts to floodplains would need to be analyzed to determine if a no rise certificate or a map revision if needed. A Letter of Map Revision (LOMR) would need to be acquired if a water surface elevation rise is determined.

Fish and Wildlife: There may be timing restrictions on tree removal for all options, especially near the Big Sioux River or forested areas. The timing restriction is to avoid effects to the federally endangered northern long-eared bat. Western prairie fringed orchid has not been located in the area, but is listed for Minnehaha County. Any impacts to native prairie may require a survey for the species prior to any construction or USFWS approval of the project, regardless if the project has a federal nexus. Additionally, bald eagle nests may be located in large trees, especially those along the Big Sioux River. It is recommended that a survey for eagles be completed as part of any project route. Timing restrictions on construction activities may be required for any bald eagles nests found within 660 feet of a bald eagle nest.

The state-listed lined snake has been found in several locations within the area, including in the cactus hills. Any disturbance to prairie areas may have the potential to impact the lined snake. The SD Game Fish and Parks (SDGFP) may require construction monitoring to minimize impacts to the snake. This monitoring may be required regardless if the project has a federal nexus.

Recreational Resources: Recreational resources exist along several options, including golf courses, parks and a state recreational area. Any impacts to recreational resources, including access during construction will require additional coordination with the overseeing entity (e.g. City of Sioux Falls Parks and Recreation Department, SDGFP). Direct disturbance to these areas may require additional restoration efforts.

Wetlands and Other Waters of the U.S.: Wetlands and Other Waters of the U.S. exist along all options. Any temporary or permanent impacts to wetlands over 0.1 acres will require notification (pre-construction notice) to the USACE. Any permanent impacts over 0.1 acres will require wetland mitigation. Wetland impacts over 0.5 acres will typically require an individual permit, which has a longer review timeline. It is not anticipated that an individual permit would be necessary for any of the options.

The following summary of the options assumes a federal nexus is required, such as State Revolving Funds or Section 404 permit:

Option 1:

- Cultural - Routed along Big Sioux River on south end. There is an increased risk to encounter cultural resources. Option 1 crosses the Ellis and Eastern railroad on the north end. This is a known archeological site and will require coordination with SHPO.

- Water Quality – Option 1 crosses the Big Sioux River in one location at the north end of the project. No other major water quality concerns are anticipated for this option.

- Floodplain – On south end of project, Option 1 follows designated floodplain for approximately 1 mile. Any structures, such as manholes, or permanent fill within this area may require additional evaluation.

- Fish and Wildlife - Option 1 may require removal of trees on north end. Timing restrictions are likely for removal of these trees to avoid effects to the northern long-eared bat. Other forested areas along this option may be toward the south end along Arrowhead Parkway. Bald eagles may be found within large trees, especially around the Big Sioux River. Timing restrictions on construction activities may be required for any bald eagles nests found within 660 feet of a bald eagle nest.

- Recreational Resources - Willow Run Golf Course exists along Arrowhead Parkway. Option 1 may need additional coordination with the golf course to ensure access is maintained during construction. Direct impacts to the golf course may also require additional coordination and restoration efforts.

- Wetlands and Other Waters of the U.S. – Wetlands exist along Option 1. It is anticipated that most impacts to wetlands will be temporary. A Pre-Construction Notice for the project will be required for the USACE. It is anticipated that the Big Sioux River crossing will also be a temporary impact. However, for water quality protection, additional BMPs may be required for that crossing.

Option 2:

- Cultural - Routed along Big Sioux River for a large portion of the project. There is an increased risk to encounter cultural resources. Option 2 crosses the Ellis and Eastern railroad on the north end. This is a known archeological site and will require coordination with SHPO.

- Water Quality – Option 2 crosses the Big Sioux River in three locations. Each crossing will be a water quality issue, especially if open trench methods are used.

- Floodplain – Option 2 follows the floodplain for much of its route from south to north. Any structures, such as manholes, or permanent fill within this area may require additional evaluation.

- Fish and Wildlife - Option 2 may require removal of trees in several locations, especially near the Big Sioux River. Timing restrictions are likely for removal of these trees to avoid effects to the northern long-eared bat. It appears that some prairie areas, possibly native prairie, exist along this option. The lined snake, a state listed species, is known from this area and impacts to prairie areas may require special construction conditions such as snake monitoring during construction and additional BMPs. Bald eagles may be found within large trees, especially around the Big Sioux River. Timing restrictions on construction activities may be required for any bald eagles nests found within 660 feet of a bald eagle nest.

- Recreational Resources – The Big Sioux River Recreational Area, which is managed by the SDGFP, is along Option 2. Permanent or temporary impacts to this area will likely require significant coordination with the SDGFP. Impacts to this area may be a Section 6(f) issue depending on funding utilized by the park. Section 6(f) properties refer to properties that have received land and water conservation funding. If the project permanently converts any 6(f) property from a recreational area, the land must be replaced. Coordination occurs through the National Park Service. Temporary impacts may still need coordination with the NPS.

- Wetlands and Other Waters of the U.S. – Wetlands exist along Option 2, especially along the Big Sioux River. Because much of this alignment goes through farmed or non-disturbed areas, there is higher chance to encounter wetlands. It is anticipated that most impacts to wetlands will be temporary. A Pre-Construction Notice for the project will be required for the USACE. It is anticipated that the Big Sioux River crossing will also be a temporary impact. However, for water quality protection, additional BMPs may be required for that crossing.

Option 3:

- Cultural – Option 3 appears to be along existing roadways, which significantly reduces the chance to encounter cultural resources. Option 3 crosses the Ellis and Eastern railroad on the north end of the route. This is a known archeological site and will require coordination with SHPO.

- Water Quality – Option 3 crosses the Big Sioux River in one location at the north end of the project. No other major water quality concerns are anticipated for this option.

- Floodplain – The only floodplain encountered by Option 3 is at the north end of the project prior to its termination. Any structures, such as manholes, or permanent fill within this area may require additional evaluation.

- Fish and Wildlife - Option 3 will only require minor removal of trees, much of it on the north end. Timing restrictions are likely for removal of these trees to avoid effects to the northern long-eared bat. This option crosses an unnamed tributary, which may possibly serve as Topeka shiner habitat when water is flowing. Construction conditions may have to be implemented for this crossing. Bald eagles may be found within large trees, especially around the Big Sioux River. Timing restrictions on construction activities may be required for any bald eagles nests found within 660 feet of a bald eagle nest.

- Recreational Resources – Option 3 runs along the west side of Willow Run Golf Course. May need additional coordination with the golf course to ensure access is maintained during construction. Any direct impacts to the golf course may also require additional coordination and restoration efforts. Option 3 is adjacent to an elementary school. The project will need to maintain access and consider pedestrian access in the area.

- Wetlands and Other Waters of the U.S. – Wetlands exist along Option 3 though these will be minimal if the option remains within the existing road right-of-way. It is anticipated that most impacts to wetlands will be temporary. A Pre-Construction Notice for the project will be required for the USACE. It is anticipated that the Big Sioux River crossing will also be a temporary impact. However, for water quality protection, additional BMPs may be required for that crossing.

Option 6

- Cultural – Routed along Big Sioux River on south end of project, there is an increased risk to encounter cultural resources. Option 6 also crosses farm ground and potential native prairie area, increasing the risk for encountering cultural resources. Option 6 also crosses the Ellis and Eastern railroad on the north end. This is a known archeological site and will require coordination with SHPO.

- Water Quality – Option 6 crosses the Big Sioux River in one location at the north end of the Project. No other major water quality concerns are anticipated for this option.

- Floodplain – On south end of project, Option 6 follows designated floodplain for approximately 1 mile. Any structures or permanent fill within this area may require additional evaluation.

- Fish and Wildlife - Option 6 may require removal of trees in several locations, especially near the Big Sioux River. Timing restrictions are likely for removal of these trees to avoid effects to the northern long-eared bat. It appears that some prairie areas, possibly native prairie exist along this alignment, particularly on the north end in an area referred to as the Cactus Hills. The lined snake, a state listed species, is known from this area and impacts to prairie areas may require special construction conditions such as snake monitoring during construction and additional BMPs. If this option is constructed within the same time frame and footprint of the proposed Veterans Memorial Highway project, then these concerns will likely be minor. However, any disturbance outside the timeframe of the Highway 100 project or outside the disturbance limits would require additional coordination with the SDGFP regarding lined snake. Bald eagles may be found within large trees, especially around the Big Sioux River. Timing restrictions on construction activities may be required for any bald eagles nests found within 660 feet of a bald eagle nest.

- Recreational Resources - Willow Run Golf Course exists along Arrowhead Parkway. May need additional coordination with the golf course to ensure access is maintained during construction. Direct impacts to the golf course may also require additional coordination and restoration efforts. Great Bear recreational area is near this Option, but as proposed at this time, the alignment does not go through the area.

- Wetlands and Other Waters of the U.S. – Wetlands exist along Option 6. It is anticipated that most impacts to wetlands will be temporary. A Pre-Construction Notice for the project will be required for the USACE. It is anticipated that the Big Sioux River crossing will also be a temporary impact. However, for water quality protection, additional BMPs may be required for that crossing.

Appendix 8.A – Biosolids Updated Watering Costs

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

Proposed Capital Improvements	Project No.	Construction Cost	Project Cost	Begin Design (Year)	Constructed by (Year)	Comments
New Thickening	1	$2,684,000	$3,330,000	2020	2025	Should include in Phase 1 Liquid Improvements
FOG Receiving and Processing	5	$2,360,000	$2,920,000	TBD	TBD	See FOG action items
Microturbines/Energy Recovery	8	$3,360,000	$4,150,000	TBD	TBD	Conduct Study: Address alternative uses.
Biosolids Handling Improvements Alternative		$14,520,000	$18,100,000	2017	2021	
TOTAL			**$28,500,000**			

In 2016 dollars.

Computed: DVP | **Date:** 10/3/2016 | **HDR Job No:** 10028508

Checked: KFN | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Thickening

Task: New Unit 2025

Priority: High

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Mechanical	1	EA	$60,000	$60,000
New Thickening	1	EA	$1,600,000	$1,600,000
Subtotal				$1,660,000
Undeveloped Design Detail(25%)				$415,000
Construction Subtotal W/Contingencies				$2,075,000
General Conditions, Mobilization (5%)				$104,000
Sales Tax Allowance (5%)				$109,000
Overhead & Profit (15%)				$343,000
Bonds & Insurance (2%)				$53,000
Total Construction Cost				$2,684,000
Engineering, Admin., Legal, Permitting (24%)				$644,000
Total Project Cost				$3,328,000

Sioux Falls WRF Master Plan

Dewatering Facilities Opinion of Probable Cost (Updated 2016 Master Plan)

Item Description	Qty	Unit	Unit Cost	Total Cost
Site Piping/Lagoon Improvements				
Mobilization	1	LS	$51,000	$51,000
Centrate Site Piping And Misc.	1	LS	$350,000	$350,000
		Site Work Subtotal		**$410,000**
Dewatering Feed Tank (Minimum of 3 days Storage)				
Mobilization	1	LS	$70,000	$70,000
Site Work	1	LS	$102,000	$102,000
Mixing	1	LS	$200,000	$200,000
Piping and Valves	1	LS	$112,000	$112,000
Dewatering Feed Tank	1	LS	$461,000	$461,000
Electrical and Controls	1	LS	$50,000	$50,000
		Dewatering Feed Tank Subtotal		**$1,000,000**
Dewatered Biosolids Storage Facility				
Mobilization	1	LS	$150,000	$150,000
Remove concrete pavement	759	SqYd	$4.00	$3,037
Remove concrete curb & gutter	804	Liner Ft	$3.25	$2,613
Excavation	2,001	CuYd	$4.75	$9,503
General backfill	1,869	CuYd	$4.75	$8,877
Granular backfill	532	CuYd	$14.50	$7,714
PCC pavement	506	SqYd	$62.00	$31,386
Concrete curb & gutter	536	Liner Ft	$13.00	$6,968
Cast-in-place concrete, footings	496	CuYd	$700	$347,200
Cast-in-place concrete, slabs	739	CuYd	$625	$461,806
Cast-in-place concrete, walls	641	CuYd	$605	$387,603
Steel superstructure	28,674	Sq Ft	$19.25	$551,975
Aluminum stop logs	6	Each	$12,500	$75,000
Washdown piping	320	Liner Ft	$21.00	$6,720
Washdown hydrant	1	Each	$3,000	$3,000
Washdown draing piping	210	Liner Ft	$35.50	$7,455
Guard posts	12	Each	$550	$6,600
Seeding & finish grading	1	LS	$6,000	$6,000
Electrical and Controls	1	LS	$60,000	$60,000
		Biosolids Storage Facility Subtotal		**$2,140,000**
Dewatering with Schwing Screw Press				
Mobilization	1	LS	$238,000	$238,000
Demolition	1	LS	$30,000	$30,000
Building modifications	1	LS	$500,000	$500,000
FSP 10 HP Screw press	3	Each	$510,000	$1,530,000
Incline screw conveyor	3	Each	$48,800	$146,400
Screw press feed piping	400	Liner Ft	$56.00	$22,400
Screw press feed piping misc.	50	Each	$110	$5,500
Screw press feed isolation valves	8	Each	$920	$7,360
Screw press feed check valves	3	Each	$3,100	$9,300
Polymer Feed System	3	Each	$60,000	$180,000
Polymer bulk storage tanks	1	Each	$10,000	$10,000
Polymer day tanks	3	Each	$2,000	$6,000
Polymer day mix tanks	3	Each	$9,000	$27,000
Polymer piping	500	Liner Ft	$46.75	$23,375
Screw press wash water piping	1	LS	$10,000	$10,000
Screw press filtrate piping	1	LS	$20,000	$20,000
Misc. piping	1	LS	$100,000	$100,000
Belt converyors	1	LS	$80,000	$80,000
Bridge crane	1	LS	$75,000	$75,000
Monorail	1	LS	$34,000	$34,000
Seeding & finish grading	1	LS	$3,600	$3,600
Coatings	1	LS	$75,000	$75,000
HVAC	1	LS		
Electrical and Controls	1	LS	$300,000	$300,000
		Dewatering with Schwing Screw Press Subtotal		**$3,440,000**

Drying with Therma-Flite Dryer				
Mobilization	1	LS	$287,000	$287,000
Demolition	1	LS	$30,000	$30,000
Building modifications	1	LS	$50,000	$50,000
IC 7000 dryer	1	Each	$3,120,000	$3,120,000
Costs associated with oversized feed hopper	1	Each	$50,000	$50,000
Feed hopper and bypass piping	100	Liner Ft	$65	$6,500
Piping flange adaptors	3	Each	$156	$468
Feed hopper and bypass isolation valves	2	Each	$1,160	$2,320
Misc. natural gas piping	1	LS	$7,500	$7,500
Belt converyors	1	LS	$56,000	$56,000
Coatings	1	LS	$75,000	$75,000
Electrical and Controls	1	LS	$490,910	$490,910
	Drying with Therma-Flite Dryer Subtotal			**$4,176,000**
Solids handling building standby generator and ATS				
Mobilization	1	LS	$40,000	$40,000
Generator	1	LS	$400,000	$400,000
Solids handling building standby generator and ATS Subtotal				$440,000
Subtotal - Direct Costs			Subtotal	$11,610,000
Undeveloped Design Details (25%)			Contingency (25%)	$2,910,000
Construction Cost				**$14,520,000**
Engineering, Admin, Legal, Permitting (24%)				$3,490,000
Total Project Cost				**$18,100,000**

Summary of Dewatering Costs

Item Description			**2014 Biosolids Study**	**2016 Master Plan**
Site Piping/Lagoon Improvements				$410,000
Dewatering Feed Tank (Minimum of 3 days Storage)				$1,000,000
Dewatered Biosolids Storage Facility			$1,477,000	$2,140,000
Dewatering with Schwing Screw Press			$1,810,000	$3,440,000
Drying with Therma-Flite Dryer			$4,141,000	$4,176,000
Solids handling building standby generator and ATS				$440,000
Subtotal - Direct Costs			$7,428,000	$11,610,000
Undeveloped Design Details (25%)			$1,490,000	$2,910,000
Construction Cost			$8,920,000	$14,520,000
Engineering, Admin, Legal, Permitting (24%)				$3,490,000
Total Project Cost				**$18,100,000**

Proposed Capital Improvements	Project No.	Project Cost	Begin Design (Year)	Constructed by (Year)	Comments
New Gravity Thickener	1	$3,330,000	2020	2025	Include in Phase 1 Liquid Improvements
FOG Receiving and Processing	5	$2,920,000	TBD	TBD	See FOG action items
Microturbines	8	$4,150,000	TBD	TBD	Conduct Study: Address alternative uses.
Biosolids Handling Improvements Alternative		$18,100,000	2018	2022	
TOTAL		**$28,500,000**			

File file name.xls | Job No. Sioux Falls WRF Master Plan | No.

HDR Engineering, Inc

HDR

Project	Sioux Falls WRF Master Plan	Computed	DVP	Date	1/9/2017
Subject	Dewatering Feed Tank	Checked		Date	
Task	Preliminary Cost	Sheet		Of	

Microsoft Excel 97

KEY:

nn	input values
nn	calculated values
$20	input unit cost

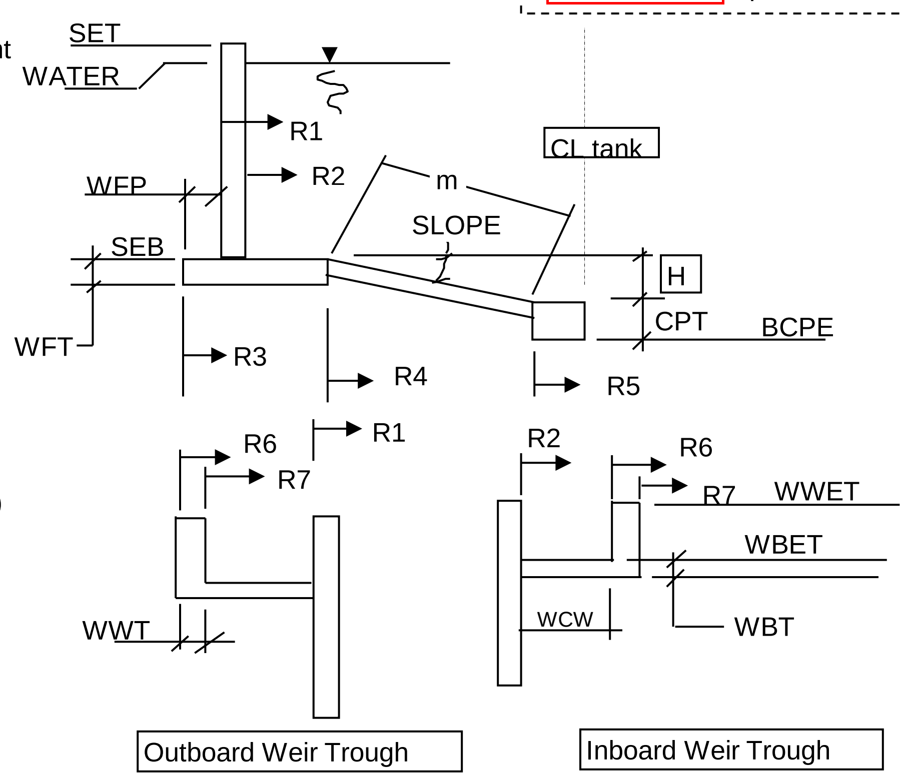
CIRCULAR CONCRETE TANK PROPERTIES

(Main Tank) Abbreviation (typ.)

water surface elev.	WATER	1405	ft
sidewall elevation top	SET	1408	ft
Floor Slope	SLOPE	2	percent
inside diameter	ID	55	ft
sidewall elev. bottom	SEB	1388	ft
sidewall thickness	SWT	1.83	ft
wall footing projection	WFP	2	ft
wall footing width (total)	WFW	8	ft
wall footing thickness	WFT	1.5	ft
slab thickness	ST	2	ft
center pier diameter	CPD	0	ft
center pier thickness	CPT	0	ft
sidewall cost	SWC	$1,000	$/yard
slab cost	SC	$750	$/yard
footing / pier cost	FC	$750	$/yard

(Weir trough)

Inboard, Outboard or No trough?		N	(I/O/N)
weir wall elev. top	WWET	722	ft
weir base elev. top	WBET	715	ft
weir channel width	WCW	3	ft
weir wall thick.	WWT	1	ft
weir base thickness	WBT	1.25	ft
weir wall cost	WWC	$500	$/yard
weir base cost	WBC	$400	$/yard



CALCULATIONS

Tank Parameters:

DEPTH = WATER - SEB = 17.00 ft.

FREEBOARD = SET-WATER = 3.00 ft.

H = SLOPE * R2 = 0.55 ft

Top of center pier Elev. = SEB-H = 1387.45

Bottom of center pier Elev. = SEB-H-CPT = 1387.45 ("BCPE")

Bottom of sidewall ftg. Elev. = SEB-WFT = 1386.50 ("BSFE")

Actual "slab" length = 'm' = Sqrt(H² + (R4-R5)²) = 23.34 ft.

Concrete volumes and costs:

general: volume = pi (R outer² - R inner²) * thickness

dimensions (ft)		ITEM:	volume (ft^3)	volume (yd^3)	cost/ yard	cost
R1	29.33	sidewall	6534	242.0	$1,000	$242,016
R2	27.50	wall ftg	2061	76.3	$750	$57,240
R3	31.33	slab	3421	126.7	$750	$95,023
R4	23.33	center pier	0	0.0	$750	$0
R5	0.00	weir wall	0	0.0	$500	$0
R6	0.00	weir base	0	0.0	$400	$0
R7	0.00		total	445.0	total	$394,279

If costs increase $50/yd total = **$416,531**

If costs decrease $50/yd total = **$372,027**

Volume of liquid in tank (cubic feet)

= Volume of { cylindrical area within sidewalls + conical area of bottom - inboard weir (if applicable) }

Volume = (PI * R2²) * ((WATER - SEB) + H/3) - (PI * (R2²-R7²) * (WATER-WBET+WBT))= **40,825** cu. ft

(conc. cost = $1,291,158 per million gal.) (= **305,369** gallons)

Excavation and backfill quantities and costs

slope at which excav. is cut	CUT =	1.5	(1 ft of drop per this many ft.)
Average Original Ground Elev.	AOGE =	1400	ft
Groundwater Elevation	GWE =	1390	ft
Finished Grade Elev.	FGE =	1400	ft
excavation cost	EC	$8.00	$/yard
dewatering cost, first foot of depth	DCFF	$50,000.00	$
dewatering cost, each additional foot	DCAF	$10,000.00	$/add'l ft depth
backfill cost	BC	$10.00	$/yard

RE2 = R3 + 4 = 35.33 ft.

RE3 = R4 - 2 = 21.33 ft.

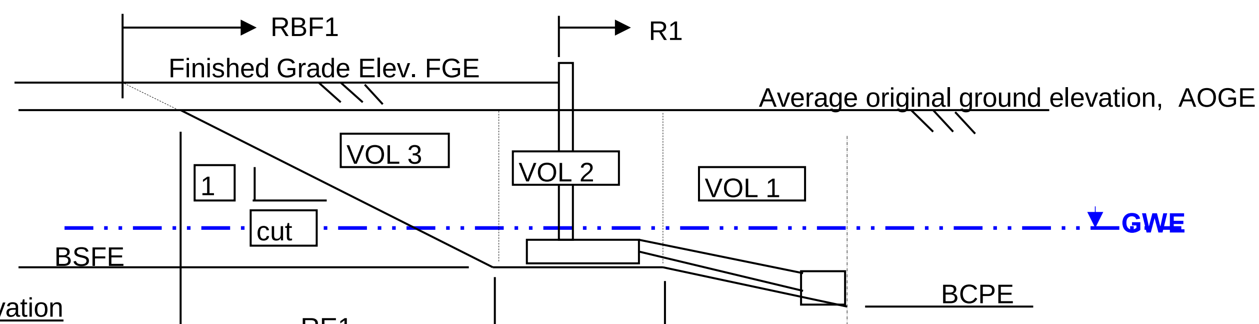
RE1 = RE2 + (AOGE-BSFE)*CUT = 55.58 ft.

RBF1 = RE2 + (FGE-BSFE)*CUT = 55.58 ft.

File file name.xls | Job No. Sioux Falls WRF Master Plan | No.

HDR Engineering, Inc

Project	Sioux Falls WRF Master Plan	Computed	DVP	Date	1/9/2017
Subject	Dewatering Feed Tank	Checked		Date	
Task	Preliminary Cost	Sheet		Of	



Excavation

VOL 1 = cylinder + cone = pi RE3² * { (AOGE-BSFE) + (BSFE-BCPE)/3 } =	18,843	cu. ft.
VOL 2 = cylinder - cylinder = pi (RE2²-RE3²) * (AOGE-BSFE) =	33,642	cu. ft.
VOL3 = frustum of cone = (pi/12)*h (D² + Dd + d²) [where d=RE2*2 and D = RE1*2] =	22,270	cu. ft.
TOTAL =	**74,755**	cu. ft.
=	**2,769**	cu. yards

Dewatering

Depth into Groundwater = GWE-BCPE = **2.5** ft

Backfill to finished grade elevation

Backfill volume = (VOL 3, up to FGE) + (VOL 2, excluding tank (ignore wall ftg and weir))

VOL3 (adjusted) = (pi/12)*h (D² + Dd + d²) [where d=RE2*2 and D = RBF1*2] =	22,270	cu. ft.
VOL 2 (adjusted) = cylinder - cylinder= pi (RE2²-R1²) * (FGE-BSFE) =	16,454	cu. ft.
TOTAL =	**38,723**	cu. ft.
=	**1,434**	cu. yards

Costs:

Excavation	**$22,150**
Dewatering	**$65,500**
Backfill	**$14,342**
TOTAL	**$101,992** Total Sitework Cost

Formwork area

1. Formwork area for inside and outside of tank vertical wall surfaces:

Outside main wall = outside circumference *height = pi (R1*2) * (SET-SEB) =	3,686	Sq. Ft.
Inside main wall = inside circumference *height = pi (R2*2) * (SET-SEB) =	3,456	Sq. Ft.
Outside weir wall = outside circumference *height = pi (R6*2) * (WWET-WBET) =	0	Sq. Ft.
Inside weir wall = inside circumference *height = pi (R7*2) * (WWET-WBET) =	0	Sq. Ft.
Total =	**7,141**	Sq. Ft.

2. Formwork area for outside of tank foundation slab vertical surface:

Outside footing ring = outside circumference *height = pi (R3*2) * WFT = **295** Sq. Ft.

3. Elevated formwork area for weir trough slab:

Outside radius = n.a. 0.00 Inside radius = n.a. 0.00

Area = pi * (Outside radius² - Inside radius²)= **0** Sq. Ft.

Scaffolding height = WBET-WBT-SEB = **n.a.** ft

Cover area and costs

cover "type"	cover name	mobilization $	per sq ft $ (UON)	
1	aluminum dome	**$20,000**	**$12**	
2	cast in place concrete	**$0**	**$500**	($/yard)
3	precast tees	**$5,000**	**$18**	
4	precast plank	**$5,000**	**$15**	
5	(none)	**$0**	**$0**	

Cover "type" from chart: 2

Are weir troughs covered? (y/n): n

Net average thickness (considering slabs, beams, columns) for CIP concrete cover (ft.): 1.33

Area of cover (ft²): 2,703

For selected cover, mobilization cost = $0

For selected cover, cover cost = $66,563 total yards of concrete= 133

Total Cover Cost = $66,563 Average cover cost/sq. ft. = $24.63

Total Costs:

Cost without cover = $496,271 (= concrete+sitework)

GRAND TOTAL COST = $562,834 (= concrete+sitework+cover)

For information only:

(Tank+Cover) cost per gallon of water = $1.51

Total cost per gallon of water = $1.84

Appendix 9.A – Model Results for Each Modeling Scenario

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

2066 SCENARIO A KEY COMPONENTS

FUTURE 2066 CONDITIONS , SCENARIO B (MODEL SCENARIO 4) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

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HDR

2066 SCENARIO B KEY COMPONENTS

FUTURE 2066 CONDITIONS , SCENARIO B (MODEL SCENARIO 4) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\MODELSCENARIOMAPPING\MODEL2066_SCENARIOB.MXD - USER: KVANDEKA - DATE: 12/18/2017

2066 Future Trunk Sewer Extensions Recommended Plan

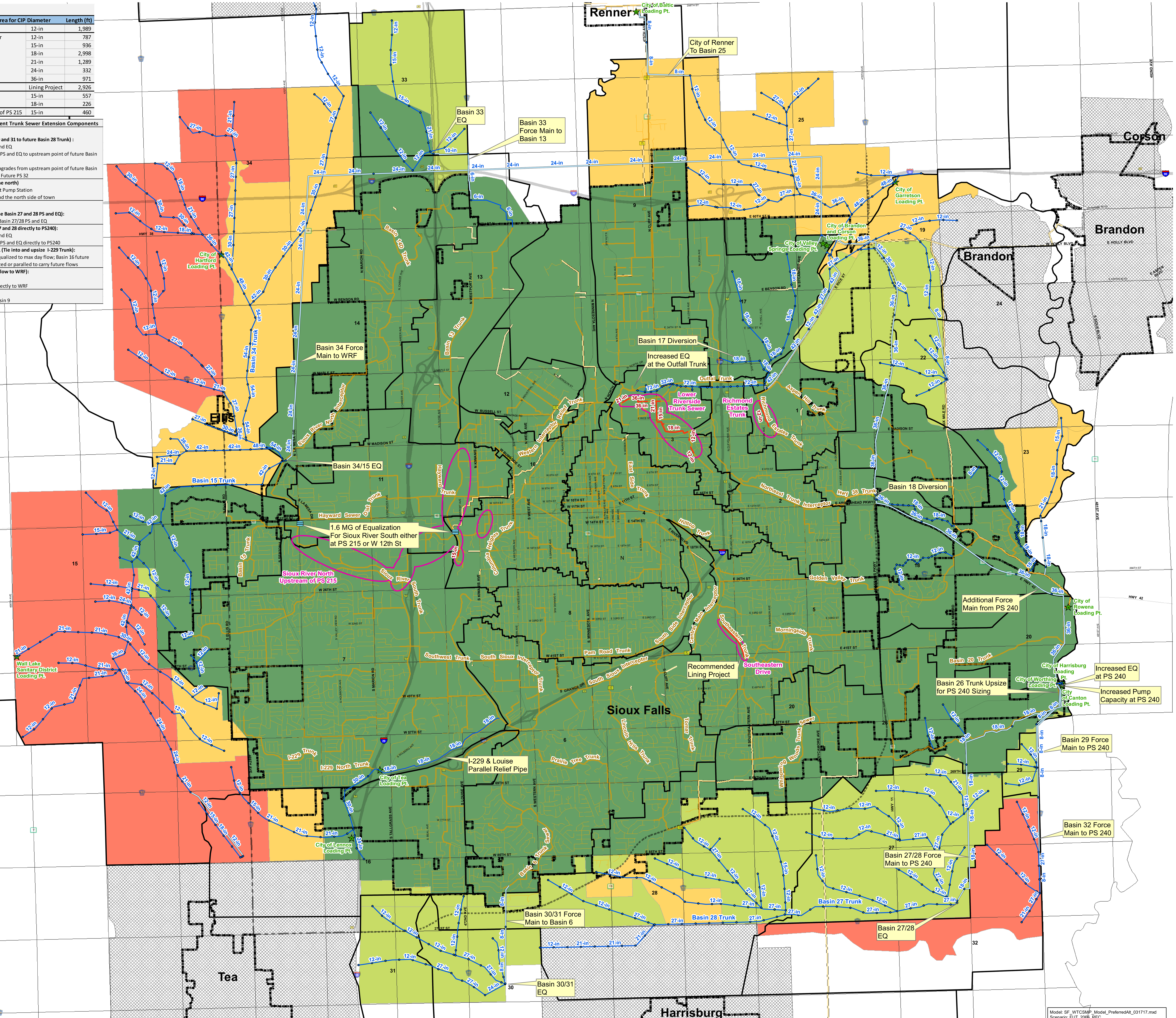
Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	8,148
Basin 9 Total		**8,148**
Basin 14	24-in	39,434
	54-in	1,202
Basin 14 Total		**40,636**
Basin 15	12-in	56,245
	15-in	3,580
	18-in	40
	21-in	20,848
	24-in	8,799
	30-in	1,811
	36-in	2,778
	42-in	21,845
Basin 15 Total		**115,947**
Basin 16	12-in	6,104
	15-in	2,000
	18-in	3,000
	21-in	7,111
	24-in	2,925
	30-in	4,948
Basin 16 Total		**26,087**
Basin 17	18-in	18,922
Basin 17 Total		**18,922**
Basin 18	8-in	2,800
	12-in	11,807
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,113**
Basin 19	12-in	16,730
	27-in	11,462
	42-in	2,426
	48-in	1,012
Basin 19 Total		**31,630**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	8-in	5,492
	12-in	13,397
Basin 22 Total		**18,888**
Basin 23	12-in	6,552
	15-in	2,416
	18-in	6,511
	21-in	1,934
Basin 23 Total		**17,414**
Basin 25	12-in	31,325
	27-in	12,099
	30-in	1,000
	36-in	4,709
	48-in	3,825
	56-in	3,341
Basin 25 Total		**56,299**

Basin	Diameter	Length (ft)
Basin 26	8-in	3,844
	8-in	177
	12-in	6,340
	18-in	1,410
	24-in	89
	36-in	47,781
Basin 26 Total		**59,641**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	42,308
	15-in	3,561
	18-in	9,447
	21-in	7,000
	27-in	20,777
Basin 28 Total		**83,093**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	24-in	1,673
	27-in	8,434
	36-in	21
Basin 30 Total		**25,282**
Basin 31	12-in	10,000
	27-in	1,000
Basin 31 Total		**11,000**
Basin 32	8-in	16,159
	12-in	11,267
	21-in	2,000
	27-in	1,508
Basin 32 Total		**30,933**
Basin 33	6-in	7,996
	10-in	2,555
	12-in	10,227
	15-in	6,747
	18-in	914
	21-in	3,149
Basin 33 Total		**31,587**
Basin 34	12-in	43,958
	18-in	2,491
	21-in	7,984
	24-in	27,215
	27-in	31,679
	30-in	19,029
	36-in	5,400
	42-in	7,489
	48-in	4,929
	54-in	12,618
	60-in	120
Basin 34 Total		**162,912**

Existing System 2066 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2066 Recommended Plan Future Development Trunk Sewer Extension Components	
Basins 30 and 31	**Option 3 (Basin 30 and 31 to future Basin 28 Trunk) :** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of future Basin 28 Trunk Sewer • Gravity sewer upgrades from upstream point of future Basin 28 Trunk Sewer to Future PS 32
Westside	**Option 1 (FM to the north)** • Basin 15/34 EQ at Pump Station • Forcemain around the north side of town
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 1 Option 1 (Tie into and upsize I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 1 (Direct Flow to WRF):** • EQ • Forcemain to directly to WRF
Renner	**Option 1:** • Flow through Basin 9



LEGEND

- 2066 CIP Equalization
- 2066 CIP Pipe Replacment
- 2066 Type A, Tier 1 Hydraulically Deficient Area
- Future Model Junctions
- Future Outfalls
- Force Main
- Gravity Main

2066 FUTURE MODEL SCENARIO COMPONENTS

- Future Regional Customer Loading Location
- Major Sanitary Sewer Basins Extended to Future

EXISTING SYSTEM MODELING

- Existing Major Lift Station
- Trunk Sewers (2016)
- Modeled Sewers (2016)
- Force Main (2016)

ROADWAYS

- INTERSTATE
- PRIMARY ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- COLLECTOR
- MINOR COLLECTOR
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- Regional Growth Areas
- PLSS Section Lines

FUTURE GROWTH TIERS

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)

HDR

0 3,000 6,000
Feet

2066 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2066 CIP ON THE EXISTING SYSTEM

FUTURE 2066 CONDITIONS , SCENARIO C (MODEL SCENARIO 6) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\MODEL2066_REC_PLAN_WITH2066CIP.MXD - USER: KVANDEKA - DATE: 2/20/2018

2066 SCENARIO D KEY COMPONENTS

FUTURE 2066 CONDITIONS , SCENARIO D (MODEL SCENARIO 9) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\MODELSCENARIOMAPPING\MODEL2066_SCENARIOD.MXD - USER: KVANDEKA - DATE: 12/18/2017

HDR

2066 SCENARIO E KEY COMPONENTS

FUTURE 2066 CONDITIONS , SCENARIO E (MODEL SCENARIO 10) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\MODELSCENARIOMAPPING\MODEL2066_SCENARIOE.MXD - USER: KVANDEKA - DATE: 12/18/2017

2066 SCENARIO F KEY COMPONENTS

FUTURE 2066 CONDITIONS , SCENARIO F (MODEL SCENARIO 11) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\MODELSCENARIOMAPPING\MODEL2066_SCENARIOF.MXD - USER: KVANDEKA - DATE: 12/18/2017

2036 Future Trunk Sewer Extensions Recommended Plan

Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	4,926
Basin 9 Total		**4,926**
Basin 14	54-in	1,202
Basin 14 Total		**1,202**
Basin 15	12-in	35,678
	21-in	2,406
	30-in	1,063
	36-in	2,778
	42-in	21,845
Basin 15 Total		**63,770**
Basin 16	21-in	6,000
	24-in	2,925
	30-in	4,948
Basin 16 Total		**13,873**
Basin 17	18-in	20,332
Basin 17 Total		**20,332**
Basin 18	8-in	2,800
	12-in	11,807
	18-in	559
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,672**
Basin 19	12-in	16,730
	27-in	11,462
	42-in	2,426
	48-in	1,012
Basin 19 Total		**31,630**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	12-in	13,397
Basin 22 Total		**13,397**
Basin 23	12-in	6,552
	15-in	2,416
	18-in	6,378
	21-in	1,934
Basin 23 Total		**17,281**
Basin 25	12-in	31,325
	27-in	12,099
	30-in	1,000
	36-in	4,709
	48-in	3,825
	56-in	3,341
Basin 25 Total		**56,299**
Basin 26	8-in	177
	12-in	5,226
	24-in	89
	30-in	47,781
	42-in	2,054
Basin 26 Total		**55,327**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	42,308
	15-in	3,561
	21-in	7,000
	27-in	20,777
Basin 28 Total		**73,646**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	18-in	9,447
	27-in	4,434
	36-in	21
Basin 30 Total		**29,056**
Basin 31	12-in	5,000
Basin 31 Total		**5,000**
Basin 33	8-in	9,336
	10-in	10,551
	12-in	11,340
	15-in	6,747
	21-in	3,149
Basin 33 Total		**41,122**
Basin 34	12-in	13,714
	18-in	827
	21-in	1,246
	24-in	2,349
	27-in	17,700
	30-in	10,426
	36-in	3,400
	42-in	5,435
	48-in	4,929
	54-in	12,661
Basin 34 Total		**72,645**

Existing System 2036 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2036 Recommended Plan Future Development Trunk Sewer Extension Components	
Basins 30 and 31	**Option 1 (Basin 30 and 31 to Basin 6 Trunk):** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of 15-inch Basin 6 Trunk Sewer • Gravity sewer upgrades from upstream point of 15-inch Basin 6 Trunk Sewer to Sioux River South Interceptor
Westside	**Option 4 (Flow through the City with EQ prior to entering)** • Basin 15/34 EQ at connection • Max Flow through City
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 2 (Tie into and parallel I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future flows are NOT equalized • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 2 (Transfer Flow through Basin 13):** • EQ • Flow through Basin 13
Renner	**Option 2 (Flow to Basin 25):** • Flow through Basin 25

2036 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2036 CIP ON THE EXISTING SYSTEM

FUTURE 2036 CONDITIONS, RECOMMEND PLAN FOR FUTURE EXTENSIONS
FUTURE 2036 BASE SANITARY FLOW WITH TIERS 1, 2, AND 3
DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\MODEL2036_REC_PLAN_WITH2066CIP.MXD - USER: KVANDEKA - DATE: 2/20/2018

2066 SCENARIO G KEY COMPONENTS

FUTURE 2066 CONDITIONS, SCENARIO G (MODEL SCENARIO 12) LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\MODELSCENARIOMAPPING\MODEL2066_SCENARIOG.MXD - USER: KVANDEKA - DATE: 12/18/2017

Appendix 9.B – Itemized Capital Costs Associated with Each Major Model Scenario for Trunk Sewer Expansion into Undeveloped Areas

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

Computed:	DVP	**Date:**	10/3/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject:	Southeastern Sewer Capacity Improvements
Task:	Southeastern Sewer Capacity Improvements
Priority:	Low

Recommendation: 13,304,800

1. Construct 1330' of New 18" and 4,800 feet of sanitary sewer to reduce potential backups.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000.00	$25,000
Clearing	1	LS	$35,000.00	$35,000
Remove Concrete Curb & Gutter	10,930	LF	$4.50	$49,185
Saw Existing Pavement	5,465	LF	$3.75	$20,494
Remove Concrete Pavement	5,100	SY	$12.00	$61,200
Remove Sanitary Manholes	17	EA	$500.00	$8,500
Remove Sewer Pipe	900	LF	$7.00	$6,300
Remove Storm Sewer Pipe	400	LF	$8.50	$3,400
Remove Watermain	1,800	LF	$5.00	$9,000
Scarify and Recompact Subgrade	5,100	SY	$0.96	$4,896
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	1,700	TON	$13.30	$22,610
Trench Stabilization	900	TON	$0.15	$135
Select Fill	8,000	TON	$5.00	$40,000
Concrete Pavment	5,100	SY	$50.00	$255,000
Concrete Curb & Gutter	10,930	LF	$18.00	$196,740
Traffic Control	1	LS	$20,000.00	$20,000
Pavement Markings	1	LS	$10,000.00	$10,000
Placing Topsoil	300	CY	$4.50	$1,350
Salvage Topsoil	300	CY	$1.25	$375
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	1,550	LB	$0.86	$1,333
Inlet Protection	10	EA	$120.00	$1,200
Replace RCP Storm Sewer Pipe	400	LF	$100.00	$40,000
18" Sanitary Sewer Pipe	1,330	LF	$70.00	$93,100
18" Sanitary Sewer Pipe Bedding Material	1,330	LF	$9.00	$11,970
30" Sanitary Sewer Pipe	4,800	LF	$225.00	$1,080,000
30" Sanitary Sewer Pipe Bedding Material	4,800	LF	$17.00	$81,600
Reconnect Sewer Service	10	EA	$700.00	$7,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$50,000.00	$50,000
Sanitary Sewer Joint Air Test	6,130	LF	$2.00	$12,260
Sanitary Sewer Pipe Deflection Test	6,130	LF	$1.00	$6,130
Trench Dewatering	6,130	LF	$25.00	$153,250
Locating Utility	10	EA	$480.00	$4,800
Verify Utility	10	EA	$305.00	$3,050
Subtotal				$2,341,000
Undeveloped Design Detail (25%)				$586,000
Construction Subtotal W/Contingencies				$2,927,000
General Conditions, Mobilization (5%)				$146,000
Sales Tax Allowance (5%)				$154,000
Overhead & Profit (15%)				$484,000
Bonds & Insurance (2%)				$74,000
Total Construction Cost				$3,785,000
Engineering, Admin., Legal, Permitting (24%)				$908,000
Total Project Cost				$4,693,000

PROJECT: **OUTFALL SEWER REPLACEMENT PROJECT** BID REQUEST NO. 16-1027

C.I.P. NO. **23019** 6/14/2017 Date:

E OF QUANTITIES

ITEM NO.	STD. BID ITEM	ITEM DESCRIPTION	UNITS	UNIT BID PRICE	APPROXIMATE QUANTITY	AMOUNT BID
GRADING						
1	9.0010	Mobilization	LS	$253,866.69	1	$253,866.69
2	100.0100	Clearing	LS	$10,000.00	1	$10,000.00
3	Special	Wetland Enhancement	LS	$30,000.00	1	$30,000.00
4	Special	Temporary Safety Fence	Ft	$5.00	1120	$5,600.00
5						
	650.7000	Remove and Replace Roadway	Ft	$400.00	500	$200,000.00
EROSION CONTROL						
	120.6300	Water For Vegetation	MGal	$4.90	11,451	$56,109.90
	734.0601	Silt Fence/ Erosion Control Wattle	Ft	$4.00	537	$2,148.00
	734.6001	Temporary Vehicle Tracking Control	Each	$1,605.00	2	$3,210.00
		General SWWP	FT	$4.00	849	$3,396.00
SANITARY SEWER						
	260.7010	Trench Stabilization Material	Ton	$35.00	300	$10,500.00
	950.0404	8" Sanitary Sewer Pipe	Ft	$50.00	100	$5,000.00
	950.2003	8" Sanitary Sewer Pipe Bedding Material	Ft	$6.00	100	$600.00
	950.0404	12" Sanitary Sewer Pipe	Ft	$60.00	100	$6,000.00
	950.2003	12" Sanitary Sewer Pipe Bedding Material	Ft	$8.00	100	$800.00
	950.0404	15" Sanitary Sewer Pipe	Ft	$65.00	100	$6,500.00
	950.2003	15" Sanitary Sewer Pipe Bedding Material	Ft	$8.50	100	$850.00
	950.0404	18" Sanitary Sewer Pipe	Ft	$70.00	100	$7,000.00
	950.2003	18" Sanitary Sewer Pipe Bedding Material	Ft	$9.00	100	$900.00
	950.0601	21" Sanitary Sewer Pipe	Ft	$70.00	10	$700.00
	950.2005	21" Sanitary Sewer Pipe Bedding Material	Ft	$11.00	10	$110.00
	950.0704	24" Sanitary Sewer Pipe	Ft	$100.00	145	$14,500.00
	950.2006	24" Sanitary Sewer Pipe Bedding Material	Ft	$12.00	145	$1,740.00
	950.0704	27" Sanitary Sewer Pipe	Ft	$150.00	145	$21,750.00
	950.2006	27" Sanitary Sewer Pipe Bedding Material	Ft	$16.00	145	$2,320.00
	950.1105	30" Sanitary Sewer Pipe	Ft	$225.00	597	$134,325.00
	950.2010	30" Sanitary Sewer Pipe Bedding Material	Ft	$17.00	597	$10,149.00
	950.1105	36" Sanitary Sewer Pipe	Ft	$275.00	597	$164,175.00
	950.2010	36" Sanitary Sewer Pipe Bedding Material	Ft	$18.00	597	$10,746.00
		42" Sanitary Sewer Pipe	Ft	$325.00	145	$47,125.00
		42" Sanitary Sewer Pipe Bedding Material	Ft	$25.00	145	$3,625.00
		48" Sanitary Sewer Pipe	Ft	$375.00	145	$54,375.00
		48" Sanitary Sewer Pipe Bedding Material	Ft	$30.00	145	$4,350.00
		54" Sanitary Sewer Pipe	Ft	$425.00	145	$61,625.00
		54" Sanitary Sewer Pipe Bedding Material	Ft	$35.00	145	$5,075.00
		60" Sanitary Sewer Pipe	Ft	$475.00	145	$68,875.00
		60" Sanitary Sewer Pipe Bedding Material	Ft	$45.00	145	$6,525.00
	Special	66" Sanitary Sewer Pipe 14' to 16' Deep	Ft	$550.00	159	$87,450.00
	Special	66" Sanitary Sewer Pipe Bedding Material	Ft	$55.00	159	$8,745.00
	Special	72" Sanitary Sewer Pipe 18' to 20' Deep	Ft	$650.00	805	$523,250.00
	Special	72" Sanitary Sewer Pipe Bedding Material	Ft	$60.00	805	$48,300.00
	Special	66" Sanitary Sewer Pipe Bedding Material	Ft	$40.00	159	$6,360.00
	Special	Sanitary Sewer 8" Gate Valve w/ Box	Each	$3,000.00	1	$3,000.00
	Special	Connect to Existing Sanitary Sewer Pipe	Each	$3,000.00	11	$33,000.00
	950.4103	48" Lined Manhole	Each	$7,500.00	3	$22,500.00
	950.4205	60" Lined Manhole	Each	$13,500.00	1	$13,500.00
	950.4302	72" Lined Manhole	Each	$14,500.00	1	$14,500.00
	Special	"x" x60" Tee Base	Each	$15,000.00	17	$255,000.00
	Special	72"x60" Tee Base	Each	$20,000.00	17	$340,000.00
	Special	60" FRPM Manhole Riser with Cone	VFT	$1,000.00	20.0	$20,000.00
	950.5200	Trench Dewatering	ft	$25.00	6,635	$165,875.00
	Special	Sanitary Sewer Joint Air Test	Ft	$2.00	12,161	$24,322.00
	Special	Sanitary Sewer Pipe Deflection Test	Ft	$1.00	12,161	$12,161.00
				Total Bid		**$2,792,533.59**

Computed: DVP | **Date:** 12/2/2016 | **HDR Job No:** 10028508

Checked: KFN | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Scenarios A-E: I229 Trunk Replacement

Task: Scenarios A-E: I229 Trunk Replacement

Recommendation:

Construction New Gravity Trunk Sewer to PS215

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
24" Sanitary Sewer Pipe	500	LF	$100.00	$50,000
24" Sanitary Sewer Pipe Bedding Material	500	LF	$4.00	$2,000
27" Sanitary Sewer Pipe	6,600	LF	$150.00	$990,000
27" Sanitary Sewer Pipe Bedding Material	6,600	LF	$4.00	$26,400
36" Sanitary Sewer Pipe	3,500	LF	$275.00	$962,500
36" Sanitary Sewer Pipe Bedding Material	3,500	LF	$6.00	$21,000
Abandon Existing Basin Trunk	10,600	LF	$30.00	$318,000
"x" x60" Tee Base	30	EA	$15,000	$450,000
Trench Dewatering	10,600	FT	$25.00	$265,000
Sanitary Sewer Joint Air Test	10,600	LF	$2.00	$21,200
Sanitary Sewer Pipe Deflection Test	10,600	LF	$1.00	$10,600
Subtotal				$3,440,000
Undeveloped Design Detail (25%)				$860,000
Construction Subtotal W/Contingencies				$4,300,000
General Conditions, Mobilization (5%)				$215,000
Bonds & Insurance (2%)				$90,000
Total Construction Cost				$4,600,000
Engineering, Admin., Legal, Permitting (24%)				$1,100,000
Total Project Cost				$5,700,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: All Scenarios F: I229 Trunk Relief

Task: All Scenarios F: I229 Trunk Relief

Recommendation:

Construction New Gravity Trunk Sewer to PS215

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
18" Sanitary Sewer Pipe	10,400	LF	$70.00	$728,000
18" Sanitary Sewer Pipe Bedding Material	10,400	LF	$0.00	$0
48" Lined Manhole	29	EA	$7,500	$217,500
Trench Dewatering	10,400	FT	$25.00	$260,000
Sanitary Sewer Joint Air Test	10,400	LF	$2.00	$20,800
Sanitary Sewer Pipe Deflection Test	10,400	LF	$1.00	$10,400
Subtotal				$1,560,000
Undeveloped Design Detail (25%)				$390,000
Construction Subtotal W/Contingencies				$1,950,000
General Conditions, Mobilization (5%)				$98,000
Bonds & Insurance (2%)				$41,000
Total Construction Cost				$2,100,000
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				$2,600,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject: Scenarios A-E: I229 Trunk Replacement

Task: Scenarios A-E: I229 Trunk Replacement

Recommendation:

Construction New Gravity Trunk Sewer to PS215

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
48" Sanitary Sewer Pipe	850	LF	$375.00	$318,750
48" Sanitary Sewer Pipe Bedding Material	850	LF	$8.50	$7,225
Abandon Existing Basin Trunk	850	LF	$30.00	$25,500
"x" x60" Tee Base	2	EA	$15,000	$30,000
Trench Dewatering	850	FT	$25.00	$21,250
Sanitary Sewer Joint Air Test	850	LF	$2.00	$1,700
Sanitary Sewer Pipe Deflection Test	850	LF	$1.00	$850
Subtotal				$730,000
Undeveloped Design Detail (25%)				$190,000
Construction Subtotal W/Contingencies				$920,000
General Conditions, Mobilization (5%)				$46,000
Bonds & Insurance (2%)				$19,000
Total Construction Cost				$1,000,000
Engineering, Admin., Legal, Permitting (24%)				$200,000
Total Project Cost				$1,200,000

Computed: DVP	**Date:** 12/2/2016	**HDR Job No:** 10028508	
Checked: KVN	**Date:**		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Scenario A and B: Sioux River North Trunk to PS215

Task: Scenario A and B: Sioux River North Trunk to PS215

Recommendation:

Construction New Gravity Trunk Sewer to PS215

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
42" Sanitary Sewer Pipe	1,100	LF	$325.00	$357,500
42" Sanitary Sewer Pipe Bedding Material	1,100	LF	$8.00	$8,800
48" Sanitary Sewer Pipe	3,600	LF	$100.00	$360,000
48" Sanitary Sewer Pipe Bedding Material	3,600	LF	$12.00	$43,200
54" Sanitary Sewer Pipe	2,900	LF	$275.00	$797,500
54" Sanitary Sewer Pipe Bedding Material	2,900	LF	$18.00	$52,200
60" Sanitary Sewer Pipe	1,400	LF	$325.00	$455,000
60" Sanitary Sewer Pipe Bedding Material	1,400	LF	$25.00	$35,000
66" Sanitary Sewer Pipe 14' to 16' Deep	8,500	LF	$375.00	$3,187,500
66" Sanitary Sewer Pipe Bedding Material	8,500	LF	$30.00	$255,000
72" Sanitary Sewer Pipe 18' to 20' Deep	6,000	LF	$425.00	$2,550,000
72" Sanitary Sewer Pipe Bedding Material	6,000	LF	$35.00	$210,000
Abandon Existing Basin Trunk	23,500	LF	$30.00	$705,000
"x" x60" Tee Base	36	EA	$15,000	$540,000
72"x60" Tee Base	17	EA	$20,000	$340,000
60" Lined Manhole	13	EA	$13,500	$175,500
Trench Dewatering	7,600	FT	$25.00	$190,000
Sanitary Sewer Joint Air Test	7,600	LF	$2.00	$15,200
Sanitary Sewer Pipe Deflection Test	7,600	LF	$1.00	$7,600
Subtotal				$10,610,000
Undeveloped Design Detail (25%)				$2,660,000
Construction Subtotal W/Contingencies				$13,270,000
General Conditions, Mobilization (5%)				$664,000
Bonds & Insurance (2%)				$279,000
Total Construction Cost				$14,200,000
Engineering, Admin., Legal, Permitting (24%)				$3,400,000
Total Project Cost				$17,600,000

Computed: DVP	**Date:** 12/2/2016	**HDR Job No:** 10028508
Checked: KFN	**Date:**	
Project: 2016 Wastewater Treatment and Collection System Master Plan		

HDR Computation

CIP Item

Subject: Scenario F: Sioux River North Trunk to PS215

Task: Scenario F: Sioux River North Trunk to PS215

Recommendation:

Construction New Gravity Trunk Sewer to PS215

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
36" Sanitary Sewer Pipe	5,800	LF	$275.00	$1,595,000
36" Sanitary Sewer Pipe Bedding Material	5,800	LF	$6.00	$34,800
42" Sanitary Sewer Pipe	10,900	LF	$325.00	$3,542,500
42" Sanitary Sewer Pipe Bedding Material	10,900	LF	$8.00	$87,200
48" Sanitary Sewer Pipe	3,200	LF	$100.00	$320,000
48" Sanitary Sewer Pipe Bedding Material	3,200	LF	$12.00	$38,400
54" Sanitary Sewer Pipe	3,700	LF	$275.00	$1,017,500
54" Sanitary Sewer Pipe Bedding Material	3,700	LF	$18.00	$66,600
Abandon Existing Basin Trunk	23,600	LF	$30.00	$708,000
"x" x60" Tee Base	67	EA	$15,000	$1,005,000
60" Lined Manhole	40	EA	$13,500	$540,000
Trench Dewatering	23,600	FT	$25.00	$590,000
Sanitary Sewer Joint Air Test	23,600	LF	$2.00	$47,200
Sanitary Sewer Pipe Deflection Test	23,600	LF	$1.00	$23,600
Subtotal				$9,940,000
Undeveloped Design Detail (25%)				$2,490,000
Construction Subtotal W/Contingencies				$12,430,000
General Conditions, Mobilization (5%)				$622,000
Bonds & Insurance (2%)				$261,000
Total Construction Cost				$13,300,000
Engineering, Admin., Legal, Permitting (24%)				$3,200,000
Total Project Cost				$16,500,000

Computed: DVP | **Date:** 12/2/2016 | **HDR Job No:** 10028508

Checked: KFN | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Scenarios A - F:Basin 15 Trunk Replacement

Task: Scenarios A - F:Basin 15 Trunk Replacement

Recommendation:
Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
36" Sanitary Sewer Pipe	2,400	LF	$275.00	$660,000
36" Sanitary Sewer Pipe Bedding Material	2,400	LF	$18.00	$43,200
Abandon Existing Basin 15 Trunk	2,400	LF	$30.00	$72,000
72" Lined Manhole	7	EA	$14,500	$99,429
Trench Dewatering	2,400	FT	$25.00	$60,000
Sanitary Sewer Joint Air Test	2,400	LF	$2.00	$4,800
Sanitary Sewer Pipe Deflection Test	2,400	LF	$1.00	$2,400
Subtotal				$1,270,000
Undeveloped Design Detail (25%)				$320,000
Construction Subtotal W/Contingencies				$1,590,000
General Conditions, Mobilization (5%)				$80,000
Bonds & Insurance (2%)				$33,000
Total Construction Cost				$1,700,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,100,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KVN	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject: Scenarios A, B and F: BASIN 15 Trunk

Task: Scenarios A, B and F: BASIN 15 Trunk

Recommendation:
Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	57,000	LF	$60.00	$3,420,000
12" Sanitary Sewer Pipe Bedding Material	57,000	LF	$8.00	$456,000
15" Sanitary Sewer Pipe	3,000	LF	$65.00	$195,000
15" Sanitary Sewer Pipe Bedding Material	3,000	LF	$8.50	$25,500
21" Sanitary Sewer Pipe	23,000	LF	$70.00	$1,610,000
21" Sanitary Sewer Pipe Bedding Material	23,000	LF	$11.00	$253,000
24" Sanitary Sewer Pipe	11,400	LF	$100.00	$1,140,000
24" Sanitary Sewer Pipe Bedding Material	11,400	LF	$12.00	$136,800
30" Sanitary Sewer Pipe	16,000	LF	$225.00	$3,600,000
30" Sanitary Sewer Pipe Bedding Material	16,000	LF	$17.00	$272,000
36" Sanitary Sewer Pipe	5,500	LF	$275.00	$1,512,500
36" Sanitary Sewer Pipe Bedding Material	5,500	LF	$18.00	$99,000
42" Sanitary Sewer Pipe	22,500	LF	$325.00	$7,312,500
42" Sanitary Sewer Pipe Bedding Material	22,500	LF	$25.00	$562,500
Abandon Existing Basin 15 Trunk	2,400	LF	$30.00	$72,000
48" Lined Manhole	195	EA	$7,500	$1,465,714
60" Lined Manhole	16	EA	$13,500	$212,143
Trench Dewatering	73,900	FT	$25.00	$1,847,500
Sanitary Sewer Joint Air Test	73,900	LF	$2.00	$147,800
Sanitary Sewer Pipe Deflection Test	73,900	LF	$1.00	$73,900
Subtotal				$24,740,000
Undeveloped Design Detail (25%)				$6,190,000
Construction Subtotal W/Contingencies				$30,930,000
General Conditions, Mobilization (5%)				$1,547,000
Bonds & Insurance (2%)				$650,000
Total Construction Cost				$33,100,000
Engineering, Admin., Legal, Permitting (24%)				$7,900,000
Total Project Cost				$41,000,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Scenarios C-E: BASIN 15 Trunk

Task: Scenarios C-E: BASIN 15 Trunk

Recommendation:

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	57,000	LF	$60.00	$3,420,000
12" Sanitary Sewer Pipe Bedding Material	57,000	LF	$8.00	$456,000
15" Sanitary Sewer Pipe	3,000	LF	$65.00	$195,000
15" Sanitary Sewer Pipe Bedding Material	3,000	LF	$8.50	$25,500
21" Sanitary Sewer Pipe	23,000	LF	$70.00	$1,610,000
21" Sanitary Sewer Pipe Bedding Material	23,000	LF	$11.00	$253,000
24" Sanitary Sewer Pipe	11,400	LF	$100.00	$1,140,000
24" Sanitary Sewer Pipe Bedding Material	11,400	LF	$12.00	$136,800
30" Sanitary Sewer Pipe	16,000	LF	$225.00	$3,600,000
30" Sanitary Sewer Pipe Bedding Material	16,000	LF	$17.00	$272,000
36" Sanitary Sewer Pipe	5,500	LF	$275.00	$1,512,500
36" Sanitary Sewer Pipe Bedding Material	5,500	LF	$18.00	$99,000
42" Sanitary Sewer Pipe	22,500	LF	$325.00	$7,312,500
42" Sanitary Sewer Pipe Bedding Material	22,500	LF	$25.00	$562,500
Abandon Existing Basin 15 Trunk	2,400	LF	$30.00	$72,000
48" Lined Manhole	195	EA	$7,500	$1,465,714
60" Lined Manhole	16	EA	$13,500	$212,143
Trench Dewatering	73,900	FT	$25.00	$1,847,500
Sanitary Sewer Joint Air Test	73,900	LF	$2.00	$147,800
Sanitary Sewer Pipe Deflection Test	73,900	LF	$1.00	$73,900
Subtotal				$24,740,000
Undeveloped Design Detail (25%)				$6,190,000
Construction Subtotal W/Contingencies				$30,930,000
General Conditions, Mobilization (5%)				$1,547,000
Bonds & Insurance (2%)				$650,000
Total Construction Cost				$33,100,000
Engineering, Admin., Legal, Permitting (24%)				$7,900,000
Total Project Cost				$41,000,000

New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	200	CY	$750	$150,000
Concrete Walls	400	CY	$1,000	$400,000
Concrete Top Slab	120	CY	$1,000	$120,000
Excavation	3,500	CY	$10	$35,000
Backfilling	4,000	CY	$10	$40,000
Crushed Rock Base	200	TON	$26	$5,200
Dewatering	1	LS	$150,000	$150,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$45,000	$45,000
Aluminum Hatches	1	LS	$40,000	$40,000
Hoists, Crane Railings	1	LS	$75,000	$75,000
Non-Clog Sewage Pumps/Motors	3	EA	$250,000	$750,000
Interior Piping, Valves, and Fittings	1	LS	$100,000	$100,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$300,000	$300,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$250,000	$250,000
Standby Generator	1	LS	$350,000	$350,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$100,000	$100,000
Miscellaneous	1	LS	$100,000	$100,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				$3,320,000
Undeveloped Design Detail (25%)				$830,000
Construction Subtotal W/Contingencies				$4,150,000
General Conditions, Mobilization (5%)				$208,000
Bonds & Insurance (2%)				$87,000
Total Construction Cost				$4,400,000
Engineering, Admin., Legal, Permitting (24%)				$1,100,000
Total Project Cost				$5,500,000

New Casing Pipe	1,500	LF	$1,000	$1,500,000
New 24" Direct Bury Forcemain	5,800	LF	$180	$1,044,000
Subtotal				$2,544,000
Undeveloped Design Detail (25%)				$640,000
Construction Subtotal W/Contingencies				$3,184,000
General Conditions, Mobilization (5%)				$159,000
Bonds & Insurance (2%)				$67,000
Total Construction Cost				$3,400,000
Engineering, Admin., Legal, Permitting (24%)				$800,000
Total Project Cost				$4,200,000

Computed: DVP **Date:** 12/2/2016 **HDR Job No:** 10028508

Checked: KVN **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 16 PS, Trunk and Forcemain

Task: BASIN 16 PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 15,16 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	9,300	LF	$60.00	$558,000
12" Sanitary Sewer Pipe Bedding Material	9,300	LF	$8.00	$74,400
15" Sanitary Sewer Pipe	3,000	LF	$65.00	$195,000
15" Sanitary Sewer Pipe Bedding Material	3,000	LF	$8.50	$25,500
18" Sanitary Sewer Pipe	4,000	LF	$70.00	$280,000
18" Sanitary Sewer Pipe Bedding Material	4,000	LF	$9.00	$36,000
21" Sanitary Sewer Pipe	12,000	LF	$70.00	$840,000
21" Sanitary Sewer Pipe Bedding Material	12,000	LF	$11.00	$132,000
24" Sanitary Sewer Pipe	4,000	LF	$100.00	$400,000
24" Sanitary Sewer Pipe Bedding Material	4,000	LF	$12.00	$48,000
30" Sanitary Sewer Pipe	5,000	LF	$225.00	$1,125,000
30" Sanitary Sewer Pipe Bedding Material	5,000	LF	$17.00	$85,000
Connect to Existing Sanitary Sewer Pipe	1	EA	$3,000.00	$3,000
48" Lined Manhole	80	EA	$7,500.00	$600,000
60" Lined Manhole	25	EA	$13,500.00	$337,500
Trench Dewatering	37,300	LF	$25.00	$932,500
Sanitary Sewer Joint Air Test	37,300	LF	$2.00	$74,600
Sanitary Sewer Pipe Deflection Test	37,300	LF	$1.00	$37,300

New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	100	CY	$1,000	$100,000
Concrete Top Slab	25	CY	$1,000	$25,000
Excavation	1,500	CY	$10	$15,000
Backfilling	750	CY	$10	$7,500
Crushed Rock Base	85	TON	$26	$2,210
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$30,000	$30,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$35,000	$70,000
Interior Piping, Valves, and Fittings	1	LS	$40,000	$40,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$100,000	$100,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$40,000	$40,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$25,000	$25,000
New Casing Pipe	700	LF	$700	$490,000
Odor Control	1	LS	$80,000	$80,000
New 10" Direct Bury Forcemain	15,500	LF	$110	$1,705,000
Subtotal				$9,290,000
Undeveloped Design Detail (25%)				$2,330,000
Construction Subtotal W/Contingencies				$11,620,000
General Conditions, Mobilization (5%)				$581,000
Bonds & Insurance (2%)				$244,000
Total Construction Cost				$12,400,000
Engineering, Admin., Legal, Permitting (24%)				$3,000,000
Total Project Cost				$15,400,000

Computed: DVP	**Date:** 12/2/2016	**HDR Job No:** 10028508	
Checked: KVN	**Date:**		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 18 Trunk

Task: BASIN 18 Trunk

Recommendation:

Construction Basin 18 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$4.50	$2,250
Saw Existing Pavement	500	LF	$3.75	$1,875
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	500	Cu.Yds.	$13.30	$6,650
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	500	LF	$18.00	$9,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
8" Sanitary Sewer Pipe	2,900	LF	$50.00	$145,000
8" Sanitary Sewer Pipe Bedding Material	2,900	LF	$6.00	$17,400
12" Sanitary Sewer Pipe	12,700	LF	$60.00	$762,000
12" Sanitary Sewer Pipe Bedding Material	12,700	LF	$8.00	$101,600
21" Sanitary Sewer Pipe	4,900	LF	$70.00	$343,000
21" Sanitary Sewer Pipe Bedding Material	4,900	LF	$11.00	$53,900
42" Sanitary Sewer Pipe	3,000	LF	$325.00	$975,000
42" Sanitary Sewer Pipe Bedding Material	3,000	LF	$25.00	$75,000
48" Lined Manhole	58	EA	$7,500	$435,000
72" Lined Manhole	8	EA	$14,500	$116,000
Trench Dewatering	23,500	FT	$25.00	$587,500
Sanitary Sewer Joint Air Test	23,500	LF	$2.00	$47,000
Sanitary Sewer Pipe Deflection Test	23,500	LF	$1.00	$23,500
Subtotal				$4,010,000
Undeveloped Design Detail (25%)				$1,010,000
Construction Subtotal W/Contingencies				$5,020,000
General Conditions, Mobilization (5%)				$251,000
Bonds & Insurance (2%)				$105,000
Total Construction Cost				$5,400,000
Engineering, Admin., Legal, Permitting (24%)				$1,300,000
Total Project Cost				$6,700,000

Computed: DVP	**Date:** 12/2/2016	**HDR Job No:**	10028508
Checked: KFN	**Date:**		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 19 Trunk

Task: BASIN 19 Trunk

Recommendation:

Construction Basin 19 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	19,000	LF	$60.00	$1,140,000
12" Sanitary Sewer Pipe Bedding Material	19,000	LF	$8.00	$152,000
27" Sanitary Sewer Pipe	12,500	LF	$150.00	$1,875,000
27" Sanitary Sewer Pipe Bedding Material	12,500	LF	$16.00	$200,000
42" Sanitary Sewer Pipe	1,000	LF	$325.00	$325,000
42" Sanitary Sewer Pipe Bedding Material	1,000	LF	$25.00	$25,000
48" Lined Manhole	90	EA	$7,500	$675,000
72" Lined Manhole	38	EA	$14,500	$551,000
Trench Dewatering	32,500	FT	$25.00	$812,500
Sanitary Sewer Joint Air Test	32,500	LF	$2.00	$65,000
Sanitary Sewer Pipe Deflection Test	32,500	LF	$1.00	$32,500
Subtotal				$6,100,000
Undeveloped Design Detail (25%)				$1,530,000
Construction Subtotal W/Contingencies				$7,630,000
General Conditions, Mobilization (5%)				$382,000
Bonds & Insurance (2%)				$160,000
Total Construction Cost				$8,200,000
Engineering, Admin., Legal, Permitting (24%)				$2,000,000
Total Project Cost				$10,200,000

Computed: DVP **Date:** 12/2/2016 **HDR Job No:** 10028508

Checked: KFN **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 23 Trunk

Task: BASIN 23 Trunk

Recommendation:

Construction Basin 23 New Gravity Trunk Sewers and PS

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	9,000	LF	$60.00	$540,000
12" Sanitary Sewer Pipe Bedding Material	9,000	LF	$8.00	$72,000
15" Sanitary Sewer Pipe	2,500	LF	$65.00	$162,500
15" Sanitary Sewer Pipe Bedding Material	2,500	LF	$8.50	$21,250
18" Sanitary Sewer Pipe	3,000	LF	$70.00	$210,000
18" Sanitary Sewer Pipe Bedding Material	3,000	LF	$9.00	$27,000
21" Sanitary Sewer Pipe	2,000	LF	$70.00	$140,000
21" Sanitary Sewer Pipe Bedding Material	2,000	LF	$11.00	$22,000
48" Lined Manhole	47	EA	$7,500	$352,500
Trench Dewatering	16,500	FT	$25.00	$412,500
Sanitary Sewer Joint Air Test	16,500	LF	$2.00	$33,000
Sanitary Sewer Pipe Deflection Test	16,500	LF	$1.00	$16,500
Subtotal				$2,250,000
Undeveloped Design Detail (25%)				$570,000
Construction Subtotal W/Contingencies				$2,820,000
General Conditions, Mobilization (5%)				$141,000
Bonds & Insurance (2%)				$59,000
Total Construction Cost				$3,000,000
Engineering, Admin., Legal, Permitting (24%)				$700,000
Total Project Cost				$3,700,000

Computed: DVP **Date:** 12/2/2016 **HDR Job No:** 10028508

Checked: KVN **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 25 Trunk

Task: BASIN 25 Trunk

Recommendation:

Construction Basin 25 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	33,000	LF	$60.00	$1,980,000
12" Sanitary Sewer Pipe Bedding Material	33,000	LF	$8.00	$264,000
27" Sanitary Sewer Pipe	8,000	LF	$150.00	$1,200,000
27" Sanitary Sewer Pipe Bedding Material	8,000	LF	$16.00	$128,000
36" Sanitary Sewer Pipe	5,000	LF	$275.00	$1,375,000
36" Sanitary Sewer Pipe Bedding Material	5,000	LF	$18.00	$90,000
42" Sanitary Sewer Pipe	1,500	LF	$325.00	$487,500
42" Sanitary Sewer Pipe Bedding Material	1,500	LF	$25.00	$37,500
48" Sanitary Sewer Pipe	4,000	LF	$375.00	$1,500,000
48" Sanitary Sewer Pipe Bedding Material	4,000	LF	$30.00	$120,000
54" Sanitary Sewer Pipe	4,000	LF	$425.00	$1,700,000
54" Sanitary Sewer Pipe Bedding Material	4,000	LF	$35.00	$140,000
48" Lined Manhole	117	EA	$7,500	$877,500
72" Lined Manhole	64	EA	$14,500	$928,000
Trench Dewatering	42,500	FT	$25.00	$1,062,500
Sanitary Sewer Joint Air Test	42,500	LF	$2.00	$85,000
Sanitary Sewer Pipe Deflection Test	42,500	LF	$1.00	$42,500
Subtotal				$12,260,000
Undeveloped Design Detail (25%)				$3,070,000
Construction Subtotal W/Contingencies				$15,330,000
General Conditions, Mobilization (5%)				$767,000
Bonds & Insurance (2%)				$322,000
Total Construction Cost				$16,400,000
Engineering, Admin., Legal, Permitting (24%)				$3,900,000
Total Project Cost				$20,300,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KVN	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject:	BASIN 26 Trunk
Task:	BASIN 26 Trunk

Recommendation:

Construction Basin 25 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	0	LF	$60.00	$0
12" Sanitary Sewer Pipe Bedding Material	0	LF	$8.00	$0
24" Sanitary Sewer Pipe	0	LF	$100.00	$0
24" Sanitary Sewer Pipe Bedding Material	0	LF	$12.00	$0
27" Sanitary Sewer Pipe	2,500	LF	$150.00	$375,000
27" Sanitary Sewer Pipe Bedding Material	2,500	LF	$16.00	$40,000
30" Sanitary Sewer Pipe	0	LF	$225.00	$0
30" Sanitary Sewer Pipe Bedding Material	0	LF	$17.00	$0
36" Sanitary Sewer Pipe	0	LF	$275.00	$0
36" Sanitary Sewer Pipe Bedding Material	0	LF	$18.00	$0
60" Sanitary Sewer Pipe	30	LF	$475.00	$14,250
60" Sanitary Sewer Pipe Bedding Material	30	LF	$45.00	$1,350
48" Lined Manhole	7	EA	$7,500	$52,500
72" Lined Manhole	7	EA	$14,500	$101,500
"x" x60" Tee Base	1	EA	$15,000	$15,000
Trench Dewatering	2,500	FT	$25.00	$62,500
Sanitary Sewer Joint Air Test	2,500	LF	$2.00	$5,000
Sanitary Sewer Pipe Deflection Test	2,500	LF	$1.00	$2,500
Subtotal				$910,000
Undeveloped Design Detail (25%)				$230,000
Construction Subtotal W/Contingencies				$1,140,000
General Conditions, Mobilization (5%)				$57,000
Bonds & Insurance (2%)				$24,000
Total Construction Cost				$1,200,000
Engineering, Admin., Legal, Permitting (24%)				$300,000
Total Project Cost				$1,500,000

Computed: DVP **Date:** 12/2/2016 **HDR Job No:** 10028508

Checked: KVN **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 26 Trunk

Task: BASIN 26 Trunk

Recommendation:
Construction Basin 25 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	5,500	LF	$60.00	$330,000
12" Sanitary Sewer Pipe Bedding Material	5,500	LF	$8.00	$44,000
24" Sanitary Sewer Pipe	340	LF	$100.00	$34,000
24" Sanitary Sewer Pipe Bedding Material	340	LF	$12.00	$4,080
27" Sanitary Sewer Pipe	2,400	LF	$150.00	$360,000
27" Sanitary Sewer Pipe Bedding Material	2,400	LF	$16.00	$38,400
30" Sanitary Sewer Pipe	13,500	LF	$225.00	$3,037,500
30" Sanitary Sewer Pipe Bedding Material	13,500	LF	$17.00	$229,500
36" Sanitary Sewer Pipe	2,500	LF	$275.00	$687,500
36" Sanitary Sewer Pipe Bedding Material	2,500	LF	$18.00	$45,000
48" Lined Manhole	23	EA	$7,500	$172,500
72" Lined Manhole	52	EA	$14,500	$754,000
Trench Dewatering	18,740	FT	$25.00	$468,500
Sanitary Sewer Joint Air Test	18,740	LF	$2.00	$37,480
Sanitary Sewer Pipe Deflection Test	18,740	LF	$1.00	$18,740
Subtotal				$6,510,000
Undeveloped Design Detail (25%)				$1,630,000
Construction Subtotal W/Contingencies				$8,140,000
General Conditions, Mobilization (5%)				$407,000
Bonds & Insurance (2%)				$171,000
Total Construction Cost				$8,700,000
Engineering, Admin., Legal, Permitting (24%)				$2,100,000
Total Project Cost				$10,800,000

Computed: DVP | **Date:** 12/2/2016 | **HDR Job No:** 10028508

Checked: KVN | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 26 Trunk

Task: BASIN 26 Trunk

Recommendation:

Construction Basin 25 New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Incidental Grading Work	1	LS	$20,000	$20,000
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	5,500	LF	$60.00	$330,000
12" Sanitary Sewer Pipe Bedding Material	5,500	LF	$8.00	$44,000
27" Sanitary Sewer Pipe	2,400	LF	$150.00	$360,000
27" Sanitary Sewer Pipe Bedding Material	2,400	LF	$16.00	$38,400
60" Sanitary Sewer Pipe	30	LF	$475.00	$14,250
60" Sanitary Sewer Pipe Bedding Material	30	LF	$45.00	$1,350
48" Lined Manhole	15	EA	$7,500	$112,500
72" Lined Manhole	6	EA	$14,500	$87,000
Trench Dewatering	7,930	FT	$25.00	$198,250
Sanitary Sewer Joint Air Test	7,930	LF	$2.00	$15,860
Sanitary Sewer Pipe Deflection Test	7,930	LF	$1.00	$7,930
Subtotal				$1,450,000
Undeveloped Design Detail (25%)				$370,000
Construction Subtotal W/Contingencies				$1,820,000
General Conditions, Mobilization (5%)				$91,000
Bonds & Insurance (2%)				$38,000
Total Construction Cost				$1,900,000
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				$2,400,000

Computed: DVP | **Date:** 12/2/2016 | **HDR Job No:** 10028508

Checked: KFN | **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Alt A, C F and G: BASIN 27/28 EQ, PS, Trunk and Forcemain

Task: Alt A, C F and G: BASIN 27/28 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	300	LF	$4.50	$1,350
Saw Existing Pavement	300	LF	$3.75	$1,125
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Gravel/Base Course	4,722	Cu.Yds.	$20.00	$94,444
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	300	LF	$18.00	$5,400
Traffic Control	1	LS	$40,000	$40,000
Pavement Markings	1	LS	$5,000	$5,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	48,000	LF	$60.00	$2,880,000
12" Sanitary Sewer Pipe Bedding Material	48,000	LF	$8.00	$384,000
21" Sanitary Sewer Pipe	1,000	LF	$70.00	$70,000
21" Sanitary Sewer Pipe Bedding Material	1,000	LF	$11.00	$11,000
27" Sanitary Sewer Pipe	1,000	LF	$150.00	$150,000
27" Sanitary Sewer Pipe Bedding Material	1,000	LF	$16.00	$16,000
30" Sanitary Sewer Pipe	5,000	LF	$225.00	$1,125,000
30" Sanitary Sewer Pipe Bedding Material	5,000	LF	$17.00	$85,000
36" Sanitary Sewer Pipe	17,700	LF	$275.00	$4,867,500
36" Sanitary Sewer Pipe Bedding Material	17,700	LF	$18.00	$318,600
48" Lined Manhole	140	EA	$7,500	$1,050,000
60" Lined Manhole	53	EA	$13,500	$721,286
Trench Dewatering	67,700	FT	$25.00	$1,692,500
Sanitary Sewer Joint Air Test	67,700	LF	$2.00	$135,400
Sanitary Sewer Pipe Deflection Test	67,700	LF	$1.00	$67,700
Subtotal				$13,940,000
Undeveloped Design Detail (25%)				$3,490,000
Construction Subtotal W/Contingencies				$17,430,000
General Conditions, Mobilization (5%)				$872,000
Bonds & Insurance (2%)				$366,000
Total Construction Cost				$18,700,000
Engineering, Admin., Legal, Permitting (24%)				$4,500,000
Total Project Cost				$23,200,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	150	CY	$750	$112,500
Concrete Walls	300	CY	$1,000	$300,000
Concrete Top Slab	100	CY	$1,000	$100,000
Excavation	3,500	CY	$10	$35,000
Backfilling	4,000	CY	$10	$40,000
Crushed Rock Base	200	TON	$26	$5,200
Dewatering	1	LS	$150,000	$150,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$45,000	$45,000
Aluminum Hatches	1	LS	$40,000	$40,000
Hoists, Crane Railings	1	LS	$75,000	$75,000
Non-Clog Sewage Pumps/Motors	3	EA	$300,000	$900,000
Interior Piping, Valves, and Fittings	1	LS	$75,000	$75,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$300,000	$300,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$200,000	$200,000
Standby Generator	1	LS	$300,000	$300,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$100,000	$100,000
Miscellaneous	1	LS	$100,000	$100,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				$3,190,000
Undeveloped Design Detail (25%)				$800,000
Construction Subtotal W/Contingencies				$3,990,000
General Conditions, Mobilization (5%)				$200,000
Bonds & Insurance (2%)				$84,000
Total Construction Cost				$4,300,000
Engineering, Admin., Legal, Permitting (24%)				$1,000,000
Total Project Cost				$5,300,000

New 2,200,000 Gallon EQ Basin	1	LS	$3,300,000	$3,300,000
Subtotal				$3,300,000
Undeveloped Design Detail (25%)				$830,000
Construction Subtotal W/Contingencies				$4,130,000
General Conditions, Mobilization (5%)				$207,000
Bonds & Insurance (2%)				$87,000
Total Construction Cost				$4,400,000
Engineering, Admin., Legal, Permitting (24%)				$1,100,000
Total Project Cost				$5,500,000

Scenario D

Item Description	Est. Qty	Units	Unit Price	Total Price
New 30" Direct Bury Forcemain	21,700	LF	$325	$7,052,500
Subtotal				$7,060,000
Undeveloped Design Detail (25%)				$1,770,000
Construction Subtotal W/Contingencies				$8,830,000
General Conditions, Mobilization (5%)				$442,000
Bonds & Insurance (2%)				$185,000
Total Construction Cost				$9,500,000
Engineering, Admin., Legal, Permitting (24%)				$2,300,000
Total Project Cost				$11,800,000

Scenario E

Item Description	Est. Qty	Units	Unit Price	Total Price
New 36" Direct Bury Forcemain	21,700	LF	$400	$8,680,000
Subtotal				$8,680,000
Undeveloped Design Detail (25%)				$2,170,000
Construction Subtotal W/Contingencies				$10,850,000
General Conditions, Mobilization (5%)				$543,000
Bonds & Insurance (2%)				$228,000
Total Construction Cost				$11,600,000
Engineering, Admin., Legal, Permitting (24%)				$2,800,000
Total Project Cost				$14,400,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KVN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 27/28 EQ, PS, Trunk and Forcemain

Task: BASIN 27/28 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	300	LF	$4.50	$1,350
Saw Existing Pavement	300	LF	$3.75	$1,125
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Gravel/Base Course	4,722	Cu.Yds.	$20.00	$94,444
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	300	LF	$18.00	$5,400
Traffic Control	1	LS	$40,000	$40,000
Pavement Markings	1	LS	$5,000	$5,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	48,000	LF	$60.00	$2,880,000
12" Sanitary Sewer Pipe Bedding Material	48,000	LF	$8.00	$384,000
21" Sanitary Sewer Pipe	1,000	LF	$70.00	$70,000
21" Sanitary Sewer Pipe Bedding Material	1,000	LF	$11.00	$11,000
27" Sanitary Sewer Pipe	24,000	LF	$150.00	$3,600,000
27" Sanitary Sewer Pipe Bedding Material	24,000	LF	$16.00	$384,000
36" Sanitary Sewer Pipe	150	LF	$275.00	$41,250
36" Sanitary Sewer Pipe Bedding Material	150	LF	$18.00	$2,700
48" Lined Manhole	140	EA	$7,500	$1,050,000
60" Lined Manhole	69	EA	$13,500	$931,500
Trench Dewatering	73,150	FT	$25.00	$1,828,750
Sanitary Sewer Joint Air Test	73,150	LF	$2.00	$146,300
Sanitary Sewer Pipe Deflection Test	73,150	LF	$1.00	$73,150
Subtotal				$11,770,000
Undeveloped Design Detail (25%)				$2,950,000
Construction Subtotal W/Contingencies				$14,720,000
General Conditions, Mobilization (5%)				$736,000
Bonds & Insurance (2%)				$309,000
Total Construction Cost				$15,800,000
Engineering, Admin., Legal, Permitting (24%)				$3,800,000
Total Project Cost				$19,600,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	27	CY	$1,000	$27,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	95	TON	$26	$2,470
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$65,000	$130,000
Interior Piping, Valves, and Fittings	1	LS	$75,000	$75,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$75,000	$75,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,280,000
Undeveloped Design Detail (25%)				$320,000
Construction Subtotal W/Contingencies				$1,600,000
General Conditions, Mobilization (5%)				$80,000
Bonds & Insurance (2%)				$34,000
Total Construction Cost				$1,700,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,100,000

New 2,400,000 Gallon EQ Basin	1	LS	$3,600,000	$3,600,000
Subtotal				$3,600,000
Undeveloped Design Detail (25%)				$900,000
Construction Subtotal W/Contingencies				$4,500,000
General Conditions, Mobilization (5%)				$225,000
Bonds & Insurance (2%)				$95,000
Total Construction Cost				$4,800,000
Engineering, Admin., Legal, Permitting (24%)				$1,200,000
Total Project Cost				$6,000,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New 18" Direct Bury Forcemain	21,700	LF	$175	$3,797,500
Subtotal				$3,800,000
Undeveloped Design Detail (25%)				$950,000
Construction Subtotal W/Contingencies				$4,750,000
General Conditions, Mobilization (5%)				$238,000
Bonds & Insurance (2%)				$100,000
Total Construction Cost				$5,100,000
Engineering, Admin., Legal, Permitting (24%)				$1,200,000
Total Project Cost				$6,300,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Alt D and E: BASIN 27/28 EQ, PS, Trunk and Forcemain

Task: Alt D and E: BASIN 27/28 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	300	LF	$4.50	$1,350
Saw Existing Pavement	300	LF	$3.75	$1,125
Remove Concrete Pavement	1,000	SY	$12.00	$12,000
Scarify and Recompact Subgrade	1,000	SY	$0.96	$960
Incidental Grading Work	1	LS	$20,000	$20,000
Gravel/Base Course	4,722	Cu.Yds.	$20.00	$94,444
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	1,000	SY	$50.00	$50,000
Concrete Curb & Gutter	300	LF	$18.00	$5,400
Traffic Control	1	LS	$40,000	$40,000
Pavement Markings	1	LS	$5,000	$5,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	48,000	LF	$60.00	$2,880,000
12" Sanitary Sewer Pipe Bedding Material	48,000	LF	$8.00	$384,000
21" Sanitary Sewer Pipe	1,000	LF	$70.00	$70,000
21" Sanitary Sewer Pipe Bedding Material	1,000	LF	$11.00	$11,000
27" Sanitary Sewer Pipe	1,000	LF	$150.00	$150,000
27" Sanitary Sewer Pipe Bedding Material	1,000	LF	$16.00	$16,000
30" Sanitary Sewer Pipe	5,000	LF	$225.00	$1,125,000
30" Sanitary Sewer Pipe Bedding Material	5,000	LF	$17.00	$85,000
36" Sanitary Sewer Pipe	17,700	LF	$275.00	$4,867,500
36" Sanitary Sewer Pipe Bedding Material	17,700	LF	$18.00	$318,600
48" Lined Manhole	140	EA	$7,500	$1,050,000
60" Lined Manhole	53	EA	$13,500	$721,286
Trench Dewatering	67,700	FT	$25.00	$1,692,500
Sanitary Sewer Joint Air Test	67,700	LF	$2.00	$135,400
Sanitary Sewer Pipe Deflection Test	67,700	LF	$1.00	$67,700
Subtotal				$13,940,000
Undeveloped Design Detail (25%)				$3,490,000
Construction Subtotal W/Contingencies				$17,430,000
General Conditions, Mobilization (5%)				$872,000
Bonds & Insurance (2%)				$366,000
Total Construction Cost				$18,700,000
Engineering, Admin., Legal, Permitting (24%)				$4,500,000
Total Project Cost				$23,200,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	200	CY	$750	$150,000
Concrete Walls	400	CY	$1,000	$400,000
Concrete Top Slab	120	CY	$1,000	$120,000
Excavation	3,500	CY	$10	$35,000
Backfilling	4,000	CY	$10	$40,000
Crushed Rock Base	200	TON	$26	$5,200
Dewatering	1	LS	$150,000	$150,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$45,000	$45,000
Aluminum Hatches	1	LS	$40,000	$40,000
Hoists, Crane Railings	1	LS	$75,000	$75,000
Non-Clog Sewage Pumps/Motors	3	EA	$500,000	$1,500,000
Interior Piping, Valves, and Fittings	1	LS	$100,000	$100,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$500,000	$500,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$250,000	$250,000
Standby Generator	1	LS	$450,000	$450,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$100,000	$100,000
Miscellaneous	1	LS	$100,000	$100,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				$4,370,000
Undeveloped Design Detail (25%)				$1,100,000
Construction Subtotal W/Contingencies				$5,470,000
General Conditions, Mobilization (5%)				$274,000
Bonds & Insurance (2%)				$115,000
Total Construction Cost				$5,900,000
Engineering, Admin., Legal, Permitting (24%)				$1,400,000
Total Project Cost				$7,300,000

New 2,200,000 Gallon EQ Basin	1	LS	$3,300,000	$3,300,000
Subtotal				$3,300,000
Undeveloped Design Detail (25%)				$830,000
Construction Subtotal W/Contingencies				$4,130,000
General Conditions, Mobilization (5%)				$207,000
Bonds & Insurance (2%)				$87,000
Total Construction Cost				$4,400,000
Engineering, Admin., Legal, Permitting (24%)				$1,100,000
Total Project Cost				$5,500,000

Scenario D

Item Description	Est. Qty	Units	Unit Price	Total Price
New 30" Direct Bury Forcemain	21,700	LF	$325	$7,052,500
Subtotal				$7,060,000
Undeveloped Design Detail (25%)				$1,770,000
Construction Subtotal W/Contingencies				$8,830,000
General Conditions, Mobilization (5%)				$442,000
Bonds & Insurance (2%)				$185,000
Total Construction Cost				$9,500,000
Engineering, Admin., Legal, Permitting (24%)				$2,300,000
Total Project Cost				$11,800,000

Scenario E

Item Description	Est. Qty	Units	Unit Price	Total Price
New 36" Direct Bury Forcemain	21,700	LF	$400	$8,680,000
Subtotal				$8,680,000
Undeveloped Design Detail (25%)				$2,170,000
Construction Subtotal W/Contingencies				$10,850,000
General Conditions, Mobilization (5%)				$543,000
Bonds & Insurance (2%)				$228,000
Total Construction Cost				$11,600,000
Engineering, Admin., Legal, Permitting (24%)				$2,800,000
Total Project Cost				$14,400,000

Computed: DVP **Date:** 12/2/2016 **HDR Job No:** 10028508

Checked: KVN **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 28 EQ, PS, Trunk and Forcemain

Task: BASIN 28 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,752	LF	$4.50	$7,884
Saw Existing Pavement	1,752	LF	$3.75	$6,570
Remove Concrete Pavement	4,000	SY	$12.00	$48,000
Scarify and Recompact Subgrade	4,000	SY	$0.96	$3,840
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	2,000	Cu.Yds.	$13.30	$26,600
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	4,000	SY	$50.00	$200,000
Concrete Curb & Gutter	1,752	LF	$18.00	$31,536
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	39,000	LF	$60.00	$2,340,000
12" Sanitary Sewer Pipe Bedding Material	39,000	LF	$8.00	$312,000
15" Sanitary Sewer Pipe	4,000	LF	$65.00	$260,000
15" Sanitary Sewer Pipe Bedding Material	4,000	LF	$8.50	$34,000
21" Sanitary Sewer Pipe	7,000	LF	$70.00	$490,000
21" Sanitary Sewer Pipe Bedding Material	7,000	LF	$11.00	$77,000
27" Sanitary Sewer Pipe	19,000	LF	$150.00	$2,850,000
27" Sanitary Sewer Pipe Bedding Material	19,000	LF	$16.00	$304,000
48" Lined Manhole	142	EA	$7,500	$1,065,000
60" Lined Manhole	54	EA	$13,500	$729,000
Trench Dewatering	69,000	FT	$25.00	$1,725,000
Sanitary Sewer Joint Air Test	69,000	LF	$2.00	$138,000
Sanitary Sewer Pipe Deflection Test	69,000	LF	$1.00	$69,000
Subtotal				$10,960,000
Undeveloped Design Detail (25%)				$2,740,000
Construction Subtotal W/Contingencies				$13,700,000
General Conditions, Mobilization (5%)				$685,000
Bonds & Insurance (2%)				$288,000
Total Construction Cost				$14,700,000
Engineering, Admin., Legal, Permitting (24%)				$3,500,000
Total Project Cost				$18,200,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	27	CY	$1,000	$27,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	95	TON	$26	$2,470
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000	$108,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$50,000	$50,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,210,000
Undeveloped Design Detail (25%)				$310,000
Construction Subtotal W/Contingencies				$1,520,000
General Conditions, Mobilization (5%)				$76,000
Bonds & Insurance (2%)				$32,000
Total Construction Cost				$1,600,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,000,000

New 700,000 Gallon EQ Basin	1	LS	$1,330,000	$1,330,000
Subtotal				$1,330,000
Undeveloped Design Detail (25%)				$340,000
Construction Subtotal W/Contingencies				$1,670,000
General Conditions, Mobilization (5%)				$84,000
Bonds & Insurance (2%)				$35,000
Total Construction Cost				$1,800,000
Engineering, Admin., Legal, Permitting (24%)				$430,000
Total Project Cost				$2,230,000

New 10" Direct Bury Forcemain	19,425	LF	$110	$2,136,750
Subtotal				$2,140,000
Undeveloped Design Detail (25%)				$540,000
Construction Subtotal W/Contingencies				$2,680,000
General Conditions, Mobilization (5%)				$134,000
Bonds & Insurance (2%)				$56,000
Total Construction Cost				$2,900,000
Engineering, Admin., Legal, Permitting (24%)				$700,000
Total Project Cost				$3,600,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KVN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 29 PS, Trunk and Forcemain

Task: BASIN 29 PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,752	LF	$4.50	$7,884
Saw Existing Pavement	1,752	LF	$3.75	$6,570
Remove Concrete Pavement	4,000	SY	$12.00	$48,000
Scarify and Recompact Subgrade	4,000	SY	$0.96	$3,840
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	2,000	Cu.Yds.	$13.30	$26,600
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	4,000	SY	$50.00	$200,000
Concrete Curb & Gutter	1,752	LF	$18.00	$31,536
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	7,500	LF	$60.00	$450,000
12" Sanitary Sewer Pipe Bedding Material	7,500	LF	$8.00	$60,000
48" Lined Manhole	21	EA	$7,500	$160,714
Trench Dewatering	7,500	FT	$25.00	$187,500
Sanitary Sewer Joint Air Test	7,500	LF	$2.00	$15,000
Sanitary Sewer Pipe Deflection Test	7,500	LF	$1.00	$7,500
Subtotal				$1,450,000
Undeveloped Design Detail (25%)				$370,000
Construction Subtotal W/Contingencies				$1,820,000
General Conditions, Mobilization (5%)				$91,000
Bonds & Insurance (2%)				$38,000
Total Construction Cost				$1,900,000
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				$2,400,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	100	CY	$1,000	$100,000
Concrete Top Slab	25	CY	$1,000	$25,000
Excavation	1,500	CY	$10	$15,000
Backfilling	750	CY	$10	$7,500
Crushed Rock Base	85	TON	$26	$2,210
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$30,000	$30,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$35,000	$70,000
Interior Piping, Valves, and Fittings	1	LS	$40,000	$40,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$100,000	$100,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$40,000	$40,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$25,000	$25,000
Subtotal				$990,000
Undeveloped Design Detail (25%)				$250,000
Construction Subtotal W/Contingencies				$1,240,000
General Conditions, Mobilization (5%)				$62,000
Bonds & Insurance (2%)				$26,000
Total Construction Cost				$1,300,000
Engineering, Admin., Legal, Permitting (24%)				$300,000
Total Project Cost				$1,600,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New 10" Direct Bury Forcemain	7,100	LF	$110	$781,000
Subtotal				$790,000
Undeveloped Design Detail (25%)				$200,000
Construction Subtotal W/Contingencies				$990,000
General Conditions, Mobilization (5%)				$50,000
Bonds & Insurance (2%)				$21,000
Total Construction Cost				$1,100,000
Engineering, Admin., Legal, Permitting (24%)				$300,000
Total Project Cost				$1,400,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 30_31 PS, EQ, Trunk and Forcemain

Task: BASIN 30_31 PS, EQ, Trunk and Forcemain

Recommendation:

Construct New 800 gpm Lift Station

Construct Forcemain from New Lift Station to Western Ave & Sioux River South. Connect to Existing 36" Intercepto

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,752	LF	$4.50	$7,884
Saw Existing Pavement	1,752	LF	$3.75	$6,570
Remove Concrete Pavement	4,000	SY	$12.00	$48,000
Scarify and Recompact Subgrade	4,000	SY	$0.96	$3,840
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	2,000	Cu.Yds.	$13.30	$26,600
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	4,000	SY	$50.00	$200,000
Concrete Curb & Gutter	1,752	LF	$18.00	$31,536
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	20,500	LF	$60.00	$1,230,000
12" Sanitary Sewer Pipe Bedding Material	20,500	LF	$8.00	$164,000
24" Sanitary Sewer Pipe	1,700	LF	$100.00	$170,000
24" Sanitary Sewer Pipe Bedding Material	1,700	LF	$12.00	$20,400
27" Sanitary Sewer Pipe	9,500	LF	$150.00	$1,425,000
27" Sanitary Sewer Pipe Bedding Material	9,500	LF	$16.00	$152,000
48" Lined Manhole	63	EA	$7,500	$475,714
60" Lined Manhole	27	EA	$13,500	$366,429
Trench Dewatering	22,200	FT	$25.00	$555,000
Sanitary Sewer Joint Air Test	22,200	LF	$2.00	$44,400
Sanitary Sewer Pipe Deflection Test	22,200	LF	$1.00	$22,200
Subtotal				$5,190,000
Undeveloped Design Detail (25%)				$1,300,000
Construction Subtotal W/Contingencies				$6,490,000
General Conditions, Mobilization (5%)				$325,000
Bonds & Insurance (2%)				$136,000
Total Construction Cost				$7,000,000
Engineering, Admin., Legal, Permitting (24%)				$1,700,000
Total Project Cost				$8,700,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New 750 gpm Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	27	CY	$1,000	$27,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	95	TON	$26	$2,470
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000	$108,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$75,000	$75,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,240,000
Undeveloped Design Detail (25%)				$310,000
Construction Subtotal W/Contingencies				$1,550,000
General Conditions, Mobilization (5%)				$78,000
Bonds & Insurance (2%)				$33,000
Total Construction Cost				$1,700,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,100,000

New 800,000 Gallon EQ Basin	1	LS	$1,700,000	$1,700,000
Subtotal				$1,700,000
Undeveloped Design Detail (25%)				$430,000
Construction Subtotal W/Contingencies				$2,130,000
General Conditions, Mobilization (5%)				$107,000
Bonds & Insurance (2%)				$45,000
Total Construction Cost				$2,300,000
Engineering, Admin., Legal, Permitting (24%)				$600,000
Total Project Cost				$2,900,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Direct Bury Forcemain	14,900	LF	$120	$1,788,000
Subtotal				$1,790,000
Undeveloped Design Detail (25%)				$450,000
Construction Subtotal W/Contingencies				$2,240,000
General Conditions, Mobilization (5%)				$112,000
Bonds & Insurance (2%)				$47,000
Total Construction Cost				$2,400,000
Engineering, Admin., Legal, Permitting (24%)				$600,000
Total Project Cost				$3,000,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KVN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 30_31 PS, EQ, Trunk and Forcemain

Task: BASIN 30_31 PS, EQ, Trunk and Forcemain

Recommendation:

Construct New 800 gpm Lift Station

Construct Forcemain from New Lift Station to Western Ave & Sioux River South. Connect to Existing 36" Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,752	LF	$4.50	$7,884
Saw Existing Pavement	1,752	LF	$3.75	$6,570
Remove Concrete Pavement	4,000	SY	$12.00	$48,000
Scarify and Recompact Subgrade	4,000	SY	$0.96	$3,840
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	2,000	Cu.Yds.	$13.30	$26,600
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	4,000	SY	$50.00	$200,000
Concrete Curb & Gutter	1,752	LF	$18.00	$31,536
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	20,500	LF	$60.00	$1,230,000
12" Sanitary Sewer Pipe Bedding Material	20,500	LF	$8.00	$164,000
24" Sanitary Sewer Pipe	1,700	LF	$100.00	$170,000
24" Sanitary Sewer Pipe Bedding Material	1,700	LF	$12.00	$20,400
27" Sanitary Sewer Pipe	9,500	LF	$150.00	$1,425,000
27" Sanitary Sewer Pipe Bedding Material	9,500	LF	$16.00	$152,000
48" Lined Manhole	63	EA	$7,500	$475,714
60" Lined Manhole	27	EA	$13,500	$366,429
Trench Dewatering	22,200	FT	$25.00	$555,000
Sanitary Sewer Joint Air Test	22,200	LF	$2.00	$44,400
Sanitary Sewer Pipe Deflection Test	22,200	LF	$1.00	$22,200
Subtotal				$5,190,000
Undeveloped Design Detail (25%)				$1,300,000
Construction Subtotal W/Contingencies				$6,490,000
General Conditions, Mobilization (5%)				$325,000
Bonds & Insurance (2%)				$136,000
Total Construction Cost				$7,000,000
Engineering, Admin., Legal, Permitting (24%)				$1,700,000
Total Project Cost				$8,700,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New 750 gpm Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	27	CY	$1,000	$27,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	95	TON	$26	$2,470
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000	$108,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$75,000	$75,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,240,000
Undeveloped Design Detail (25%)				$310,000
Construction Subtotal W/Contingencies				$1,550,000
General Conditions, Mobilization (5%)				$78,000
Bonds & Insurance (2%)				$33,000
Total Construction Cost				$1,700,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,100,000

New 800,000 Gallon EQ Basin	1	LS	$1,700,000	$1,700,000
Subtotal				$1,700,000
Undeveloped Design Detail (25%)				$430,000
Construction Subtotal W/Contingencies				$2,130,000
General Conditions, Mobilization (5%)				$107,000
Bonds & Insurance (2%)				$45,000
Total Construction Cost				$2,300,000
Engineering, Admin., Legal, Permitting (24%)				$600,000
Total Project Cost				$2,900,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New HDD Forcemain	21,100	LF	$220	$4,642,000
Subtotal				$4,650,000
Undeveloped Design Detail (25%)				$1,170,000
Construction Subtotal W/Contingencies				$5,820,000
General Conditions, Mobilization (5%)				$291,000
Bonds & Insurance (2%)				$122,000
Total Construction Cost				$6,200,000
Engineering, Admin., Legal, Permitting (24%)				$1,500,000
Total Project Cost				$7,700,000

Computed:	DVP	**Date:**	12/2/2016	**HDR Job No:**	10028508
Checked:	KFN	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 30_31 PS, EQ, Trunk and Forcemain

Task: BASIN 30_31 PS, EQ, Trunk and Forcemain

Recommendation:

Construct New 800 gpm Lift Station

Construct Forcemain from New Lift Station to Western Ave & Sioux River South. Connect to Existing 36" Interceptor Sewer.

Construction New Gravity Trunk Sewers

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,752	LF	$4.50	$7,884
Saw Existing Pavement	1,752	LF	$3.75	$6,570
Remove Concrete Pavement	4,000	SY	$12.00	$48,000
Scarify and Recompact Subgrade	4,000	SY	$0.96	$3,840
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	2,000	Cu.Yds.	$13.30	$26,600
Trench Stabilization	1,000	TON	$35.00	$35,000
Select Fill	4,000	TON	$5.00	$20,000
Concrete Pavment	4,000	SY	$50.00	$200,000
Concrete Curb & Gutter	1,752	LF	$18.00	$31,536
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	1	LS	$15,000	$15,000
Placing Topsoil	1,200	CY	$4.50	$5,400
Salvage Topsoil	1,200	CY	$1.25	$1,500
Sodding	1,500	SY	$3.60	$5,400
Fertilizer	2,000	LB	$0.86	$1,720
12" Sanitary Sewer Pipe	20,500	LF	$60.00	$1,230,000
12" Sanitary Sewer Pipe Bedding Material	20,500	LF	$8.00	$164,000
24" Sanitary Sewer Pipe	1,700	LF	$100.00	$170,000
24" Sanitary Sewer Pipe Bedding Material	1,700	LF	$12.00	$20,400
27" Sanitary Sewer Pipe	9,500	LF	$150.00	$1,425,000
27" Sanitary Sewer Pipe Bedding Material	9,500	LF	$16.00	$152,000
48" Lined Manhole	63	EA	$7,500	$475,714
60" Lined Manhole	27	EA	$13,500	$366,429
Trench Dewatering	22,200	FT	$25.00	$555,000
Sanitary Sewer Joint Air Test	22,200	LF	$2.00	$44,400
Sanitary Sewer Pipe Deflection Test	22,200	LF	$1.00	$22,200
Subtotal				$5,190,000
Undeveloped Design Detail (25%)				$1,300,000
Construction Subtotal W/Contingencies				$6,490,000
General Conditions, Mobilization (5%)				$325,000
Bonds & Insurance (2%)				$136,000
Total Construction Cost				$7,000,000
Engineering, Admin., Legal, Permitting (24%)				$1,700,000
Total Project Cost				$8,700,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New 750 gpm Drywell/Wet Well Lift Station and Forcemain				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	27	CY	$1,000	$27,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	95	TON	$26	$2,470
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000	$108,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$75,000	$75,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,240,000
Undeveloped Design Detail (25%)				$310,000
Construction Subtotal W/Contingencies				$1,550,000
General Conditions, Mobilization (5%)				$78,000
Bonds & Insurance (2%)				$33,000
Total Construction Cost				$1,700,000
Engineering, Admin., Legal, Permitting (24%)				$400,000
Total Project Cost				$2,100,000

New 800,000 Gallon EQ Basin	1	LS	$1,700,000	$1,700,000
Subtotal				$1,700,000
Undeveloped Design Detail (25%)				$430,000
Construction Subtotal W/Contingencies				$2,130,000
General Conditions, Mobilization (5%)				$107,000
Bonds & Insurance (2%)				$45,000
Total Construction Cost				$2,300,000
Engineering, Admin., Legal, Permitting (24%)				$600,000
Total Project Cost				$2,900,000

Item Description	Est. Qty	Units	Unit Price	Total Price
New Direct Bury Forcemain	7,253	LF	$120	$870,360
Subtotal				$880,000
Undeveloped Design Detail (25%)				$220,000
Construction Subtotal W/Contingencies				$1,100,000
General Conditions, Mobilization (5%)				$55,000
Bonds & Insurance (2%)				$23,000
Total Construction Cost				$1,200,000
Engineering, Admin., Legal, Permitting (24%)				$300,000
Total Project Cost				$1,500,000

Appendix 9.C – Alternative Comparison between Scenarios C and G for Trunk Sewer Expansion in Undeveloped Areas

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018

Figure 11.4 Selected 2066 Long-Term Improvements Map

2066 Future Trunk Sewer Extensions Recommended Plan

Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	8,148
Basin 9 Total		**8,148**
Basin 14	24-in	39,434
	54-in	1,202
Basin 14 Total		**40,636**
Basin 15	12-in	56,245
	15-in	3,580
	18-in	40
	21-in	20,848
	24-in	8,799
	30-in	1,811
	36-in	2,778
	42-in	21,845
Basin 15 Total		**115,947**
Basin 16	12-in	6,104
	15-in	2,000
	18-in	3,000
	21-in	7,111
	24-in	2,925
	30-in	4,948
Basin 16 Total		**26,087**
Basin 17	18-in	18,922
Basin 17 Total		**18,922**
Basin 18	8-in	2,800
	12-in	11,807
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,113**
Basin 19	12-in	16,730
	27-in	11,462
	42-in	2,426
	48-in	1,012
Basin 19 Total		**31,630**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	8-in	5,492
	12-in	13,397
Basin 22 Total		**18,888**
Basin 23	12-in	6,552
	15-in	2,416
	18-in	6,511
	21-in	1,934
Basin 23 Total		**17,414**
Basin 25	12-in	31,325
	27-in	12,099
	30-in	1,000
	36-in	4,709
	48-in	3,825
	56-in	3,341
Basin 25 Total		**56,299**

Basin	Diameter	Length (ft)
Basin 26	8-in	3,844
	8-in	177
	12-in	6,340
	18-in	1,410
	24-in	89
	36-in	47,781
Basin 26 Total		**59,641**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	42,308
	15-in	3,561
	18-in	9,447
	21-in	7,000
	27-in	20,777
Basin 28 Total		**83,093**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	24-in	1,673
	27-in	8,434
	36-in	21
Basin 30 Total		**25,282**
Basin 31	12-in	10,000
	27-in	1,000
Basin 31 Total		**11,000**
Basin 32	8-in	16,159
	12-in	11,267
	21-in	2,000
	27-in	1,508
Basin 32 Total		**30,933**
Basin 33	6-in	7,996
	10-in	2,555
	12-in	10,227
	15-in	6,747
	18-in	914
	21-in	3,149
Basin 33 Total		**31,587**
Basin 34	12-in	43,958
	18-in	2,491
	21-in	7,984
	24-in	27,215
	27-in	31,679
	30-in	19,029
	36-in	5,400
	42-in	7,489
	48-in	4,929
	54-in	12,618
	60-in	120
Basin 34 Total		**162,912**

Existing System 2066 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2066 Recommended Plan Future Development Trunk Sewer Extension Components

Basins 30 and 31	**Option 3 (Basin 30 and 31 to future Basin 28 Trunk) :** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of future Basin 28 Trunk Sewer • Gravity sewer upgrades from upstream point of future Basin 28 Trunk Sewer to Future PS 32
Westside	**Option 1 (FM to the north)** • Basin 15/34 EQ at Pump Station • Forcemain around the north side of town
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 1 Option 1 (Tie into and upsize I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 1 (Direct Flow to WRF):** • EQ • Forcemain to directly to WRF
Renner	**Option 1:** • Flow through Basin 9

2066 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2066 CIP ON THE EXISTING SYSTEM

FUTURE 2066 CONDITIONS, RECOMMEND PLAN FOR FUTURE EXTENSIONS
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3, AND 4 DEVELOPMENT EXTENT

Figure ES.7 Collection – Selected Collection Alternative C (2036 and Beyond Option)

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Basins 30 and 31	**Option 1 (Basin 30 and 31 to Basin 6 Trunk):** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of 15-inch Basin 6 Trunk Sewer • Gravity sewer upgrades from upstream point of 15-inch Basin 6 Trunk Sewer to Sioux River South Interceptor
Westside	**Option 4 (Flow through the City with EQ prior to entering)** • Basin 15/34 EQ at connection • Max Flow through City
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basin 33	**Option 2:** • EQ • Flow through Basin 13
Renner	**Option 2:** • Flow through Basin 25

ADVANTAGES/DISADVANTAGES

These Advantages/Disadvantages are presented in the context of comparing to Scenario C. This scenario specifically examines accommodating future sewer extensions and does not account for existing conditions improvement needs.

ADVANTAGES (compared to Scenario C)
- A long force main is not required for Basin 15 and Basin 34
- The existing system can accommodate Basin 33 via a 6.6 mile force main
- Basins 30 and 31 can be sent through the existing system via Basin 6 with a 1.4 mile force main
- Upsizing of Basin 26 not specifically required for future trunk extensions (may be required for future local development)

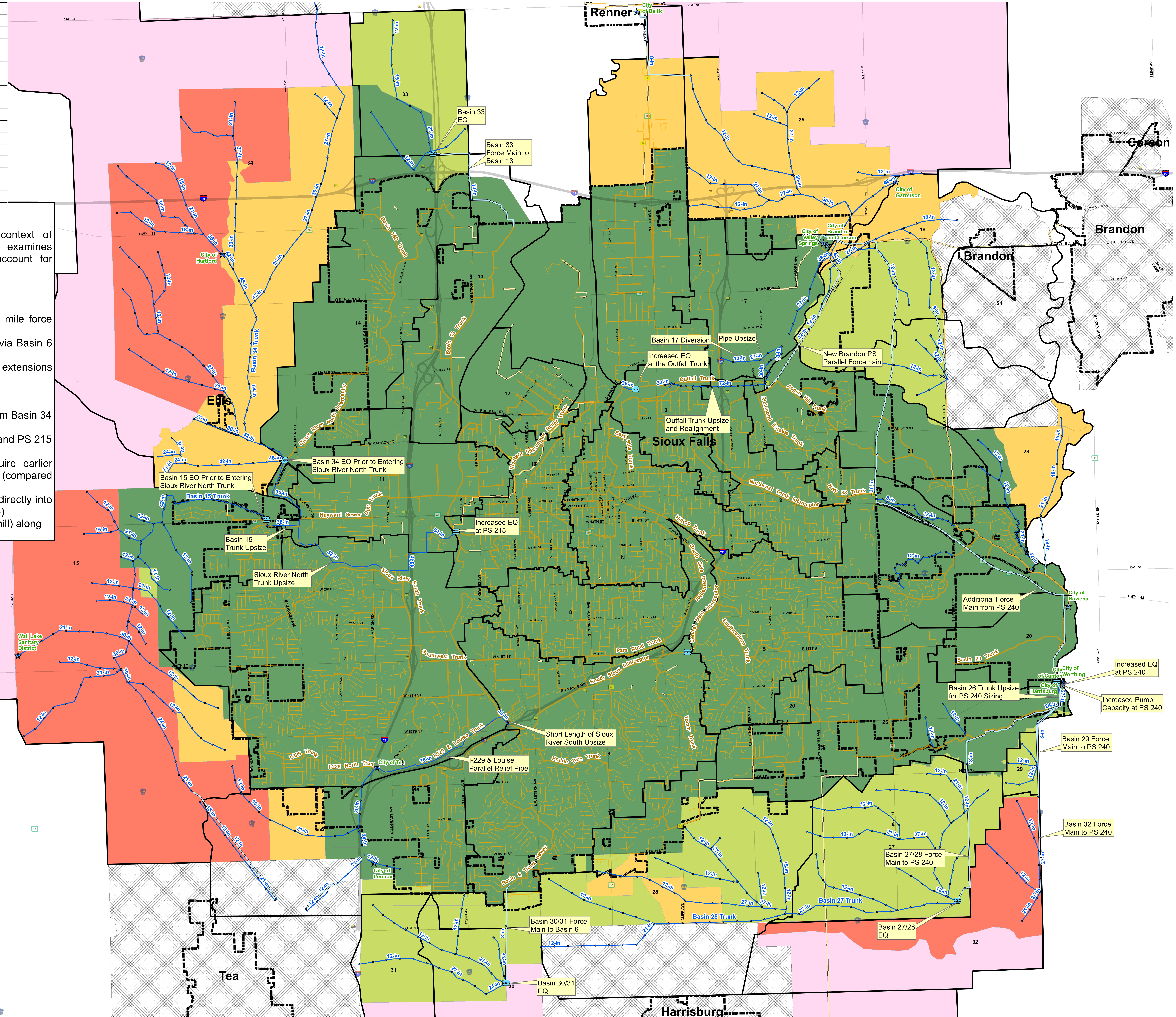
DISADVANTAGES (compared to Scenario C)
- Upsizing is required for the entire Sioux River North Trunk from Basin 34 connection
- High Volumes of EQ (41.3 MG) between basin 15, basin 34, and PS 215 with long drain times
- Earlier upstream development within Basin 28 will require earlier construction of the downstream portions of the Basin 28 trunk (compared to Basin 28 early development going through Basin 26)
- Longer force main required to serve Basin 27 and 28 to tie directly into PS 240 (as opposed to a shorter force main tying into Basin 26)
- Four foot sewer surcharges due to backwater at PS 218 (Tuthill) along

2066 FUTURE MODEL SCENARIO COMPONENTS
- Future Regional Customer Loading Location
- Future Model Junctions
- Future EQ Basins
- Future Outfalls
- Force Main
- Gravity Main
- Major Sanitary Sewer Basins Extended to Future

EXISTING SYSTEM MODELING
- Existing Major Lift Station
- Trunk Sewers (2016)
- Modeled Sewers (2016)
- Force Main (2016)

ROADWAYS
- INTERSTATE
- PRIMARY ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- COLLECTOR
- MINOR COLLECTOR
- Municipal Boundaries
- Regional Growth Areas

FUTURE GROWTH TIERS
- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)



0 3,000 6,000
Feet

2066 ALTERNATIVE G KEY COMPONENTS

FUTURE 2066 CONDITIONS, ALTERNATIVE G LAYOUT
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3 AND 4 DEVELOPMENT EXTENT

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Appendix 10.A – Detailed Breakdown of Age and Condition Reliability Related Capital Improvements

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018

Table A.10.1. Detailed Breakdown of Age and Condition Reliability Related Capital Improvements

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	Maintenance Building (2)	Building Structure	Age & reliability	Replace roof, trim, coping, & flashing	$367,000
		Mezzanine	Safety	Replace missing ladder rail and missing toe plate.	$3,800
		HVAC System	Age & reliability	Replace HVAC system	$680,000
High	Grit Building (Headworks) (3)	Copper Piping	Pipe is severely corroded	Replace copper piping with PVC piping	$13,000
		Grit Chambers/ Control Gates	Very corrosive area that requires frequent rehab.	Rehabilitate influent channel and replace gates	$610,000
		Concrete Floor	Cracking/deterioration of floor.	Repair concrete floor at overhead door of screen room	$18,000
		Building Structure	Damaged/missing brick	Repair brick on SE corner of bldg.	$5,000
		Concrete Stairway and Railing	Safety concern	Replace concrete around railing.	$1,200
		Sidewalks & Stoops	Settling/separating from bldg.	Replace sidewalks & stoops as part of Facility Sidewalk Replacement Plan	-
		Roof Access Ladder	Safety concern	Repair roof access ladder	$1,000
		Building Structure	Age & weathered	Replace the exterior doors (4 Single Doors)	$24,000
			Age & reliability	Replace roof, coping, trim, & flashing	$74,000
		HVAC	Age/reliability & efficiency	Replace HVAC system	$143,000
		Electrical - General	Update to meet NFPA 820 requirements	Replace electrical	$151,000
		Electrical	Age and deterioration	Repair exterior electrical conduits and supports	$51,000
High	Sludge Pumping Building (4)	Electrical - Fiber Optic		Extend fiber optic line	$60,000
		Electrical - General	Update to meeting NFPA 820 requirements	Replace electrical	$60,000
High	Primary Clarifiers (5)	Primary Clarifier #1	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Primary Clarifier #2	Worn seals around observation windows	Replace windows system of catwalk	$5,750

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		Primary Clarifier #3	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Primary Clarifier #4	Worn seals around observation windows	Replace windows system of catwalk	$5,750
		Electrical	Corrosion	Replace conduit and boxes at platforms	$121,000
			Down leads missing or broken	Replace lightning protection system	$13,000
High	First Stage Intermediate Clarifiers (7)	Electrical	Corrosion	Replace conduit and boxes on walkways	$50,000
High	Second Stage Intermediate Clarifiers (9)	Structural	Age & safety	Replace concrete at the guardrail posts	$5,000
		Electrical	Age & corrosion	Replace conduit and boxes on walkways	$50,000
High	Process Pumping (10)	Humus & In-Plant Piping	Age & wear	Replace humus line with glass lined pipe	$360,000
		Building Structure	Leaking between joints	Seal joints & repair concrete between wetwell & drywell	$224,000
		Electrical	Age & corrosion	Replace conduit and j-box near entrance	$30,600
High	Gravity Thickeners/ Tunnel (11)	Gravity Thickener #1	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$145,000
			Corrosion	Replace mechanism	$547,000
			Corrosion on supports	Rehab support for odor control blowers	$4,500
		Gravity Thickener #2	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$145,000
			Not properly secured	Repair stairs and landing	$4,000
			Corrosion/thin metal	Replace mechanism	$547,000
			Corrosion on supports	Rehab support for odor control blowers	$4,500
		Tunnel	Deteriorated walls	Concrete walls	$109,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
			Water leaks into tunnel through walls.	Install drainage system.	$50,000
			Water damage	Replace brick/tuck-point exit stair tower	$23,000
			Water damage	Replace roof, coping, trim & flashing on exit stair tower	$9,000
			Door is old and weathered	Replace the single access door at the tunnel tower exit	$7,000
			Corrosion on scum and sludge piping	Sandblast and recoat piping	$91,000
		Thickened Sludge Pump #1 (11PUM1100)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		Thickened Sludge Pump #2 (11PUM1101)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		Thickened Sludge Pump #3 (11PUM1102)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
High	Gravity Thickeners/ Tunnel (11)	Thickened Sludge Pump #4 (11PUM1103)	Pump is worn and inefficient	Replace pump	$91,000
			Pump is worn and inefficient	Replace motor	
		HVAC	Code Compliance	Update HVAC system to meet NFPA 820	$156,000
		Electrical	Age & condition	Replace conduit at thickener platforms	$49,000
			Age & condition	Replace conduit/supports and wiring in tunnel	$45,000
High	Digesters (12)	Building Structure	Water leaks into bldg. At west side	Install drainage system (addressed in tunnel improvements).	-
		Electrical	Code compliance	Remove electrical from existing electrical rm.	$1,044,000
High	Energy Recovery (13)	Generator #1	Requires frequent overhauls due to non-scrubbed biogas.	Caterpillar (Under current CIP for replacement)	Included in Current CIP
		Generator #2	Requires frequent overhauls due to non-scrubbed biogas.	Caterpillar (Under current CIP for replacement)	Included in Current CIP

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		Generator #3	Requires frequent overhauls due to non-scrubbed biogas.	Jenbacker (Under current CIP for replacement)	Included in Current CIP
		Building Structure	Issues with operation, function, & size of existing double doors.	Replace south door w/rollup door	$62,000
		Building Structure	Doors are old and weathered	Replace the exterior access doors (2 double and 1 single)	$31,000
		Gas Fired Hot Water Boilers	Age & condition	Replace the boilers	$241,000
		Heat Exchanger Tube (5 Each)	Age & condition	Replace the heat exchanger tubes	$251,000
		Boiler Hot Water Pump (2 Each)	Age & condition	Replace the boiler hot water pumps	$101,000
		Supply Fans (2 Each)	Age & condition	Replace the supply fans	$21,000
		Roof Exhaust Fans #3 & #4	Age & condition	Replace exhaust fans #3 & #4	$21,000
High	Solids Dewatering (14)	Building Structure - Roof	Age & condition	Replace with dewatering project	$260,000
		Building – Exterior Doors	Age & condition	Replace the exterior access doors (5 single)	$37,000
		HVAC	Age & condition	Upgrade and rezone heat and add natural gas heating	$289,000
		Electrical	Age & condition	Replace/upgrade with dewatering project	$621,000
High	Engine Generator (15)	Controls	Service reliability	Install utility circuit bypass	$252,000
High	Equipment Storage (17)	Building Structure	Space requirements	Expand office area to NW part of bldg.	$428,000
		HVAC	Old tube heaters	Update HVAC system and expand to new office area	$141,000
High	Control Building (18)	Civil/Site	Water ponds and runs into bldg.	Correct drainage on N & W sides of bldg.	$61,000
High	Control Building (18)	Blower #1 (18BLO001)	Age and efficiency	Replace blower	Included in Phase I Impr.
			Age and efficiency	Replace motor	
		Blower #2 (18BLO002)	Age and efficiency	Replace blower	Included in Phase I Impr.
			Age and efficiency	Replace motor	

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		Blower #3 (18BLO003)	Age and efficiency	Replace blower	Included in Phase I Impr.
			Age and efficiency	Replace motor	
		Blower #4 (18BLO004)	Age and efficiency	Replace blower	Included in Phase I Impr.
			Age and efficiency	Replace motor	
		Electrical	Age & efficiency	Update controls	Included in Phase I Impr.
		Building Structure	Deterioration and water damage	Replace ext. sealant and tuck-point	$622,000
		Building – Exterior Doors	Aged & worn	Replace the exterior access doors (2 single)	$16,000
		HVAC	Age/reliability	Replace entire HVAC system	$603,000
		Electrical	Age/reliability	Replace/relocate switchgear/separate switchgear circuits	Included in Phase I Impr.
High	Aeration Basins (18C)	Air Header Piping	Leaks at couplings	Replace leaking couplings	Included in Phase I Impr.
		Diffusers	Inefficient. Missing diffuser tubes	Replace with fine bubble diffusers	Included in Phase I Impr.
		Influent Valves	Corrosion	Replace the valve actuators	Included in Phase I Impr.
		Electrical	Corrosion	Replace electrical J-boxes and conduit	$164,000
High	RAS Building (19)	Building Structure	Age/condition & reliability	Replace roof, coping, trim & flashing	$107,000
		Electrical - General	Age, condition & reliability	Upgrade electrical conduit and wiring.	$621,000
		HVAC - General	Age/reliability	Update/replace HVAC equipment	$258,000
High	Filter Building (21)	Piping & Valves	Valve actuators are original	Replace filter inf. & eff. valve actuators	$644,000
		Filter Bypass Weir	Restricts flow to filters	Raise filter bypass weir	$51,000
		Electrical	Age, condition & reliability	Update conduit and wiring.	$321,000
High	Chemical Feed Building (22)	Electrical	Age, condition & reliability	Replace transformer and update conduit and wiring.	$252,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
High	In-Plant Pumping (24)	Building Structure	Age & condition	Replace roof, coping, trim & flashing	$38,000
		Electrical – General	Age, Condition, & Reliability	Update Electrical	$321,000
High	In-Plant Pumping (24)	HVAC	Age, Condition, & Reliability	Replace HVAC System Including Heat Recovery and MAU	$236,000
High	Site Electrical	Electrical Feed Loop	Age, Condition & Reliability	Replace electrical duct bank feed loop	$423,000
High	Equalization Basins (32)	Building Structure	Freeze potential	Expand building to cover dump pits (Part of a current design project).	Under Design
		Electrical	Corrosion	Replace bottom channel of MCC (Included as part of a current design project).	Under Design
			Obsolete	Replace light fixtures in bldg. (Included as part of a current design project).	Under Design
			Corrosion	Replace conduit supports in clarifier basin	$50,000
		Entire Facilities	Labor intensive, outdated, and difficult truck access.	Expand and upgrade facilities as Part of Current Design Project	Under Design
Total High Priority Recommended WRF Improvements					$14,026,600
Medium	Maintenance Building (2)	Compressed Air System	Age/wear & reliability	Replace air compressor	$20,100
		Building Structure	Faded/peeling paint	Sandblast maintenance bay walls and ceiling & repaint	$87,000
Medium	Grit Building (Headworks) (3)	Grit Blower #1 (03BL0301)	Age/wear & reliability	Replace blower	$10,500
			Age/wear & reliability	Replace motor	
		Grit Blower #3 (03BL0303)	Age/wear & reliability	Replace blower	$10,500
			Age/wear & reliability	Replace motor	
		Grit Pump & Blower Piping	Age & deterioration	Sandblast and recoat or replace piping	$314,000
		Grit Pump Suction Valves	Age/wear & reliability	Replace 2 Gate Valves	$8,000
		Grit Pump & Blower Discharge Valves	Age/wear & reliability	Replace 13 Valves	$50,000
Medium	Sludge Pumping Building (4)	Building – Exterior Door	Aged & worn	Replace exterior doors (1 double & 1 single)	$29,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		HVAC - General	Lacking heat at times during the colder months. Condensation Issues.	Add supplemental natural gas heat or remove from hot water loop and install natural gas heating. Add dehumidification.	$64,000
Medium	Primary Clarifiers (5)	Primary Clarifier #1	Cracks/wear & discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanism drive	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant Corrosion	Replace telescoping valve	$16,000
Medium	Primary Clarifiers (5)	Primary Clarifier #2	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		Primary Clarifier #3	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		Primary Clarifier #4	Cracks/wear and discoloration of concrete	Restore int./ext. concrete surfaces	$188,000
			Age/reliability	Replace mechanisms drives	$151,000
			Age and wear	Replace/restore sludge collector	$459,000
			Significant corrosion	Replace telescoping valve	$16,000
		HVAC/Odor Control	Compliance with NFPA 820	Evaluate compliance with NFPA 820	
Medium	Manhole #8 (6B)	Civil/Site	Sidewalks are difficult to clear snow with UTV	Eliminate sidewalk steps and replace sidewalk from Splitter MH#4 to Splitter MH#5 part of facility sidewalk replacement plan	-
Medium	First Stage Intermediate Cl. (7)	Civil/Site	Space under stands.	Fill/grade under humus valve supports	$3,600

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	Manhole 10 (8B)	Civil/Site	Sidewalks are difficult to clear snow with UTV	Replace Sidewalks as part of facility sidewalk replacement plan	-
Medium	Splitter Manhole #7 (9A)	Civil/Site	Cracking & settling	Replace concrete sidewalk as part of facility sidewalk replacement plan	-
			Steps and sidewalks difficult to clear snow with UTV	Eliminate Sidewalk Steps/Widen Sidewalk as part of facility sidewalk replacement plan	-
Medium	Manhole #11 (9B)	Civil/Site	Cracked sidewalks	Replaced cracked sidewalks as part of facility sidewalk replacement plan	-
Medium	Process Pumping (10)	Building Structure	Doors do not shut properly	Repair/ replace all exterior doors.	$41,000
			Deterioration/water damage	Replace Sealant/backer rod. Tuck-point.	$90,000
			Safety Reasons	Installed a landing /stairs on the rear exit.	$7,000
			Leaks/water damage	Sealant/backer rod on all windows.	$6,000
Medium	Digesters (12)	Gas Storage Sphere	Very corrosive environment	Sandblast and Recoat Interior and Exterior Surfaces	$640,000
Medium	Engine Generator (15)	Civil/Site	Cracked/deteriorated	Replace driveway and pavement	$84,000
		Enclosure	Corrosion & safety requirements	Rehabilitate enclosure and provide platform and stairs	$12,000
Medium	Dumping Station (16)	Electrical	Electrical no longer used	Remove & Demolish conduit/supports and wiring.	$10,000
Medium	Control Building (18)	Electrical	Safety	Evaluate changing the blower voltage to 480 V.	
Medium	Splitter Manhole #1 (18A)	Concrete Structure	Wastewater splashing out during high flows	Cover concrete structure with aluminum tread plate to prevent splashing.	$239,000
Medium	Manhole #1 (18B)	Concrete Structure	Wastewater splashing out during high flows	Cover concrete structure with aluminum tread plate to prevent splashing.	$21,000
Medium	Aeration Basins (18C)	Concrete Basins	Standing water in bottom of basins when drained	Slope bottom of basins with grout	$452,000
			Cracking on the upper walls and basin bottoms	Repair basin bottom and wall surfaces	$738,000
		Electrical	Corrosion on conduits	Replace dissolved oxygen sensor conduit	$103,000
			Corrosion & outdated lighting	Replace lighting around basins	$47,000
	RAS Building (19)	RAS Pump #1 (19PUMR01)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium		RAS Pump #2 (19PUMR02)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		RAS Pump #3 (19PUMR03)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		RAS Pump #4 (19PUMR04)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		RAS Pump #5 (19PUMR05)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		WAS Pump #1 (19PUMW01)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		WAS Pump #2 (19PUMW02)	Age/wear & reliability	Replace pump	Included in Phase I Impr.
			Age/wear & reliability	Replace motor	
		Building Structure	Masonry cracking	Mitigate settling	$51,000
			Groundwater leaks into drywell	Seal drywell	$186,000
			Grating is bent	Replace grating on North-side of bldg.	$58,000
			Deterioration/ water damage	Replace sealant/backer rod. Tuck-point.	$95,000
Medium	RAS Building (19)	Building – Exterior Door	Age & weathered	Replace exterior double door	$17,000
Medium	Final Clarifiers (20)	Clarifier #1	Cracking/ deterioration of concrete	Basin - Repair concrete structure (Included in Phase I Improvements).	Included in Phase I Impr.
			Age & wear	Mechanism - Replace sludge collection mechanism (Included in Phase I Improvements).	Included in Phase I Impr.
			Weirs function poorly at high flows	Construct new in-board launderer off external wall (Included in Phase I Improvements).	Included in Phase I Impr.

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		Clarifier #2	Cracking/deterioration of concrete	Basin - Repair concrete structure (Included in Phase I Improvements).	Included in Phase I Impr.
			Age & wear	Mechanism (Included in Phase I Improvements).	Included in Phase I Impr.
			Weirs function poorly at high flows	Construct new in-board launderer off external wall (Included in Phase I Improvements).	Included in Phase I Impr.
		Clarifier #3	Cracking/deterioration of concrete	Basin - Repair concrete structure (Included in Phase I Improvements).	Included in Phase I Impr.
			Age & wear	Mechanism (Included in Phase I Improvements).	Included in Phase I Impr.
			Weirs function poorly at high flows	Construct new in-board launderer off external wall (Included in Phase I Improvements).	Included in Phase I Impr.
		Clarifier #4	Cracking/deterioration of concrete	Basin - Repair concrete structure (Included in Phase I Improvements).	Included in Phase I Impr.
			Age & wear	Mechanism (Included in Phase I Improvements)	Included in Phase I Impr.
			Weirs function poorly at high flows	Construct new in-board launderer off external wall (Included in Phase I Improvements).	Included in Phase I Impr.
		Site/Civil	Cracking and settling concrete steps and sidewalks	Replace concrete steps and sidewalks as part of Facility Sidewalk Replacement Plan.	Included in Phase I Impr.
		Electrical	Age & condition	Replace with new mechanisms as part of the Phase I Improvements.	Included in Phase I Impr.
		Piping/Valves	Age & condition	Replace as part of new mechanisms (Included in Phase I Improvements).	Included in Phase I Impr.
Medium	Filter Building (21)	Building Structure	Damaged masonry	Repair masonry on south side of Bldg.	$215,000
			Water intrusion	Repair cracks on the SW wall of Bldg. (inside and out)	$76,000
			Water damage	Replace Sealant/backer rod. Tuck-point.	$19,000
			Water intrusion	Replace Sealant/backer rod on windows	$13,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
Medium	Filter Building (21)	Building – Exterior Doors	Age & weathered	Replace Exterior Doors (1 double door and 1 single)	$24,000
		Building Structure	Paint is peeling	Repaint walls in lower pipe gallery	$7,000
Medium	Chemical Feed Building (22)	Civil/Site	Concrete sidewalk is cracked and settling	Replace sidewalk as part of Facility Sidewalk Replacement Plan.	$0
		Building Structure	Cracking concrete	Rehab exterior west stairway	$2,000
		Building – Exterior	Age & weathered	Replace exterior doors (1 double door and 3 single)	$47,000
Medium	Chlorine Contact Basin (23)	Parshall Flume	Questionable accuracy during flooding.	Replace with magnetic flow meter on effluent line (Included as part of Phase I Improvements.	Included in Phase I Impr.
		Concrete Structure	Expansion required for future capacity	Expand as part of Phase I Improvements	Included in Phase I Impr.
Medium	In-Plant Pumping (24)	NPW Pump #2 (24PUMP02)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump #3 (24PUMP03)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump #4 (24PUMP04)	Age & frequent maintenance required	Replace pump	$30,333
			Age & frequent maintenance required	Replace motor	
		NPW Pump Controls	Pumps run continuously to prevent frequent cycling	Add constant pressure pumping system to NPW Pumps.	$166,500
		Strainer #1 (24STR001)	Age & frequent maintenance required	Replace NPW strainer #1	$24,500
		Strainer #2 (24STR002)	Age & frequent maintenance required	Replace NPW strainer #2	$24,500
		NPW Flow Meter (24FLM038)	Age	Replace NPW flow meter	$21,000
Medium	In-Plant Pumping (24)	In-Plant Waste Pump #1 (24PUMW01)	Age & frequent maintenance required	Replace pump	$50,333
			Age & frequent maintenance required	Replace motor	
Medium	In-Plant Pumping (24)	In-Plant Waste Pump #2	Age & frequent maintenance required	Replace pump	$50,333

Priority	Major Structure	Major Component	Risk Description	Recommendation	Cost
		(24PUMW02)	Age & frequent maintenance required	Replace motor	
		In-Plant Waste Pump #3 (PUMW03)	Age & frequent maintenance required	Replace pump	$50,333
			Age & frequent maintenance required	Replace motor	
		In-Plant Waste Controls		Add VFDs to In-Plant Waste Pumps	$86,500
		In-Plant Waste Flow Meter (24FLM037)	Age & condition	Replace In-Plant Waste Flow Meter	$21,000
		Piping & Valves	Age & condition	Replace/upgrade piping and valves	$185,000
		Building Structure	Damaged masonry	Repair brick on SW corner of bldg.	$6,000
			Water damage	Replace sealant/backer rod. Tuck-point.	$44,000
		Building – Exterior Door	Age & weathered	Replace exterior double door	$17,000
Medium	Civil/Site	Concrete Sidewalks/ Steps	Cracking, settlement, worn	Replace, widen, re-grade and eliminate concrete steps	$937,000
		Concrete Pavement	Cracking, settlement, worn	Remove and replace pavement and curb & gutter	$4,734,000
Medium	Equalization Basins (32)	Clarifier	Corrosion on inlet well	Sandblast and recoat center well	$24,000
			Corrosion on influent piping	Sandblast and recoat piping	$5,000
Total Medium Priority Recommended WRF Improvements					$13,690,00
Total Combined High and Medium Priority Recommended WRF Improvements					$27,720,000

Appendix 11.A – Preliminary Opinion of Lift Station Costs

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018

Table 11.A.1 Lift Station Condition Assessment Recommendations

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-203 Cherokee & "C" Operation	General	No as-built of station	Laser scan for as-built drawings of lift station	$21,000
			Provide for future capacity of station.	Address hotels, restaurants, and increased flows.	$21,000
		Process	Maintenance accessibility	Extend forcemains so both tie together in station	$63,000
			Deterioration, rusting and corrosion.	Sandblast and coat pump room and piping.	$16,000
			Access for forcemain cleaning.	Provide pigging station for the dual forcemains.	$31,000
			Need for suction capability with potentially deeper wetwell.	Change pumps to self-priming type pumps.	$151,000
			Required for PS upgrades	Extend suction lines through current wetwell to new wetwell.	$63,000
			Scour grease and clean wetwell.	Provide baffles or pre-rotation basin inserts (Ogee style wetwell)	$21,000
		Structural/Architectural	Old and deteriorated.	Replace roof	$44,000
			Maintenance & reliability	Construct new dual wetwell and fill old wetwell to grade.	$176,000
			Access for Vactor truck for cleaning.	Provide access hatches over dual wetwell.	$21,000
		HVAC	Required for PS upgrades	New HVAC system for the pump room and electrical room.	$65,000
		Electrical	Required for PS upgrades	Provide new electrical switchgear, motor control center, and VFDs.	$151,000
			Required for PS upgrades	Provide new generator and move to "Old Wetwell" location.	$71,000
			Required for PS upgrades	Provide seal-offs to isolate per code requirements.	$11,000
High	PS-204 Modern Press - 806 N West Avenue	Process	Safe removal of pumps and equipment.	Add Davit crane base on top slab of both wetwell and drywell	$5,000
		Electrical	Currently below grade in unsafe location	New circuit breakers at upper (immediate) level with true lockable disconnects	$31,000
			Currently below grade in unsafe location	Move generator transfer switch outside on pole.	$21,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-205 6th and Hawthorne	Architectural	Currently no safe access to the below grade pump room	Add Safe Access Maintenance Unit	$81,000
		Electrical	Currently have to use portable generator.	Provide Standby Generator with Self Contained Enclosure	$81,000
		Electrical	Controls are outdated.	Upgrade the Controls	$61,000
High	PS-206 Burnside	Structural/Architectural	Groundwater leaks into vault	Reseal mag meter vault	$31,000
			Deteriorated building	Replace above grade building	$112,000
		HVAC	Old and outdated	New supply and exhaust HVAC System	$41,000
		Electrical	Existing is older, salvage generator.	New generator and electrical upgrades	$121,000
High	PS-218 Tuthill Park - 3500 S. Blauvelt	Process	Rattling/tapping noise.	Monitor pump 4 for noise.	
			Assurance there is seal water.	Change operation of seal water to run to pumps at all times.	$21,000
			Corrosion on metallic piping	Replace seal water piping with PVC.	$21,000
			Monitor seal water flow.	Add flow tubes to seal water lines.	$29,000
		Structural/Architectural	Prevent flood water from entering building.	Install removable floodgates at the doors.	$36,000
			Prevent flood water from entering wetwell.	Raise curb around wetwell openings.	$21,000
				Construct new wall with a window to isolate electrical room.	$15,000
			Currently below flood elevation.	Raise odor control transformer	$11,000
		HVAC	Inadequate ventilation	Provide additional ventilation for HVAC System.	$31,000
		Electrical	Corrosion	Clean and coat or replace bus bars.	$151,000
				Install video monitoring cameras.	$31,000
			Currently below flood elevation.	Raise/rotate gas regulator.	$11,000

Priority	Major Structure	Major Component	Risk Description	Recommendation	Estimated Cost
High	PS-220 Rock Island	Process	Leaking at wall of pipe penetrations.	Remove and replace link seal on suction and forcemain piping.	$15,000
		HVAC	Room is damp.	Install dehumidifier.	$10,000
			Water is dripping on heater in current location.	Move unit heater.	$20,000
		Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$80,000
High	All Lift Stations	SCADA & Controls	Some equipment and Software is outdated	Upgrade SCADA Equipment.	$275,000
Total High Priority Recommended Lift Station Improvements					**$2,289,000**
Medium	PS-201	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-213	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-220 Rock Island	Process	Address flooding issues	Convert to submersible style station.	$914,000
	PS-221	Electrical	Currently have to use portable generator	Provide Standby Generator with Self Contained Enclosure	$81,000
	PS-224 - 50th Street N	Entire Station	Ragging problems	Replace pumps with Flygt-N or recessed impeller pumps	$151,000
Total Medium Priority Recommended Lift Station Improvements					**$1,310,000**
Total Combined High and Medium Priority Recommended Lift Station Improvements					**$3,600,000**

Appendix 11.B – Preliminary Opinion of Collection Costs

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

Computed: KJL | Date: 7/6/2017 | HDR Job No: 10028508

Checked: DVP | Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sioux River South EQ Improvements

Task: Sioux River South EQ Improvements

Priority: Low NOT RECOMMENDED

Recommendation:

1. Add 2.0 Million Gallons of EQ to Sioux River South Interceptor

Capital Cost:

New 2.0 Million Gallon EQ Basin	1	LS	$4,000,000	$4,000,000
Subtotal				$4,000,000
Undeveloped Design Detail (25%)				$1,000,000
Construction Subtotal W/Contingencies				**$5,000,000**
General Conditions, Mobilization (5%)				$250,000
Bonds & Insurance (2%)				$105,000
Total Construction Cost				**$5,400,000**
Engineering, Admin., Legal, Permitting (24%)				$1,300,000
Land Acquisition				$250,000
Total Project Cost				**$7,000,000**

Computed: KJL	**Date:** 7/6/2017	**HDR Job No:** 10028508	
Checked: DVP	**Date:**		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Sioux River North EQ Improvements

Task: Sioux River North EQ Improvements

Priority: Low

Recommendation:

1. Add 2.0 Million Gallons of EQ to Sioux River North Interceptor

Capital Cost:

New 2.0 Million Gallon EQ Basin	1	LS	$4,000,000	$4,000,000
Subtotal				$4,000,000
Undeveloped Design Detail (25%)				$1,000,000
Construction Subtotal W/Contingencies				**$5,000,000**
General Conditions, Mobilization (5%)				$250,000
Bonds & Insurance (2%)				$105,000
Total Construction Cost				**$5,400,000**
Engineering, Admin., Legal, Permitting (24%)				$1,300,000
Land Acquisition				$250,000
Total Project Cost				**$7,000,000**

Computed:	KJL	**Date:**	6/19/2017	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Southeastern Sewer Capacity Improvements

Task: Southeastern Sewer Capacity Improvements

Priority: Low

Recommendation: 13,304,800

1. Install CIPP Liner in 2,950' of existing 24 in. sewer.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Saw Existing Pavement	486	LF	$7.00	$3,402
Remove Pavement	400	SY	$10.00	$4,000
Remove Concrete Curb & Gutter	270	LF	$6.00	$1,620
Remove Sanitary Manholes	9	EA	$500.00	$4,500
Concrete Curb & Gutter	270	LF	$50.00	$13,500
Base Course	300	TON	$20.00	$6,000
Asphalt Concrete Pavement	200	TON	$75.00	$15,000
Pavement Markings	1	LS	$750.00	$750
Seed/Fertilize/Mulch	550	SY	$0.50	$275
Traffic Control	1	LS	$15,000.00	$15,000
24" Sewer Lining/Cleaning	2,950	LF	$125.00	$368,750
Manhole rehap/replacement	9	EA	$15,000.00	$135,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$120,000.00	$120,000
Subtotal				$688,000
Undeveloped Design Detail (25%)				$172,000
Construction Subtotal W/Contingencies				**$860,000**
General Conditions, Mobilization (5%)				$43,000
Sales Tax Allowance (5%)				$45,000
Overhead & Profit (15%)				$142,000
Bonds & Insurance (2%)				$22,000
Total Construction Cost				**$1,112,000**
Engineering, Admin., Legal, Permitting (24%)				$267,000
Total Project Cost				**$1,400,000**

Computed: KJL | Date: 6/19/2017 | HDR Job No: 10028508

Checked: DVP | Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Richmond Estates Trunk

Task: Richmond Estates Trunk

Priority: Low

Recommendation: 13,304,800

1. Construct 2,000' of New 12" sanitary sewer to reduce potential backups.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000.00	$25,000
Remove Concrete Curb & Gutter	50	LF	$6.00	$300
Saw Existing Pavement	150	LF	$7.00	$1,050
Remove Pavement	160	SY	$10.00	$1,600
Remove Sanitary Manholes	7	EA	$2,000.00	$14,000
Remove Sewer Pipe	2,000	LF	$15.00	$30,000
Remove Storm Sewer Pipe	30	LF	$15.00	$450
Scarify and Recompact Subgrade	160	SY	$1.00	$160
Base Course	84	TON	$20.00	$1,680
Asphalt concrete composite	100	TON	$115.00	$11,500
Concrete Curb & Gutter	50	LF	$50.00	$2,500
Traffic Control	1	LS	$1,500.00	$1,500
Placing Topsoil	4,040	CY	$3.00	$12,120
Salvage Topsoil	4,040	CY	$3.00	$12,120
Seed/Fertilizer/Mulch	5	ACRE	$3,500.00	$17,500
Erosion Control	5	ACRE	$4,500.00	$22,500
Replace RCP Storm Sewer Pipe	30	LF	$100.00	$3,000
12" Sanitary Sewer Pipe	2,000	LF	$60.00	$120,000
12" Sanitary Sewer Pipe Bedding Material	2,000	LF	$9.00	$18,000
Manhole Replacement	7	EA	$20,000.00	$140,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$100,000.00	$100,000
Sanitary Sewer Joint Air Test	2,000	LF	$3.00	$6,000
Sanitary Sewer Pipe Deflection Test	2,000	LF	$2.00	$4,000
Trench Dewatering	2,000	LF	$25.00	$50,000
Locating Utility	5	EA	$250.00	$1,250
Verify Utility	5	EA	$250.00	$1,250
Subtotal				$598,000
Undeveloped Design Detail (25%)				$150,000
Construction Subtotal W/Contingencies				**$748,000**
General Conditions, Mobilization (5%)				$37,000
Sales Tax Allowance (5%)				$39,000
Overhead & Profit (15%)				$124,000
Bonds & Insurance (2%)				$19,000
Total Construction Cost				**$967,000**
Engineering, Admin., Legal, Permitting (24%)				$232,000
Total Project Cost				**$1,200,000**

Computed: KJL | Date: 7/6/2017 | HDR Job No: 10028508

Checked: DVP | Date:

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: Southwest Trunk

Task: Southwest Trunk

Priority: Low

Recommendation:

1. Upsize sanitary sewer to reduce potential backups.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$10,000.00	$10,000
Remove Concrete Curb & Gutter	1,450	LF	$6.00	$8,700
Saw Existing Pavement	250	LF	$7.00	$1,750
Remove Pavement	4,028	SY	$10.00	$40,280
Remove Sanitary Manholes	6	EA	$2,000.00	$12,000
Remove Sewer Pipe	790	LF	$15.00	$11,850
Remove Storm Sewer Pipe	400	LF	$15.00	$6,000
Scarify and Recompact Subgrade	4,028	SY	$1.00	$4,028
Base Course	2,108	TON	$20.00	$42,160
Asphalt concrete composite	1,500	TON	$115.00	$172,500
Concrete Curb & Gutter	1,450	LF	$50.00	$72,500
Traffic Control	1	LS	$20,000.00	$20,000
Placing Topsoil	810	CY	$3.00	$2,430
Salvage Topsoil	810	CY	$3.00	$2,430
Seed/Fertilizer/Mulch	1	ACRE	$3,500.00	$3,500
Erosion Control	1	ACRE	$4,500.00	$4,500
Replace RCP Storm Sewer Pipe	400	LF	$100.00	$40,000
15" Sanitary Sewer Pipe	560	LF	$70.00	$39,200
18" Sanitary Sewer Pipe	230	LF	$100.00	$23,000
15" Sanitary Sewer Pipe Bedding Material	560	LF	$10.00	$5,600
18" Sanitary Sewer Pipe Bedding Material	230	LF	$15.00	$3,450
Manhole Replacement	6	EA	$20,000.00	$120,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$50,000.00	$50,000
Sanitary Sewer Joint Air Test	790	LF	$3.00	$2,370
Sanitary Sewer Pipe Deflection Test	790	LF	$2.00	$1,580
Trench Dewatering	790	LF	$25.00	$19,750
Locating Utility	10	EA	$250.00	$2,500
Verify Utility	10	EA	$250.00	$2,500
Subtotal				$725,000
Undeveloped Design Detail (25%)				$182,000
Construction Subtotal W/Contingencies				**$907,000**
General Conditions, Mobilization (5%)				$45,000
Sales Tax Allowance (5%)				$48,000
Overhead & Profit (15%)				$150,000
Bonds & Insurance (2%)				$23,000
Total Construction Cost				**$1,173,000**
Engineering, Admin., Legal, Permitting (24%)				$282,000
Total Project Cost				**$1,500,000**

Computed:	KJL	**Date:**	7/6/2017	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject: Central Main

Task: Central Main

Priority: Low NOT RECOMMENDED

Recommendation:

1. Upsize sanitary sewer to reduce potential backups.

Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$30,000.00	$30,000
Remove Concrete Curb & Gutter	2,100	LF	$6.00	$12,600
Saw Existing Pavement	1,050	LF	$7.00	$7,350
Remove Pavement	2,917	SY	$10.00	$29,170
Remove Sanitary Manholes	12	EA	$2,000.00	$24,000
Remove Sewer Pipe	3,600	LF	$15.00	$54,000
Remove Storm Sewer Pipe	1,400	LF	$15.00	$21,000
Scarify and Recompact Subgrade	2,917	SY	$1.00	$2,917
Base Course	1,526	TON	$20.00	$30,520
Asphalt concrete composite	1,100	TON	$115.00	$126,500
Concrete Curb & Gutter	2,100	LF	$50.00	$105,000
Traffic Control	1	LS	$25,000.00	$25,000
Placing Topsoil	3,230	CY	$3.00	$9,690
Salvage Topsoil	3,230	CY	$3.00	$9,690
Seed/Fertilizer/Mulch	4	ACRE	$3,500.00	$14,000
Erosion Control	4	ACRE	$4,500.00	$18,000
Replace RCP Storm Sewer Pipe	1,400	LF	$100.00	$140,000
60" Sanitary Sewer Pipe	400	LF	$475.00	$190,000
66" Sanitary Sewer Pipe	2,650	LF	$550.00	$1,457,500
72" Sanitary Sewer Pipe	550	LF	$600.00	$330,000
60" Sanitary Sewer Pipe Bedding Material	400	LF	$40.00	$16,000
66" Sanitary Sewer Pipe Bedding Material	2,650	LF	$50.00	$132,500
72" Sanitary Sewer Pipe Bedding Material	550	LF	$60.00	$33,000
Manhole Replacement	12	EA	$40,000.00	$480,000
Sanitary Sewer Temporary Bypass Pumping	1	LS	$450,000.00	$450,000
Sanitary Sewer Joint Air Test	3,600	LF	$3.00	$10,800
Sanitary Sewer Pipe Deflection Test	3,600	LF	$2.00	$7,200
Trench Dewatering	3,600	LF	$25.00	$90,000
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				**$3,882,000**
Undeveloped Design Detail (25%)				$971,000
Construction Subtotal W/Contingencies				**$4,853,000**
General Conditions, Mobilization (5%)				$243,000
Sales Tax Allowance (5%)				$255,000
Overhead & Profit (15%)				$803,000
Bonds & Insurance (2%)				$123,000
Total Construction Cost				**$6,277,000**
Engineering, Admin., Legal, Permitting (24%)				$1,506,000
Total Project Cost				**$7,800,000**

Computed:	KJL	Date:	6/27/2017	HDR Job No:	10028508
Checked:	DVP	Date:			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject:	BASIN 15 Trunk Sewer
Task:	BASIN 15 Trunk Sewer

Recommendation:

Construction of New Gravity Trunk Sewers and EQ Basin.

Construction of a New Pump Station and Force Main in 2066.

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$60,000	$60,000
Clearing	1	LS	$40,000	$40,000
Remove Concrete Curb & Gutter	2,000	LF	$6.00	$12,000
Saw Existing Pavement	2,000	LF	$8.00	$16,000
Remove Pavement	5,556	SY	$10.00	$55,560
Scarify and Recompact Subgrade	5,556	SY	$1.00	$5,556
Incidental Grading Work	1	LS	$40,000	$40,000
Base Course	2,907	TON	$20.00	$58,140
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	7,000	TON	$18.00	$126,000
Permanent Surfacing	5,556	SY	$75.00	$416,700
Concrete Curb & Gutter	2,000	LF	$60.00	$120,000
Traffic Control	1	LS	$60,000	$60,000
Pavement Markings	6000	LS	$12.00	$72,000
Placing Topsoil	67,760	CY	$3.00	$203,280
Salvage Topsoil	67,760	CY	$3.00	$203,280
Seed/Fertilizer/Mulch	84	ACRE	$3,500.00	$294,000
SWPPP (Erosion Control)	84	ACRE	$4,500.00	$378,000
12" Sanitary Sewer Pipe	15,900	LF	$60.00	$954,000
21" Sanitary Sewer Pipe	2,450	LF	$120.00	$294,000
42" Sanitary Sewer Pipe	17,950	LF	$325.00	$5,833,750
12" Sanitary Sewer Pipe Bedding Material	15,900	LF	$9.00	$143,100
21" Sanitary Sewer Pipe Bedding Material	2,450	LF	$20.00	$49,000
42" Sanitary Sewer Pipe Bedding Material	17,950	LF	$30.00	$538,500
48" Lined Manhole	46	EA	$9,000	$414,000
60" Lined Manhole	7	EA	$15,000	$105,000
84" Lined Manhole	52	EA	$25,000	$1,300,000
Manhole Frame and Cover	105	EA	$600.00	$63,000
Manhole External Frame Seal	105	EA	$350.00	$36,750
Manhole Construction Plate Marker	105	EA	$175.00	$18,375
Manhole Marker	105	EA	$250.00	$26,250
Manhole Exfiltration\Vacuum Test	105	EA	$450.00	$47,250
Trench Dewatering	36,300	FT	$25.00	$907,500
Sanitary Sewer Joint Air Test	36,300	LF	$3.00	$108,900
Sanitary Sewer Pipe Deflection Test	36,300	LF	$2.00	$72,600
Locating Utility	20	EA	$250.00	$5,000
Verify Utility	20	EA	$250.00	$5,000
Subtotal				**$13,100,000**
Undeveloped Design Detail (25%)				$3,280,000
Construction Subtotal W/Contingencies				**$16,380,000**
General Conditions, Mobilization (5%)				$819,000
Bonds & Insurance (2%)				$344,000
Total Construction Cost				**$17,500,000**
Engineering, Admin., Legal, Permitting (24%)				$4,200,000
Credit for In-Place Cost Recovery ($2,167.46/acre * 1,200 acres)				($2,601,000)
Total Project Cost				**$19,100,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$75,000	$75,000
Clearing	1	LS	$75,000	$75,000
Remove Concrete Curb & Gutter	2,500	LF	$6.00	$15,000
Saw Existing Pavement	2,500	LF	$8.00	$20,000
Remove Pavement	6,945	SY	$10.00	$69,450
Scarify and Recompact Subgrade	6,945	SY	$1.00	$6,945
Incidental Grading Work	1	LS	$50,000	$50,000
Base Course	3,634	TON	$20.00	$72,680
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	8,800	TON	$18.00	$158,400
Permanent Surfacing	6,945	SY	$75.00	$520,875
Concrete Curb & Gutter	2,500	LF	$60.00	$150,000
Traffic Control	1	LS	$80,000	$80,000
Pavement Markings	7500	LS	$12.00	$90,000
Placing Topsoil	117,780	CY	$3.00	$353,340
Salvage Topsoil	117,780	CY	$3.00	$353,340
Seed/Fertilizer/Mulch	146	ACRE	$3,500.00	$511,000
SWPPP (Erosion Control)	146	ACRE	$4,500.00	$657,000
12" Sanitary Sewer Pipe	35,300	LF	$60.00	$2,118,000
21" Sanitary Sewer Pipe	2,450	LF	$120.00	$294,000
30" Sanitary Sewer Pipe	1,100	LF	$225.00	$247,500
36" Sanitary Sewer Pipe	2,800	LF	$275.00	$770,000
42" Sanitary Sewer Pipe	21,900	LF	$325.00	$7,117,500
12" Sanitary Sewer Pipe Bedding Material	35,300	LF	$9.00	$317,700
21" Sanitary Sewer Pipe Bedding Material	2,450	LF	$20.00	$49,000
27" Sanitary Sewer Pipe Bedding Material	1,100	LF	$22.00	$24,200
36" Sanitary Sewer Pipe Bedding Material	2,800	LF	$25.00	$70,000
42" Sanitary Sewer Pipe Bedding Material	21,900	LF	$30.00	$657,000
48" Lined Manhole	101	EA	$9,000	$909,000
60" Lined Manhole	11	EA	$15,000	$165,000
72" Lined Manhole	8	EA	$20,000	$160,000
84" Lined Manhole	63	EA	$25,000	$1,575,000
Manhole Frame and Cover	183	EA	$600.00	$109,800
Manhole External Frame Seal	183	EA	$350.00	$64,050
Manhole Construction Plate Marker	183	EA	$175.00	$32,025
Manhole Marker	183	EA	$250.00	$45,750
Manhole Exfiltration\Vacuum Test	183	EA	$450.00	$82,350
Trench Dewatering	63,550	FT	$25.00	$1,588,750
Sanitary Sewer Joint Air Test	63,550	LF	$3.00	$190,650
Sanitary Sewer Pipe Deflection Test	63,550	LF	$2.00	$127,100
Locating Utility	30	EA	$250.00	$7,500
Verify Utility	30	EA	$250.00	$7,500
Subtotal				**$20,010,000**
Undeveloped Design Detail (25%)				$5,010,000
Construction Subtotal W/Contingencies				**$25,020,000**
General Conditions, Mobilization (5%)				$1,251,000
Bonds & Insurance (2%)				$525,000
Total Construction Cost				**$26,800,000**
Engineering, Admin., Legal, Permitting (24%)				$6,400,000
Credit for In-Place Cost Recovery ($2,167.46/acre * 1,200 acres)				($2,601,000)
Total Project Cost				**$30,600,000**

2066 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$150,000	$150,000
Remove Concrete Curb & Gutter	3,500	LF	$6.00	$21,000
Saw Existing Pavement	3,500	LF	$8.00	$28,000
Remove Pavement	9,723	SY	$10.00	$97,230
Scarify and Recompact Subgrade	9,723	SY	$1.00	$9,723
Incidental Grading Work	1	LS	$75,000	$75,000
Base Course	5,087	TON	$20.00	$101,740
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	12,300	TON	$18.00	$221,400
Permanent Surfacing	9,723	SY	$75.00	$729,225
Concrete Curb & Gutter	3,500	LF	$60.00	$210,000
Traffic Control	1	LS	$120,000	$120,000
Pavement Markings	10500	LS	$12.00	$126,000
Placing Topsoil	213,770	CY	$3.00	$641,310
Salvage Topsoil	213,770	CY	$3.00	$641,310
Seed/Fertilizer/Mulch	265	ACRE	$3,500.00	$927,500
SWPPP (Erosion Control)	265	ACRE	$4,500.00	$1,192,500
12" Sanitary Sewer Pipe	55,900	LF	$60.00	$3,354,000
15" Sanitary Sewer Pipe	3,600	LF	$70.00	$252,000
18" Sanitary Sewer Pipe	50	LF	$100.00	$5,000
21" Sanitary Sewer Pipe	20,850	LF	$120.00	$2,502,000
24" Sanitary Sewer Pipe	8,800	LF	$130.00	$1,144,000
30" Sanitary Sewer Pipe	1,850	LF	$225.00	$416,250
36" Sanitary Sewer Pipe	2,800	LF	$275.00	$770,000
42" Sanitary Sewer Pipe	21,450	LF	$325.00	$6,971,250
12" Sanitary Sewer Pipe Bedding Material	55,900	LF	$9.00	$503,100
15" Sanitary Sewer Pipe Bedding Material	3,600	LF	$10.00	$36,000
18" Sanitary Sewer Pipe Bedding Material	50	LF	$15.00	$750
21" Sanitary Sewer Pipe Bedding Material	20,850	LF	$20.00	$417,000
24" Sanitary Sewer Pipe Bedding Material	8,800	LF	$22.00	$193,600
27" Sanitary Sewer Pipe Bedding Material	1,850	LF	$22.00	$40,700
36" Sanitary Sewer Pipe Bedding Material	2,800	LF	$25.00	$70,000
42" Sanitary Sewer Pipe Bedding Material	21,450	LF	$30.00	$643,500
48" Lined Manhole	170	EA	$9,000	$1,530,000
60" Lined Manhole	91	EA	$15,000	$1,365,000
72" Lined Manhole	8	EA	$20,000	$160,000
84" Lined Manhole	62	EA	$25,000	$1,550,000
Manhole Frame and Cover	331	EA	$600.00	$198,600
Manhole External Frame Seal	331	EA	$350.00	$115,850
Manhole Construction Plate Marker	331	EA	$175.00	$57,925
Manhole Marker	331	EA	$250.00	$82,750
Manhole Exfiltration\Vacuum Test	331	EA	$450.00	$148,950
Trench Dewatering	115,300	FT	$25.00	$2,882,500
Sanitary Sewer Joint Air Test	115,300	LF	$3.00	$345,900
Sanitary Sewer Pipe Deflection Test	115,300	LF	$2.00	$230,600
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				$31,470,000
Undeveloped Design Detail (25%)				$7,870,000
Construction Subtotal W/Contingencies				**$39,340,000**
General Conditions, Mobilization (5%)				$1,967,000
Bonds & Insurance (2%)				$826,000
Total Construction Cost				**$42,100,000**
Engineering, Admin., Legal, Permitting (24%)				$10,100,000
Credit for In-Place Cost Recovery ($2,167.46/acre * 1,200 acres)				($2,601,000)
Total Project Cost				**$49,600,000**

	2026	2036	2066	EQ Basin	2066 EQ Basin	PS	FM
Total Project Cost	$19,100,000	$30,600,000	$49,600,000	$18,400,000	$22,500,000	$10,500,000	$45,500,000
Total Area Served (Acres)	1146	1627	6378	5091	12257	12257	12257
Subtotal Cost/Acre	$16,700.00	$18,900.00	$7,800.00	$3,700.00	$1,900.00	$900.00	$3,800.00
Total Cost/Acre	**$20,400.00**	**$22,600.00**	**$14,400.00**	-	-	-	-

Computed:	KJL	Date:	6/27/2017	HDR Job No:	10028508
Checked:	DVP	Date:			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 16 PS, Trunk and Forcemain

Task: BASIN 16 PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 15 Trunk Sewer.

Construction New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$35,000	$35,000
Clearing	1	LS	$25,000	$25,000
Remove Concrete Curb & Gutter	1,000	LF	$6.00	$6,000
Abandon Sanitary Sewer Pipe	10,400	LF	$20.00	$208,000
Saw Existing Pavement	1,000	LF	$8.00	$8,000
Remove Pavement	2,778	SY	$10.00	$27,780
Scarify and Recompact Subgrade	2,778	SY	$1.00	$2,778
Incidental Grading Work	1	LS	$30,000	$30,000
Base Course	1,454	TON	$20.00	$29,080
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	3,500	TON	$18.00	$63,000
Permanent Surfacing	2,778	SY	$75.00	$208,350
Concrete Curb & Gutter	1,000	LF	$60.00	$60,000
Traffic Control	1	LS	$25,000	$25,000
Pavement Markings	3000	LS	$12.00	$36,000
Placing Topsoil	41,140	CY	$3.00	$123,420
Salvage Topsoil	41,140	CY	$3.00	$123,420
Seed/Fertilizer/Mulch	51	ACRE	$3,500.00	$178,500
SWPPP (Erosion Control)	51	ACRE	$4,500.00	$229,500
12" Sanitary Sewer Pipe	2,750	LF	$60.00	$165,000
18" Sanitary Sewer Pipe	10,400	LF	$100.00	$1,040,000
21" Sanitary Sewer Pipe	1,000	LF	$120.00	$120,000
24" Sanitary Sewer Pipe	3,150	LF	$130.00	$409,500
30" Sanitary Sewer Pipe	4,750	LF	$225.00	$1,068,750
12" Sanitary Sewer Pipe Bedding Material	2,750	LF	$9.00	$24,750
18" Sanitary Sewer Pipe Bedding Material	10,400	LF	$15.00	$156,000
21" Sanitary Sewer Pipe Bedding Material	1,000	LF	$20.00	$20,000
24" Sanitary Sewer Pipe Bedding Material	3,150	LF	$22.00	$69,300
30" Sanitary Sewer Pipe Bedding Material	4,750	LF	$24.00	$114,000
36" Steel Casing Pipe - Trenchless Installation	1,000	LF	$750	$750,000
36" Steel Casing Pipe w/Spacers & End Seals	1,000	LF	$155	$155,000
48" Lined Manhole	8	EA	$9,000	$72,000
60" Lined Manhole	56	EA	$15,000	$840,000
Sanitary Sewer Temporary Bypass	1	LS	$400,000	$400,000
Manhole Frame and Cover	64	EA	$600.00	$38,400
Manhole External Frame Seal	64	EA	$350.00	$22,400
Manhole Construction Plate Marker	64	EA	$175.00	$11,200
Manhole Marker	64	EA	$250.00	$16,000
Manhole Exfiltration\Vacuum Test	64	EA	$450.00	$28,800
Trench Dewatering	22,050	FT	$25.00	$551,250
Sanitary Sewer Joint Air Test	22,050	LF	$3.00	$66,150
Sanitary Sewer Pipe Deflection Test	22,050	LF	$2.00	$44,100
Locating Utility	25	EA	$250.00	$6,250
Verify Utility	25	EA	$250.00	$6,250
Subtotal				**$7,630,000**
Undeveloped Design Detail (25%)				$1,910,000
Construction Subtotal W/Contingencies				**$9,540,000**
General Conditions, Mobilization (5%)				$477,000
Bonds & Insurance (2%)				$200,000
Total Construction Cost				**$10,200,000**
Engineering, Admin., Legal, Permitting (24%)				$2,400,000
Total Project Cost				**$12,600,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$60,000	$60,000
Clearing	1	LS	$50,000	$50,000
Remove Concrete Curb & Gutter	1,500	LF	$6.00	$9,000
Abandon Sanitary Sewer Pipe	10,400	LF	$20.00	$208,000
Saw Existing Pavement	1,500	LF	$8.00	$12,000
Remove Pavement	4,167	SY	$10.00	$41,670
Scarify and Recompact Subgrade	4,167	SY	$1.00	$4,167
Incidental Grading Work	1	LS	$50,000	$50,000
Base Course	2,180	TON	$20.00	$43,600
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	5,300	TON	$18.00	$95,400
Permanent Surfacing	4,167	SY	$75.00	$312,525
Concrete Curb & Gutter	1,500	LF	$60.00	$90,000
Traffic Control	1	LS	$70,000	$70,000
Pavement Markings	4500	LS	$12.00	$54,000
Placing Topsoil	50,820	CY	$3.00	$152,460
Salvage Topsoil	50,820	CY	$3.00	$152,460
Seed/Fertilizer/Mulch	63	ACRE	$3,500.00	$220,500
SWPPP (Erosion Control)	63	ACRE	$4,500.00	$283,500
12" Sanitary Sewer Pipe	2,750	LF	$60.00	$165,000
18" Sanitary Sewer Pipe	10,400	LF	$100.00	$1,040,000
21" Sanitary Sewer Pipe	6,000	LF	$120.00	$720,000
24" Sanitary Sewer Pipe	3,150	LF	$130.00	$409,500
30" Sanitary Sewer Pipe	4,750	LF	$225.00	$1,068,750
12" Sanitary Sewer Pipe Bedding Material	2,750	LF	$9.00	$24,750
18" Sanitary Sewer Pipe Bedding Material	10,400	LF	$15.00	$156,000
21" Sanitary Sewer Pipe Bedding Material	6,000	LF	$20.00	$120,000
24" Sanitary Sewer Pipe Bedding Material	3,150	LF	$22.00	$69,300
30" Sanitary Sewer Pipe Bedding Material	4,750	LF	$24.00	$114,000
36" Steel Casing Pipe - Trenchless Installation	1,000	LF	$750	$750,000
36" Steel Casing Pipe w/Spacers & End Seals	1,000	LF	$155	$155,000
48" Lined Manhole	8	EA	$9,000	$72,000
60" Lined Manhole	70	EA	$15,000	$1,050,000
Sanitary Sewer Temporary Bypass	1	LS	$400,000	$400,000
Manhole Frame and Cover	78	EA	$600.00	$46,800
Manhole External Frame Seal	78	EA	$350.00	$27,300
Manhole Construction Plate Marker	78	EA	$175.00	$13,650
Manhole Marker	78	EA	$250.00	$19,500
Manhole Exfiltration\Vacuum Test	78	EA	$450.00	$35,100
Trench Dewatering	27,050	FT	$25.00	$676,250
Sanitary Sewer Joint Air Test	27,050	LF	$3.00	$81,150
Sanitary Sewer Pipe Deflection Test	27,050	LF	$2.00	$54,100
Locating Utility	30	EA	$250.00	$7,500
Verify Utility	30	EA	$250.00	$7,500
Subtotal				**$9,210,000**
Undeveloped Design Detail (25%)				$2,310,000
Construction Subtotal W/Contingencies				**$11,520,000**
General Conditions, Mobilization (5%)				$576,000
Bonds & Insurance (2%)				$242,000
Total Construction Cost				**$12,300,000**
Engineering, Admin., Legal, Permitting (24%)				$3,000,000
Total Project Cost				**$15,300,000**

2066 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$100,000	$100,000
Clearing	1	LS	$80,000	$80,000
Remove Concrete Curb & Gutter	2,500	LF	$6.00	$15,000
Abandon Sanitary Sewer Pipe	17,000	LF	$20.00	$340,000
Saw Existing Pavement	2,500	LF	$8.00	$20,000
Remove Pavement	6,945	SY	$10.00	$69,450
Scarify and Recompact Subgrade	6,945	SY	$1.00	$6,945
Incidental Grading Work	1	LS	$75,000	$75,000
Base Course	3,634	TON	$20.00	$72,680
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	8,800	TON	$18.00	$158,400
Permanent Surfacing	6,945	SY	$75.00	$520,875
Concrete Curb & Gutter	2,500	LF	$60.00	$150,000
Traffic Control	1	LS	$100,000	$100,000
Pavement Markings	7500	LS	$12.00	$90,000
Placing Topsoil	86,320	CY	$3.00	$258,960
Salvage Topsoil	86,320	CY	$3.00	$258,960
Seed/Fertilizer/Mulch	107	ACRE	$3,500.00	$374,500
SWPPP (Erosion Control)	107	ACRE	$4,500.00	$481,500
12" Sanitary Sewer Pipe	10,200	LF	$60.00	$612,000
15" Sanitary Sewer Pipe	2,000	LF	$70.00	$140,000
18" Sanitary Sewer Pipe	19,400	LF	$100.00	$1,940,000
21" Sanitary Sewer Pipe	7,100	LF	$120.00	$852,000
24" Sanitary Sewer Pipe	3,150	LF	$130.00	$409,500
30" Sanitary Sewer Pipe	4,750	LF	$225.00	$1,068,750
12" Sanitary Sewer Pipe Bedding Material	10,200	LF	$9.00	$91,800
15" Sanitary Sewer Pipe Bedding Material	2,000	LF	$10.00	$20,000
18" Sanitary Sewer Pipe Bedding Material	19,400	LF	$15.00	$291,000
21" Sanitary Sewer Pipe Bedding Material	7,100	LF	$20.00	$142,000
24" Sanitary Sewer Pipe Bedding Material	3,150	LF	$22.00	$69,300
30" Sanitary Sewer Pipe Bedding Material	4,750	LF	$24.00	$114,000
36" Steel Casing Pipe - Trenchless Installation	1,500	LF	$750	$1,125,000
36" Steel Casing Pipe w/Spacers & End Seals	1,500	LF	$155	$232,500
48" Lined Manhole	35	EA	$9,000	$315,000
60" Lined Manhole	99	EA	$15,000	$1,485,000
Sanitary Sewer Temporary Bypass	1	LS	$400,000	$400,000
Manhole Frame and Cover	134	EA	$600.00	$80,400
Manhole External Frame Seal	134	EA	$350.00	$46,900
Manhole Construction Plate Marker	134	EA	$175.00	$23,450
Manhole Marker	134	EA	$250.00	$33,500
Manhole Exfiltration\Vacuum Test	134	EA	$450.00	$60,300
Trench Dewatering	46,600	FT	$25.00	$1,165,000
Sanitary Sewer Joint Air Test	46,600	LF	$3.00	$139,800
Sanitary Sewer Pipe Deflection Test	46,600	LF	$2.00	$93,200
Locating Utility	40	EA	$250.00	$10,000
Verify Utility	40	EA	$250.00	$10,000
Subtotal				**$14,160,000**
Undeveloped Design Detail (25%)				$3,540,000
Construction Subtotal W/Contingencies				**$17,700,000**
General Conditions, Mobilization (5%)				$885,000
Bonds & Insurance (2%)				$372,000
Total Construction Cost				**$19,000,000**
Engineering, Admin., Legal, Permitting (24%)				$4,600,000
Total Project Cost				**$23,600,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$5,000	$5,000
Clearing	1	LS	$5,000	$5,000
Trench Stabilization	1,000	TON	$15.00	$15,000
Placing Topsoil	12,910	CY	$3.00	$38,730
Salvage Topsoil	12,910	CY	$3.00	$38,730
Seed/Fertilizer/Mulch	16	ACRE	$3,500.00	$56,000
SWPPP (Erosion Control)	16	ACRE	$4,500.00	$72,000
12" Sanitary Sewer Force Main	6,700	LF	$140.00	$938,000
12" Force Main Pipe Bedding Material	6,700	LF	$9.00	$60,300
60" Lined Manhole w/ Combination Air Valve	14	EA	$12,500	$175,000
Manhole Frame and Cover	14	EA	$600.00	$8,400
Manhole External Frame Seal	14	EA	$350.00	$4,900
Manhole Construction Plate Marker	14	EA	$175.00	$2,450
Manhole Marker	14	EA	$250.00	$3,500
Manhole Exfiltration\Vacuum Test	14	EA	$450.00	$6,300
Trench Dewatering	6,700	FT	$25.00	$167,500
Pipe Hydrostatic Pressure Testing	6,700	LF	$2.00	$13,400
Locating Utility	5	EA	$250.00	$1,250
Verify Utility	5	EA	$250.00	$1,250
Subtotal				$1,620,000
Undeveloped Design Detail (25%)				$410,000
Construction Subtotal W/Contingencies				**$2,030,000**
General Conditions, Mobilization (5%)				$102,000
Bonds & Insurance (2%)				$43,000
Total Construction Cost				**$2,200,000**
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				**$2,700,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station				
Concrete Base Slab	10	CY	$750	$7,500
Concrete Walls	50	CY	$1,000	$50,000
Concrete Top Slab	10	CY	$1,000	$10,000
Excavation	500	CY	$10	$5,000
Backfilling	100	CY	$10	$1,000
Crushed Rock Base	85	TON	$26	$2,210
Dewatering	1	LS	$25,000	$25,000
Concrete Fillets in Wet Well	1	LS	$10,000	$10,000
Dry Well False Floor	1	LS	$10,000	$10,000
Painting	1	LS	$15,000	$15,000
Aluminum Hatches	1	LS	$15,000	$15,000
Hoists, Crane Railings	1	LS	$20,000	$20,000
Non-Clog Sewage Pumps/Motors	2	EA	$35,000	$70,000
Interior Piping, Valves, and Fittings	1	LS	$30,000	$30,000
Sump Pump System	1	LS	$5,000	$5,000
MCC/VFDs	1	LS	$50,000	$50,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$60,000	$60,000
Standby Generator	1	LS	$40,000	$40,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$10,000	$10,000
Mag Meter	1	LS	$25,000	$25,000
Odor Control	1	LS	$20,000	$20,000
Subtotal				$680,000
Undeveloped Design Detail (25%)				$170,000
Construction Subtotal W/Contingencies				**$850,000**
General Conditions, Mobilization (5%)				$43,000
Bonds & Insurance (2%)				$18,000
Total Construction Cost				**$900,000**
Engineering, Admin., Legal, Permitting (24%)				$200,000
Land Acquisition				$250,000
Total Project Cost				**$1,400,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$12,600,000	$15,300,000	$23,600,000	-	$1,400,000	$2,700,000
Total Area Served (Acres)	287	655	1075	-	1075	1075
Subtotal Cost/Acre	$44,000.00	$23,400.00	$22,000.00	-	$1,400.00	$2,600.00
Total Cost/Acre	$44,000.00	$23,400.00	$26,000.00	-	-	-

Computed: KJL	**Date:** 6/21/2017	**HDR Job No:**	10028508
Checked: DVP	**Date:**		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 17 Trunk

Task: BASIN 17 Trunk

Recommendation:

Construction Basin 17 New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$30,000	$30,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$15,000	$15,000
Pavement Markings	1500	LS	$12.00	$18,000
Placing Topsoil	17,750	CY	$3.00	$53,250
Salvage Topsoil	17,750	CY	$3.00	$53,250
Seed/Fertilizer/Mulch	22	ACRE	$3,500.00	$77,000
SWPPP (Erosion Control)	22	ACRE	$4,500.00	$99,000
10" Sanitary Sewer Pipe (0-12 feet deep)	1,200	Ft	$60.00	$72,000
10" Sanitary Sewer Pipe (12-20 feet deep)	400	Ft	$72.00	$28,800
12" Sanitary Sewer Pipe	4,000	Ft	$60.00	$240,000
18" Sanitary Sewer Pipe (0-12 feet deep)	1,000	Ft	$90.00	$90,000
18" Sanitary Sewer Pipe (12-20 feet deep)	2,300	Ft	$100.00	$230,000
18" Sanitary Sewer Pipe (20+ feet deep)	600	Ft	$135.00	$81,000
10" Sanitary Sewer Pipe Bedding Material	1,600	Ft	$7.00	$11,200
12" Sanitary Sewer Pipe Bedding Material	4,000	Ft	$9.00	$36,000
18" Sanitary Sewer Pipe Bedding Material	3,900	Ft	$15.00	$58,500
24" Steel Casing Pipe - Trenchless Installation	500	LF	$600	$300,000
24" Steel Casing Pipe w/Spacers & End Seals	500	LF	$85	$42,500
48" Lined Manhole	19	Each	$9,000.00	$171,000
60" Lined Manhole	13	Each	$15,000.00	$195,000
Manhole Frame and Cover	32	EA	$600.00	$19,200
Manhole External Frame Seal	32	EA	$350.00	$11,200
Manhole Construction Plate Marker	32	EA	$175.00	$5,600
Manhole Marker	32	EA	$250.00	$8,000
Manhole Exfiltration\Vacuum Test	32	EA	$450.00	$14,400
Trench Dewatering	9,500	FT	$25.00	$237,500
Sanitary Sewer Joint Air Test	9,500	LF	$3.00	$28,500
Sanitary Sewer Pipe Deflection Test	9,500	LF	$2.00	$19,000
Locating Utility	10	EA	$250.00	$2,500
Verify Utility	10	EA	$250.00	$2,500
Subtotal				$2,530,000
Undeveloped Design Detail (25%)				$640,000
Construction Subtotal W/Contingencies				**$3,170,000**
General Conditions, Mobilization (5%)				$159,000
Bonds & Insurance (2%)				$67,000
Total Construction Cost				**$3,400,000**
Engineering, Admin., Legal, Permitting (24%)				$800,000
Total Project Cost				**$4,200,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$4,200,000	-	-	-	-	-
Total Area Served (Acres)	1063	-	-	-	-	-
Total Cost/Acre	**$4,000.00**	-	-	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No:	10028508
Checked: DVP	Date:		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 18 Trunk Sewers

Task: BASIN 18 Trunk Sewers

Recommendation:

Construction Basin 18 New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$50,000	$50,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$30,000	$30,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$20,000	$20,000
Pavement Markings	1500	LF	$12.00	$18,000
Placing Topsoil	26,620	CY	$3.00	$79,860
Salvage Topsoil	26,620	CY	$3.00	$79,860
Seed/Fertilizer/Mulch	33	ACRE	$3,500.00	$115,500
SWPPP (Erosion Control)	33	ACRE	$4,500.00	$148,500
12" Sanitary Sewer Pipe	6,900	LF	$60.00	$414,000
18" Sanitary Sewer Pipe	7,200	LF	$160.00	$1,152,000
12" Sanitary Sewer Pipe Bedding Material	6,900	LF	$9.00	$62,100
18" Sanitary Sewer Pipe Bedding Material	7,200	LF	$15.00	$108,000
Connect to Existing Sanitary Sewer Pipe	2	EA	$3,000	$6,000
48" Lined Manhole	20	EA	$9,000	$180,000
60" Lined Manhole	21	EA	$15,000	$315,000
Sanitary Sewer Temporary Bypass	1	LS	$50,000	$50,000
Manhole Frame and Cover	41	EA	$600.00	$24,600
Manhole External Frame Seal	41	EA	$350.00	$14,350
Manhole Construction Plate Marker	41	EA	$175.00	$7,175
Manhole Marker	41	EA	$250.00	$10,250
Manhole Exfiltration\Vacuum Test	41	EA	$450.00	$18,450
Trench Dewatering	14,100	FT	$25.00	$352,500
Sanitary Sewer Joint Air Test	14,100	LF	$3.00	$42,300
Sanitary Sewer Pipe Deflection Test	14,100	LF	$2.00	$28,200
Locating Utility	20	EA	$250.00	$5,000
Verify Utility	20	EA	$250.00	$5,000
Subtotal				$3,600,000
Undeveloped Design Detail (25%)				$900,000
Construction Subtotal W/Contingencies				**$4,500,000**
General Conditions, Mobilization (5%)				$225,000
Bonds & Insurance (2%)				$95,000
Total Construction Cost				**$4,800,000**
Engineering, Admin., Legal, Permitting (24%)				$1,200,000
Total Project Cost				**$6,000,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$6,000,000	-	-	-	-	-
Total Area Served (Acres)	611	-	-	-	-	-
Total Cost/Acre	**$9,900.00**	-	-	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No:	10028508
Checked: DVP	Date:		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 19 & 22 PS, Trunks, and Forcemain

Task: BASIN 19 & 22 PS, Trunks, and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 19 Trunk Sewer.

Construct New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$140,000	$140,000
Clearing	1	LS	$80,000	$80,000
Remove Concrete Curb & Gutter	2,000	LF	$6.00	$12,000
Saw Existing Pavement	2,000	LF	$8.00	$16,000
Remove Pavement	5,556	SY	$10.00	$55,560
Scarify and Recompact Subgrade	5,556	SY	$1.00	$5,556
Incidental Grading Work	1	LS	$50,000	$50,000
Base Course	2,907	TON	$20.00	$58,140
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	7,000	TON	$18.00	$126,000
Permanent Surfacing	5,556	SY	$75.00	$416,700
Concrete Curb & Gutter	2,000	LF	$60.00	$120,000
Traffic Control	1	LS	$90,000	$90,000
Pavement Markings	6000	LS	$12.00	$72,000
Placing Topsoil	70,990	CY	$3.00	$212,970
Salvage Topsoil	70,990	CY	$3.00	$212,970
Seed/Fertilizer/Mulch	88	ACRE	$3,500.00	$308,000
SWPPP (Erosion Control)	88	ACRE	$4,500.00	$396,000
12" Sanitary Sewer Pipe	26,000	LF	$60.00	$1,560,000
27" Sanitary Sewer Pipe	11,500	LF	$150.00	$1,725,000
42" Sanitary Sewer Pipe	750	LF	$325.00	$243,750
12" Sanitary Sewer Pipe Bedding Material	26,000	LF	$9.00	$234,000
27" Sanitary Sewer Pipe Bedding Material	11,500	LF	$22.00	$253,000
42" Sanitary Sewer Pipe Bedding Material	750	LF	$30.00	$22,500
48" Lined Manhole	75	EA	$9,000	$675,000
60" Lined Manhole	33	EA	$15,000	$495,000
84" Lined Manhole	3	EA	$25,000	$75,000
Manhole Frame and Cover	111	EA	$600.00	$66,600
Manhole External Frame Seal	111	EA	$350.00	$38,850
Manhole Construction Plate Marker	111	EA	$175.00	$19,425
Manhole Marker	111	EA	$250.00	$27,750
Manhole Exfiltration\Vacuum Test	111	EA	$450.00	$49,950
Trench Dewatering	38,250	FT	$25.00	$956,250
Sanitary Sewer Joint Air Test	38,250	LF	$3.00	$114,750
Sanitary Sewer Pipe Deflection Test	38,250	LF	$2.00	$76,500
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				**$9,050,000**
Undeveloped Design Detail (25%)				$2,270,000
Construction Subtotal W/Contingencies				**$11,320,000**
General Conditions, Mobilization (5%)				$566,000
Bonds & Insurance (2%)				$238,000
Total Construction Cost				**$12,100,000**
Engineering, Admin., Legal, Permitting (24%)				$2,900,000
Total Project Cost				**$15,000,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$100,000	$100,000
Remove Concrete Curb & Gutter	2,000	LF	$6.00	$12,000
Saw Existing Pavement	2,000	LF	$8.00	$16,000
Remove Pavement	5,556	SY	$10.00	$55,560
Scarify and Recompact Subgrade	5,556	SY	$1.00	$5,556
Incidental Grading Work	1	LS	$50,000	$50,000
Base Course	2,907	TON	$20.00	$58,140
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	7,000	TON	$18.00	$126,000
Permanent Surfacing	5,556	SY	$75.00	$416,700
Concrete Curb & Gutter	2,000	LF	$60.00	$120,000
Traffic Control	1	LS	$100,000	$100,000
Pavement Markings	6000	LS	$12.00	$72,000
Placing Topsoil	79,060	CY	$3.00	$237,180
Salvage Topsoil	79,060	CY	$3.00	$237,180
Seed/Fertilizer/Mulch	98	ACRE	$3,500.00	$343,000
SWPPP (Erosion Control)	98	ACRE	$4,500.00	$441,000
12" Sanitary Sewer Pipe	30,150	LF	$60.00	$1,809,000
27" Sanitary Sewer Pipe	11,500	LF	$150.00	$1,725,000
42" Sanitary Sewer Pipe	750	LF	$325.00	$243,750
12" Sanitary Sewer Pipe Bedding Material	30,150	LF	$9.00	$271,350
27" Sanitary Sewer Pipe Bedding Material	11,500	LF	$22.00	$253,000
42" Sanitary Sewer Pipe Bedding Material	750	LF	$30.00	$22,500
48" Lined Manhole	87	EA	$9,000	$783,000
60" Lined Manhole	33	EA	$15,000	$495,000
84" Lined Manhole	3	EA	$25,000	$75,000
Manhole Frame and Cover	123	EA	$600.00	$73,800
Manhole External Frame Seal	123	EA	$350.00	$43,050
Manhole Construction Plate Marker	123	EA	$175.00	$21,525
Manhole Marker	123	EA	$250.00	$30,750
Manhole Exfiltration\Vacuum Test	123	EA	$450.00	$55,350
Trench Dewatering	42,400	FT	$25.00	$1,060,000
Sanitary Sewer Joint Air Test	42,400	LF	$3.00	$127,200
Sanitary Sewer Pipe Deflection Test	42,400	LF	$2.00	$84,800
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				$9,760,000
Undeveloped Design Detail (25%)				$2,440,000
Construction Subtotal W/Contingencies				**$12,200,000**
General Conditions, Mobilization (5%)				$610,000
Bonds & Insurance (2%)				$256,000
Total Construction Cost				**$13,100,000**
Engineering, Admin., Legal, Permitting (24%)				$3,100,000
Total Project Cost				**$16,200,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	35	CY	$1,000	$35,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	100	TON	$26	$2,600
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$35,000	$35,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$60,000	$120,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$50,000	$50,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				**$1,230,000**
Undeveloped Design Detail (25%)				$310,000
Construction Subtotal W/Contingencies				**$1,540,000**
General Conditions, Mobilization (5%)				$77,000
Bonds & Insurance (2%)				$32,000
Total Construction Cost				**$1,600,000**
Engineering, Admin., Legal, Permitting (24%)				$400,000
Land Acquisition				$250,000
Total Project Cost				**$2,300,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$30,000	$30,000
Clearing	1	LS	$25,000	$25,000
Remove Concrete Curb & Gutter	5,500	LF	$6.00	$33,000
Saw Existing Pavement	5,500	LF	$8.00	$44,000
Remove Pavement	15,000	SY	$10.00	$150,000
Scarify and Recompact Subgrade	15,000	SY	$1.00	$15,000
Incidental Grading Work	1	LS	$40,000	$40,000
Base Course	7,847	TON	$20.00	$156,940
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	37,800	TON	$18.00	$680,400
Permanent Surfacing	15,000	SY	$75.00	$1,125,000
Concrete Curb & Gutter	5,500	LF	$60.00	$330,000
Traffic Control	1	LS	$100,000	$100,000
Pavement Markings	21600	LF	$12.00	$259,200
Placing Topsoil	5,650	CY	$3.00	$16,950
Salvage Topsoil	5,650	CY	$3.00	$16,950
Seed/Fertilizer/Mulch	7	ACRE	$3,500.00	$24,500
SWPPP (Erosion Control)	7	ACRE	$4,500.00	$31,500
8" Sanitary Sewer Force Main	5,500	LF	$110.00	$605,000
8" Sanitary Sewer Pipe Bedding Material	5,500	LF	$6.00	$33,000
60" Lined Manhole w/ Combination Air Valve	11	EA	$12,500	$137,500
Manhole Frame and Cover	11	EA	$600.00	$6,600
Manhole External Frame Seal	11	EA	$350.00	$3,850
Manhole Construction Plate Marker	11	EA	$175.00	$1,925
Manhole Marker	11	EA	$250.00	$2,750
Manhole Exfiltration\Vacuum Test	11	EA	$450.00	$4,950
Trench Dewatering	5,500	FT	$25.00	$137,500
Pipe Hydrostatic Pressure Testing	5,500	LF	$2.00	$11,000
Locating Utility	30	EA	$250.00	$7,500
Verify Utility	30	EA	$250.00	$7,500
Subtotal				$4,060,000
Undeveloped Design Detail (25%)				$1,020,000
Construction Subtotal W/Contingencies				**$5,080,000**
General Conditions, Mobilization (5%)				$254,000
Bonds & Insurance (2%)				$107,000
Total Construction Cost				**$5,400,000**
Engineering, Admin., Legal, Permitting (24%)				$1,300,000
Total Project Cost				**$6,700,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$15,000,000	$16,200,000	-	-	$2,300,000	$6,700,000
Total Area Served (Acres)	1386	1941	-	-	1941	1941
Subtotal Cost/Acre	$10,900.00	$8,400.00	-	-	$1,200.00	$3,500.00
Total Cost/Acre	**$15,600.00**	**$13,100.00**	-	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No:	10028508
Checked: DVP	Date:		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 23 Trunk, PS, & Force Main

Task: BASIN 23 Trunk, PS, & Force Main

Recommendation:

Construction of Basin 23 New Gravity Trunk Sewers, PS, and Force Main

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$40,000	$40,000
Clearing	1	LS	$20,000	$20,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$25,000	$25,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$25,000	$25,000
Pavement Markings	1500	LS	$12.00	$18,000
Placing Topsoil	22,590	CY	$3.00	$67,770
Salvage Topsoil	22,590	CY	$3.00	$67,770
Seed/Fertilizer/Mulch	28	ACRE	$3,500.00	$98,000
SWPPP (Erosion Control)	28	ACRE	$4,500.00	$126,000
12" Sanitary Sewer Pipe	6,600	LF	$60.00	$396,000
21" Sanitary Sewer Pipe	3,100	LF	$120.00	$372,000
24" Sanitary Sewer Pipe	250	LF	$130.00	$32,500
42" Sanitary Sewer Pipe	2,200	LF	$325.00	$715,000
12" Sanitary Sewer Pipe Bedding Material	6,600	LF	$9.00	$59,400
21" Sanitary Sewer Pipe Bedding Material	3,100	LF	$20.00	$62,000
24" Sanitary Sewer Pipe Bedding Material	250	LF	$22.00	$5,500
42" Sanitary Sewer Pipe Bedding Material	2,200	LF	$200.00	$440,000
48" Lined Manhole	19	EA	$9,000	$171,000
60" Lined Manhole	10	EA	$15,000	$150,000
84" Lined Manhole	7	EA	$25,000	$175,000
Manhole Frame and Cover	36	EA	$600.00	$21,600
Manhole External Frame Seal	36	EA	$350.00	$12,600
Manhole Construction Plate Marker	36	EA	$175.00	$6,300
Manhole Marker	36	EA	$250.00	$9,000
Manhole Exfiltration\Vacuum Test	36	EA	$450.00	$16,200
Trench Dewatering	12,150	FT	$25.00	$303,750
Sanitary Sewer Joint Air Test	12,150	LF	$3.00	$36,450
Sanitary Sewer Pipe Deflection Test	12,150	LF	$2.00	$24,300
Locating Utility	25	EA	$250.00	$6,250
Verify Utility	25	EA	$250.00	$6,250
Subtotal				$3,730,000
Undeveloped Design Detail (25%)				$940,000
Construction Subtotal W/Contingencies				**$4,670,000**
General Conditions, Mobilization (5%)				$234,000
Bonds & Insurance (2%)				$98,000
Total Construction Cost				**$5,000,000**
Engineering, Admin., Legal, Permitting (24%)				$1,200,000
Total Project Cost				**$6,200,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$60,000	$60,000
Clearing	1	LS	$50,000	$50,000
Remove Concrete Curb & Gutter	1,000	LF	$6.00	$6,000
Saw Existing Pavement	1,000	LF	$8.00	$8,000
Remove Pavement	2,778	SY	$10.00	$27,780
Scarify and Recompact Subgrade	2,778	SY	$1.00	$2,778
Incidental Grading Work	1	LS	$40,000	$40,000
Base Course	1,454	TON	$20.00	$29,080
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	3,500	TON	$18.00	$63,000
Permanent Surfacing	2,778	SY	$75.00	$208,350
Concrete Curb & Gutter	1,000	LF	$60.00	$60,000
Traffic Control	1	LS	$50,000	$50,000
Pavement Markings	3000	LS	$12.00	$36,000
Placing Topsoil	36,300	CY	$3.00	$108,900
Salvage Topsoil	36,300	CY	$3.00	$108,900
Seed/Fertilizer/Mulch	45	ACRE	$3,500.00	$157,500
SWPPP (Erosion Control)	45	ACRE	$4,500.00	$202,500
12" Sanitary Sewer Pipe	6,600	LF	$60.00	$396,000
15" Sanitary Sewer Pipe	2,450	LF	$70.00	$171,500
18" Sanitary Sewer Pipe	3,050	LF	$100.00	$305,000
21" Sanitary Sewer Pipe	5,050	LF	$120.00	$606,000
24" Sanitary Sewer Pipe	250	LF	$130.00	$32,500
42" Sanitary Sewer Pipe	2,200	LF	$325.00	$715,000
12" Sanitary Sewer Pipe Bedding Material	6,600	LF	$9.00	$59,400
15" Sanitary Sewer Pipe Bedding Material	2,450	LF	$10.00	$24,500
18" Sanitary Sewer Pipe Bedding Material	3,050	LF	$15.00	$45,750
21" Sanitary Sewer Pipe Bedding Material	5,050	LF	$20.00	$101,000
24" Sanitary Sewer Pipe Bedding Material	250	LF	$22.00	$5,500
42" Sanitary Sewer Pipe Bedding Material	2,200	LF	$30.00	$66,000
48" Lined Manhole	26	EA	$9,000	$234,000
60" Lined Manhole	24	EA	$15,000	$360,000
84" Lined Manhole	7	EA	$25,000	$175,000
Manhole Frame and Cover	57	EA	$600.00	$34,200
Manhole External Frame Seal	57	EA	$350.00	$19,950
Manhole Construction Plate Marker	57	EA	$175.00	$9,975
Manhole Marker	57	EA	$250.00	$14,250
Manhole Exfiltration\Vacuum Test	57	EA	$450.00	$25,650
Trench Dewatering	19,600	FT	$25.00	$490,000
Sanitary Sewer Joint Air Test	19,600	LF	$3.00	$58,800
Sanitary Sewer Pipe Deflection Test	19,600	LF	$2.00	$39,200
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				$5,250,000
Undeveloped Design Detail (25%)				$1,320,000
Construction Subtotal W/Contingencies				**$6,570,000**
General Conditions, Mobilization (5%)				$329,000
Bonds & Insurance (2%)				$138,000
Total Construction Cost				**$7,000,000**
Engineering, Admin., Legal, Permitting (24%)				$1,700,000
Total Project Cost				**$8,700,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$20,000	$20,000
Clearing	1	LS	$10,000	$10,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$10,000	$10,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$20,000	$20,000
Pavement Markings	1500	LF	$12.00	$18,000
Placing Topsoil	8,880	CY	$3.00	$26,640
Salvage Topsoil	8,880	CY	$3.00	$26,640
Seed/Fertilizer/Mulch	11	ACRE	$3,500.00	$38,500
SWPPP (Erosion Control)	11	ACRE	$4,500.00	$49,500
One 18" or Dual Sanitary Sewer Force Mains	4,450	LF	$160.00	$712,000
One 18" or Dual Force Mains Bedding Material	4,450	LF	$25.00	$111,250
96" Lined Manhole w/ Combination Air Valve	9	EA	$30,000	$270,000
Manhole Frame and Cover	9	EA	$600.00	$5,400
Manhole External Frame Seal	9	EA	$350.00	$3,150
Manhole Construction Plate Marker	9	EA	$175.00	$1,575
Manhole Marker	9	EA	$250.00	$2,250
Manhole Exfiltration\Vacuum Test	9	EA	$450.00	$4,050
Trench Dewatering	4,450	FT	$25.00	$111,250
Pipe Hydrostatic Pressure Testing	4,450	LF	$2.00	$8,900
Locating Utility	20	EA	$250.00	$5,000
Verify Utility	20	EA	$250.00	$5,000
Subtotal				$1,680,000
Undeveloped Design Detail (25%)				$420,000
Construction Subtotal W/Contingencies				**$2,100,000**
General Conditions, Mobilization (5%)				$105,000
Bonds & Insurance (2%)				$44,000
Total Construction Cost				**$2,200,000**
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				**$2,700,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station				
Concrete Base Slab	50	CY	$750	$37,500
Concrete Walls	200	CY	$1,000	$200,000
Concrete Top Slab	50	CY	$1,000	$50,000
Excavation	2,500	CY	$10	$25,000
Backfilling	3,500	CY	$10	$35,000
Crushed Rock Base	200	TON	$26	$5,200
Dewatering	1	LS	$150,000	$150,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$40,000	$40,000
Aluminum Hatches	1	LS	$40,000	$40,000
Hoists, Crane Railings	1	LS	$60,000	$60,000
Non-Clog Sewage Pumps/Motors	3	EA	$250,000	$750,000
Interior Piping, Valves, and Fittings	1	LS	$75,000	$75,000
Sump Pump System	1	LS	$5,000	$5,000
MCC/VFDs	1	LS	$250,000	$250,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$200,000	$200,000
Standby Generator	1	LS	$300,000	$300,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$100,000	$100,000
Miscellaneous	1	LS	$100,000	$100,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				$2,720,000
Undeveloped Design Detail (25%)				$680,000
Construction Subtotal W/Contingencies				**$3,400,000**
General Conditions, Mobilization (5%)				$170,000
Bonds & Insurance (2%)				$71,000
Total Construction Cost				**$3,600,000**
Engineering, Admin., Legal, Permitting (24%)				$900,000
Land Acquisition				$250,000
Total Project Cost				**$4,800,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$6,200,000	$8,700,000	-	-	$4,800,000	$2,700,000
Total Area Served (Acres)	218	890	-	-	890	890
Subtotal Cost/Acre	$28,500.00	$9,800.00	-	-	$5,400.00	$3,100.00
Total Cost/Acre	**$28,500.00**	**$18,300.00**	-	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No: 10028508
Checked: DVP	Date:	

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 25 Trunk

Task: BASIN 25 Trunk

Recommendation:

Construction of Basin 25 New Gravity Trunk Sewers

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$150,000	$150,000
Remove Concrete Curb & Gutter	4,000	LF	$6.00	$24,000
Saw Existing Pavement	4,000	LF	$8.00	$32,000
Remove Pavement	11,112	SY	$10.00	$111,120
Scarify and Recompact Subgrade	11,112	SY	$1.00	$11,112
Incidental Grading Work	1	LS	$75,000	$75,000
Base Course	5,813	TON	$20.00	$116,260
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	14,000	TON	$18.00	$252,000
Permanent Surfacing	11,112	SY	$75.00	$833,400
Concrete Curb & Gutter	4,000	LF	$60.00	$240,000
Traffic Control	1	LS	$200,000	$200,000
Pavement Markings	12000	LS	$12.00	$144,000
Placing Topsoil	104,870	CY	$3.00	$314,610
Salvage Topsoil	104,870	CY	$3.00	$314,610
Seed/Fertilizer/Mulch	130	ACRE	$3,500.00	$455,000
SWPPP (Erosion Control)	130	ACRE	$4,500.00	$585,000
12" Sanitary Sewer Pipe	31,350	LF	$60.00	$1,881,000
27" Sanitary Sewer Pipe	12,100	LF	$150.00	$1,815,000
30" Sanitary Sewer Pipe	1,000	LF	$225.00	$225,000
36" Sanitary Sewer Pipe	4,750	LF	$275.00	$1,306,250
48" Sanitary Sewer Pipe	3,850	LF	$375.00	$1,443,750
56" Sanitary Sewer Pipe	3,350	LF	$425.00	$1,423,750
12" Sanitary Sewer Pipe Bedding Material	31,350	LF	$9.00	$282,150
27" Sanitary Sewer Pipe Bedding Material	12,100	LF	$22.00	$266,200
30" Sanitary Sewer Pipe Bedding Material	1,000	LF	$24.00	$24,000
36" Sanitary Sewer Pipe Bedding Material	4,750	LF	$25.00	$118,750
48" Sanitary Sewer Pipe Bedding Material	3,850	LF	$35.00	$134,750
56" Sanitary Sewer Pipe Bedding Material	3,350	LF	$35.00	$117,250
24" Steel Casing Pipe - Trenchless Installation	2,000	LF	$600	$1,200,000
24" Steel Casing Pipe w/Spacers & End Seals	2,000	LF	$85	$170,000
36" Steel Casing Pipe - Trenchless Installation	500	LF	$750	$375,000
36" Steel Casing Pipe w/Spacers & End Seals	500	LF	$155	$77,500
42" Steel Casing Pipe - Trenchless Installation	1,000	LF	$1,000	$1,000,000
42" Steel Casing Pipe w/Spacers & End Seals	1,000	LF	$500	$500,000
48" Lined Manhole	90	EA	$9,000	$810,000
60" Lined Manhole	38	EA	$15,000	$570,000
72" Lined Manhole	14	EA	$20,000	$280,000
48" x 42" Tee Base	11	EA	$15,000	$165,000
56" x 48" Tee Base	10	EA	$18,000	$180,000
42" FRPM Manhole Riser with Cone	220	VFT	$600	$132,000
48" FRPM Manhole Riser with Cone	200	VFT	$700	$140,000
Manhole Frame and Cover	163	EA	$600.00	$97,800
Manhole External Frame Seal	163	EA	$350.00	$57,050
Manhole Construction Plate Marker	163	EA	$175.00	$28,525
Manhole Marker	163	EA	$250.00	$40,750
Manhole Exfiltration\Vacuum Test	163	EA	$450.00	$73,350
Trench Dewatering	56,400	FT	$25.00	$1,410,000
Sanitary Sewer Joint Air Test	56,400	LF	$3.00	$169,200
Sanitary Sewer Pipe Deflection Test	56,400	LF	$2.00	$112,800
Locating Utility	75	EA	$250.00	$18,750
Verify Utility	75	EA	$250.00	$18,750
Subtotal				$20,690,000
Undeveloped Design Detail (25%)				$5,180,000
Construction Subtotal W/Contingencies				**$25,870,000**
General Conditions, Mobilization (5%)				$1,294,000
Bonds & Insurance (2%)				$543,000
Total Construction Cost				**$27,700,000**
Engineering, Admin., Legal, Permitting (24%)				$6,600,000
Total Project Cost				**$34,300,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	-	$34,300,000	-	-	-	-
Total Area Served (Acres)	-	2442	-	-	-	-
Total Cost/Acre	-	**$14,100.00**	-	-	-	-

Computed: KJL **Date:** 6/27/2017 **HDR Job No:** 10028508

Checked: DVP **Date:**

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 26 Trunk

Task: BASIN 26 Trunk

Recommendation:

Construction of Basin 26 New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$50,000	$50,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$30,000	$30,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$20,000	$20,000
Pavement Markings	1500	LF	$12.00	$18,000
Placing Topsoil	12,100	CY	$3.00	$36,300
Salvage Topsoil	12,100	CY	$3.00	$36,300
Seed/Fertilizer/Mulch	15	ACRE	$3,500.00	$52,500
SWPPP (Erosion Control)	15	ACRE	$4,500.00	$67,500
12" Sanitary Sewer Pipe	6,100	LF	$60.00	$366,000
24" Sanitary Sewer Pipe	100	LF	$130.00	$13,000
12" Sanitary Sewer Pipe Bedding Material	6,100	LF	$9.00	$54,900
24" Sanitary Sewer Pipe Bedding Material	100	LF	$22.00	$2,200
Connect to Existing Sanitary Sewer Pipe	2	EA	$3,000	$6,000
48" Lined Manhole	18	EA	$9,000	$162,000
60" Lined Manhole	1	EA	$15,000	$15,000
Sanitary Sewer Temporary Bypass	1	LS	$50,000	$50,000
Manhole Frame and Cover	19	EA	$600.00	$11,400
Manhole External Frame Seal	19	EA	$350.00	$6,650
Manhole Construction Plate Marker	19	EA	$175.00	$3,325
Manhole Marker	19	EA	$250.00	$4,750
Manhole Exfiltration\Vacuum Test	19	EA	$450.00	$8,550

Trench Dewatering	6,200	FT	$25.00	$155,000
Sanitary Sewer Joint Air Test	6,200	LF	$3.00	$18,600
Sanitary Sewer Pipe Deflection Test	6,200	LF	$2.00	$12,400
Locating Utility	40	EA	$250.00	$10,000
Verify Utility	40	EA	$250.00	$10,000
Subtotal				$1,480,000
Undeveloped Design Detail (25%)				$370,000
Construction Subtotal W/Contingencies				**$1,850,000**
General Conditions, Mobilization (5%)				$93,000
Bonds & Insurance (2%)				$39,000
Total Construction Cost				**$2,000,000**
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				**$2,500,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$2,500,000	-	-	-	-	-
Total Area Served (Acres)	304	-	-	-	-	-
Total Cost/Acre	**$8,300.00**	-	-	-	-	-

Computed:	KJL	Date:	6/27/2017	HDR Job No:	10028508
Checked:	DVP	Date:			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 27 & 28 EQ, PS, Trunk and Forcemain

Task: BASIN 27 & 28 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station and EQ

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construction New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$140,000	$140,000
Clearing	1	LS	$125,000	$125,000
Remove Concrete Curb & Gutter	10,800	LF	$6.00	$64,800
Saw Existing Pavement	10,800	LF	$8.00	$86,400
Remove Pavement	30,000	SY	$10.00	$300,000
Scarify and Recompact Subgrade	30,000	SY	$1.00	$30,000
Incidental Grading Work	1	LS	$70,000	$70,000
Base Course	15,694	TON	$20.00	$313,880
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	65,800	TON	$18.00	$1,184,400
Permanent Surfacing	30,000	SY	$75.00	$2,250,000
Concrete Curb & Gutter	10,800	LF	$60.00	$648,000
Traffic Control	1	LS	$85,000	$85,000
Pavement Markings	40400	LS	$12.00	$484,800
Placing Topsoil	242,810	CY	$3.00	$728,430
Salvage Topsoil	242,810	CY	$3.00	$728,430
Seed/Fertilizer/Mulch	301	ACRE	$3,500.00	$1,053,500
SWPPP (Erosion Control)	301	ACRE	$4,500.00	$1,354,500
12" Sanitary Sewer Pipe	74,850	LF	$60.00	$4,491,000
15" Sanitary Sewer Pipe	3,600	LF	$70.00	$252,000
21" Sanitary Sewer Pipe	9,000	LF	$120.00	$1,080,000
27" Sanitary Sewer Pipe	43,100	LF	$150.00	$6,465,000
36" Sanitary Sewer Pipe	150	LF	$275.00	$41,250
12" Sanitary Sewer Pipe Bedding Material	74,850	LF	$9.00	$673,650
15" Sanitary Sewer Pipe Bedding Material	3,600	LF	$10.00	$36,000
21" Sanitary Sewer Pipe Bedding Material	9,000	LF	$20.00	$180,000
27" Sanitary Sewer Pipe Bedding Material	43,100	LF	$22.00	$948,200
36" Sanitary Sewer Pipe Bedding Material	150	LF	$25.00	$3,750
48" Lined Manhole	225	EA	$9,000	$2,025,000
60" Lined Manhole	149	EA	$15,000	$2,235,000
72" Lined Manhole	1	EA	$20,000	$20,000
Manhole Frame and Cover	375	EA	$600.00	$225,000
Manhole External Frame Seal	375	EA	$350.00	$131,250
Manhole Construction Plate Marker	375	EA	$175.00	$65,625
Manhole Marker	375	EA	$250.00	$93,750
Manhole Exfiltration\Vacuum Test	375	EA	$450.00	$168,750
Trench Dewatering	130,700	FT	$25.00	$3,267,500
Sanitary Sewer Joint Air Test	130,700	LF	$3.00	$392,100
Sanitary Sewer Pipe Deflection Test	130,700	LF	$2.00	$261,400
Locating Utility	45	EA	$250.00	$11,250
Verify Utility	45	EA	$250.00	$11,250
Subtotal				**$32,750,000**
Undeveloped Design Detail (25%)				$8,190,000
Construction Subtotal W/Contingencies				**$40,940,000**
General Conditions, Mobilization (5%)				$2,047,000
Bonds & Insurance (2%)				$860,000
Total Construction Cost				**$43,800,000**
Engineering, Admin., Legal, Permitting (24%)				$10,500,000
Total Project Cost				**$54,300,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$150,000	$150,000
Remove Concrete Curb & Gutter	11,000	LF	$6.00	$66,000
Saw Existing Pavement	11,000	LF	$8.00	$88,000
Remove Pavement	30,556	SY	$10.00	$305,560
Scarify and Recompact Subgrade	30,556	SY	$1.00	$30,556
Incidental Grading Work	1	LS	$75,000	$75,000
Base Course	15,985	TON	$20.00	$319,700
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	66,500	TON	$18.00	$1,197,000
Permanent Surfacing	30,556	SY	$75.00	$2,291,700
Concrete Curb & Gutter	11,000	LF	$60.00	$660,000
Traffic Control	1	LS	$100,000	$100,000
Pavement Markings	41000	LS	$12.00	$492,000
Placing Topsoil	262,170	CY	$3.00	$786,510
Salvage Topsoil	262,170	CY	$3.00	$786,510
Seed/Fertilizer/Mulch	325	ACRE	$3,500.00	$1,137,500
SWPPP (Erosion Control)	325	ACRE	$4,500.00	$1,462,500
12" Sanitary Sewer Pipe	85,500	LF	$60.00	$5,130,000
15" Sanitary Sewer Pipe	3,600	LF	$70.00	$252,000
21" Sanitary Sewer Pipe	9,000	LF	$120.00	$1,080,000
27" Sanitary Sewer Pipe	43,100	LF	$150.00	$6,465,000
36" Sanitary Sewer Pipe	150	LF	$275.00	$41,250
12" Sanitary Sewer Pipe Bedding Material	85,500	LF	$9.00	$769,500
15" Sanitary Sewer Pipe Bedding Material	3,600	LF	$10.00	$36,000
21" Sanitary Sewer Pipe Bedding Material	9,000	LF	$20.00	$180,000
27" Sanitary Sewer Pipe Bedding Material	43,100	LF	$22.00	$948,200
36" Sanitary Sewer Pipe Bedding Material	150	LF	$25.00	$3,750
48" Lined Manhole	255	EA	$9,000	$2,295,000
60" Lined Manhole	149	EA	$15,000	$2,235,000
72" Lined Manhole	1	EA	$20,000	$20,000
Manhole Frame and Cover	405	EA	$600.00	$243,000
Manhole External Frame Seal	405	EA	$350.00	$141,750
Manhole Construction Plate Marker	405	EA	$175.00	$70,875
Manhole Marker	405	EA	$250.00	$101,250
Manhole Exfiltration\Vacuum Test	405	EA	$450.00	$182,250
Trench Dewatering	141,350	FT	$25.00	$3,533,750
Sanitary Sewer Joint Air Test	141,350	LF	$3.00	$424,050
Sanitary Sewer Pipe Deflection Test	141,350	LF	$2.00	$282,700
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				**$34,580,000**
Undeveloped Design Detail (25%)				$8,650,000
Construction Subtotal W/Contingencies				**$43,230,000**
General Conditions, Mobilization (5%)				$2,162,000
Bonds & Insurance (2%)				$908,000
Total Construction Cost				**$46,300,000**
Engineering, Admin., Legal, Permitting (24%)				$11,100,000
Total Project Cost				**$57,400,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station				
Concrete Base Slab	150	CY	$750	$112,500
Concrete Walls	300	CY	$1,000	$300,000
Concrete Top Slab	100	CY	$1,000	$100,000
Excavation	3,500	CY	$10	$35,000
Backfilling	4,000	CY	$10	$40,000
Crushed Rock Base	200	TON	$26	$5,200
Dewatering	1	LS	$150,000	$150,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$45,000	$45,000
Aluminum Hatches	1	LS	$40,000	$40,000
Hoists, Crane Railings	1	LS	$75,000	$75,000
Non-Clog Sewage Pumps/Motors	3	EA	$300,000	$900,000
Interior Piping, Valves, and Fittings	1	LS	$75,000	$75,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$300,000	$300,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$200,000	$200,000
Standby Generator	1	LS	$300,000	$300,000
HVAC	1	LS	$35,000	$35,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$100,000	$100,000
Miscellaneous	1	LS	$100,000	$100,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				**$3,190,000**
Undeveloped Design Detail (25%)				$800,000
Construction Subtotal W/Contingencies				**$3,990,000**
General Conditions, Mobilization (5%)				$200,000
Bonds & Insurance (2%)				$84,000
Total Construction Cost				**$4,300,000**
Engineering, Admin., Legal, Permitting (24%)				$1,000,000
Land Acquisition				$250,000
Total Project Cost				**$5,600,000**

New 3.3 Million Gallon EQ Basin	1	LS	$6,600,000	$6,600,000
Subtotal				$6,600,000
Undeveloped Design Detail (25%)				$1,650,000
Construction Subtotal W/Contingencies				**$8,250,000**
General Conditions, Mobilization (5%)				$413,000
Bonds & Insurance (2%)				$173,000
Total Construction Cost				**$8,800,000**
Engineering, Admin., Legal, Permitting (24%)				$2,100,000
Land Acquisition				$250,000
Total Project Cost				**$11,200,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$60,000	$60,000
Clearing	1	LS	$50,000	$50,000
Remove Concrete Curb & Gutter	11,200	LF	$6.00	$67,200
Saw Existing Pavement	11,200	LF	$8.00	$89,600
Remove Pavement	31,112	SY	$10.00	$311,120
Scarify and Recompact Subgrade	31,112	SY	$1.00	$31,112
Incidental Grading Work	1	LS	$40,000	$40,000
Base Course	16,276	TON	$20.00	$325,520
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	76,700	TON	$18.00	$1,380,600
Permanent Surfacing	31,112	SY	$75.00	$2,333,400
Concrete Curb & Gutter	11,200	LF	$60.00	$672,000
Traffic Control	1	LS	$50,000	$50,000
Pavement Markings	44,300	LF	$12.00	$531,600
Placing Topsoil	15,330	CY	$3.00	$45,990
Salvage Topsoil	15,330	CY	$3.00	$45,990
Seed/Fertilizer/Mulch	19	ACRE	$3,500.00	$66,500
SWPPP (Erosion Control)	19	ACRE	$4,500.00	$85,500
One 18" or Dual Sanitary Sewer Force Mains	21,700	LF	$160.00	$3,472,000
One 18" or Dual Force Mains Bedding Material	21,700	LF	$25.00	$542,500
96" Lined Manhole w/ Combination Air Valve	44	EA	$30,000	$1,320,000
Manhole Frame and Cover	44	EA	$600.00	$26,400
Manhole External Frame Seal	44	EA	$350.00	$15,400
Manhole Construction Plate Marker	44	EA	$175.00	$7,700
Manhole Marker	44	EA	$250.00	$11,000
Manhole Exfiltration\Vacuum Test	44	EA	$450.00	$19,800
Trench Dewatering	21,700	FT	$25.00	$542,500
Pipe Hydrostatic Pressure Testing	21,700	LF	$2.00	$43,400
Locating Utility	30	EA	$250.00	$7,500
Verify Utility	30	EA	$250.00	$7,500
Subtotal				$12,220,000
Undeveloped Design Detail (25%)				$3,060,000
Construction Subtotal W/Contingencies				**$15,280,000**
General Conditions, Mobilization (5%)				$764,000
Bonds & Insurance (2%)				$321,000
Total Construction Cost				**$16,400,000**
Engineering, Admin., Legal, Permitting (24%)				$3,900,000
Total Project Cost				**$20,300,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$54,300,000	$57,400,000	-	$11,200,000	$5,600,000	$20,300,000
Total Area Served (Acres)	5472	5920	-	5920	5920	5920
Subtotal Cost/Acre	$10,000.00	$9,700.00	-	$1,900.00	$1,000.00	$3,500.00
Total Cost/Acre	**$16,400.00**	**$16,100.00**	-	-	-	-

Computed:	KJL	**Date:**	6/27/2017	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			
Project:	2016 Wastewater Treatment and Collection System Master Plan				

HDR Computation

CIP Item

Subject:	BASIN 29 PS, Trunk and Forcemain
Task:	BASIN 29 PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construct New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$10,000	$10,000
Clearing	1	LS	$15,000	$15,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,390	SY	$10.00	$13,900
Scarify and Recompact Subgrade	1,390	SY	$1.00	$1,390
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	728	TON	$20.00	$14,560
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,390	SY	$75.00	$104,250
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$15,000	$15,000
Pavement Markings	1500	LS	$12.00	$18,000
Placing Topsoil	13,720	CY	$3.00	$41,160
Salvage Topsoil	13,720	CY	$3.00	$41,160
Seed/Fertilizer/Mulch	17	ACRE	$3,500.00	$59,500
SWPPP (Erosion Control)	17	ACRE	$4,500.00	$76,500
12" Sanitary Sewer Pipe	7,300	LF	$60.00	$438,000
12" Sanitary Sewer Pipe Bedding Material	7,300	LF	$9.00	$65,700
48" Lined Manhole	21	EA	$9,000	$189,000
Manhole Frame and Cover	21	EA	$600.00	$12,600
Manhole External Frame Seal	21	EA	$350.00	$7,350
Manhole Construction Plate Marker	21	EA	$175.00	$3,675
Manhole Marker	21	EA	$250.00	$5,250
Manhole Exfiltration\Vacuum Test	21	EA	$450.00	$9,450
Trench Dewatering	7,300	FT	$25.00	$182,500
Sanitary Sewer Joint Air Test	7,300	LF	$3.00	$21,900
Sanitary Sewer Pipe Deflection Test	7,300	LF	$2.00	$14,600
Locating Utility	10	EA	$250.00	$2,500
Verify Utility	10	EA	$250.00	$2,500
Subtotal				**$1,470,000**
Undeveloped Design Detail (25%)				$370,000
Construction Subtotal W/Contingencies				**$1,840,000**
General Conditions, Mobilization (5%)				$92,000
Bonds & Insurance (2%)				$39,000
Total Construction Cost				**$2,000,000**
Engineering, Admin., Legal, Permitting (24%)				$500,000
Total Project Cost				**$2,500,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	100	CY	$1,000	$100,000
Concrete Top Slab	25	CY	$1,000	$25,000
Excavation	1,500	CY	$10	$15,000
Backfilling	750	CY	$10	$7,500
Crushed Rock Base	85	TON	$26	$2,210
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$30,000	$30,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$35,000	$70,000
Interior Piping, Valves, and Fittings	1	LS	$40,000	$40,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$100,000	$100,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$40,000	$40,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$25,000	$25,000
Subtotal				$990,000
Undeveloped Design Detail (25%)				$250,000
Construction Subtotal W/Contingencies				**$1,240,000**
General Conditions, Mobilization (5%)				$62,000
Bonds & Insurance (2%)				$26,000
Total Construction Cost				**$1,300,000**
Engineering, Admin., Legal, Permitting (24%)				$300,000
Land Acquisition				$250,000
Total Project Cost				**$1,900,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$20,000	$20,000
Clearing	1	LS	$15,000	$15,000
Remove Concrete Curb & Gutter	5,400	LF	$6.00	$32,400
Saw Existing Pavement	5,400	LF	$8.00	$43,200
Remove Pavement	7,200	SY	$10.00	$72,000
Scarify and Recompact Subgrade	7,200	SY	$1.00	$7,200
Incidental Grading Work	1	LS	$15,000	$15,000
Base Course	3,767	TON	$20.00	$75,340
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	37,800	TON	$18.00	$680,400
Permanent Surfacing	7,200	SY	$75.00	$540,000
Concrete Curb & Gutter	5,400	LF	$60.00	$324,000
Traffic Control	1	LS	$40,000	$40,000
Pavement Markings	21600	LF	$12.00	$259,200
Placing Topsoil	2,420	CY	$3.00	$7,260
Salvage Topsoil	2,420	CY	$3.00	$7,260
Seed/Fertilizer/Mulch	3	ACRE	$3,500.00	$10,500
SWPPP (Erosion Control)	3	ACRE	$4,500.00	$13,500
8" Sanitary Sewer Force Main	7,050	LF	$110.00	$775,500
8" Force Main Bedding Material	7,050	LF	$6.00	$42,300
60" Lined Manhole w/ Combination Air Valve	15	EA	$12,500	$187,500
Manhole Frame and Cover	15	EA	$600.00	$9,000
Manhole External Frame Seal	15	EA	$350.00	$5,250
Manhole Construction Plate Marker	15	EA	$175.00	$2,625
Manhole Marker	15	EA	$250.00	$3,750
Manhole Exfiltration\Vacuum Test	15	EA	$450.00	$6,750
Trench Dewatering	7,050	FT	$25.00	$176,250
Pipe Hydrostatic Pressure Testing	7,050	LF	$2.00	$14,100
Locating Utility	30	EA	$250.00	$7,500
Verify Utility	30	EA	$250.00	$7,500
Subtotal				$3,420,000
Undeveloped Design Detail (25%)				$860,000
Construction Subtotal W/Contingencies				**$4,280,000**
General Conditions, Mobilization (5%)				$214,000
Bonds & Insurance (2%)				$90,000
Total Construction Cost				**$4,600,000**
Engineering, Admin., Legal, Permitting (24%)				$1,100,000
Total Project Cost				**$5,700,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$2,500,000	-	-	-	$1,900,000	$5,700,000
Total Area Served (Acres)	187	-	-	-	187	187
Subtotal Cost/Acre	$13,400.00	-	-	-	$10,200.00	$30,500.00
Total Cost/Acre	**$54,100.00**	-	-	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No: 10028508
Checked: DVP	Date:	

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 30 & 31 PS, EQ, Trunk and Forcemain

Task: BASIN 30 & 31 PS, EQ, Trunk and Forcemain

Recommendation:

Construct New 800 gpm Lift Station

Construct Forcemain from New Lift Station to Existing 36" Interceptor Sewer.

Construct New Gravity Trunk Sewers

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$30,000	$30,000
Clearing	1	LS	$25,000	$25,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$50,000	$50,000
Pavement Markings	1500	LS	$12	$18,000
Placing Topsoil	33,080	CY	$3.00	$99,240
Salvage Topsoil	33,080	CY	$3.00	$99,240
Seed/Fertilizer/Mulch	41	ACRE	$3,500.00	$143,500
SWPPP (Erosion Control)	41	ACRE	$4,500.00	$184,500
12" Sanitary Sewer Pipe	12,900	LF	$60.00	$774,000
27" Sanitary Sewer Pipe	4,500	LF	$150.00	$675,000
36" Sanitary Sewer Pipe	25	LF	$275.00	$6,875
12" Sanitary Sewer Pipe Bedding Material	12,900	LF	$9.00	$116,100
27" Sanitary Sewer Pipe Bedding Material	4,500	LF	$22.00	$99,000
36" Sanitary Sewer Pipe Bedding Material	25	LF	$25.00	$625
48" Lined Manhole	37	EA	$9,000	$333,000
60" Lined Manhole	13	EA	$15,000	$195,000
72" Lined Manhole	1	EA	$20,000	$20,000
Manhole Frame and Cover	51	EA	$600.00	$30,600
Manhole External Frame Seal	51	EA	$350.00	$17,850
Manhole Construction Plate Marker	51	EA	$175.00	$8,925
Manhole Marker	51	EA	$250.00	$12,750
Manhole Exfiltration\Vacuum Test	51	EA	$450.00	$22,950
Trench Dewatering	17,425	FT	$25.00	$435,625
Sanitary Sewer Joint Air Test	17,425	LF	$3.00	$52,275
Sanitary Sewer Pipe Deflection Test	17,425	LF	$2.00	$34,850
Locating Utility	6	EA	$250.00	$1,500
Verify Utility	6	EA	$250.00	$1,500
Subtotal				**$3,730,000**
Undeveloped Design Detail (25%)				$940,000
Construction Subtotal W/Contingencies				**$4,670,000**
General Conditions, Mobilization (5%)				$234,000
Bonds & Insurance (2%)				$98,000
Total Construction Cost				**$5,000,000**
Engineering, Admin., Legal, Permitting (24%)				$1,200,000
Total Project Cost				**$6,200,000**

2066 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$40,000	$40,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	1,000	LF	$6.00	$6,000
Saw Existing Pavement	1,000	LF	$8.00	$8,000
Remove Pavement	2,778	SY	$10.00	$27,780
Scarify and Recompact Subgrade	2,778	SY	$1.00	$2,778
Incidental Grading Work	1	LS	$25,000	$25,000
Base Course	1,454	TON	$20.00	$29,080
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	3,500	TON	$18.00	$63,000
Permanent Surfacing	2,778	SY	$75.00	$208,350
Concrete Curb & Gutter	1,000	LF	$60.00	$60,000
Traffic Control	1	LS	$75,000	$75,000
Pavement Markings	3000	LS	$12	$36,000
Placing Topsoil	54,050	CY	$3.00	$162,150
Salvage Topsoil	54,050	CY	$3.00	$162,150
Seed/Fertilizer/Mulch	67	ACRE	$3,500.00	$234,500
SWPPP (Erosion Control)	67	ACRE	$4,500.00	$301,500
12" Sanitary Sewer Pipe	17,950	LF	$60.00	$1,077,000
24" Sanitary Sewer Pipe	1,700	LF	$130.00	$221,000
27" Sanitary Sewer Pipe	9,500	LF	$150.00	$1,425,000
36" Sanitary Sewer Pipe	25	LF	$275.00	$6,875
12" Sanitary Sewer Pipe Bedding Material	17,950	LF	$9.00	$161,550
24" Sanitary Sewer Pipe Bedding Material	1,700	LF	$22.00	$37,400
27" Sanitary Sewer Pipe Bedding Material	9,500	LF	$22.00	$209,000
36" Sanitary Sewer Pipe Bedding Material	25	LF	$25.00	$625
48" Lined Manhole	52	EA	$9,000	$468,000
60" Lined Manhole	32	EA	$15,000	$480,000
72" Lined Manhole	1	EA	$20,000	$20,000
Manhole Frame and Cover	85	EA	$600.00	$51,000
Manhole External Frame Seal	85	EA	$350.00	$29,750
Manhole Construction Plate Marker	85	EA	$175.00	$14,875
Manhole Marker	85	EA	$250.00	$21,250
Manhole Exfiltration\Vacuum Test	85	EA	$450.00	$38,250
Trench Dewatering	29,175	FT	$25.00	$729,375
Sanitary Sewer Joint Air Test	29,175	LF	$3.00	$87,525
Sanitary Sewer Pipe Deflection Test	29,175	LF	$2.00	$58,350
Locating Utility	10	EA	$250.00	$2,500
Verify Utility	10	EA	$250.00	$2,500
Subtotal				$6,640,000
Undeveloped Design Detail (25%)				$1,660,000
Construction Subtotal W/Contingencies				**$8,300,000**
General Conditions, Mobilization (5%)				$415,000
Bonds & Insurance (2%)				$174,000
Total Construction Cost				**$8,900,000**
Engineering, Admin., Legal, Permitting (24%)				$2,100,000
Total Project Cost				**$11,000,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New 800 gpm Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	150	CY	$1,000	$150,000
Concrete Top Slab	35	CY	$1,000	$35,000
Excavation	2,355	CY	$10	$23,550
Backfilling	4,400	CY	$10	$44,000
Crushed Rock Base	100	TON	$26	$2,600
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$36,000	$36,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$54,000	$108,000
Interior Piping, Valves, and Fittings	1	LS	$60,000	$60,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$130,000	$130,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$75,000	$75,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$45,000	$45,000
Subtotal				$1,250,000
Undeveloped Design Detail (25%)				$320,000
Construction Subtotal W/Contingencies				**$1,570,000**
General Conditions, Mobilization (5%)				$79,000
Bonds & Insurance (2%)				$33,000
Total Construction Cost				**$1,700,000**
Engineering, Admin., Legal, Permitting (24%)				$400,000
Land Acquisition				$250,000
Total Project Cost				**$2,400,000**

New 1.2 Million Gallon EQ Basin	1	LS	$2,400,000	$2,400,000
Subtotal				$2,400,000
Undeveloped Design Detail (25%)				$600,000
Construction Subtotal W/Contingencies				**$3,000,000**
General Conditions, Mobilization (5%)				$150,000
Bonds & Insurance (2%)				$63,000
Total Construction Cost				**$3,200,000**
Engineering, Admin., Legal, Permitting (24%)				$800,000
Land Acquisition				$250,000
Total Project Cost				**$4,300,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$30,000	$30,000
Clearing	1	LS	$25,000	$25,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$30,000	$30,000
Pavement Markings	1500	LF	$12.00	$18,000
Placing Topsoil	13,720	CY	$3.00	$41,160
Salvage Topsoil	13,720	CY	$3.00	$41,160
Seed/Fertilizer/Mulch	17	ACRE	$3,500.00	$59,500
SWPPP (Erosion Control)	17	ACRE	$4,500.00	$76,500
8" Sanitary Sewer Force Main	7,300	LF	$110.00	$803,000
8" Force Main Bedding Material	7,300	LF	$6.00	$43,800
60" Lined Manhole w/ Combination Air Valve	15	EA	$12,500	$187,500
Manhole Frame and Cover	15	EA	$600.00	$9,000
Manhole External Frame Seal	15	EA	$350.00	$5,250
Manhole Construction Plate Marker	15	EA	$175.00	$2,625
Manhole Marker	15	EA	$250.00	$3,750
Manhole Exfiltration\Vacuum Test	15	EA	$450.00	$6,750
Trench Dewatering	7,300	FT	$25.00	$182,500
Pipe Hydrostatic Pressure Testing	7,300	LF	$2.00	$14,600
Locating Utility	20	EA	$250.00	$5,000
Verify Utility	20	EA	$250.00	$5,000
Subtotal				$1,830,000
Undeveloped Design Detail (25%)				$460,000
Construction Subtotal W/Contingencies				**$2,290,000**
General Conditions, Mobilization (5%)				$115,000
Bonds & Insurance (2%)				$48,000
Total Construction Cost				**$2,500,000**
Engineering, Admin., Legal, Permitting (24%)				$600,000
Total Project Cost				**$3,100,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$6,200,000	-	$11,000,000	$4,300,000	$2,400,000	$3,100,000
Total Area Served (Acres)	1410	-	1491	1491	1491	1491
Subtotal Cost/Acre	$4,400.00	-	$7,400.00	$2,900.00	$1,700.00	$2,100.00
Total Cost/Acre	**$11,100.00**	-	**$14,100.00**	-	-	-

Computed:	KJL	**Date:**	6/27/2017	**HDR Job No:**	10028508
Checked:	DVP	**Date:**			

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 32 PS, Trunk and Forcemain

Task: BASIN 32 PS, Trunk and Forcemain

Recommendation:

Construct New Lift Station

Construct Forcemain from New Lift Station to Basin 26 Interceptor Sewer.

Construct New Gravity Trunk Sewers

2066 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$35,000	$35,000
Remove Concrete Curb & Gutter	500	LF	$6.00	$3,000
Saw Existing Pavement	500	LF	$8.00	$4,000
Remove Pavement	1,390	SY	$10.00	$13,900
Scarify and Recompact Subgrade	1,390	SY	$1.00	$1,390
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	728	TON	$20.00	$14,560
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	1,800	TON	$18.00	$32,400
Permanent Surfacing	1,390	SY	$75.00	$104,250
Concrete Curb & Gutter	500	LF	$60.00	$30,000
Traffic Control	1	LS	$15,000	$15,000
Pavement Markings	1500	LS	$12	$18,000
Placing Topsoil	28,240	CY	$3.00	$84,720
Salvage Topsoil	28,240	CY	$3.00	$84,720
Seed/Fertilizer/Mulch	35	ACRE	$3,500.00	$122,500
SWPPP (Erosion Control)	35	ACRE	$4,500.00	$157,500
12" Sanitary Sewer Pipe	11,300	LF	$60.00	$678,000
21" Sanitary Sewer Pipe	2,000	LF	$120.00	$240,000
27" Sanitary Sewer Pipe	1,550	LF	$150.00	$232,500
12" Sanitary Sewer Pipe Bedding Material	11,300	LF	$9.00	$101,700
21" Sanitary Sewer Pipe Bedding Material	2,000	LF	$20.00	$40,000
27" Sanitary Sewer Pipe Bedding Material	1,550	LF	$22.00	$34,100
48" Lined Manhole	33	EA	$9,000	$297,000
60" Lined Manhole	11	EA	$15,000	$165,000
Manhole Frame and Cover	44	EA	$600.00	$26,400
Manhole External Frame Seal	44	EA	$350.00	$15,400
Manhole Construction Plate Marker	44	EA	$175.00	$7,700
Manhole Marker	44	EA	$250.00	$11,000
Manhole Exfiltration\Vacuum Test	44	EA	$450.00	$19,800
Trench Dewatering	14,850	FT	$25.00	$371,250
Sanitary Sewer Joint Air Test	14,850	LF	$3.00	$44,550
Sanitary Sewer Pipe Deflection Test	14,850	LF	$2.00	$29,700
Locating Utility	10	EA	$250.00	$2,500
Verify Utility	10	EA	$250.00	$2,500
Subtotal				$3,110,000
Undeveloped Design Detail (25%)				$780,000
Construction Subtotal W/Contingencies				**$3,890,000**
General Conditions, Mobilization (5%)				$195,000
Bonds & Insurance (2%)				$82,000
Total Construction Cost				**$4,200,000**
Engineering, Admin., Legal, Permitting (24%)				$1,000,000
Total Project Cost				**$5,200,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
New 700 gpm Drywell/Wet Well Lift Station				
Concrete Base Slab	35	CY	$750	$26,250
Concrete Walls	100	CY	$1,000	$100,000
Concrete Top Slab	25	CY	$1,000	$25,000
Excavation	1,500	CY	$10	$15,000
Backfilling	750	CY	$10	$7,500
Crushed Rock Base	85	TON	$26	$2,210
Dewatering	1	LS	$50,000	$50,000
Concrete Fillets in Wet Well	1	LS	$20,000	$20,000
Dry Well False Floor	1	LS	$20,000	$20,000
Painting	1	LS	$30,000	$30,000
Aluminum Hatches	1	LS	$30,000	$30,000
Hoists, Crane Railings	1	LS	$30,000	$30,000
Non-Clog Sewage Pumps/Motors	2	EA	$35,000	$70,000
Interior Piping, Valves, and Fittings	1	LS	$40,000	$40,000
Sump Pump System	1	LS	$10,000	$10,000
MCC/VFDs	1	LS	$100,000	$100,000
Instrumentation and Controls	1	LS	$50,000	$50,000
Electrical	1	LS	$72,000	$72,000
Standby Generator	1	LS	$40,000	$40,000
HVAC	1	LS	$25,000	$25,000
Plumbing	1	LS	$18,000	$18,000
Building Over Dry Well (225 SF)	1	LS	$50,000	$50,000
Site Work	1	LS	$55,000	$55,000
Miscellaneous	1	LS	$75,000	$75,000
Mag Meter	1	LS	$25,000	$25,000
Subtotal				$990,000
Undeveloped Design Detail (25%)				$250,000
Construction Subtotal W/Contingencies				**$1,240,000**
General Conditions, Mobilization (5%)				$62,000
Bonds & Insurance (2%)				$26,000
Total Construction Cost				**$1,300,000**
Engineering, Admin., Legal, Permitting (24%)				$300,000
Land Acquisition				$250,000
Total Project Cost				**$1,900,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$30,000	$30,000
Clearing	1	LS	$25,000	$25,000
Remove Concrete Curb & Gutter	7,050	LF	$6.00	$42,300
Saw Existing Pavement	7,050	LF	$8.00	$56,400
Remove Pavement	1,389	SY	$10.00	$13,890
Scarify and Recompact Subgrade	1,389	SY	$1.00	$1,389
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	727	TON	$20.00	$14,540
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	49,400	TON	$18.00	$889,200
Permanent Surfacing	1,389	SY	$75.00	$104,175
Concrete Curb & Gutter	7,050	LF	$60.00	$423,000
Traffic Control	1	LS	$30,000	$30,000
Pavement Markings	28200	LF	$12.00	$338,400
Placing Topsoil	12,910	CY	$3.00	$38,730
Salvage Topsoil	12,910	CY	$3.00	$38,730
Seed/Fertilizer/Mulch	16	ACRE	$3,500.00	$56,000
SWPPP (Erosion Control)	16	ACRE	$4,500.00	$72,000
8" Sanitary Sewer Force Main	16,200	LF	$110.00	$1,782,000
8" Force Main Bedding Material	16,200	LF	$6.00	$97,200
60" Lined Manhole w/ Combination Air Valve	33	EA	$12,500	$412,500
Manhole Frame and Cover	33	EA	$600.00	$19,800
Manhole External Frame Seal	33	EA	$350.00	$11,550
Manhole Construction Plate Marker	33	EA	$175.00	$5,775
Manhole Marker	33	EA	$250.00	$8,250
Manhole Exfiltration\Vacuum Test	33	EA	$450.00	$14,850
Trench Dewatering	16,200	FT	$25.00	$405,000
Pipe Hydrostatic Pressure Testing	16,200	LF	$2.00	$32,400
Locating Utility	20	EA	$250.00	$5,000
Verify Utility	20	EA	$250.00	$5,000
Subtotal				$5,010,000
Undeveloped Design Detail (25%)				$1,260,000
Construction Subtotal W/Contingencies				**$6,270,000**
General Conditions, Mobilization (5%)				$314,000
Bonds & Insurance (2%)				$132,000
Total Construction Cost				**$6,700,000**
Engineering, Admin., Legal, Permitting (24%)				$1,600,000
Total Project Cost				**$8,300,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	-	-	$5,200,000	-	$1,900,000	$8,300,000
Total Area Served (Acres)	-	-	1288	-	1288	1288
Subtotal Cost/Acre	-	-	$4,100.00	-	$1,500.00	$6,500.00
Total Cost/Acre	-	-	**$12,100.00**	-	-	-

Computed: KJL	Date: 6/27/2017	HDR Job No: 10028508	
Checked: DVP	Date:		

Project: 2016 Wastewater Treatment and Collection System Master Plan

HDR Computation

CIP Item

Subject: BASIN 33 EQ, PS, Trunk and Forcemain

Task: BASIN 33 EQ, PS, Trunk and Forcemain

Recommendation:

Construct New Gravity Trunk Sewers

Construct New Lift Station and FM

Construct EQ

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$25,000	$25,000
Clearing	1	LS	$20,000	$20,000
Remove Concrete Curb & Gutter	100	LF	$6.00	$600
Saw Existing Pavement	100	LF	$8.00	$800
Remove Pavement	280	SY	$10.00	$2,800
Scarify and Recompact Subgrade	280	SY	$1.00	$280
Incidental Grading Work	1	LS	$20,000	$20,000
Base Course	147	TON	$20.00	$2,940
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	400	TON	$18.00	$7,200
Permanent Surfacing	280	SY	$75.00	$21,000
Concrete Curb & Gutter	100	LF	$60.00	$6,000
Traffic Control	1	LS	$15,000	$15,000
Pavement Markings	300	LF	$12.00	$3,600
Placing Topsoil	39,530	CY	$3.00	$118,590
Salvage Topsoil	39,530	CY	$3.00	$118,590
Seed/Fertilizer/Mulch	49	ACRE	$3,500.00	$171,500
SWPPP (Erosion Control)	49	ACRE	$4,500.00	$220,500
12" Sanitary Sewer Pipe	11,350	LF	$60.00	$681,000
15" Sanitary Sewer Pipe	6,750	LF	$70.00	$472,500
21" Sanitary Sewer Pipe	3,200	LF	$120.00	$384,000
12" Sanitary Sewer Pipe Bedding Material	11,350	LF	$9.00	$102,150
15" Sanitary Sewer Pipe Bedding Material	6,750	LF	$10.00	$67,500
21" Sanitary Sewer Pipe Bedding Material	3,200	LF	$20.00	$64,000
36" Steel Casing Pipe - Trenchless Installation	500	LF	$750	$375,000
36" Steel Casing Pipe w/Spacers & End Seals	500	LF	$155	$77,500
48" Lined Manhole	52	EA	$9,000	$468,000
60" Lined Manhole	10	EA	$15,000	$150,000
Manhole Frame and Cover	62	Each	$600.00	$37,200
Manhole External Frame Seal	62	Each	$350.00	$21,700
Manhole Construction Plate Marker	62	Each	$175.00	$10,850
Manhole Marker	62	Each	$250.00	$15,500
Manhole Exfiltration\Vacuum Test	62	Each	$450.00	$27,900
Trench Dewatering	21,300	FT	$25.00	$532,500
Sanitary Sewer Joint Air Test	21,300	LF	$3.00	$63,900
Sanitary Sewer Pipe Deflection Test	21,300	LF	$2.00	$42,600
Locating Utility	5	Each	$250.00	$1,250
Verify Utility	5	Each	$250.00	$1,250
Subtotal				$4,370,000
Undeveloped Design Detail (25%)				$1,100,000
Construction Subtotal W/Contingencies				**$5,470,000**
General Conditions, Mobilization (5%)				$274,000
Bonds & Insurance (2%)				$115,000
Total Construction Cost				**$5,900,000**
Engineering, Admin., Legal, Permitting (24%)				$1,400,000
Total Project Cost				**$7,300,000**

Basin 14D (Foundation Park) Sanitary Sewer Extension				
Mobilization - Demobilization (6%)	1	LS	$210,000	$210,000
Grading	1	LS	$317,400	$317,400
Storm Sewer	1	LS	$6,000	$6,000
Pavement Markings	1	LS	$2,850	$2,850
Traffic Control	1	LS	$78,750	$78,750
Surfacing	1	LS	$113,900	$113,900
Erosion Control	1	LS	$186,250	$186,250
Watermain	1	LS	$13,400	$13,400
Sanitary Sewer	1	LS	$2,645,200	$2,645,200
Fiber Optic	1	LS	$30,700	$30,700
Alternate A	1	LS	$79,400	$79,400
Subtotal				**$3,683,850**
Engineering, Admin., Legal, Permitting (24%)				$900,000
Total Project Cost				**$4,600,000**

New 900,000 Gallon EQ Basin	1	LS	$2,300,000	$2,300,000
Subtotal				**$2,300,000**
Undeveloped Design Detail (25%)				$580,000
Construction Subtotal W/Contingencies				**$2,880,000**
General Conditions, Mobilization (5%)				$144,000
Bonds & Insurance (2%)				$60,000
Total Construction Cost				**$3,100,000**
Engineering, Admin., Legal, Permitting (24%)				$700,000
Land Acquisition				$250,000
Total Project Cost				**$4,100,000**

New Drywell/Wet Well Lift Station and Forcemain				
Mobilization - Demobilization (4%)	1	LS	$101,400	$101,400
General Conditions (6%)	1	LS	$152,110	$152,110
Civil Site Work	1	LS	$221,500	$221,500
Architectural	1	LS	$501,600	$501,600
Structural	1	LS	$684,400	$684,400
Mechanical	1	LS	$120,850	$120,850
Process Equipment	1	LS	$283,800	$283,800
Process Piping	1	LS	$207,260	$207,260
Electrical	1	LS	$421,500	$421,500
Instrumentation	1	LS	$94,200	$94,200
Subtotal				**$2,788,620**
Sales Tax (6%)				$167,318
Undeveloped Design Detail (5%)				$139,431
Contractor Overhead & Profit (15%)				$418,293
Total Construction Cost				**$3,500,000**
Engineering, Admin., Legal, Permitting (24%)				$800,000
Total Project Cost				**$4,300,000**

	2026	2036	2066	EQ Basin	PS	FM
Total Project Cost	$7,300,000	-	-	$4,100,000	$4,300,000	$4,600,000
Total Area Served (Acres)	1598	-	-	1598	1598	1598
Subtotal Cost/Acre	$4,600.00	-	-	$2,600.00	$2,700.00	$2,900.00
Total Cost/Acre	**$12,800.00**	-	-	-	-	-

Computed: KJL	Date: 6/23/2017	HDR Job No:	10028508
Checked: DVP	Date:		
Project:	2016 Wastewater Treatment and Collection System Master Plan		

HDR Computation

CIP Item

Subject: BASIN 34 EQ, PS, Trunk and Forcemain

Task: BASIN 34 EQ, PS, Trunk and Forcemain

Recommendation:

Construct Basin 34 Trunk Sewers

Construct EQ

Construct New Pump Station and Force Main in 2066.

2026 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$5,000	$5,000
Clearing	1	LS	$5,000	$5,000
Remove Concrete Curb & Gutter	100	LF	$6.00	$600
Saw Existing Pavement	100	LF	$7.00	$700
Remove Pavement	300	SY	$10.00	$3,000
Scarify and Recompact Subgrade	300	SY	$1.00	$300
Incidental Grading Work	1	LS	$1,000	$1,000
Base Course	105	TON	$20.00	$2,093
Trench Stabilization	50	TON	$15.00	$750
Select Fill	100	TON	$18.00	$1,800
Permanent Surfacing	300	SY	$75.00	$22,500
Concrete Curb & Gutter	100	LF	$60.00	$6,000
Traffic Control	1	LS	$5,000	$5,000
Pavement Markings	200	LF	$12.00	$2,400
Placing Topsoil	810	CY	$3.00	$2,430
Salvage Topsoil	810	CY	$3.00	$2,430
Seed/Fertilizer/Mulch	1	ACRE	$3,500.00	$3,500
SWPPP (Erosion Control)	1	ACRE	$4,500.00	$4,500
54" Sanitary Sewer Pipe	45	LF	$425.00	$19,125
54" Sanitary Sewer Pipe Bedding Material	45	LF	$35.00	$1,575
48" x 54" Tee Base	1	EA	$18,000	$18,000
48" FRPM Manhole Riser with Cone	20	VFT	$700	$14,000
Manhole Frame and Cover	1	EA	$600.00	$600
Manhole External Frame Seal	1	EA	$350.00	$350
Manhole Construction Plate Marker	1	EA	$175.00	$175
Manhole Marker	1	EA	$250.00	$250
Manhole Exfiltration\Vacuum Test	1	EA	$450.00	$450
Trench Dewatering	45	FT	$25.00	$1,125
Sanitary Sewer Joint Air Test	45	LF	$3.00	$135
Sanitary Sewer Pipe Deflection Test	45	LF	$2.00	$90
Locating Utility	5	EA	$250.00	$1,250
Verify Utility	5	EA	$250.00	$1,250
Subtotal				$130,000
Undeveloped Design Detail (25%)				$40,000
Construction Subtotal W/Contingencies				**$170,000**
General Conditions, Mobilization (5%)				$9,000
Bonds & Insurance (2%)				$4,000
Total Construction Cost				**$200,000**
Engineering, Admin., Legal, Permitting (24%)				$48,000
Total Project Cost				**$200,000**

2036 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$100,000	$100,000
Clearing	1	LS	$100,000	$100,000
Remove Concrete Curb & Gutter	3,000	LF	$6.00	$18,000
Saw Existing Pavement	3,000	LF	$7.00	$21,000
Remove Pavement	42,778	SY	$10.00	$427,780
Scarify and Recompact Subgrade	42,778	SY	$1.00	$42,778
Incidental Grading Work	1	LS	$30,000	$30,000
Base Course	22,379	TON	$20.00	$447,580
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	53,900	TON	$18.00	$970,200
Permanent Surfacing	42,778	SY	$75.00	$3,208,350
Concrete Curb & Gutter	3,000	LF	$60.00	$180,000
Traffic Control	1	LS	$80,000	$80,000
Pavement Markings	33800	LF	$12.00	$405,600
Placing Topsoil	130,680	CY	$3.00	$392,040
Salvage Topsoil	130,680	CY	$3.00	$392,040
Seed/Fertilizer/Mulch	162	ACRE	$3,500.00	$567,000
SWPPP (Erosion Control)	162	ACRE	$4,500.00	$729,000
12" Sanitary Sewer Pipe	13,200	LF	$60.00	$792,000
18" Sanitary Sewer Pipe	350	LF	$100.00	$35,000
21" Sanitary Sewer Pipe	1,000	LF	$120.00	$120,000
24" Sanitary Sewer Pipe	2,350	LF	$130.00	$305,500
27" Sanitary Sewer Pipe	17,700	LF	$150.00	$2,655,000
30" Sanitary Sewer Pipe	10,450	LF	$225.00	$2,351,250
36" Sanitary Sewer Pipe	2,700	LF	$275.00	$742,500
42" Sanitary Sewer Pipe	5,900	LF	$325.00	$1,917,500
48" Sanitary Sewer Pipe	3,850	LF	$375.00	$1,443,750
54" Sanitary Sewer Pipe	12,650	LF	$425.00	$5,376,250
12" Sanitary Sewer Pipe Bedding Material	13,200	LF	$9.00	$118,800
18" Sanitary Sewer Pipe Bedding Material	350	LF	$15.00	$5,250
21" Sanitary Sewer Pipe Bedding Material	1,000	LF	$20.00	$20,000
24" Sanitary Sewer Pipe Bedding Material	2,350	LF	$22.00	$51,700
27" Sanitary Sewer Pipe Bedding Material	17,700	LF	$22.00	$389,400
30" Sanitary Sewer Pipe Bedding Material	10,450	LF	$24.00	$250,800
36" Sanitary Sewer Pipe Bedding Material	2,700	LF	$25.00	$67,500
42" Sanitary Sewer Pipe Bedding Material	5,900	LF	$30.00	$177,000
48" Sanitary Sewer Pipe Bedding Material	3,850	LF	$35.00	$134,750
54" Sanitary Sewer Pipe Bedding Material	12,650	LF	$35.00	$442,750
Connect to Existing Sanitary Sewer Pipe	1	EA	$3,000	$3,000
42" Steel Casing Pipe - Trenchless Installation	1,000	LF	$1,000	$1,000,000
42" Steel Casing Pipe w/Spacers & End Seals	1,000	LF	$500	$500,000
48" Lined Manhole	38	EA	$9,000	$342,000
60" Lined Manhole	91	EA	$15,000	$1,365,000
72" Lined Manhole	8	EA	$20,000	$160,000
84" Lined Manhole	17	EA	$25,000	$425,000
48" x 42" Tee Base	11	EA	$15,000	$165,000
54" x 48" Tee Base	37	EA	$18,000	$666,000
42" FRPM Manhole Riser with Cone	220	VFT	$600	$132,000
48" FRPM Manhole Riser with Cone	740	VFT	$700	$518,000
Manhole Frame and Cover	202	EA	$600.00	$121,200
Manhole External Frame Seal	202	EA	$350.00	$70,700
Manhole Construction Plate Marker	202	EA	$175.00	$35,350
Manhole Marker	202	EA	$250.00	$50,500
Manhole Exfiltration\Vacuum Test	202	EA	$450.00	$90,900
Trench Dewatering	70,150	FT	$25.00	$1,753,750
Sanitary Sewer Joint Air Test	70,150	LF	$3.00	$210,450
Sanitary Sewer Pipe Deflection Test	70,150	LF	$2.00	$140,300
Locating Utility	40	EA	$250.00	$10,000
Verify Utility	40	EA	$250.00	$10,000
Subtotal				$33,300,000
Undeveloped Design Detail (25%)				$8,330,000
Construction Subtotal W/Contingencies				**$41,630,000**
General Conditions, Mobilization (5%)				$2,082,000
Bonds & Insurance (2%)				$874,000
Total Construction Cost				**$44,600,000**
Engineering, Admin., Legal, Permitting (24%)				$10,700,000
Total Project Cost				**$55,300,000**

2066 Capital Cost:

Item Description	Est. Qty	Units	Unit Price	Total Price
Sanitary Sewer Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$150,000	$150,000
Remove Concrete Curb & Gutter	5,000	LF	$6.00	$30,000
Saw Existing Pavement	5,000	LF	$7.00	$35,000
Remove Pavement	48,334	SY	$10.00	$483,340
Scarify and Recompact Subgrade	48,334	SY	$1.00	$48,334
Incidental Grading Work	1	LS	$40,000	$40,000
Base Course	25,285	TON	$20.00	$505,700
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	60,900	TON	$18.00	$1,096,200
Permanent Surfacing	48,334	SY	$75.00	$3,625,050
Concrete Curb & Gutter	5,000	LF	$60.00	$300,000
Traffic Control	1	LS	$120,000	$120,000
Pavement Markings	39800	LF	$12.00	$477,600
Placing Topsoil	256,520	CY	$3.00	$769,560
Salvage Topsoil	256,520	CY	$3.00	$769,560
Seed/Fertilizer/Mulch	318	ACRE	$3,500.00	$1,113,000
SWPPP (Erosion Control)	318	ACRE	$4,500.00	$1,431,000
12" Sanitary Sewer Pipe	44,000	LF	$60.00	$2,640,000
18" Sanitary Sewer Pipe	2,500	LF	$100.00	$250,000
21" Sanitary Sewer Pipe	8,000	LF	$120.00	$960,000
24" Sanitary Sewer Pipe	2,350	LF	$130.00	$305,500
27" Sanitary Sewer Pipe	31,700	LF	$150.00	$4,755,000
30" Sanitary Sewer Pipe	19,050	LF	$225.00	$4,286,250
36" Sanitary Sewer Pipe	5,400	LF	$275.00	$1,485,000
42" Sanitary Sewer Pipe	7,500	LF	$325.00	$2,437,500
48" Sanitary Sewer Pipe	4,950	LF	$375.00	$1,856,250
54" Sanitary Sewer Pipe	12,650	LF	$425.00	$5,376,250
60" Sanitary Sewer Pipe	120	LF	$475.00	$57,000
12" Sanitary Sewer Pipe Bedding Material	44,000	LF	$9.00	$396,000
18" Sanitary Sewer Pipe Bedding Material	2,500	LF	$15.00	$37,500
21" Sanitary Sewer Pipe Bedding Material	8,000	LF	$20.00	$160,000
24" Sanitary Sewer Pipe Bedding Material	2,350	LF	$22.00	$51,700
27" Sanitary Sewer Pipe Bedding Material	31,700	LF	$22.00	$697,400
30" Sanitary Sewer Pipe Bedding Material	19,050	LF	$24.00	$457,200
36" Sanitary Sewer Pipe Bedding Material	5,400	LF	$25.00	$135,000
42" Sanitary Sewer Pipe Bedding Material	7,500	LF	$30.00	$225,000
48" Sanitary Sewer Pipe Bedding Material	4,950	LF	$35.00	$173,250
54" Sanitary Sewer Pipe Bedding Material	12,650	LF	$35.00	$442,750
60" Sanitary Sewer Pipe Bedding Material	120	LF	$40.00	$4,800
Connect to Existing Sanitary Sewer Pipe	1	EA	$3,000	$3,000
36" Steel Casing Pipe - Trenchless Installation	500	LF	$750	$375,000
36" Steel Casing Pipe w/Spacers & End Seals	500	LF	$155	$77,500
42" Steel Casing Pipe - Trenchless Installation	1,500	LF	$1,000	$1,500,000
42" Steel Casing Pipe w/Spacers & End Seals	1,500	LF	$500	$750,000
48" Lined Manhole	126	EA	$9,000	$1,134,000
60" Lined Manhole	182	EA	$15,000	$2,730,000
72" Lined Manhole	16	EA	$20,000	$320,000
84" Lined Manhole	22	EA	$25,000	$550,000
48" x 42" Tee Base	15	EA	$15,000	$225,000
54" x 48" Tee Base	37	EA	$18,000	$666,000
60" x 48" Tee Base	1	EA	$18,000	$18,000
42" FRPM Manhole Riser with Cone	300	VFT	$600	$180,000
48" FRPM Manhole Riser with Cone	760	VFT	$700	$532,000
Manhole Frame and Cover	399	EA	$600.00	$239,400
Manhole External Frame Seal	399	EA	$350.00	$139,650
Manhole Construction Plate Marker	399	EA	$175.00	$69,825
Manhole Marker	399	EA	$250.00	$99,750
Manhole Exfiltration\Vacuum Test	399	EA	$450.00	$179,550
Trench Dewatering	138,220	FT	$25.00	$3,455,500
Sanitary Sewer Joint Air Test	138,220	LF	$3.00	$414,660
Sanitary Sewer Pipe Deflection Test	138,220	LF	$2.00	$276,440
Locating Utility	50	EA	$250.00	$12,500
Verify Utility	50	EA	$250.00	$12,500
Subtotal				$52,310,000
Undeveloped Design Detail (25%)				$13,080,000
Construction Subtotal W/Contingencies				**$65,390,000**
General Conditions, Mobilization (5%)				$3,270,000
Bonds & Insurance (2%)				$1,373,000
Total Construction Cost				**$70,000,000**
Engineering, Admin., Legal, Permitting (24%)				$16,800,000
Total Project Cost				**$86,800,000**

New 13.0 MGD Drywell/Wet Well Lift Station				
Concrete Base Slab	400	CY	$750	$300,000
Concrete Walls	800	CY	$1,000	$800,000
Concrete Top Slab	240	CY	$1,000	$240,000
Excavation	7,000	CY	$10	$70,000
Backfilling	8,000	CY	$10	$80,000
Crushed Rock Base	400	TON	$26	$10,400
Dewatering	1	LS	$250,000	$250,000
Concrete Fillets in Wet Well	1	LS	$40,000	$40,000
Dry Well False Floor	1	LS	$40,000	$40,000
Painting	1	LS	$100,000	$100,000
Aluminum Hatches	1	LS	$80,000	$80,000
Hoists, Crane Railings	1	LS	$100,000	$100,000
Non-Clog Sewage Pumps/Motors	3	EA	$600,000	$1,800,000
Interior Piping, Valves, and Fittings	1	LS	$200,000	$200,000
Sump Pump System	1	LS	$20,000	$20,000
MCC/VFDs	1	LS	$550,000	$550,000
Instrumentation and Controls	1	LS	$75,000	$75,000
Electrical	1	LS	$300,000	$300,000
Standby Generator	1	LS	$500,000	$500,000
HVAC	1	LS	$60,000	$60,000
Plumbing	1	LS	$25,000	$25,000
Building Over Dry Well (225 SF)	1	LS	$75,000	$75,000
Site Work	1	LS	$150,000	$150,000
Miscellaneous	1	LS	$150,000	$150,000
Mag Meter	1	LS	$75,000	$75,000
Subtotal				**$6,100,000**
Undeveloped Design Detail (25%)				$1,530,000
Construction Subtotal W/Contingencies				**$7,630,000**
General Conditions, Mobilization (5%)				$382,000
Bonds & Insurance (2%)				$160,000
Total Construction Cost				**$8,200,000**
Engineering, Admin., Legal, Permitting (24%)				$2,000,000
Land Acquisition				$250,000
Total Project Cost				**$10,500,000**

New 6.2 Million Gallon EQ Basin	1	LS	$10,900,000	$10,900,000
Subtotal				**$10,900,000**
Undeveloped Design Detail (25%)				$2,730,000
Construction Subtotal W/Contingencies				**$13,630,000**
General Conditions, Mobilization (5%)				$682,000
Bonds & Insurance (2%)				$286,000
Total Construction Cost				**$14,600,000**
Engineering, Admin., Legal, Permitting (24%)				$3,500,000
Land Acquisition				$250,000
Total Project Cost				**$18,400,000**

Note: Need future land for total 10.7 Million Gallon EQ Basin

New 10.7 Million Gallon EQ Basin	1	LS	$13,400,000	$13,400,000
Subtotal				**$13,400,000**
Undeveloped Design Detail (25%)				$3,350,000
Construction Subtotal W/Contingencies				**$16,750,000**
General Conditions, Mobilization (5%)				$838,000
Bonds & Insurance (2%)				$352,000
Total Construction Cost				**$17,900,000**
Engineering, Admin., Legal, Permitting (24%)				$4,300,000
Land Acquisition				$250,000
Total Project Cost				**$22,500,000**

Item Description	Est. Qty	Units	Unit Price	Total Price
Force Main Improvements				
Miscellaneous Site Preparation Work	1	LS	$150,000	$150,000
Clearing	1	LS	$150,000	$150,000
Remove Concrete Curb & Gutter	5,000	LF	$6.00	$30,000
Saw Existing Pavement	5,000	LF	$8.00	$40,000
Remove Pavement	13,889	SY	$10.00	$138,890
Scarify and Recompact Subgrade	13,889	SY	$1.00	$13,889
Incidental Grading Work	1	LS	$100,000	$100,000
Base Course	7,266	TON	$20.00	$145,320
Trench Stabilization	1,000	TON	$15.00	$15,000
Select Fill	17,500	TON	$18.00	$315,000
Permanent Surfacing	13,889	SY	$75.00	$1,041,675
Concrete Curb & Gutter	5,000	LF	$60.00	$300,000
Traffic Control	1	LS	$120,000	$120,000
Pavement Markings	15000	LF	$12.00	$180,000
Placing Topsoil	121,000	CY	$3.00	$363,000
Salvage Topsoil	121,000	CY	$3.00	$363,000
Seed/Fertilizer/Mulch	150	ACRE	$3,500.00	$525,000
SWPPP (Erosion Control)	150	ACRE	$4,500.00	$675,000
One 24" or Dual Sanitary Sewer Force Mains	65,000	LF	$200.00	$13,000,000
One 24" or Dual Force Main Bedding Material	65,000	LF	$30.00	$1,950,000
36" Steel Casing Pipe - Trenchless Installation	2,000	LF	$750	$1,500,000
36" Steel Casing Pipe w/Spacers & End Seals	2,000	LF	$155	$310,000
96" Lined Manhole w/ Combination Air Valve	130	EA	$30,000	$3,900,000
Manhole Frame and Cover	130	EA	$600.00	$78,000
Manhole External Frame Seal	130	EA	$350.00	$45,500
Manhole Construction Plate Marker	130	EA	$175.00	$22,750
Manhole Marker	130	EA	$250.00	$32,500
Manhole Exfiltration\Vacuum Test	130	EA	$450.00	$58,500
Trench Dewatering	65,000	FT	$25.00	$1,625,000
Pipe Hydrostatic Pressure Testing	65,000	LF	$2.00	$130,000
Locating Utility	100	EA	$250.00	$25,000
Verify Utility	100	EA	$250.00	$25,000
Subtotal				$27,370,000
Undeveloped Design Detail (25%)				$6,850,000
Construction Subtotal W/Contingencies				**$34,220,000**
General Conditions, Mobilization (5%)				$1,711,000
Bonds & Insurance (2%)				$719,000
Total Construction Cost				**$36,700,000**
Engineering, Admin., Legal, Permitting (24%)				$8,800,000
Total Project Cost				**$45,500,000**

	2026	2036	2066	EQ Basin	2066 EQ Basin	PS	FM
Total Project Cost	$200,000	$55,300,000	$86,800,000	$18,400,000	$22,500,000	$10,500,000	$45,500,000
Total Area Served (Acres)	15	3464	7079	5091	12257	12257	12257
Subtotal Cost/Acre	$13,400.00	$16,000.00	$12,300.00	$3,700.00	$1,900.00	$900.00	$3,800.00
Total Cost/Acre	**$17,100.00**	$19,700.00	**$18,900.00**	-	-	-	-

Appendix 11.C – Future Pipe Size Detailed

Wastewater Treatment and Collection System Master Plan

Sioux Falls, SD

February 2018

Existing System 2015 CIP

Basin	Type A Hydraulic Deficiency Area for CIP		Diameter	Length (ft)
1	Richmond Estates Trunk	1	12-in	1,989
3	Lower Riverside Trunk Sewer	1.25	15-in	331
		1.75	21-in	657
		2	24-in	12
5	Southeastern Drive	2.25	Lining Project	1,128
7	Southwest Trunk	1.5	18-in	226

LEGEND

- 2015 CIP Pipe Replacment
- 2015 Type A, Tier 1 Hydraulically Deficient Area
- Major Sanitary Sewer Basins Extended to Future

EXISTING SYSTEM MODELING

- Existing Major Lift Station
- Trunk Sewers (2016)
- Modeled Sewers (2016)
- Force Main (2016)

ROADWAYS

- INTERSTATE
- PRIMARY ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- COLLECTOR
- MINOR COLLECTOR
- Municipal Boundaries
- Regional Growth Areas
- PLSS Section Lines

0 3,000 6,000
Feet

2015 CIP ON THE EXISTING SYSTEM

EXISTING 2015 CONDITIONS
WITH 2015 CIP ON EXISTING SYSTEM

Appendix 11.C – Future Pipe Size Detailed

2026

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

2026 Future Trunk Sewer Extensions Recommended Plan

Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	4,926
Basin 9 Total		**4,926**
Basin 14	54-in	1,202
Basin 14 Total		**1,202**
Basin 15	12-in	15,895
	21-in	2,406
	42-in	17,902
Basin 15 Total		**36,203**
Basin 16	21-in	1,000
	24-in	2,925
	30-in	4,948
Basin 16 Total		**8,873**
Basin 17	18-in	20,332
Basin 17 Total		**20,332**
Basin 18	8-in	2,800
	12-in	11,807
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,113**
Basin 19	12-in	12,580
	27-in	11,462
	42-in	755
Basin 19 Total		**24,797**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	12-in	13,397
Basin 22 Total		**13,397**
Basin 23	12-in	6,552
Basin 23 Total		**6,552**
Basin 25	48-in	340
Basin 25 Total		**340**

Basin	Diameter	Length (ft)
Basin 26	8-in	177
	12-in	5,226
	24-in	89
	30-in	47,781
Basin 26 Total		**53,273**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	31,646
	15-in	3,561
	21-in	7,000
	27-in	20,777
Basin 28 Total		**62,985**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	18-in	9,447
	27-in	4,434
	36-in	21
Basin 30 Total		**29,056**
Basin 31	12-in	5,000
Basin 31 Total		**5,000**
Basin 33	8-in	9,336
	10-in	10,551
	12-in	11,340
	15-in	6,747
	21-in	3,149
Basin 33 Total		**41,122**
	54-in	43
		43

Existing System 2026 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2026 Recommended Plan Future Development Trunk Sewer Extension Components	
Basins 30 and 31	**Option 1 (Basin 30 and 31 to Basin 6 Trunk):** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of 15-inch Basin 6 Trunk Sewer • Gravity sewer upgrades from upstream point of 15-inch Basin 6 Trunk Sewer to Sioux River South Interceptor
Westside	**Option 4 (Flow through the City with EQ prior to entering)** • Basin 15/34 EQ at connection • Max Flow through City
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 2 (Tie into and parallel I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future flows are NOT equalized • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 2 (Transfer Flow through Basin 13):** • EQ • Flow through Basin 13
Renner	**Option 2 (Flow to Basin 25):** • Flow through Basin 25

2026 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2026 CIP ON THE EXISTING SYSTEM

FUTURE 2026 CONDITIONS, RECOMMEND PLAN FOR FUTURE EXTENSIONS
FUTURE 2026 BASE SANITARY FLOW WITH TIERS 1 AND 2
DEVELOPMENT EXTENT

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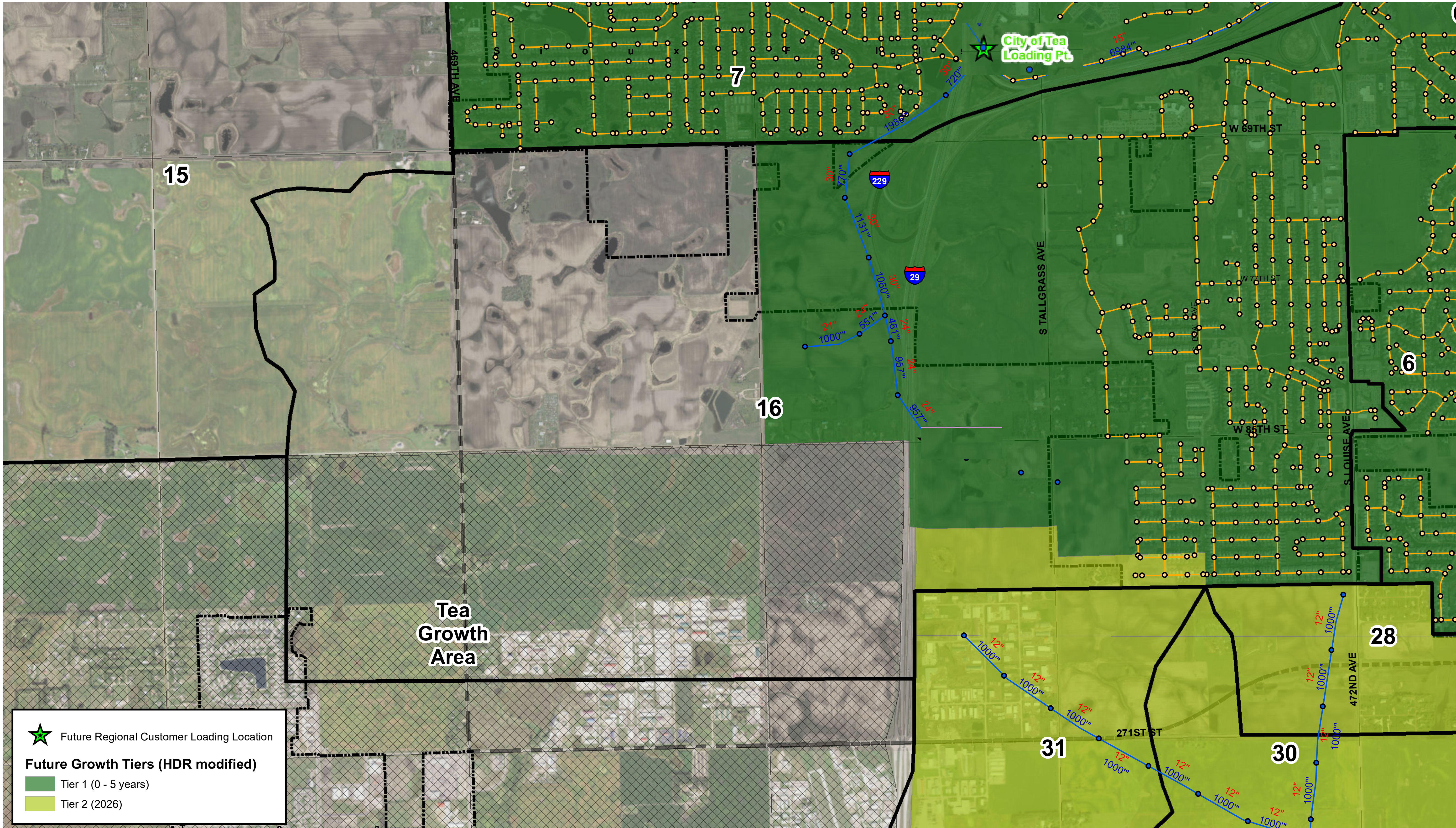


HDR City of Sioux Falls

Feet 0 1,700

LEGEND

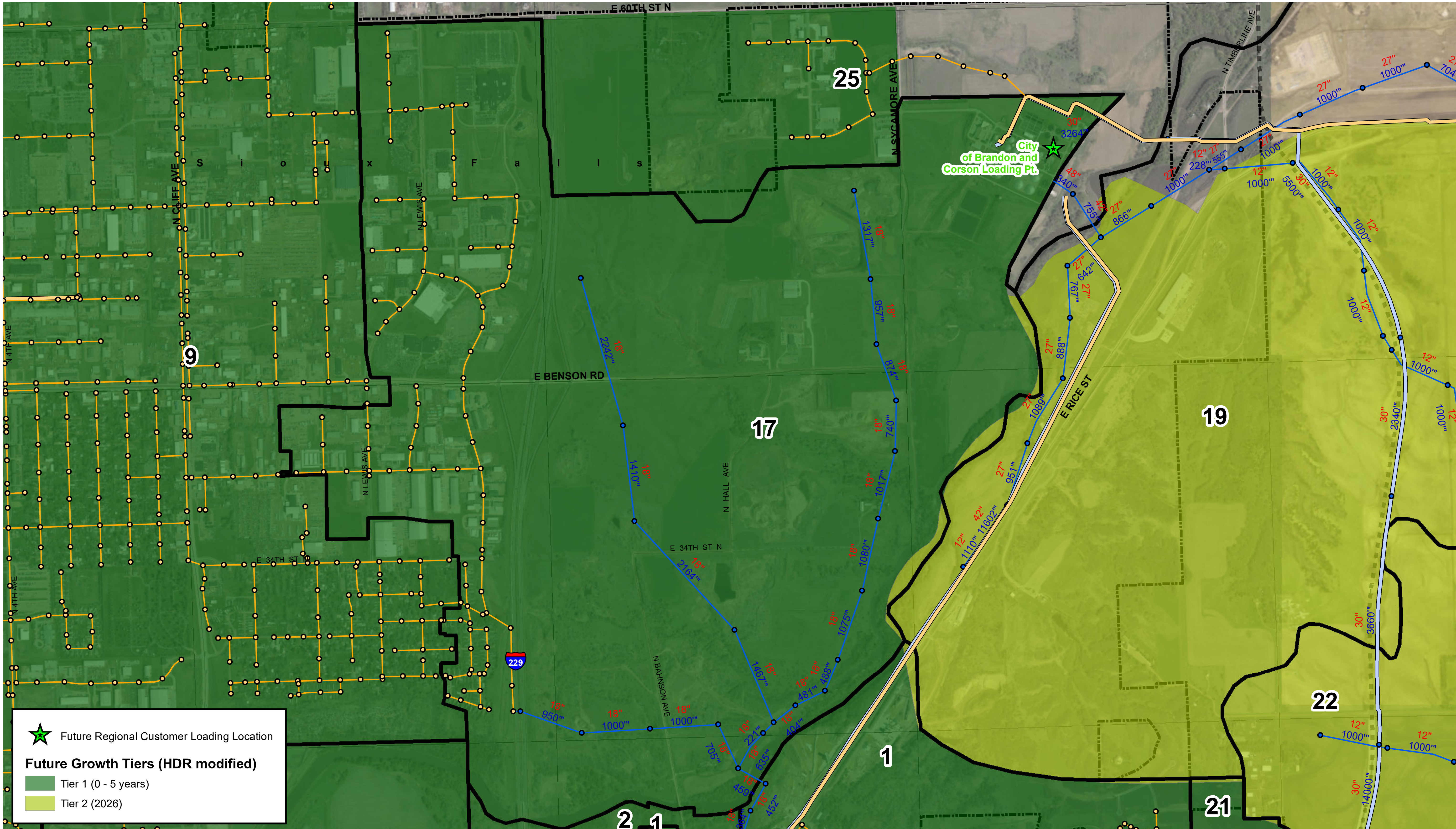
- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 16

DATE: 12/18/2017



LEGEND

Existing Collection System	Future Conceptualized Collection System
Existing Major Lift Station	Future Gravity Main Concept
Existing Gravity Main	Future Force Main Concept
Existing Force Main	Conceptual Future Sewer Pump Stations
Future West Corridor Alignment	Major Sanitary Sewer Basins
Future Highway 100 Alignment	Regional Growth Areas
Municipal Boundaries	Diameter (in)
PLSS Section Lines	Length (ft)

0 Feet 1,400

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 17

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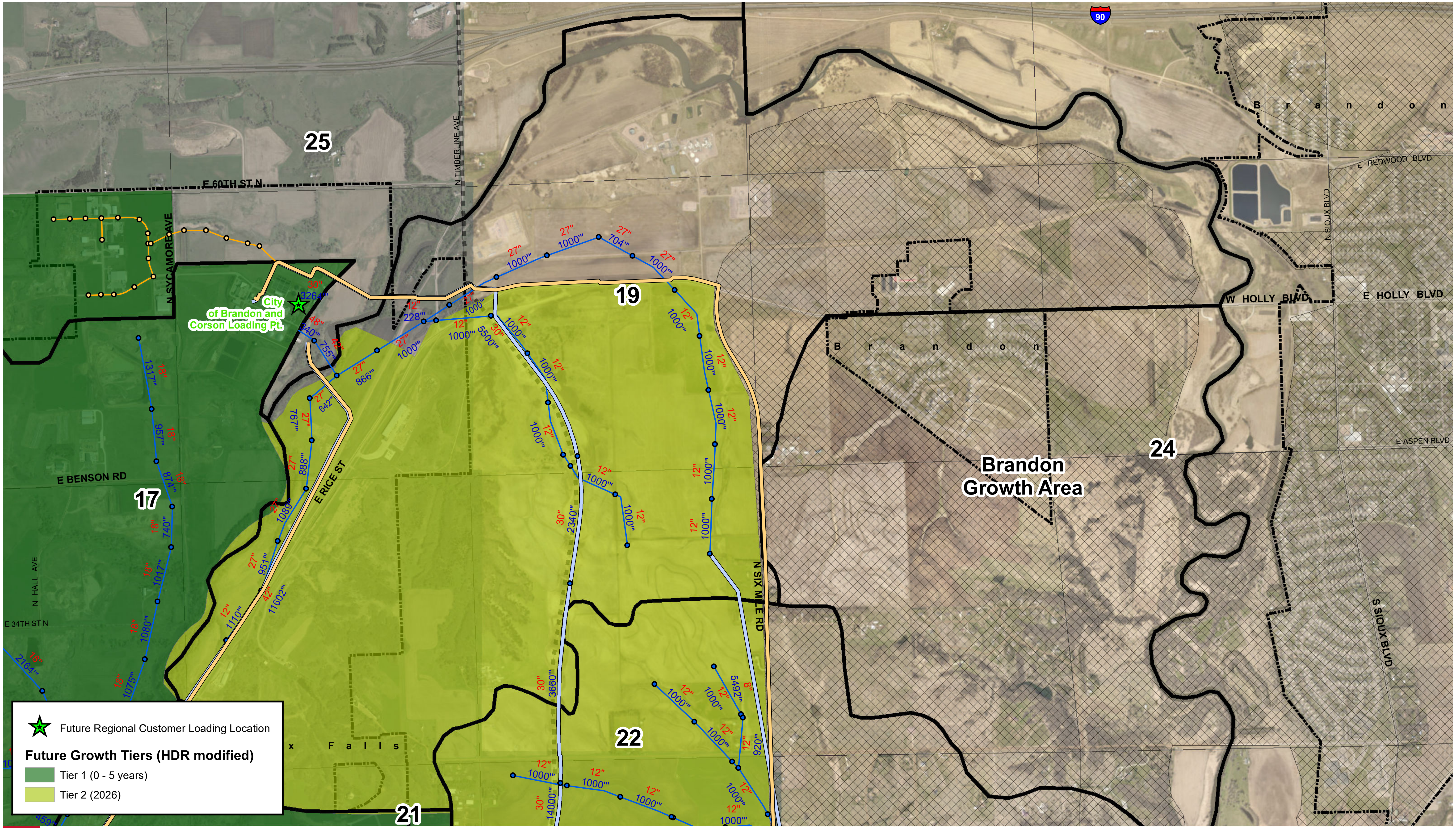

LEGEND

Existing Collection System	Future Conceptualized Collection System
PS Existing Major Lift Station	Future Gravity Main Concept
Existing Gravity Main	Future Force Main Concept
Existing Force Main	PS Conceptual Future Sewer Pump Stations
Future West Corridor Alignment	Major Sanitary Sewer Basins
Future Highway 100 Alignment	Regional Growth Areas
Municipal Boundaries	Diameter (in)
PLSS Section Lines	Length (ft)

0 Feet 1,750

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 19

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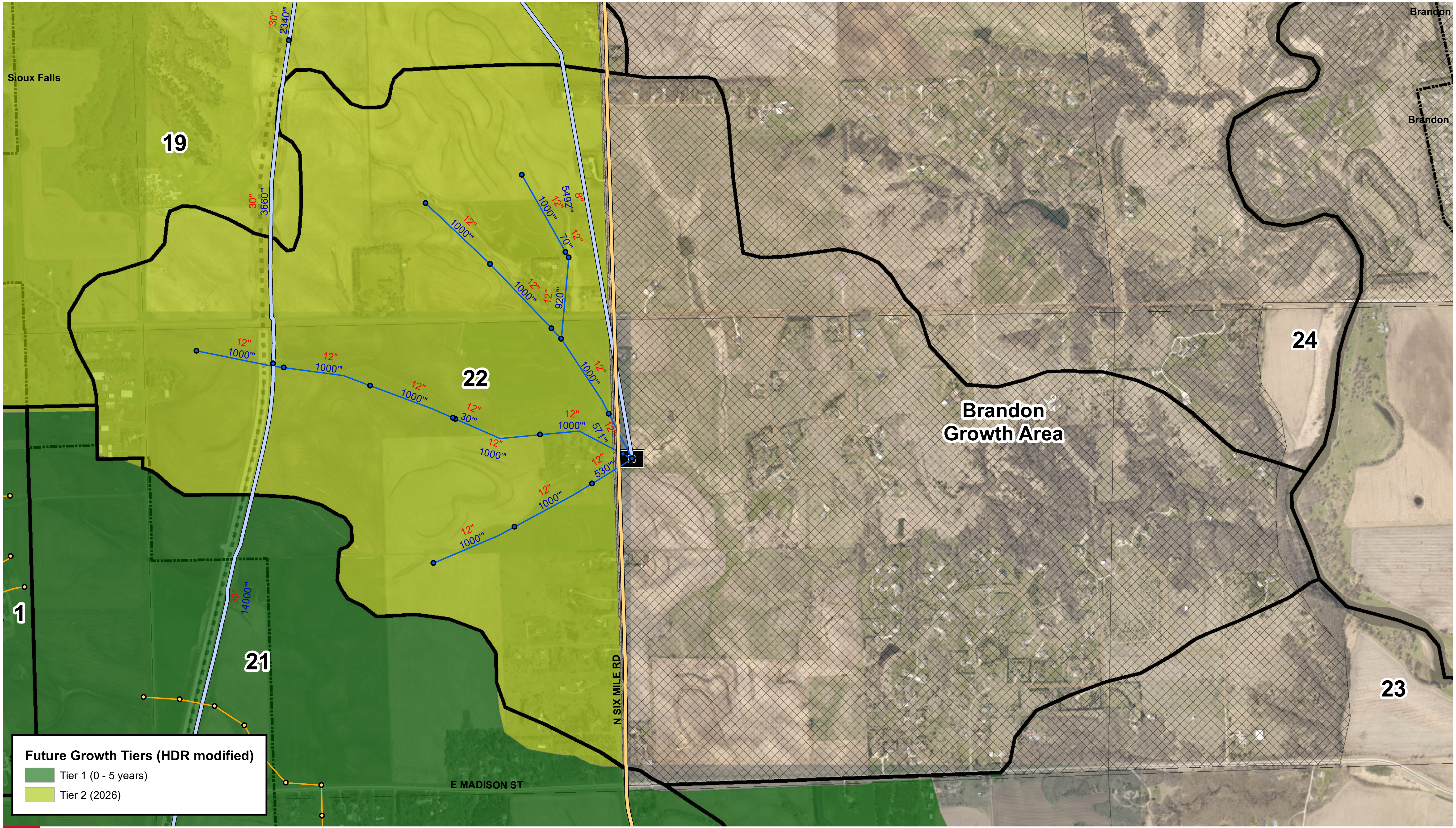

City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 1,100

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 22

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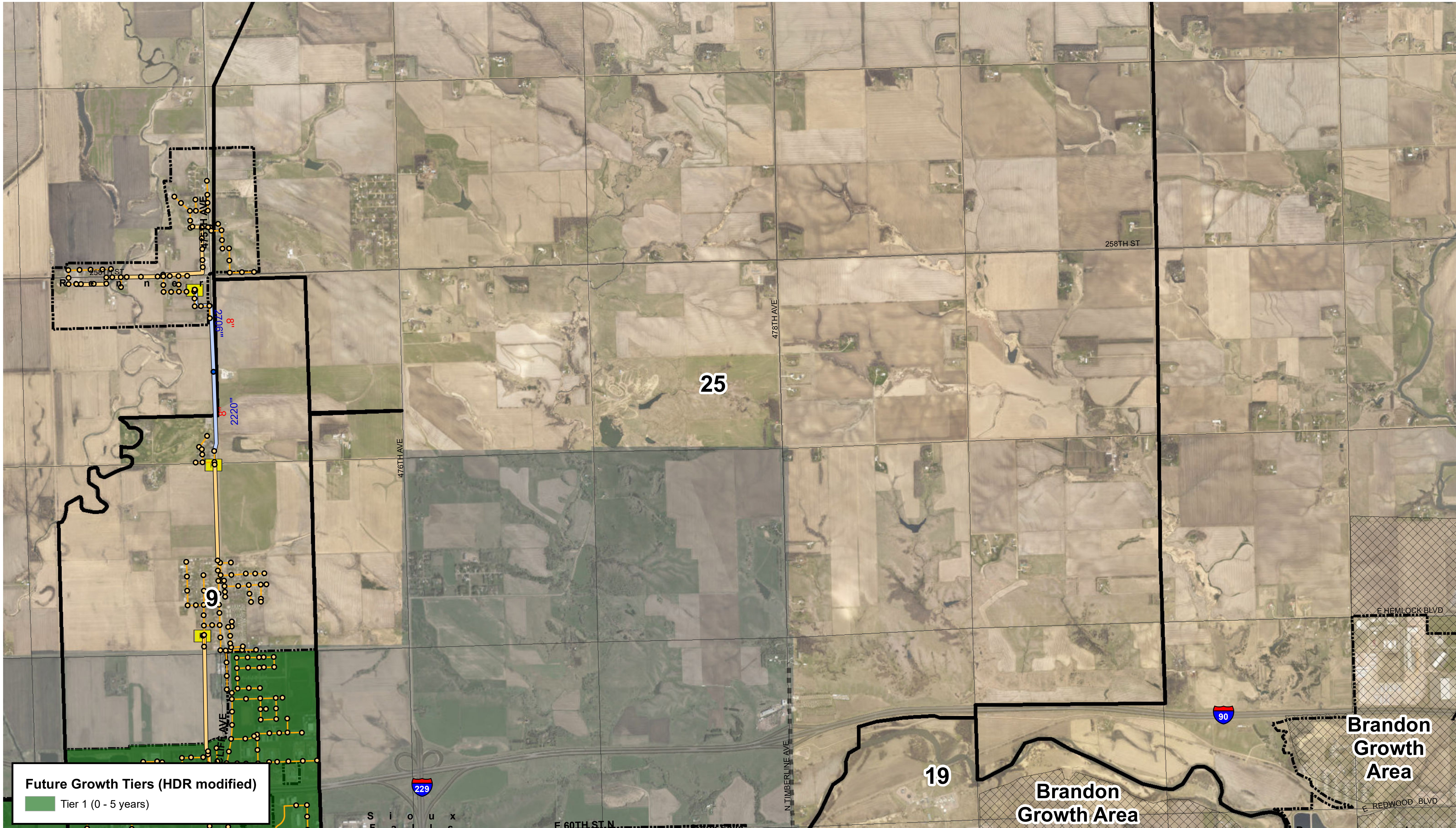

City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
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- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 2,750

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 25

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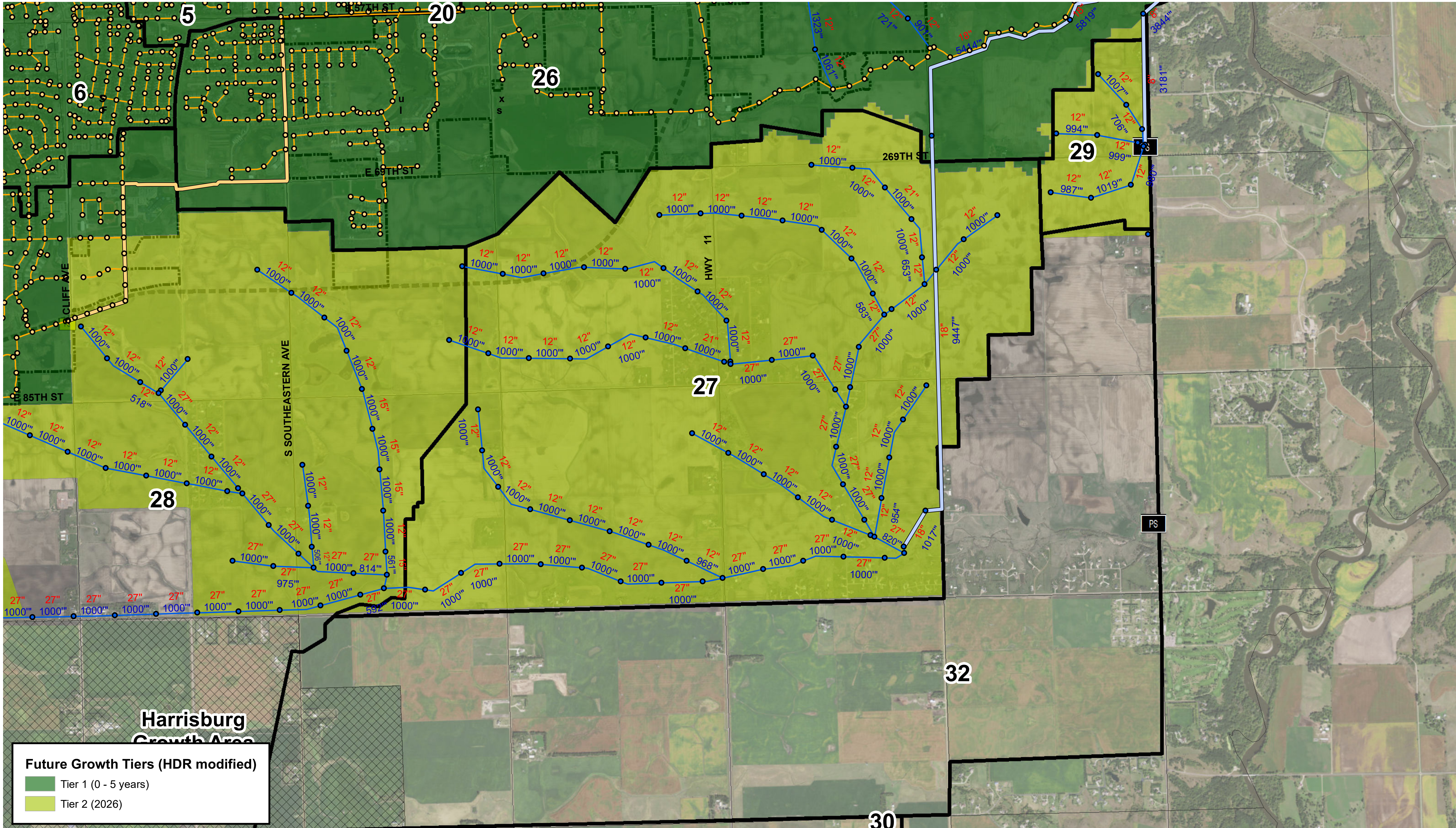

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
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- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 2,400

HDR City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASINS 27, 29, AND 32

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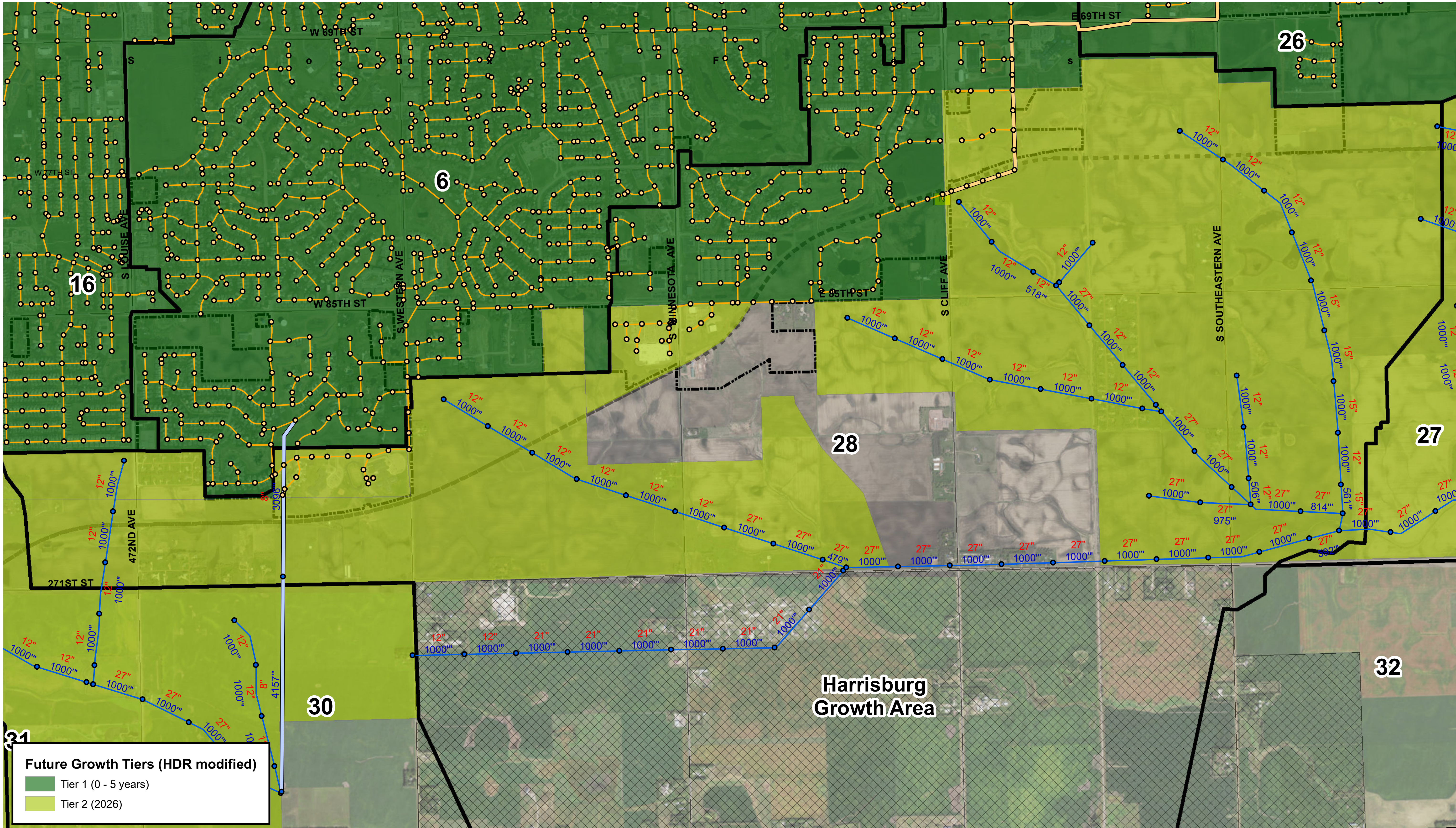

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
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- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 1,900

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 28

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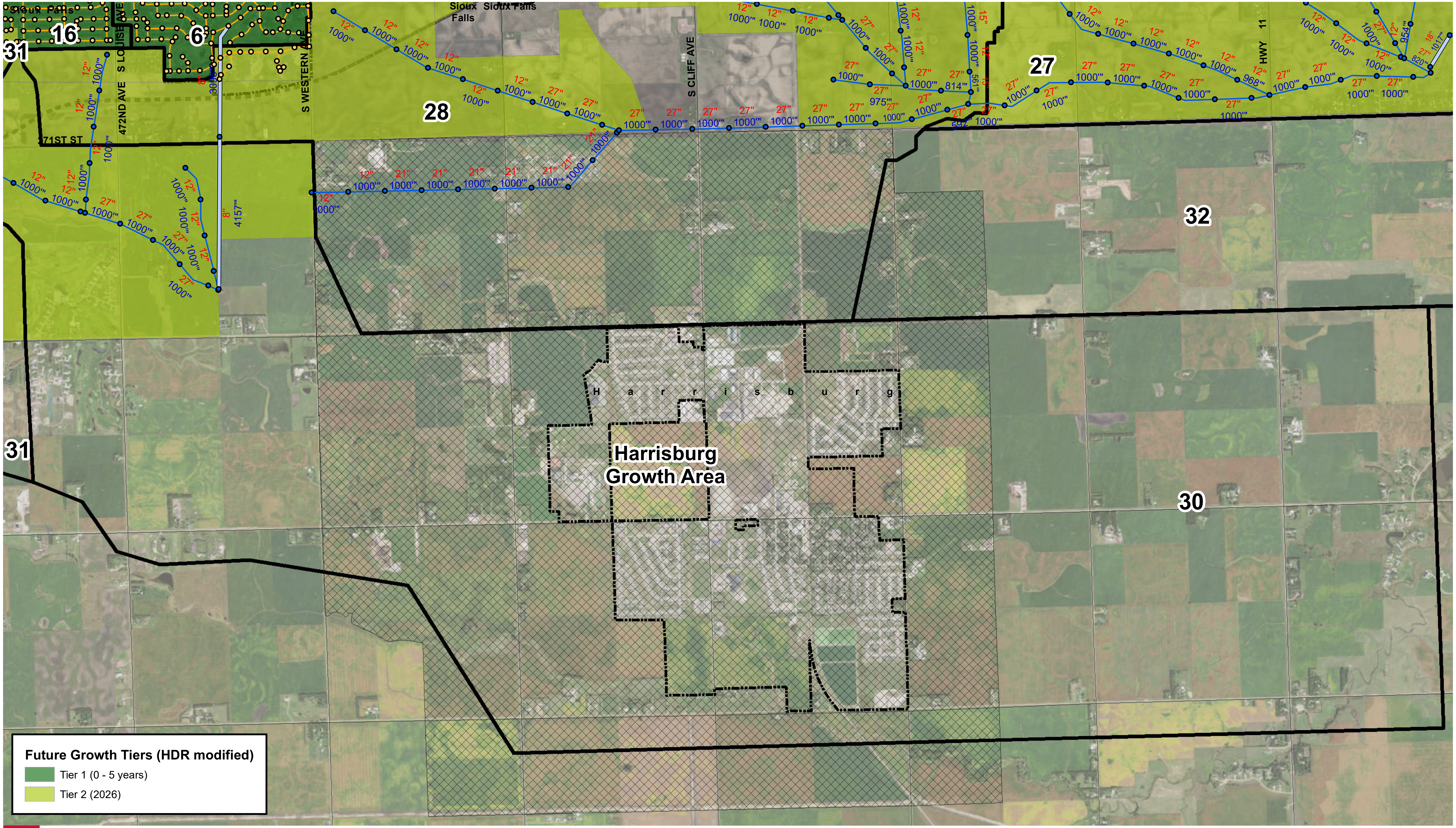

LEGEND

Existing Collection System	Future Conceptualized Collection System	Future West Corridor Alignment
Existing Major Lift Station	Future Gravity Main Concept	Future Highway 100 Alignment
Existing Gravity Main	Future Force Main Concept	Municipal Boundaries
Existing Force Main	Conceptual Future Sewer Pump Stations	PLSS Section Lines

Major Sanitary Sewer Basins
Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 2,600

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 30

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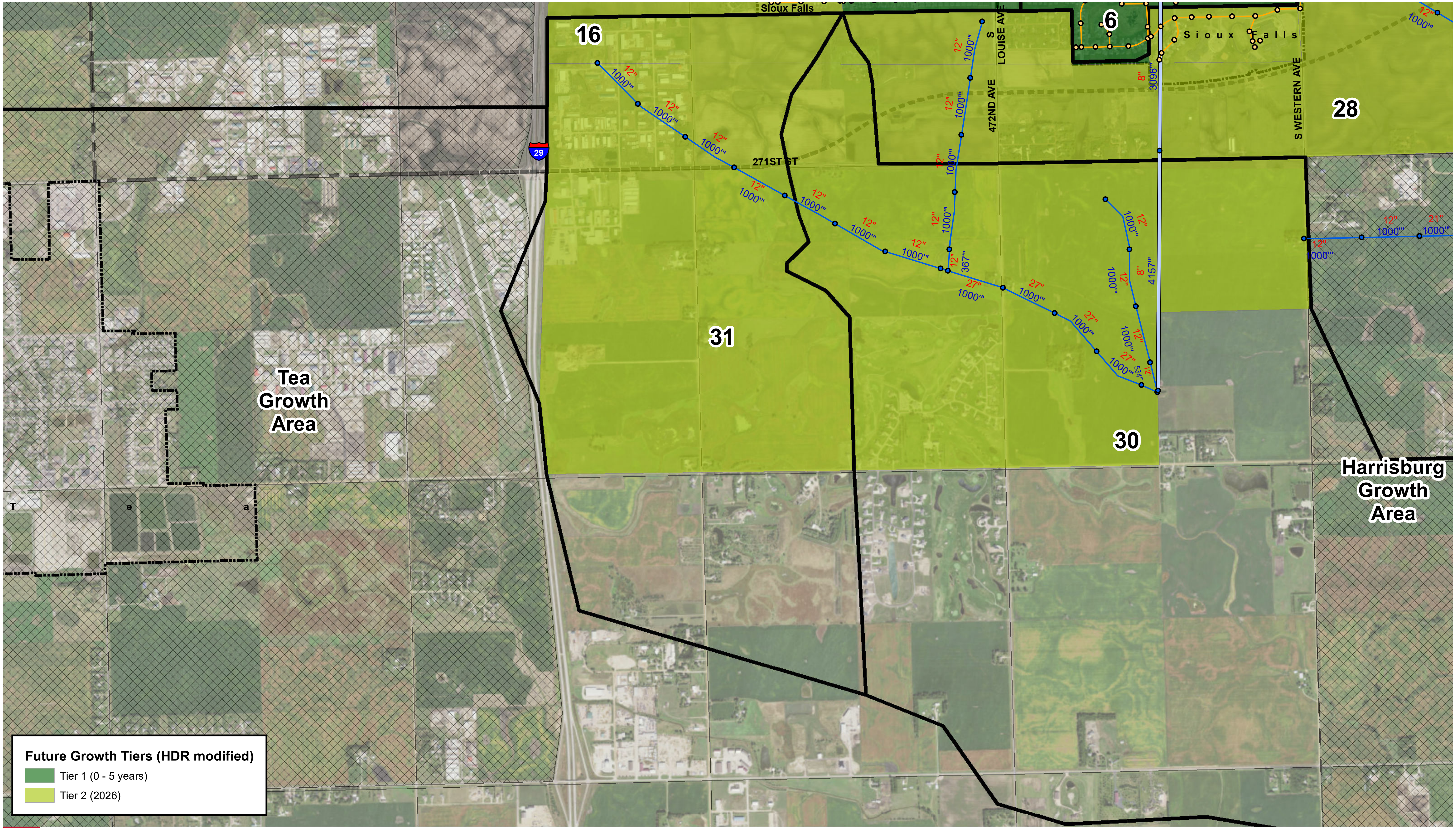

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
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- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 1,700

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 31

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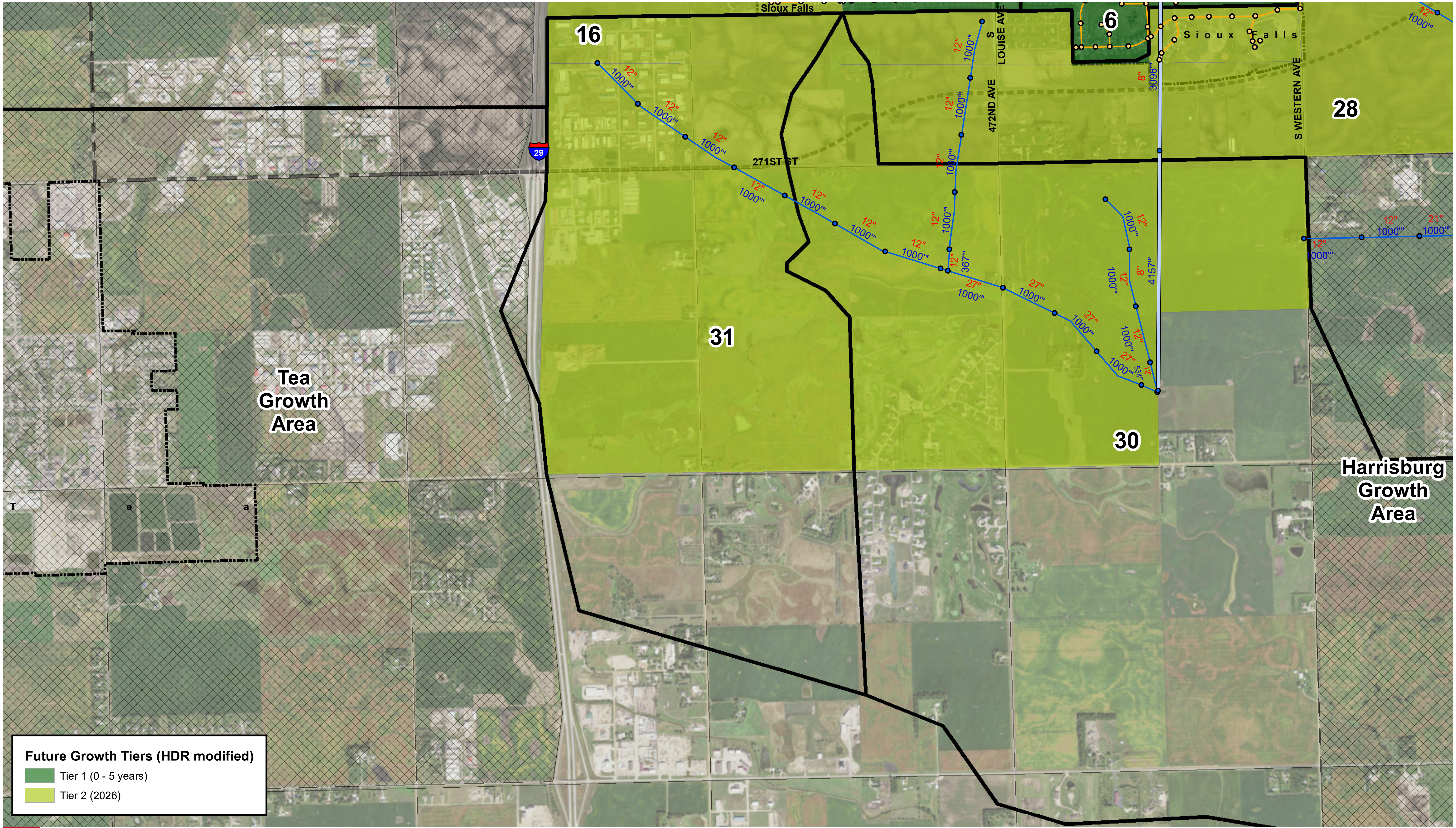

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 1,700

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 31

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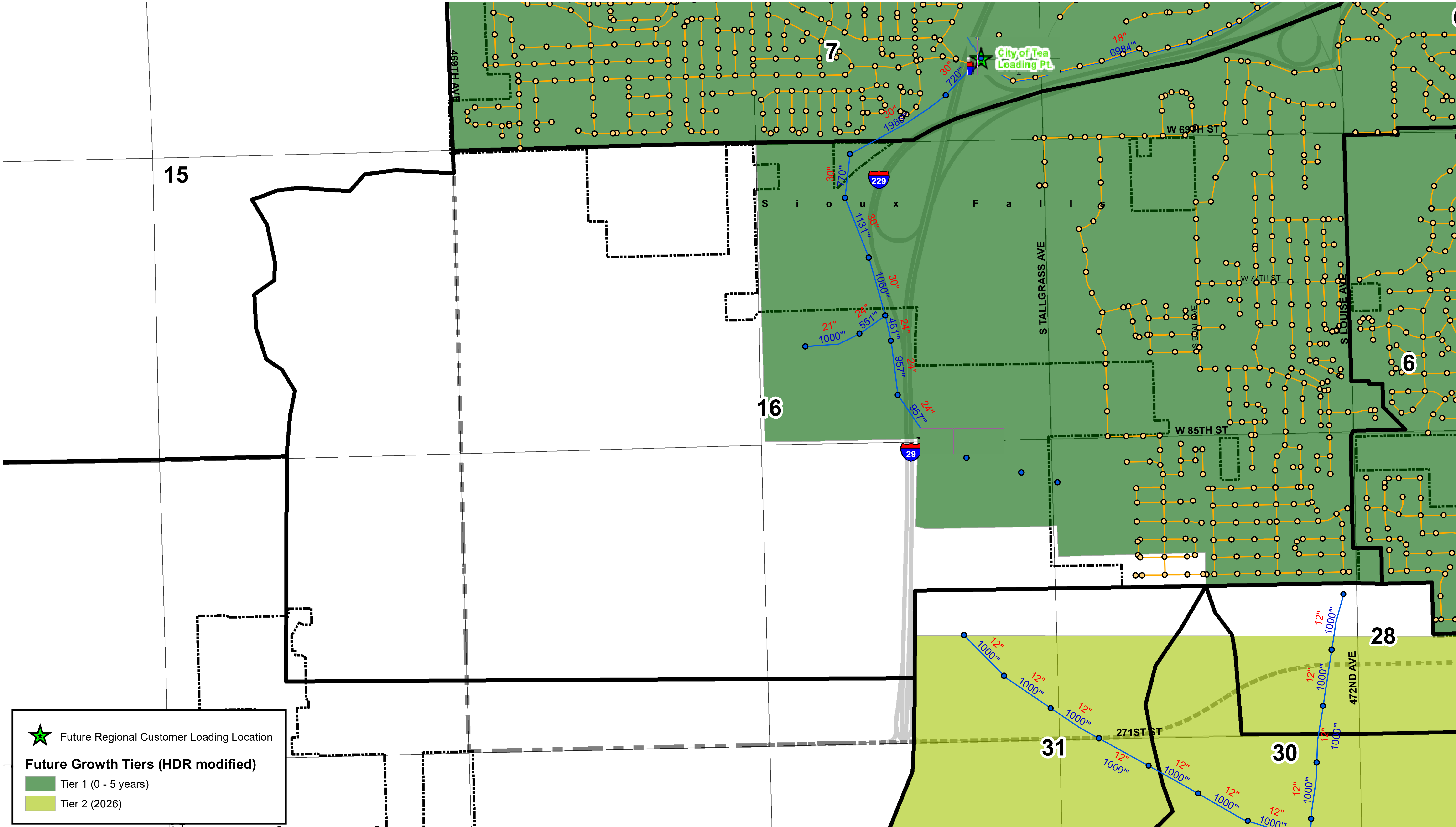


LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- PS Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins

Diameter (in)
Length (ft)

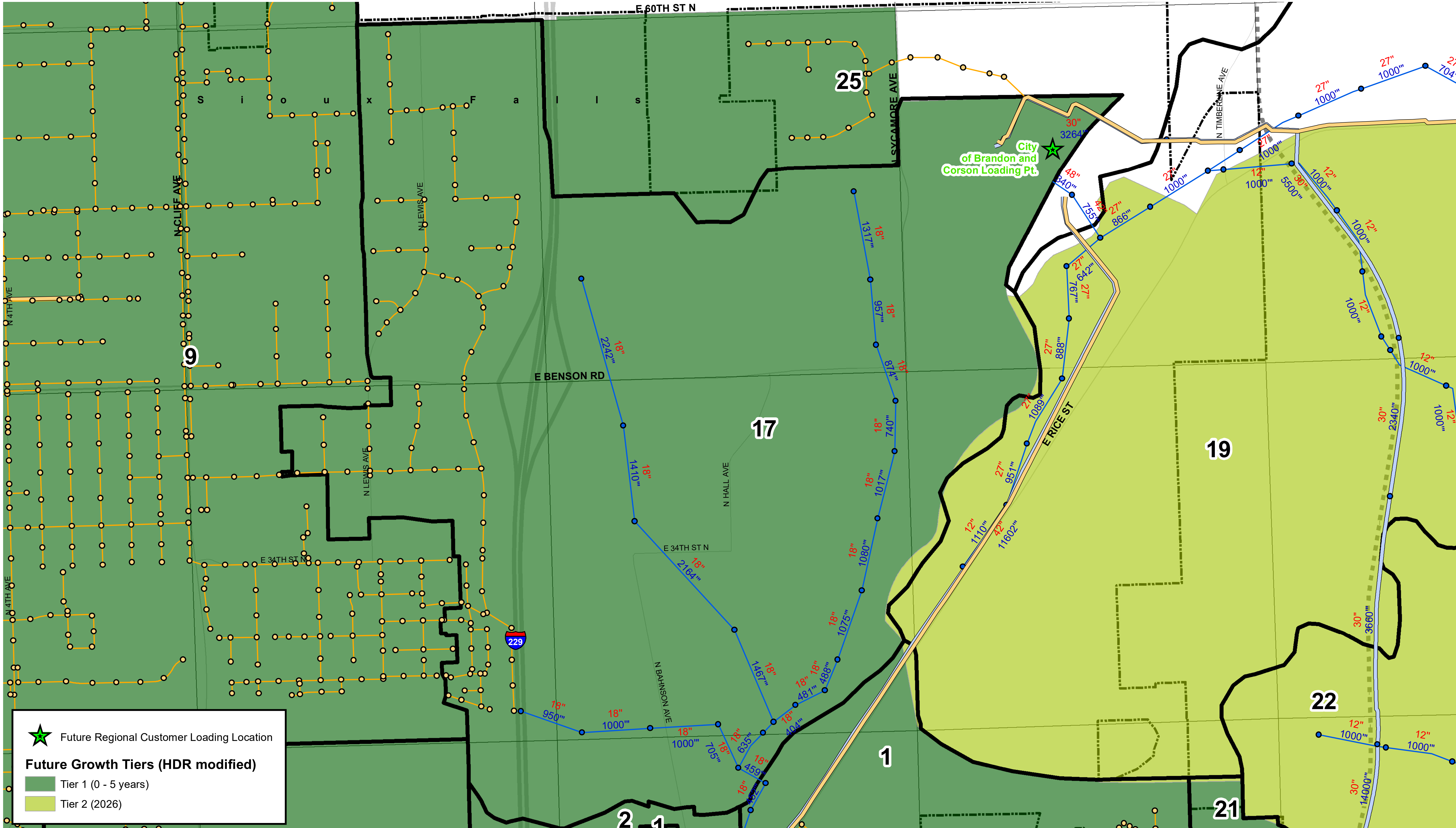
HDR
City of Sioux Falls

0 Feet 1,700

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 16

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
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Diameter (in)
Length (ft)

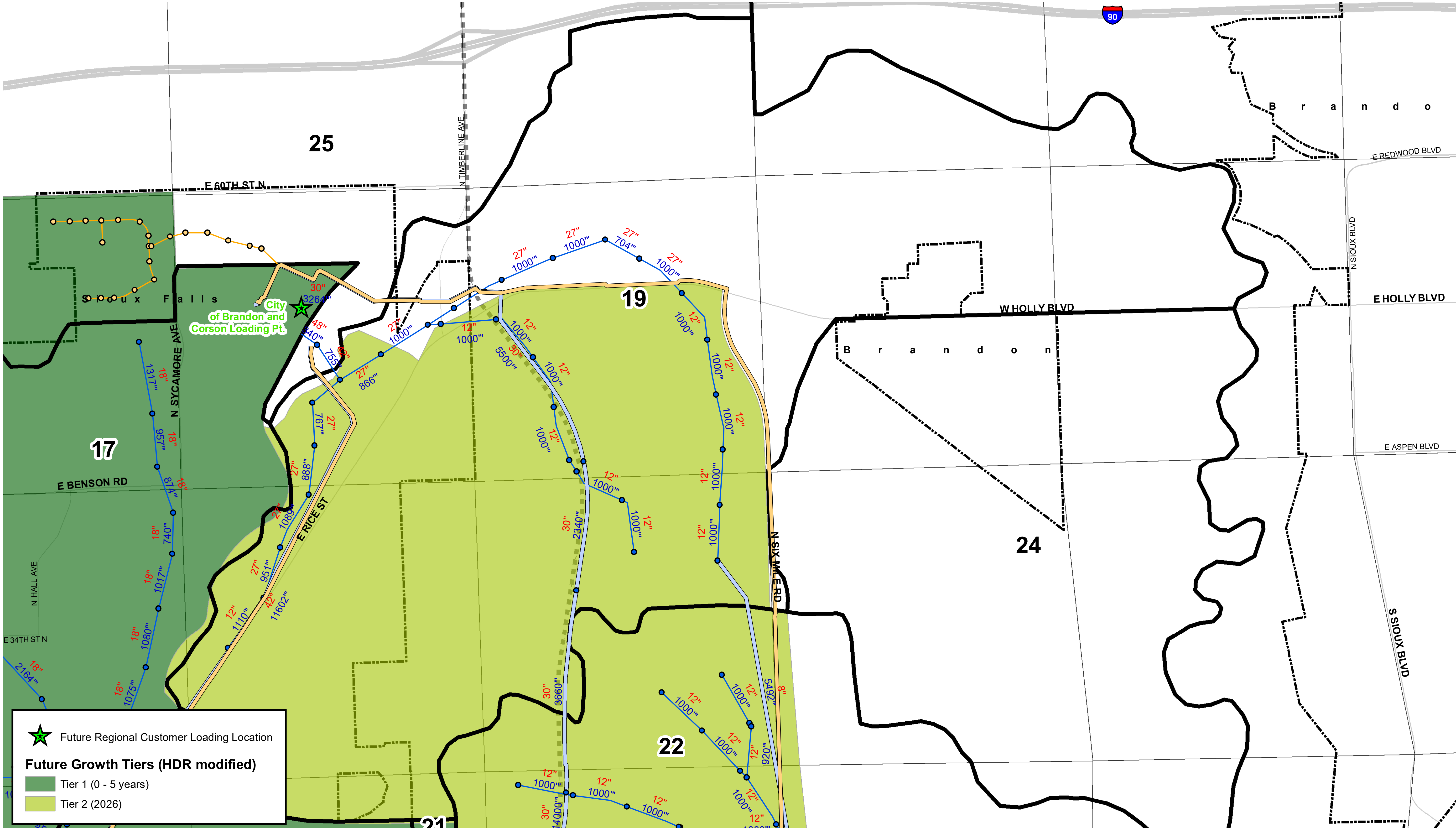
0 Feet 1,400

HDR City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 17

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



HDR | City of Sioux Falls

0 Feet 1,750

LEGEND

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Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 19

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017

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- PLSS Section Lines
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Diameter (in)
Length (ft)

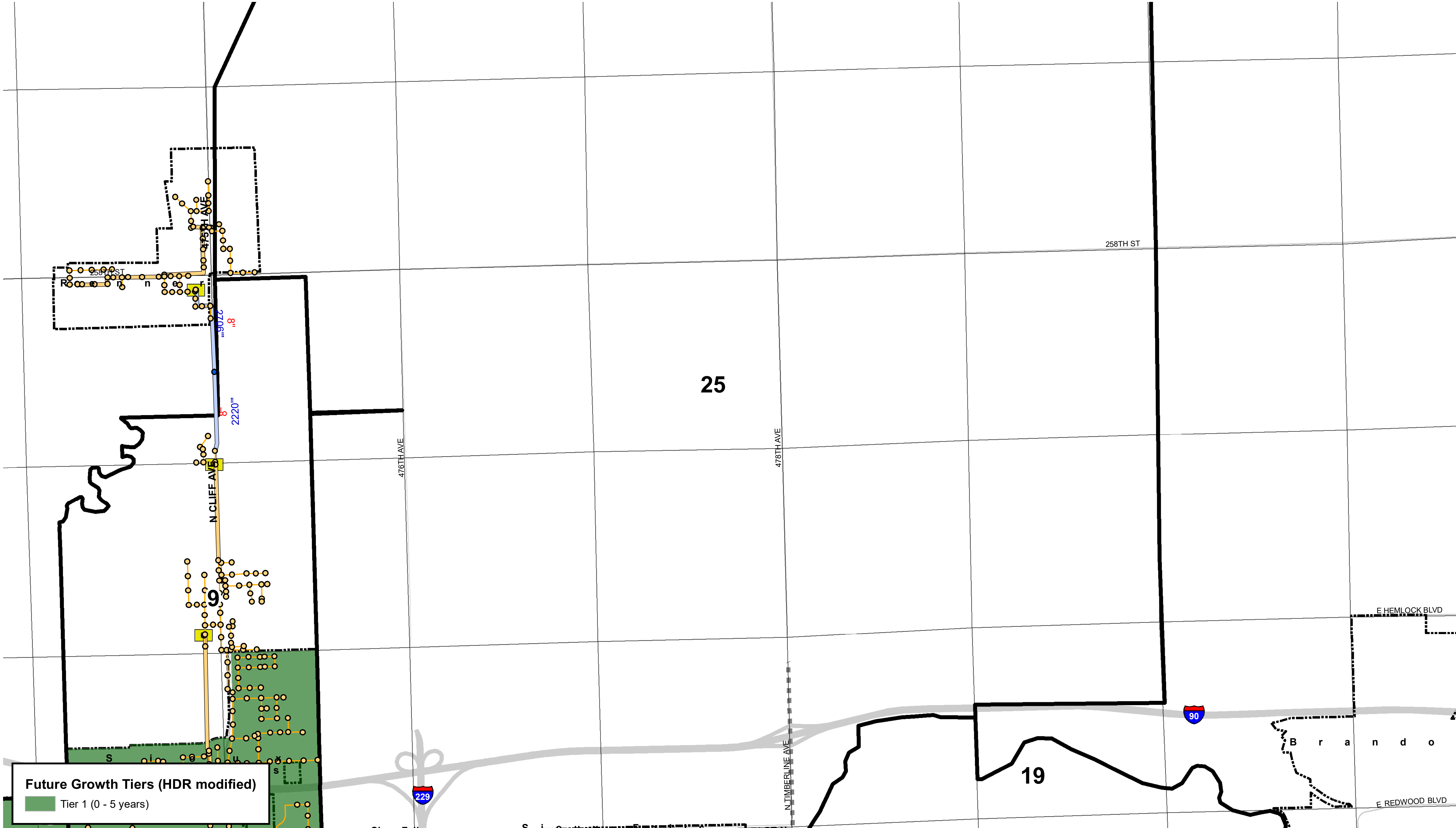
HDR City of Sioux Falls

0 Feet 1,100

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 22

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



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Diameter (in)
Length (ft)

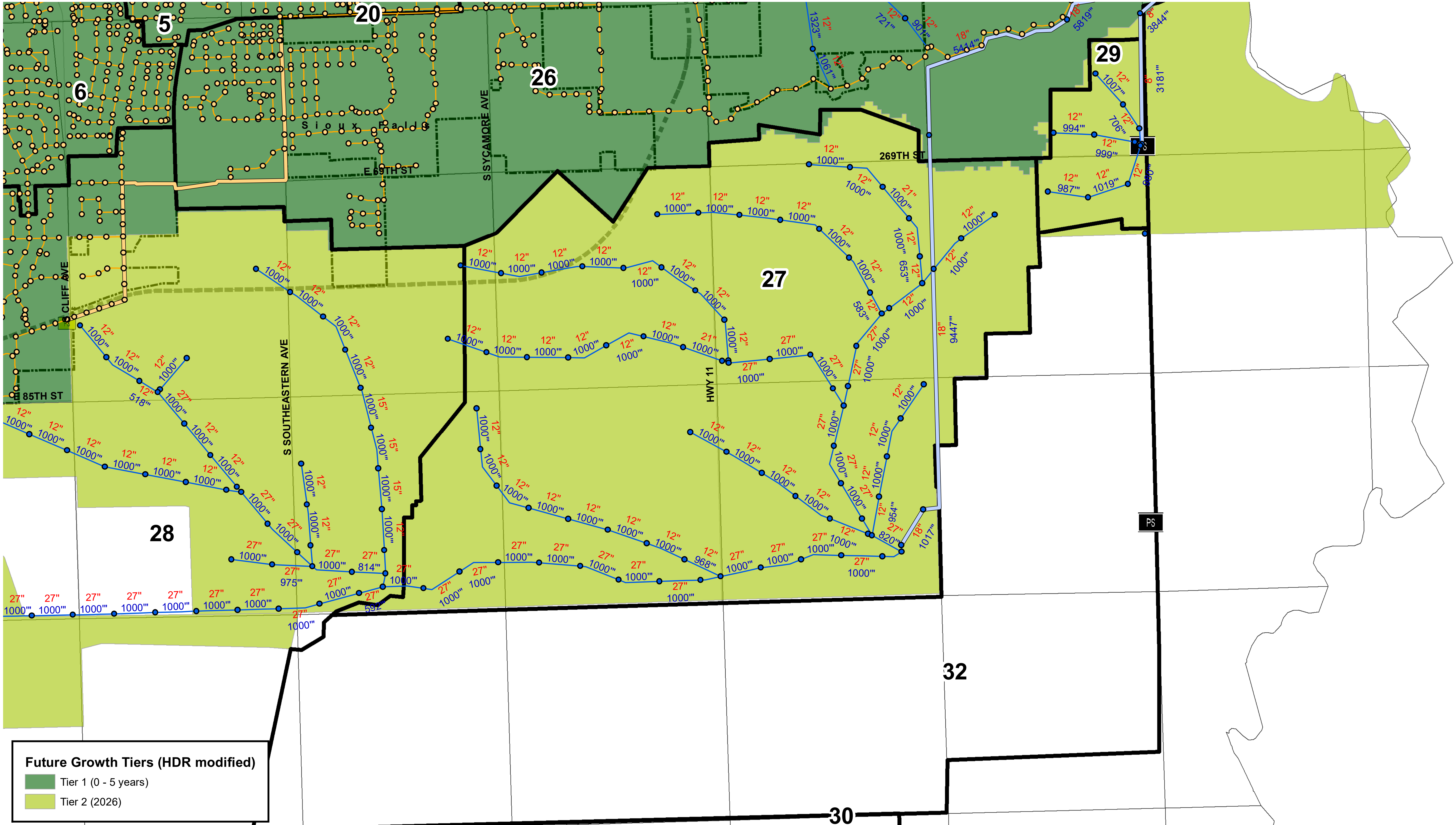
0 Feet 2,750

HDR City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 25

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



LEGEND

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Existing Gravity Main
Existing Force Main
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Future Force Main Concept
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Future Highway 100 Alignment
Municipal Boundaries
PLSS Section Lines
Major Sanitary Sewer Basins

Diameter (in)
Length (ft)

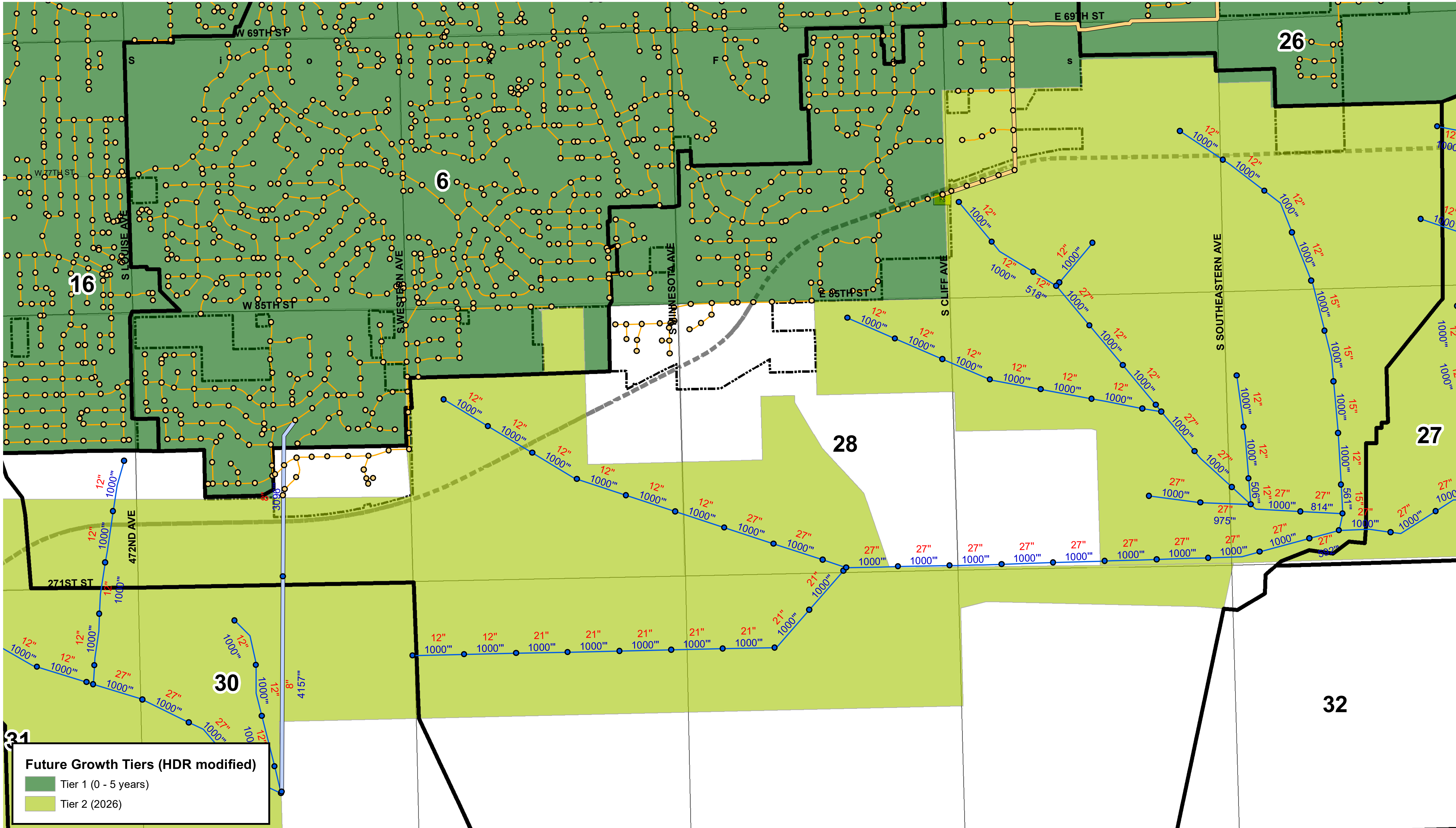
0 Feet 2,400

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASINS 27, 29, AND 32

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



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Diameter (in)
Length (ft)

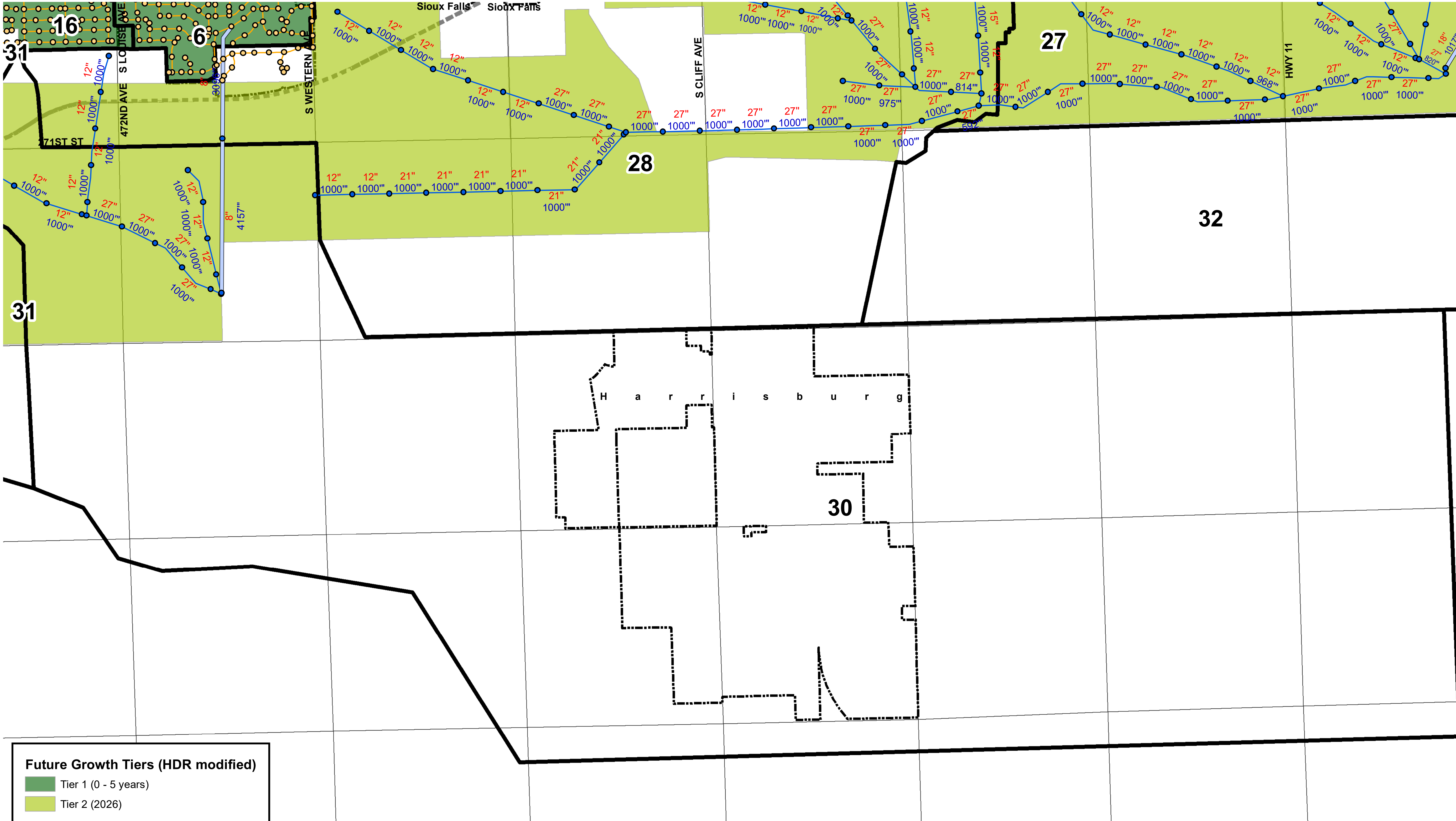
0 Feet 1,900

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 28

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



HDR
City of Sioux Falls

0 Feet 2,600

LEGEND

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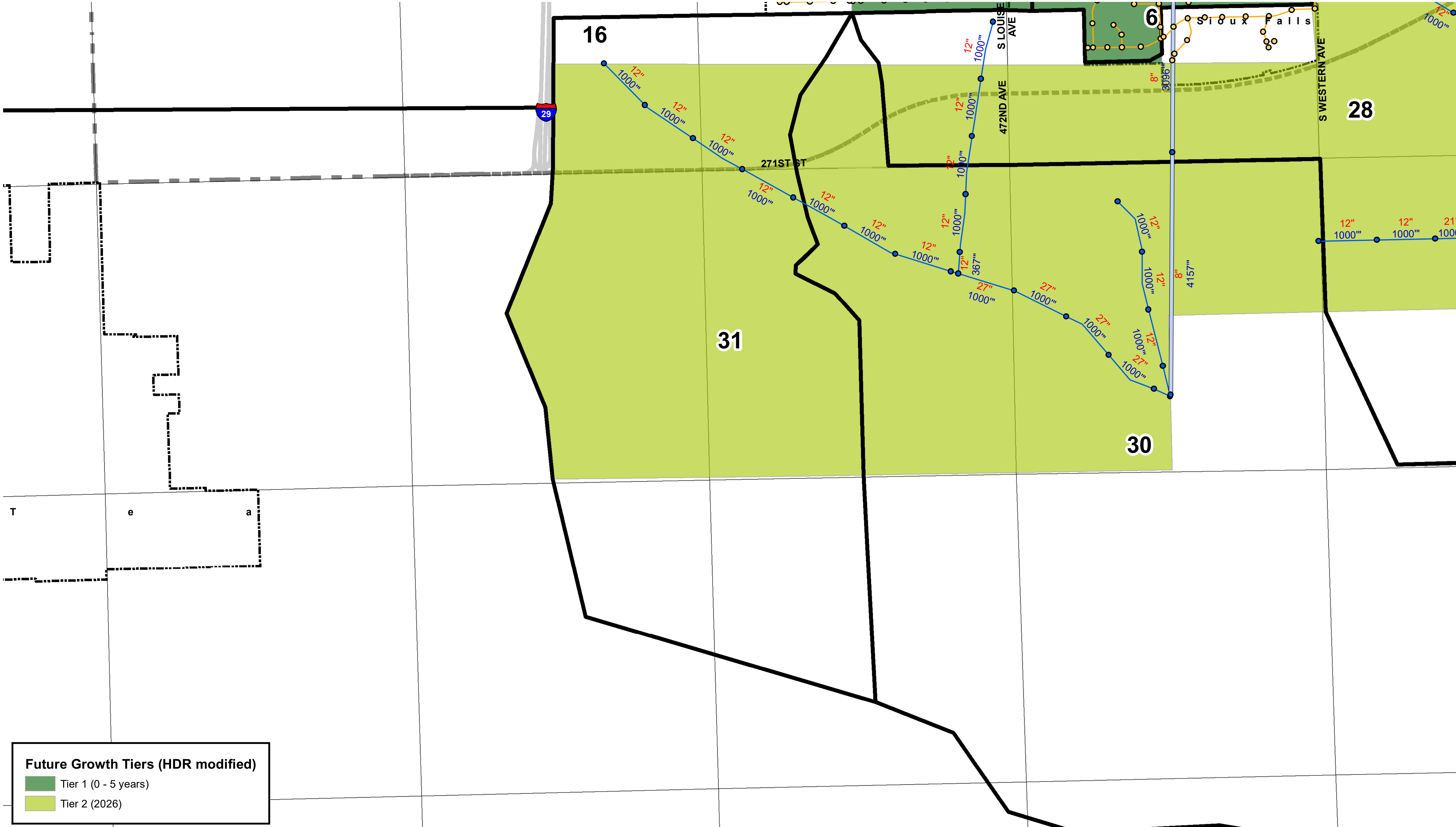
Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 30

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



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Diameter (in)
Length (ft)

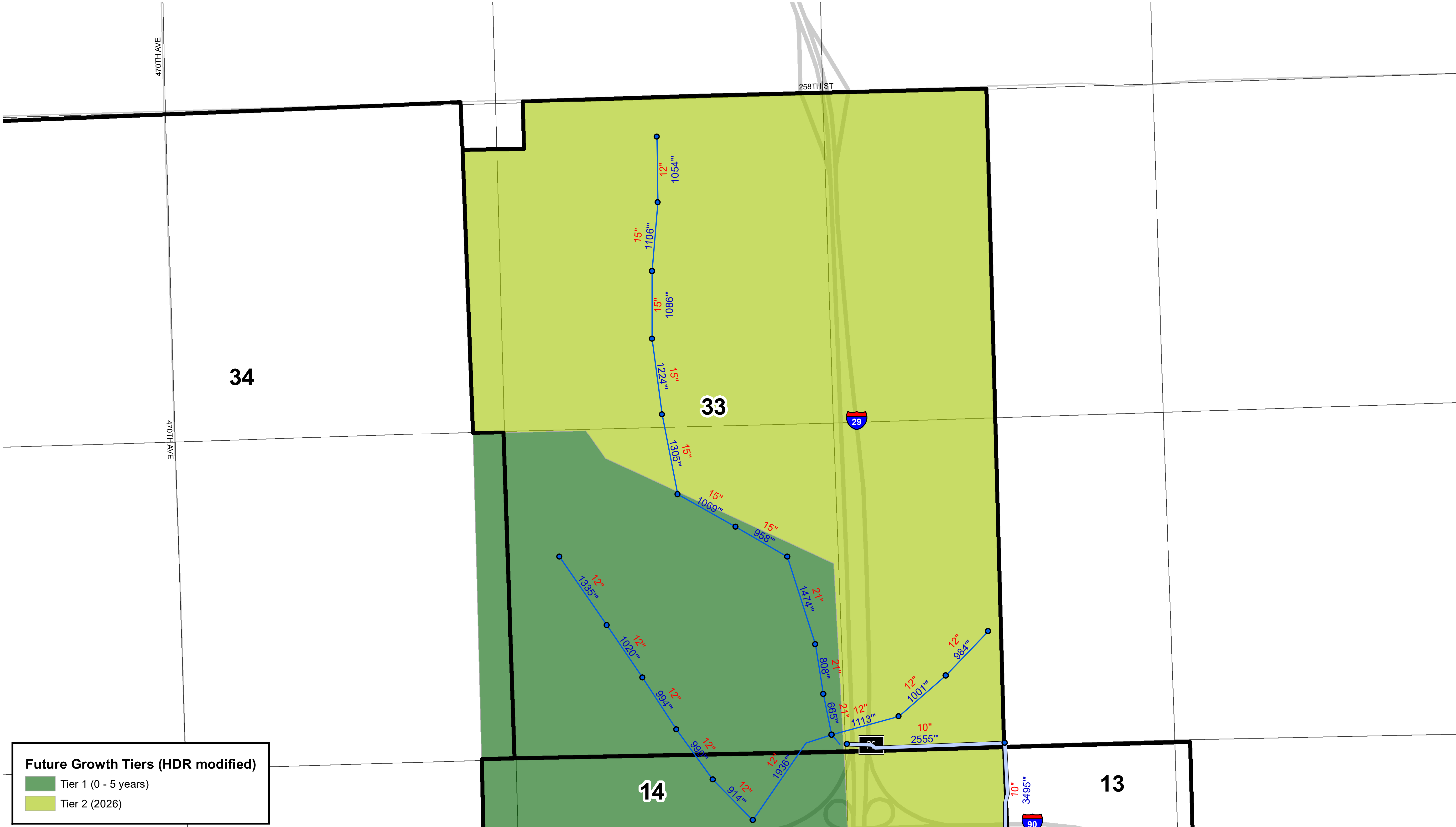
0 Feet 1,700

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 31

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



LEGEND

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- PLSS Section Lines
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Diameter (in)
Length (ft)

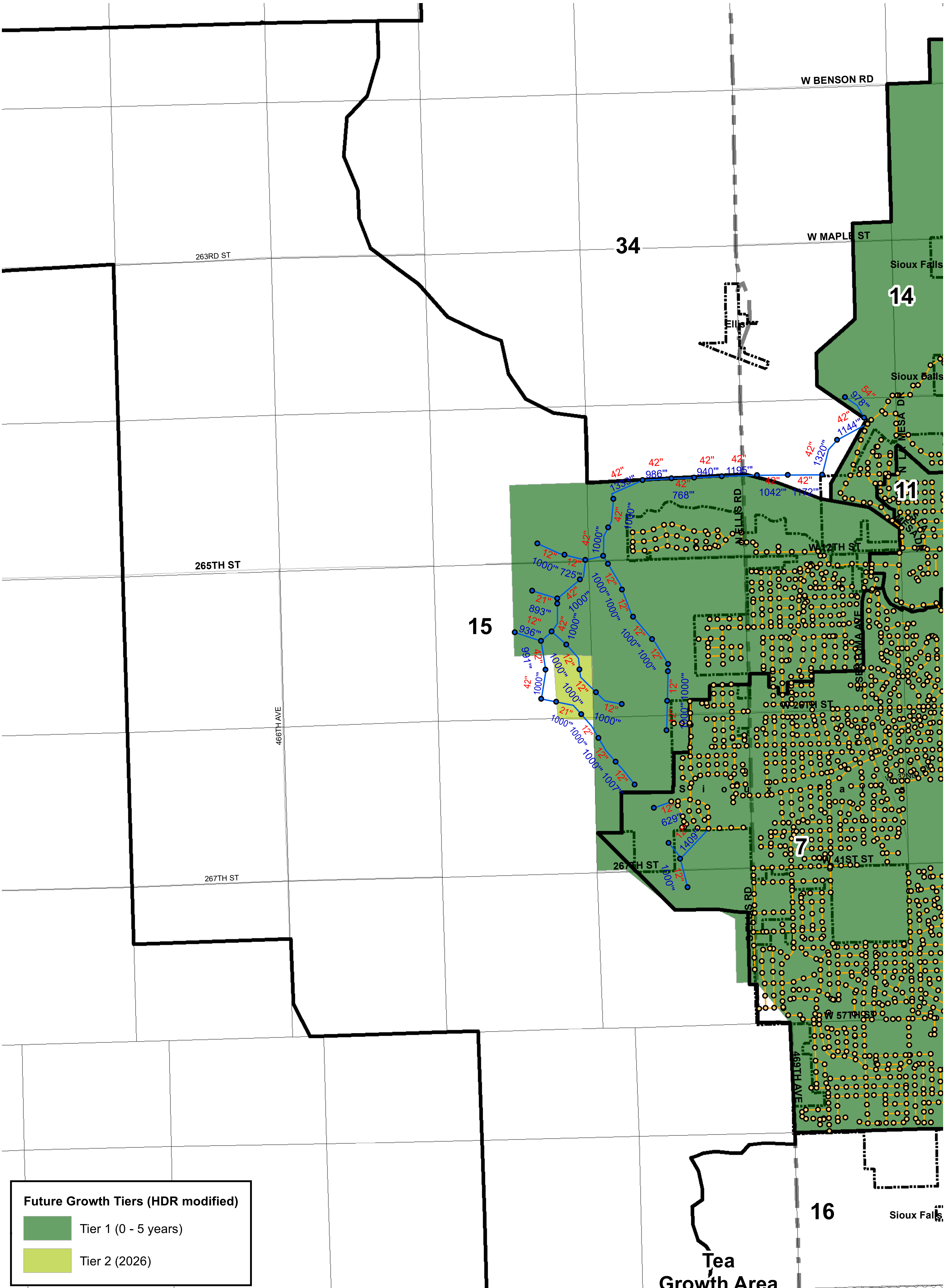
0 Feet 1,500

HDR — City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 33

PATH: \\SXF-SRV01\ENG\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_LANDSCAPE.MXD - USER: JECHRIST - DATE: 8/17/2017



City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 15

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
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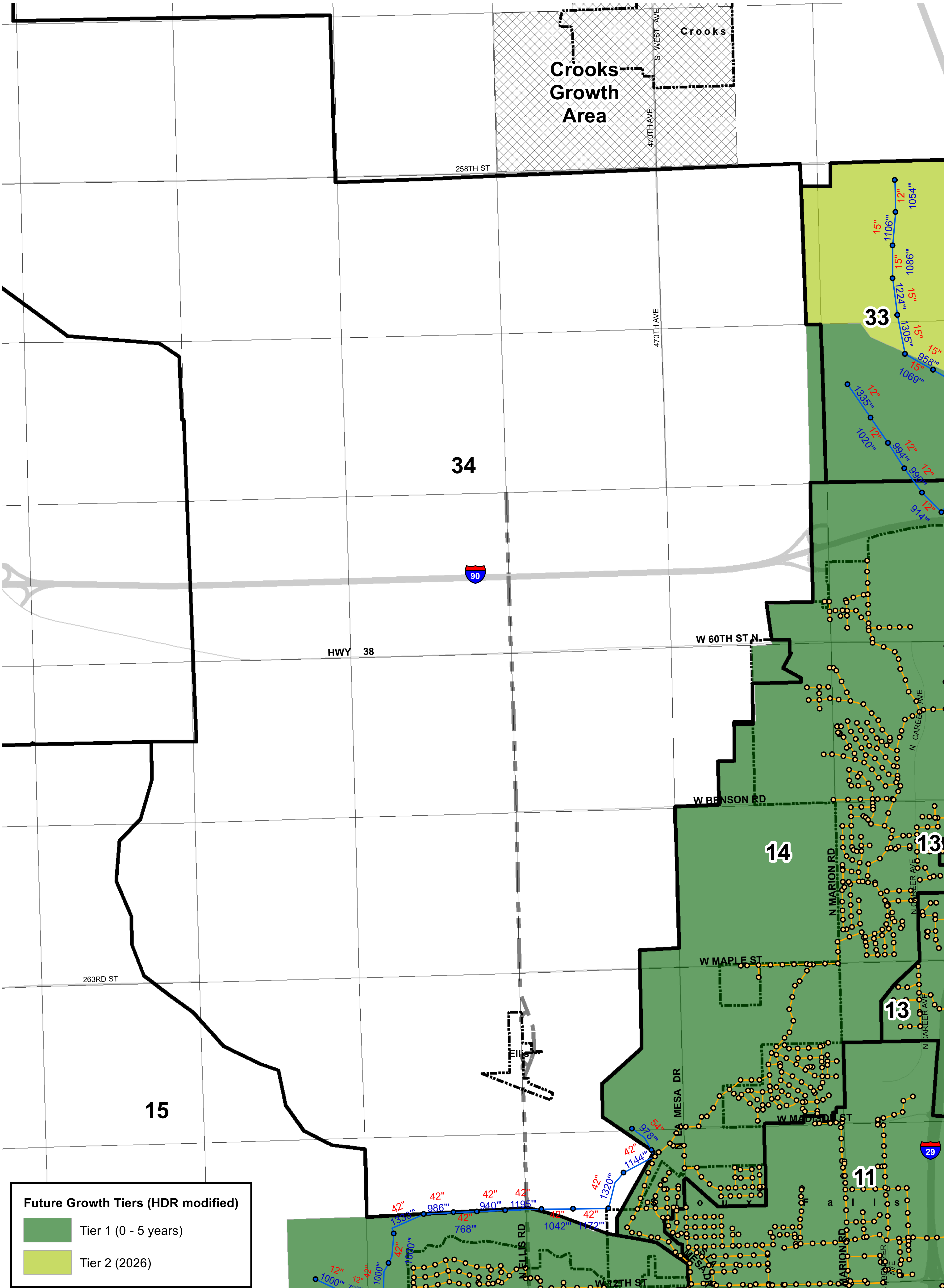
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 3,300

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2026 CONCEPTUALIZED TRUNK MAINS

BASIN 34

HDR

City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
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- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 3,200

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2026_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017

Appendix 11.C – Future Pipe Size Detailed

2036

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD

February 2018

2036 Future Trunk Sewer Extensions Recommended Plan

Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	4,926
Basin 9 Total		**4,926**
Basin 14	54-in	1,202
Basin 14 Total		**1,202**
Basin 15	12-in	35,678
	21-in	2,406
	30-in	1,063
	36-in	2,778
	42-in	21,845
Basin 15 Total		**63,770**
Basin 16	21-in	6,000
	24-in	2,925
	30-in	4,948
Basin 16 Total		**13,873**
Basin 17	18-in	20,332
Basin 17 Total		**20,332**
Basin 18	8-in	2,800
	12-in	11,807
	18-in	559
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,672**
Basin 19	12-in	16,730
	27-in	11,462
	42-in	2,426
	48-in	1,012
Basin 19 Total		**31,630**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	12-in	13,397
Basin 22 Total		**13,397**
Basin 23	12-in	6,552
	15-in	2,416
	18-in	6,378
	21-in	1,934
Basin 23 Total		**17,281**
Basin 25	12-in	31,325
	27-in	12,099
	30-in	1,000
	36-in	4,709
	48-in	3,825
	56-in	3,341
Basin 25 Total		**56,299**

Basin	Diameter	Length (ft)
Basin 26	8-in	177
	12-in	5,226
	24-in	89
	30-in	47,781
	42-in	2,054
Basin 26 Total		**55,327**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	42,308
	15-in	3,561
	21-in	7,000
	27-in	20,777
Basin 28 Total		**73,646**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	18-in	9,447
	27-in	4,434
	36-in	21
Basin 30 Total		**29,056**
Basin 31	12-in	5,000
Basin 31 Total		**5,000**
Basin 33	8-in	9,336
	10-in	10,551
	12-in	11,340
	15-in	6,747
	21-in	3,149
Basin 33 Total		**41,122**
Basin 34	12-in	13,714
	18-in	827
	21-in	1,246
	24-in	2,349
	27-in	17,700
	30-in	10,426
	36-in	3,400
	42-in	5,435
	48-in	4,929
	54-in	12,661
Basin 34 Total		**72,645**

Existing System 2036 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2036 Recommended Plan Future Development Trunk Sewer Extension Components	
Basins 30 and 31	**Option 1 (Basin 30 and 31 to Basin 6 Trunk):** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of 15-inch Basin 6 Trunk Sewer • Gravity sewer upgrades from upstream point of 15-inch Basin 6 Trunk Sewer to Sioux River South Interceptor
Westside	**Option 4 (Flow through the City with EQ prior to entering)** • Basin 15/34 EQ at connection • Max Flow through City
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 2 (Tie into and parallel I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future flows are NOT equalized • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 2 (Transfer Flow through Basin 13):** • EQ • Flow through Basin 13
Renner	**Option 2 (Flow to Basin 25):** • Flow through Basin 25

2036 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2036 CIP ON THE EXISTING SYSTEM

FUTURE 2036 CONDITIONS, RECOMMEND PLAN FOR FUTURE EXTENSIONS
FUTURE 2036 BASE SANITARY FLOW WITH TIERS 1, 2, AND 3 DEVELOPMENT EXTENT

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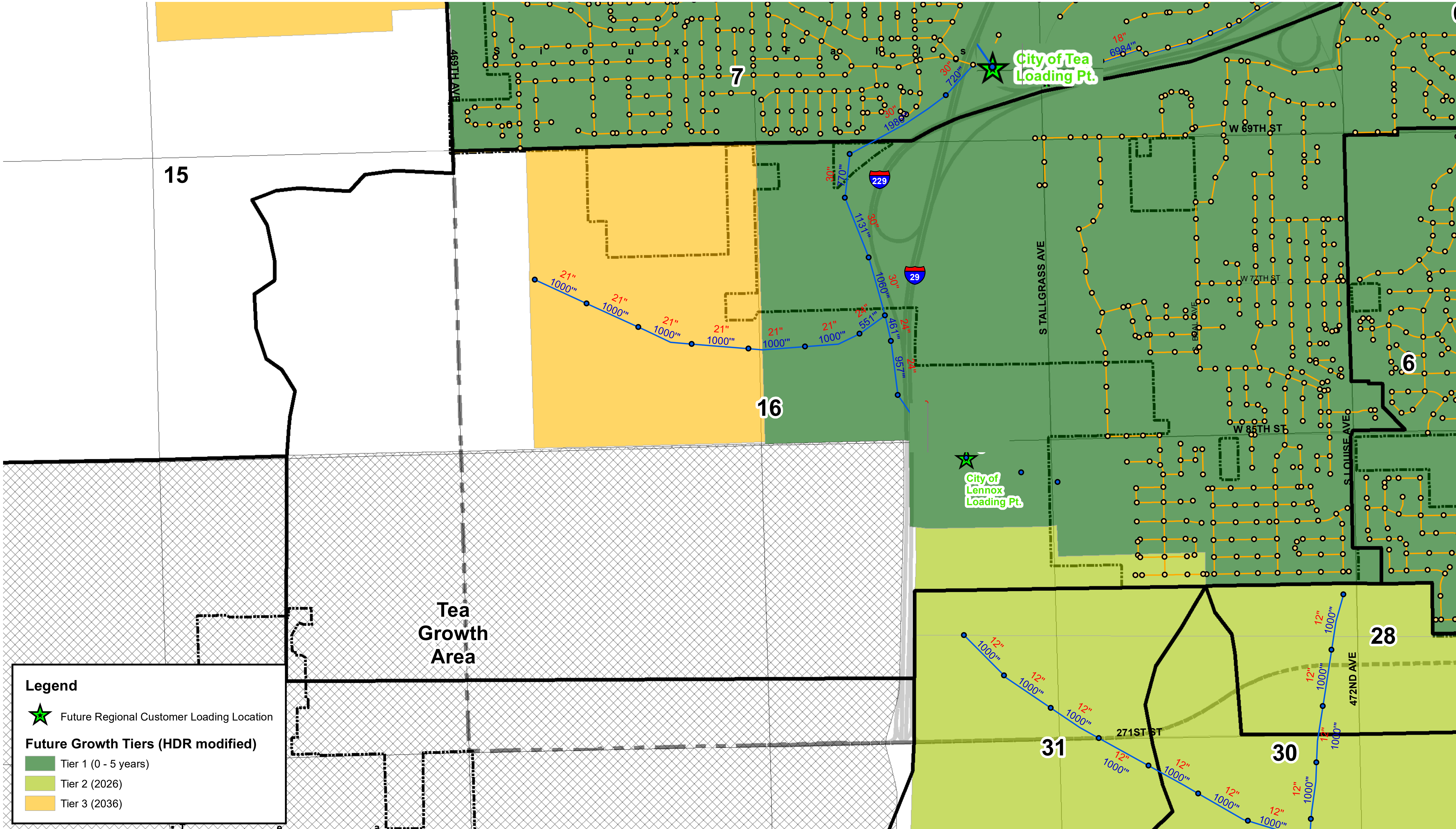

HDR
City of Sioux Falls

0 Feet 1,700

LEGEND

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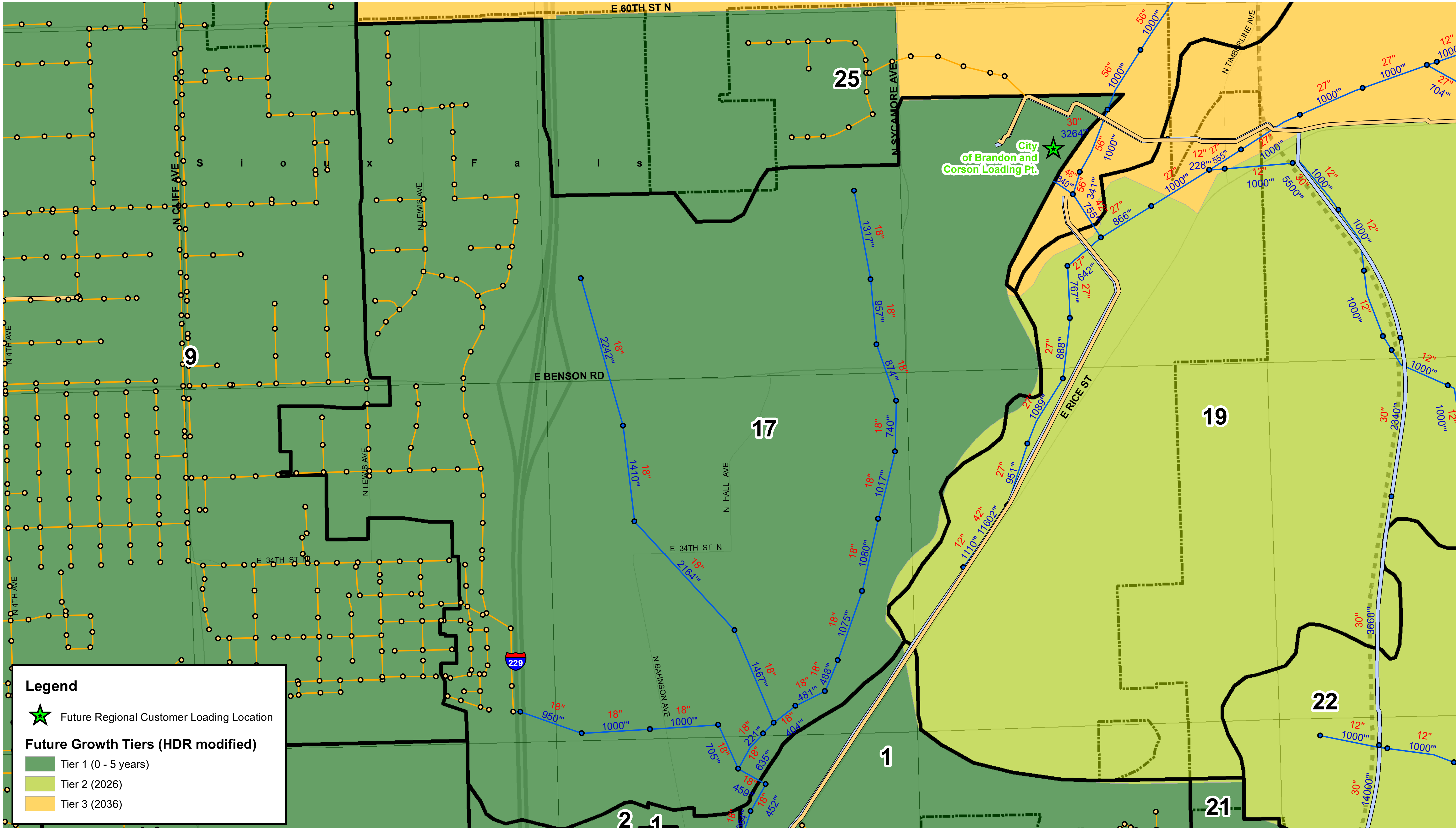
Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 16

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

Feet 0 1,400

HDR City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 17

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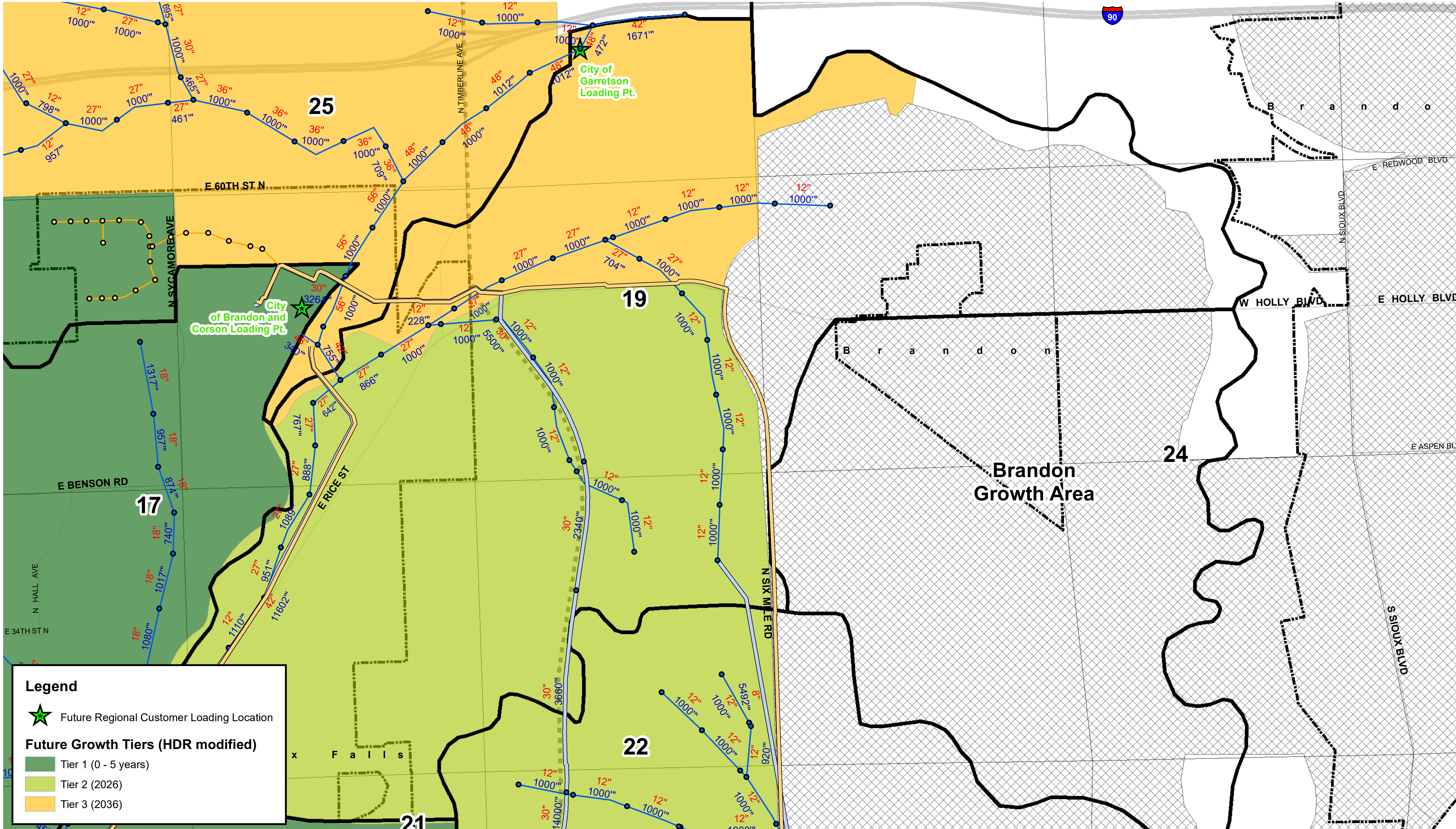

HDR

City of Sioux Falls

0 Feet 1,750

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Length (ft)

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BASIN 19

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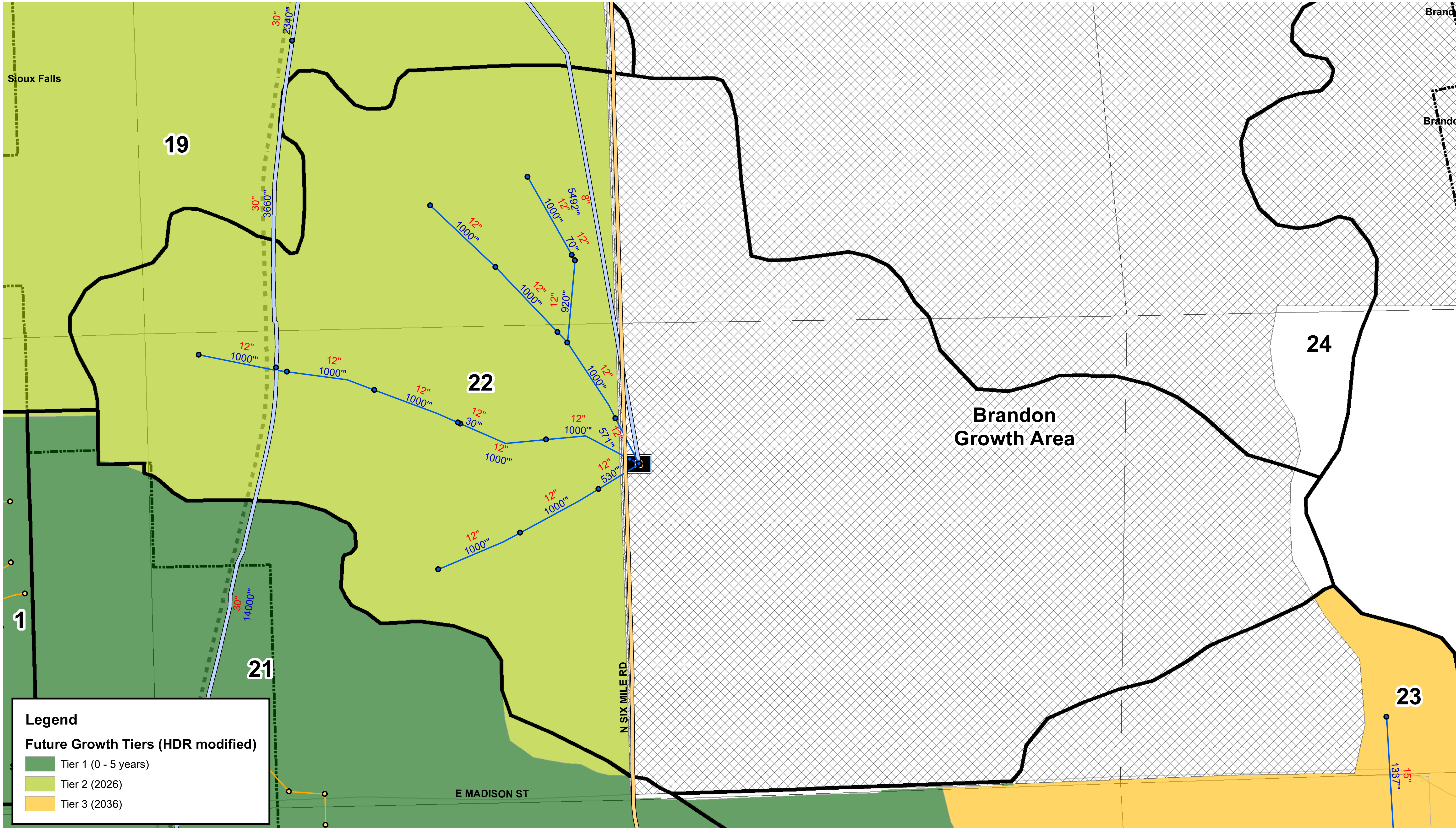


LEGEND

Existing Collection System	Future Conceptualized Collection System	Future West Corridor Alignment	Major Sanitary Sewer Basins
PS Existing Major Lift Station	Future Gravity Main Concept	Future Highway 100 Alignment	Regional Growth Areas
Existing Gravity Main	Future Force Main Concept	Municipal Boundaries	
Existing Force Main	PS Conceptual Future Sewer Pump Stations	PLSS Section Lines	

HDR City of Sioux Falls

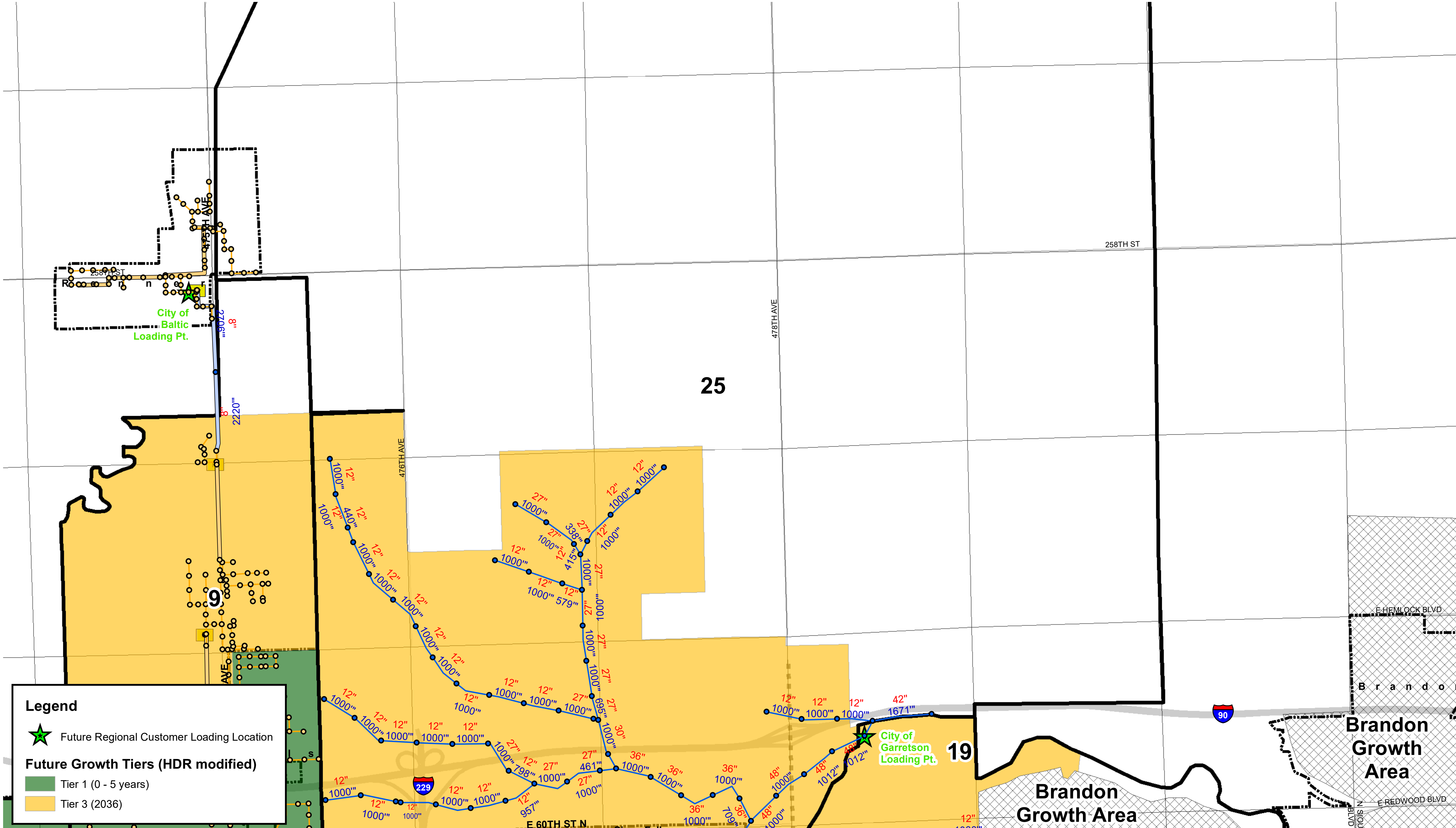
0 Feet 1,100

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 22

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

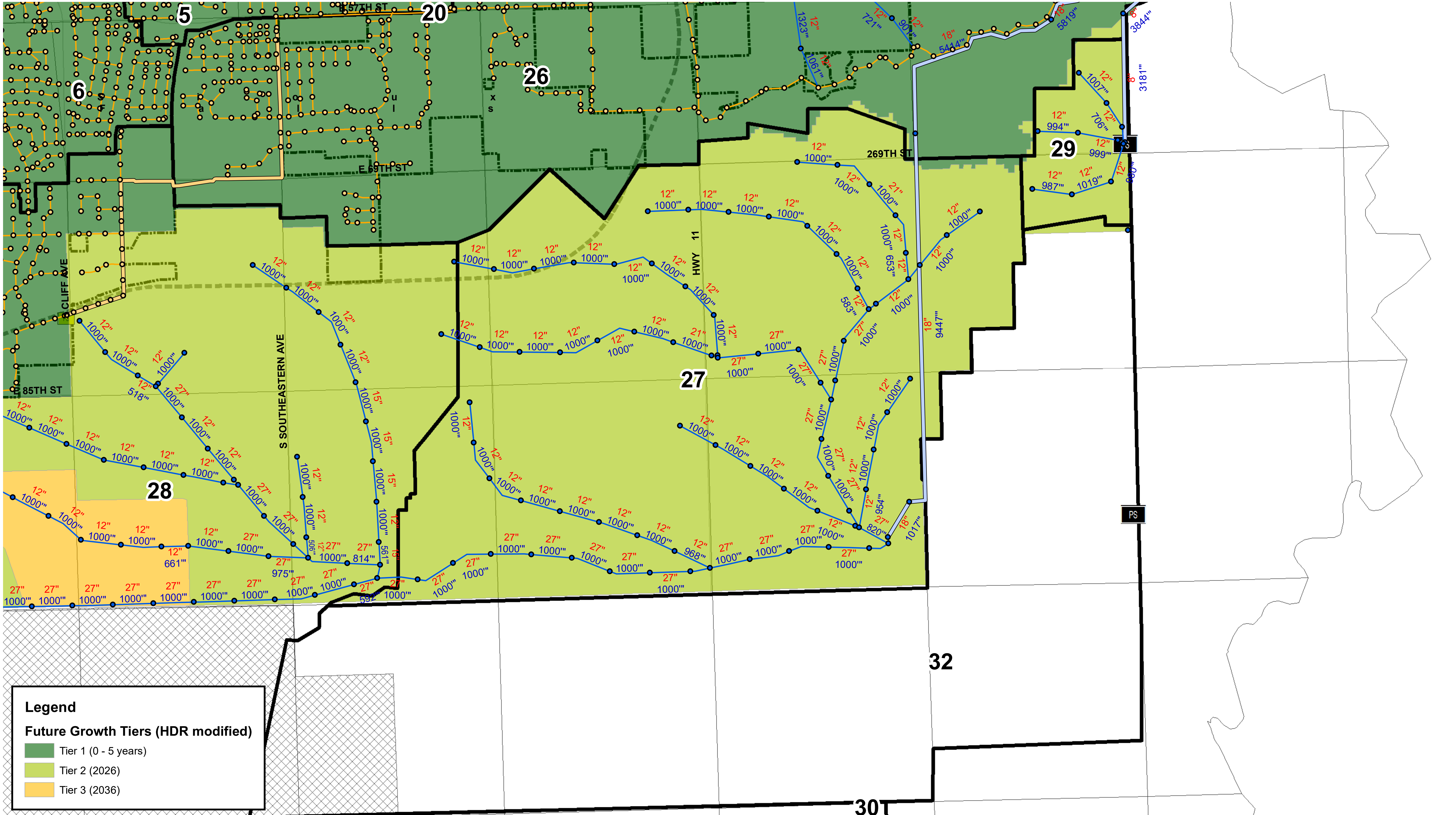
0 Feet 2,750

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 25

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
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Diameter (in)
Length (ft)

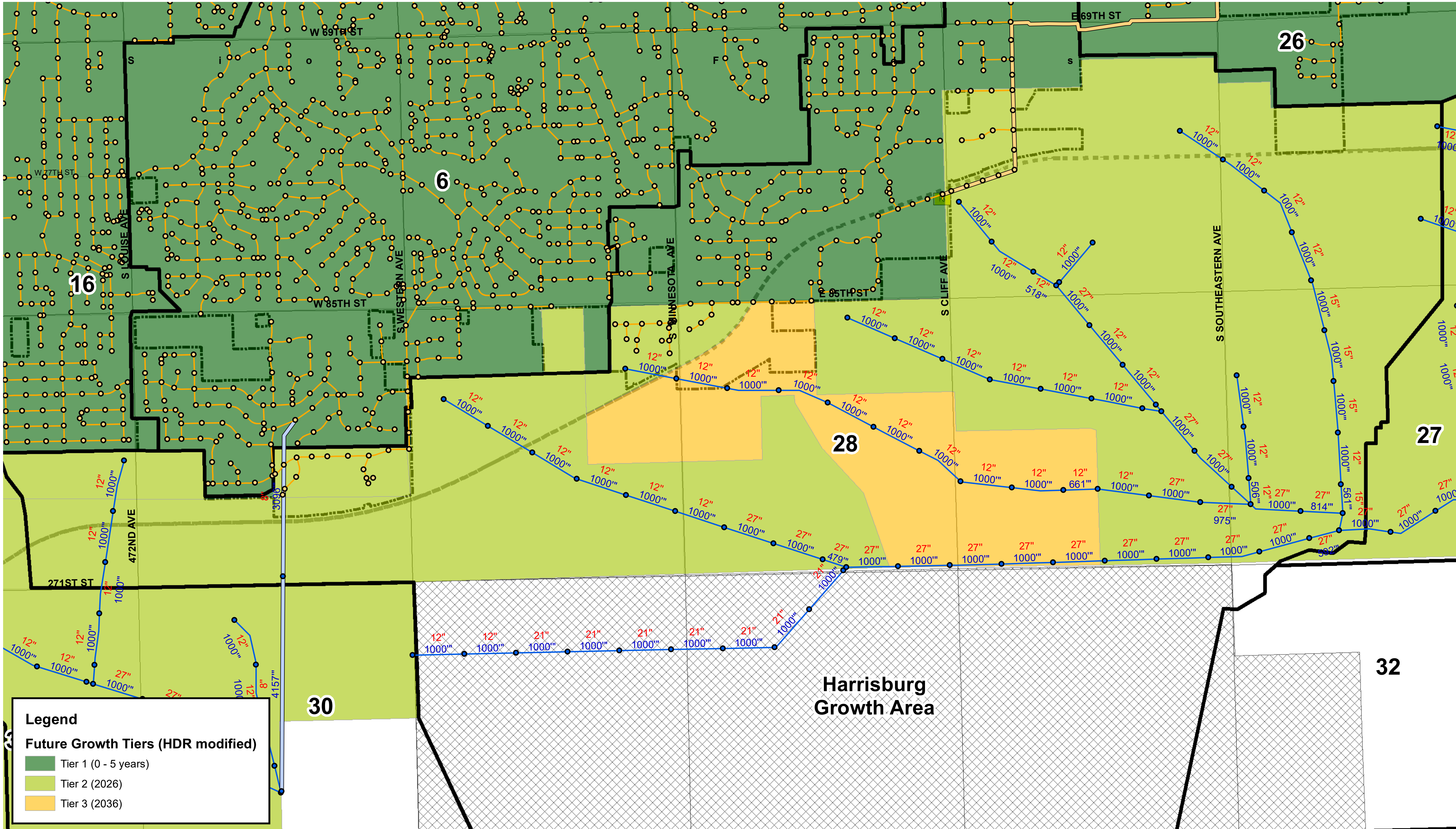
0 Feet 2,400

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASINS 27, 29, AND 32

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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PLSS Section Lines
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Regional Growth Areas

Diameter (in)
Length (ft)

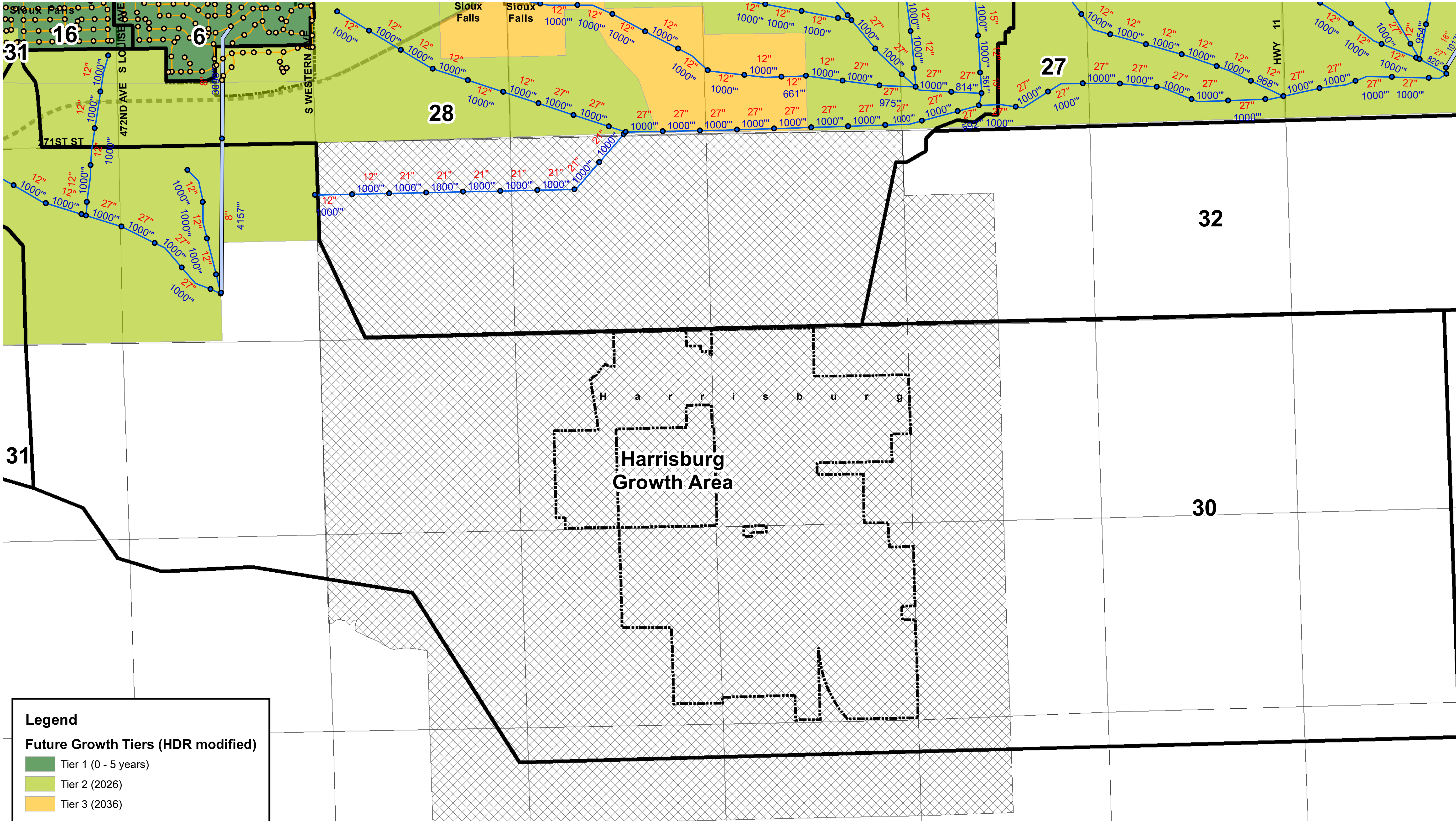
0 Feet 1,900

HDR
City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 28

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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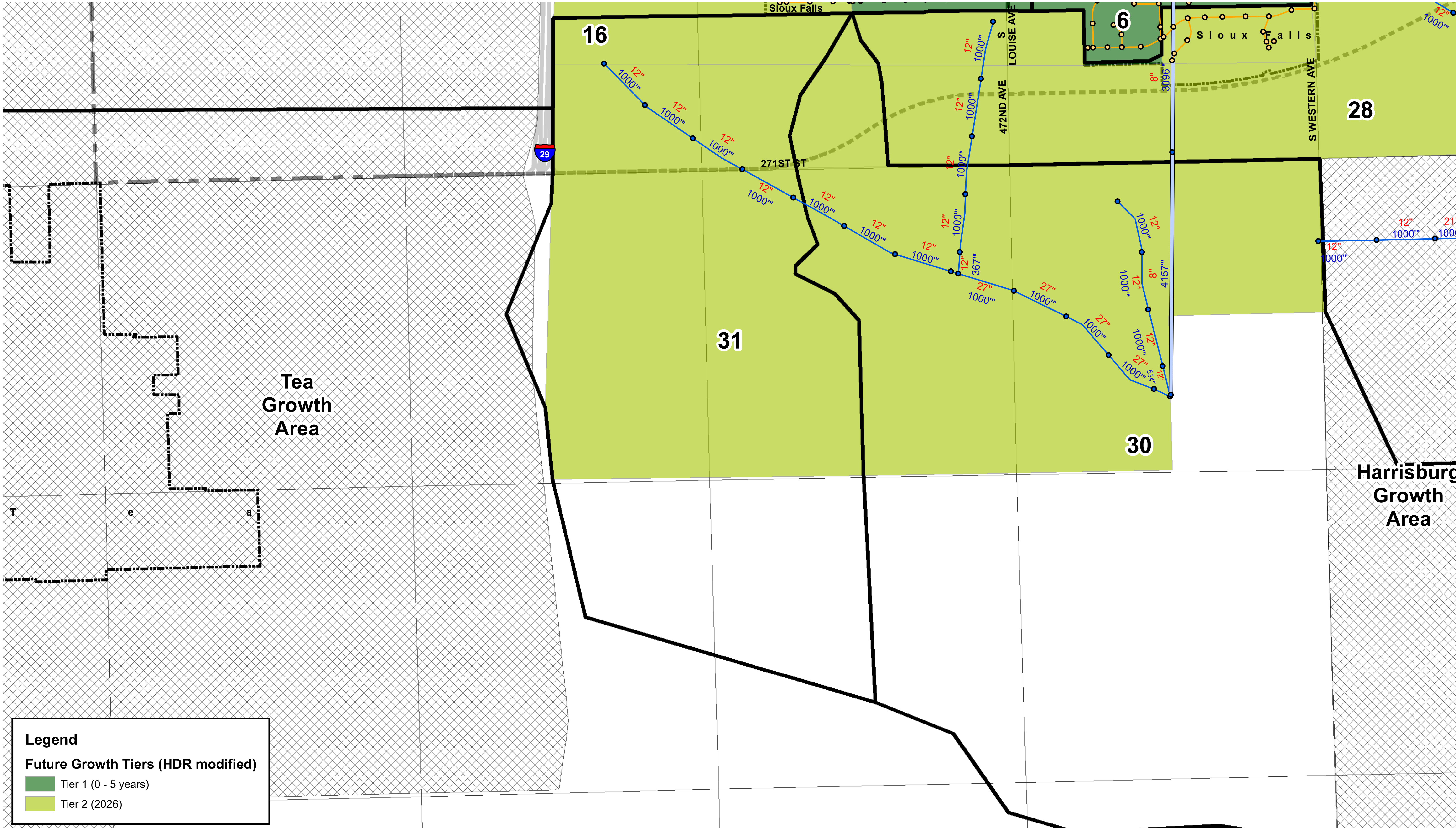
Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 30

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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PLSS Section Lines
Major Sanitary Sewer Basins
Regional Growth Areas
Diameter (in)
Length (ft)

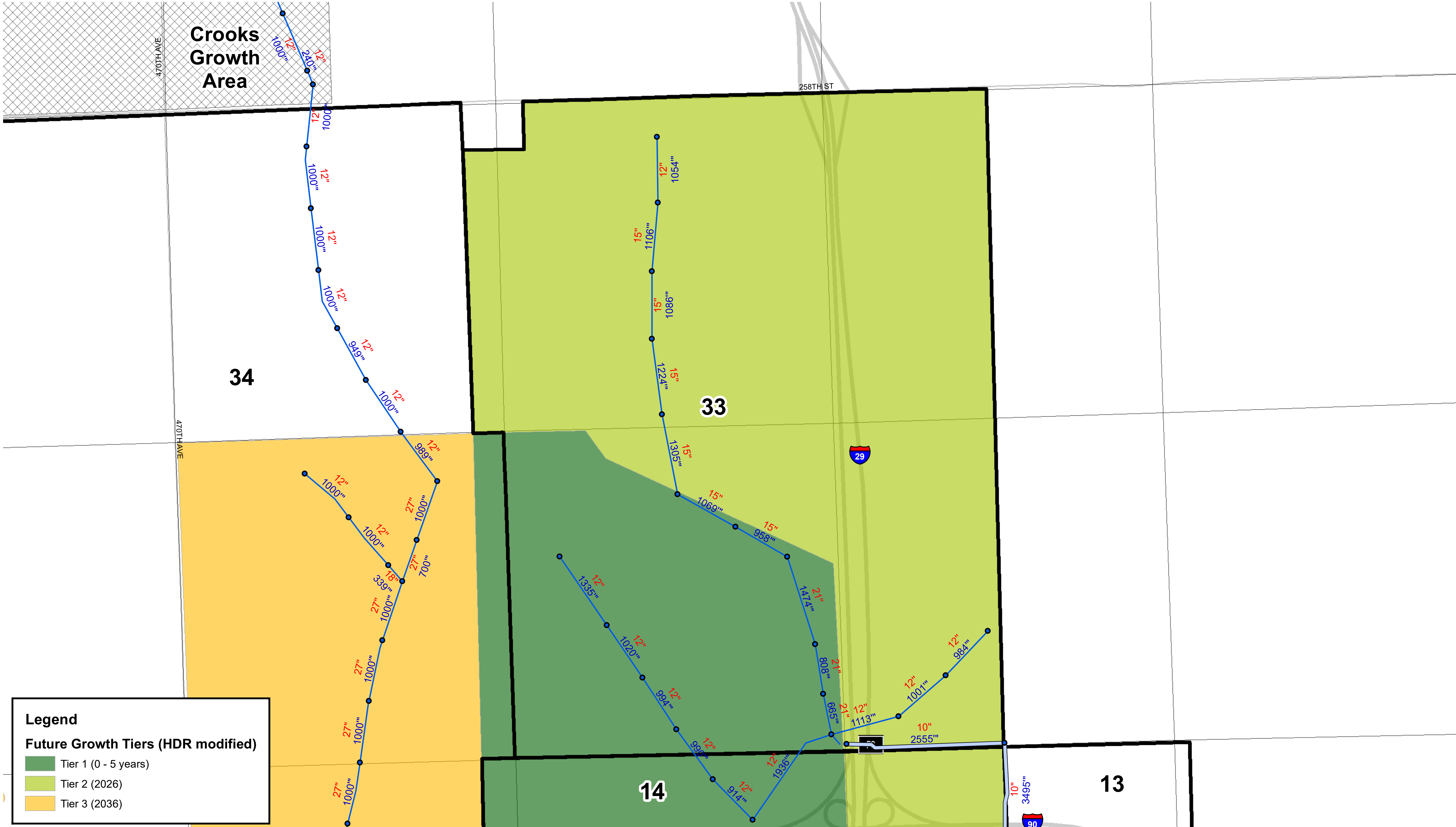
0 Feet 1,700

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 31

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

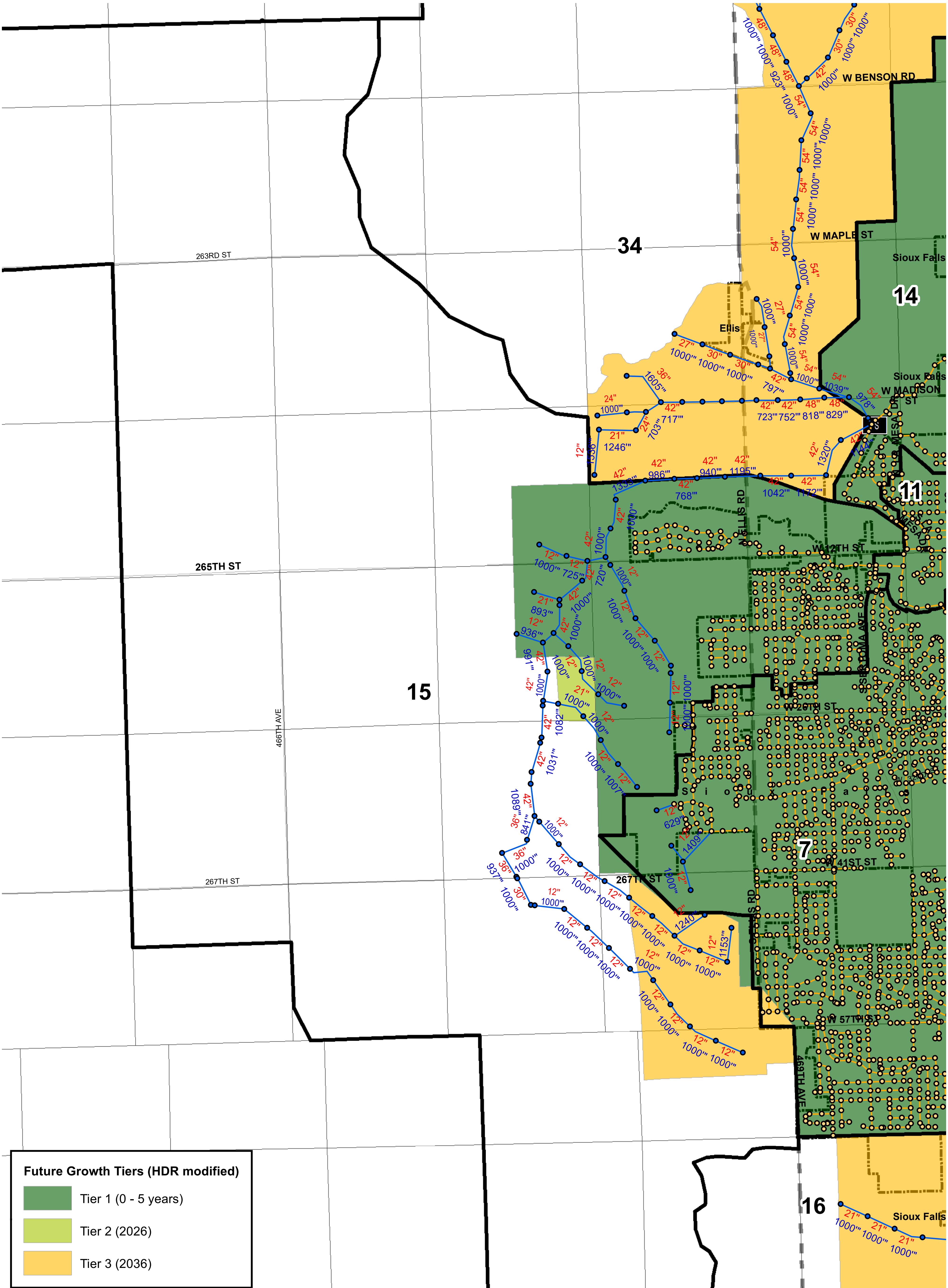
0 Feet 1,500

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 33

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 15

City of Sioux Falls

LEGEND

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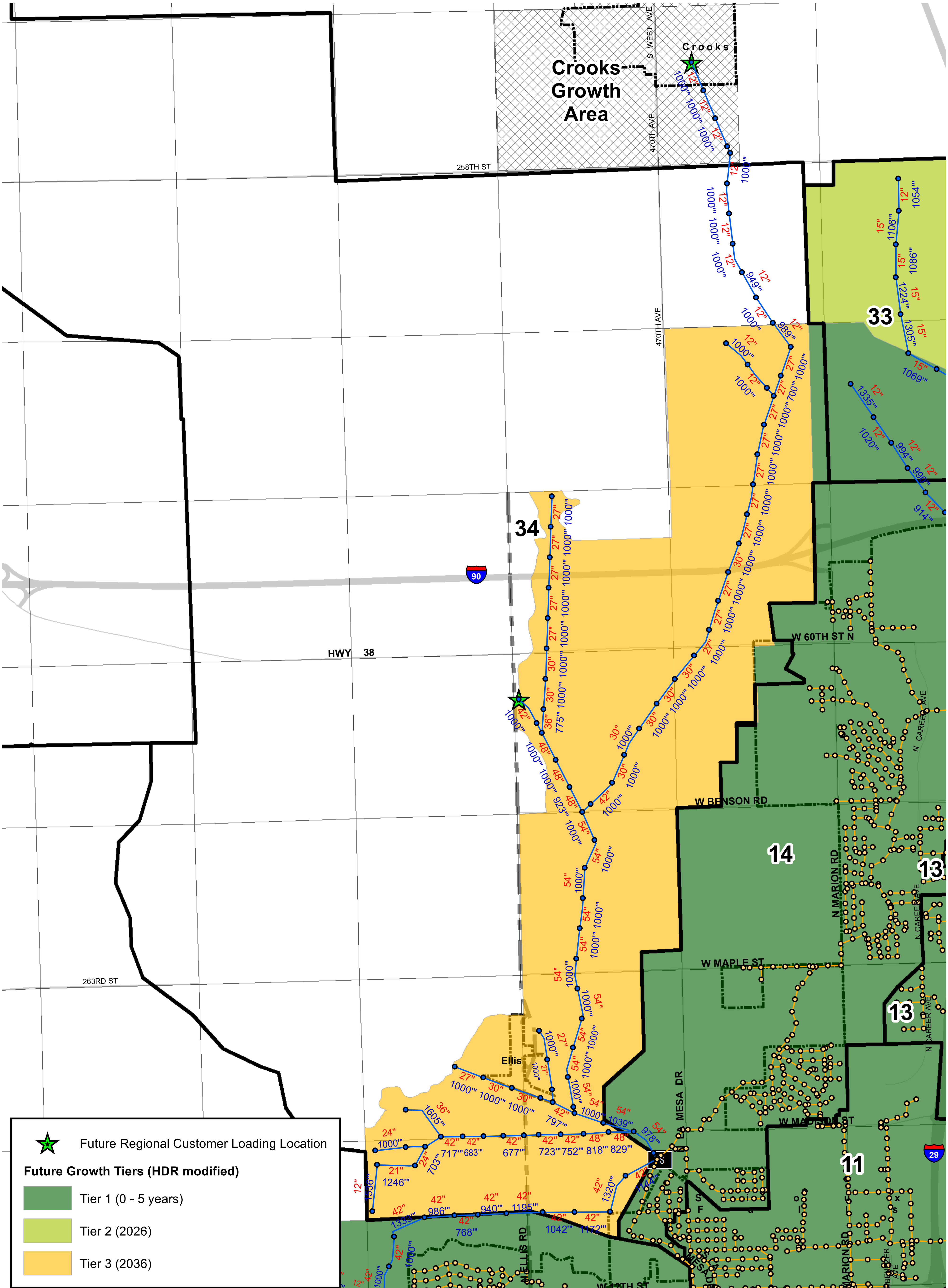
- Regional Growth Areas

0 Feet 3,300

Diameter (in)
Length (ft)

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2036_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2036 CONCEPTUALIZED TRUNK MAINS

BASIN 34

City of Sioux Falls

LEGEND

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Diameter (in)
Length (ft)

0 Feet 3,200

Appendix 11.C – Future Pipe Size Detailed

2066

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018

2066 Future Trunk Sewer Extensions Recommended Plan

Basin	Diameter	Length (ft)
Basin 7	12-in	3,707
	18-in	10,517
	30-in	720
Basin 7 Total		**14,944**
Basin 9	8-in	8,148
Basin 9 Total		**8,148**
Basin 14	24-in	39,434
	54-in	1,202
Basin 14 Total		**40,636**
Basin 15	12-in	56,245
	15-in	3,580
	18-in	40
	21-in	20,848
	24-in	8,799
	30-in	1,811
	36-in	2,778
	42-in	21,845
Basin 15 Total		**115,947**
Basin 16	12-in	6,104
	15-in	2,000
	18-in	3,000
	21-in	7,111
	24-in	2,925
	30-in	4,948
Basin 16 Total		**26,087**
Basin 17	18-in	18,922
Basin 17 Total		**18,922**
Basin 18	8-in	2,800
	12-in	11,807
	21-in	3,067
	24-in	241
	42-in	2,198
Basin 18 Total		**20,113**
Basin 19	12-in	16,730
	27-in	11,462
	42-in	2,426
	48-in	1,012
Basin 19 Total		**31,630**
Basin 21	8-in	1,049
Basin 21 Total		**1,049**
Basin 22	8-in	5,492
	12-in	13,397
Basin 22 Total		**18,888**
Basin 23	12-in	6,552
	15-in	2,416
	18-in	6,511
	21-in	1,934
Basin 23 Total		**17,414**
Basin 25	12-in	31,325
	27-in	12,099
	30-in	1,000
	36-in	4,709
	48-in	3,825
	56-in	3,341
Basin 25 Total		**56,299**

Basin	Diameter	Length (ft)
Basin 26	8-in	3,844
	8-in	177
	12-in	6,340
	18-in	1,410
	24-in	89
	36-in	47,781
Basin 26 Total		**59,641**
Basin 27	12-in	43,167
	18-in	12,250
	21-in	2,000
	27-in	22,276
	36-in	109
Basin 27 Total		**79,803**
Basin 28	12-in	42,308
	15-in	3,561
	18-in	9,447
	21-in	7,000
	27-in	20,777
Basin 28 Total		**83,093**
Basin 29	8-in	3,181
	12-in	7,272
Basin 29 Total		**10,454**
Basin 30	8-in	7,253
	12-in	7,901
	24-in	1,673
	27-in	8,434
	36-in	21
Basin 30 Total		**25,282**
Basin 31	12-in	10,000
	27-in	1,000
Basin 31 Total		**11,000**
Basin 32	8-in	16,159
	12-in	11,267
	21-in	2,000
	27-in	1,508
Basin 32 Total		**30,933**
Basin 33	6-in	7,996
	10-in	2,555
	12-in	10,227
	15-in	6,747
	18-in	914
	21-in	3,149
Basin 33 Total		**31,587**
Basin 34	12-in	43,958
	18-in	2,491
	21-in	7,984
	24-in	27,215
	27-in	31,679
	30-in	19,029
	36-in	5,400
	42-in	7,489
	48-in	4,929
	54-in	12,618
	60-in	120
Basin 34 Total		**162,912**

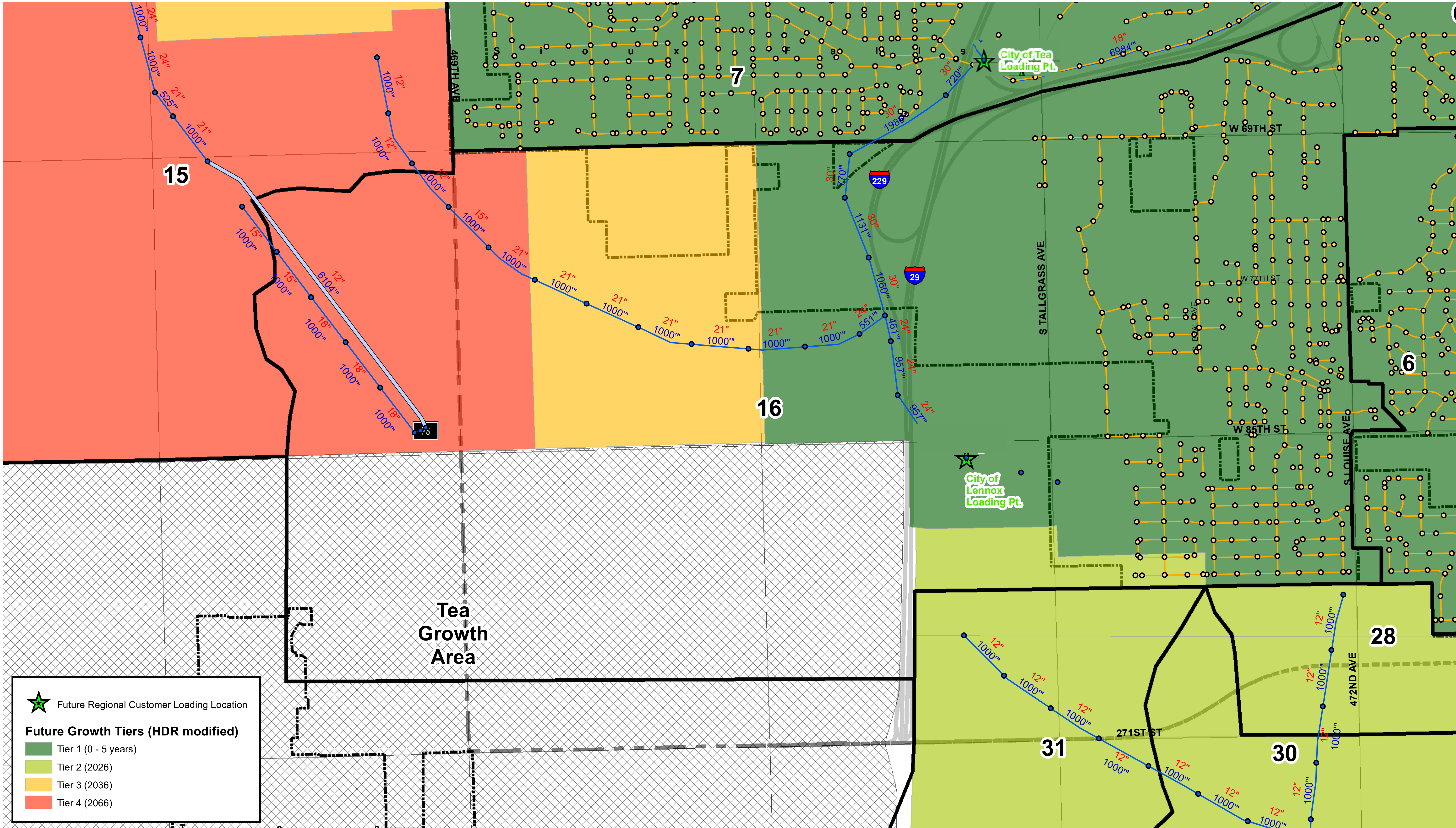
Existing System 2066 CIP

Basin	Type A Hydraulic Deficiency Area for CIP	Diameter	Length (ft)
1	Richmond Estates Trunk	12-in	1,989
3	Lower Riverside Trunk Sewer	12-in	787
		15-in	936
		18-in	2,998
		21-in	1,289
		24-in	332
		36-in	971
5	Southeastern Drive	Lining Project	2,926
7	Southwest Trunk	15-in	557
		18-in	226
10	Sioux River North Upstream of PS 215	15-in	460

2066 Recommended Plan Future Development Trunk Sewer Extension Components	
Basins 30 and 31	**Option 3 (Basin 30 and 31 to future Basin 28 Trunk) :** • Basin 30/31 PS and EQ • Forcemain from PS and EQ to upstream point of future Basin 28 Trunk Sewer • Gravity sewer upgrades from upstream point of future Basin 28 Trunk Sewer to Future PS 32
Westside	**Option 1 (FM to the north)** • Basin 15/34 EQ at Pump Station • Forcemain around the north side of town
Basin 28	**Option 3 (Tie to the Basin 27 and 28 PS and EQ):** • Gravity main to Basin 27/28 PS and EQ
Basins 27 and 28	**Option 2 (Basin 27 and 28 directly to PS240):** • Basin 27/28 PS and EQ • Forcemain from PS and EQ directly to PS240
Tea and Basin 16 Flows	**Option 1 Option 1 (Tie into and upsize I-229 Trunk):** • Tea Flows are equalized to max day flow; Basin 16 future • I-229 Trunk upsized or paralled to carry future flows
Basin 33	**Option 1 (Direct Flow to WRF):** • EQ • Forcemain to directly to WRF
Renner	**Option 1:** • Flow through Basin 9

2066 FUTURE DEVELOPMENT EXTENSION RECOMMENDED PLAN WITH 2066 CIP ON THE EXISTING SYSTEM

FUTURE 2066 CONDITIONS, RECOMMEND PLAN FOR FUTURE EXTENSIONS
FUTURE 2066 BASE SANITARY FLOW WITH TIERS 1, 2, 3, AND 4
DEVELOPMENT EXTENT



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Diameter (in)
Length (ft)

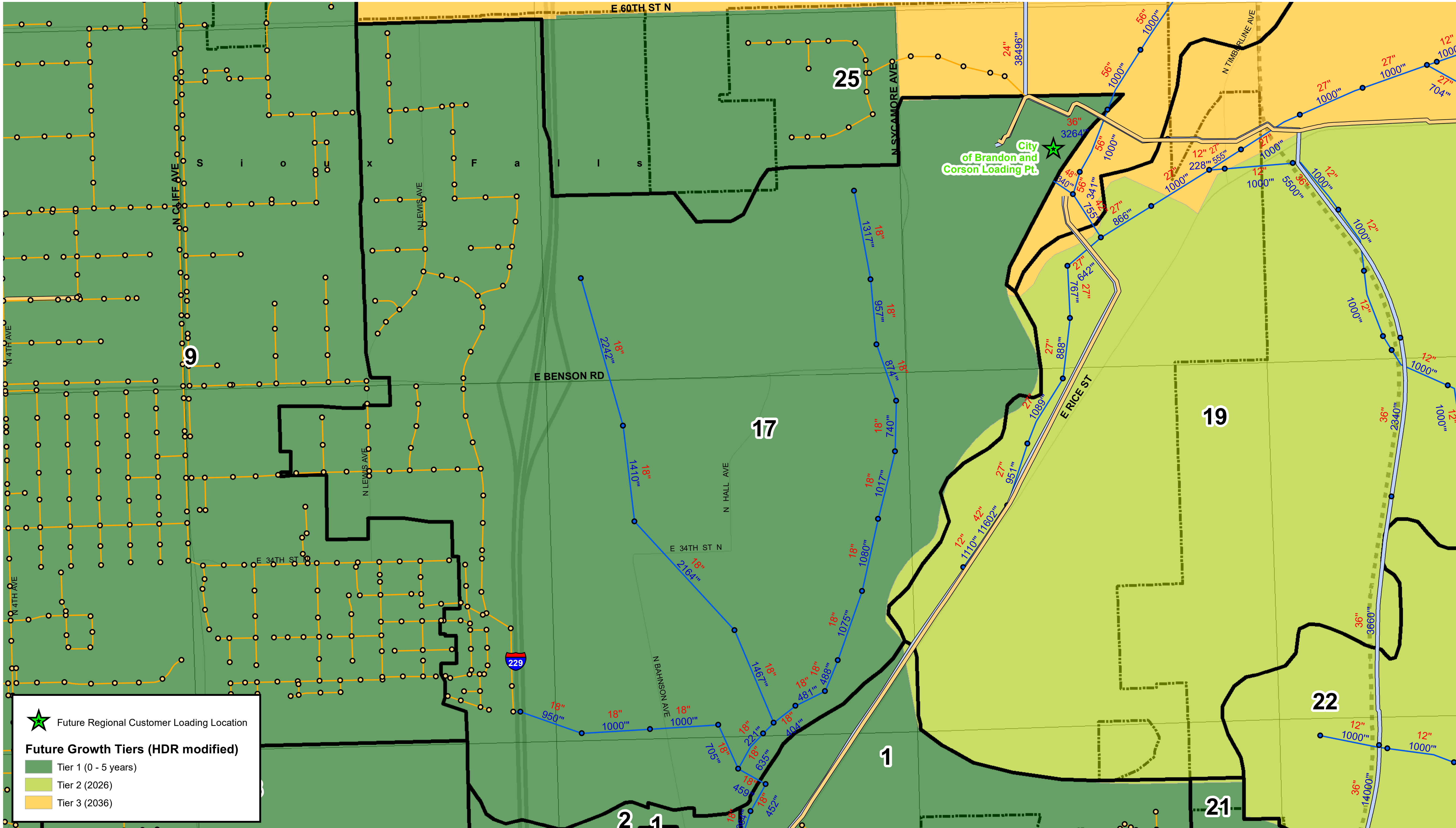
0 Feet 1,700

HDR City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 16

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

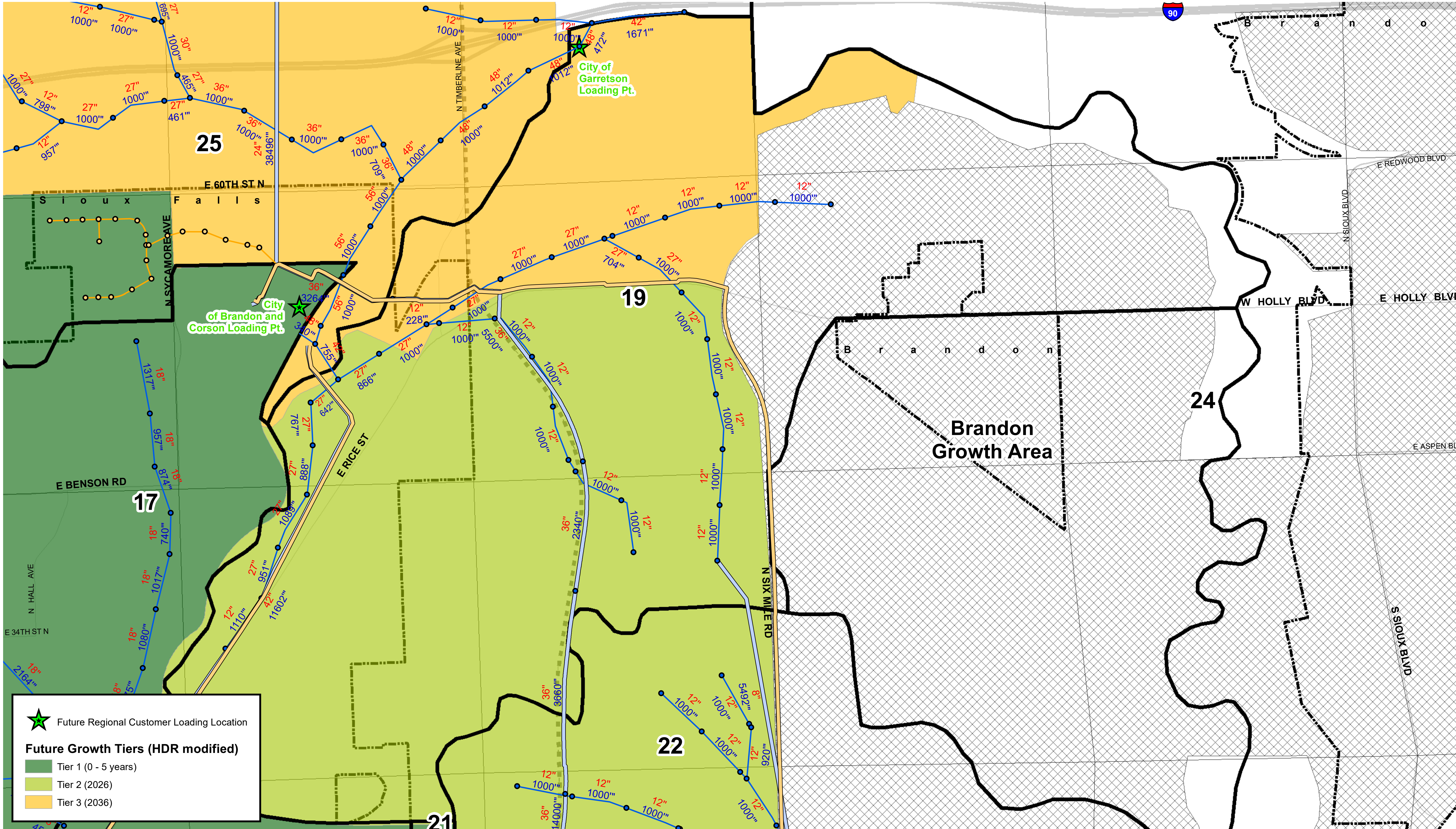
0 Feet 1,400

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 17

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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City of Sioux Falls

0 Feet 1,750

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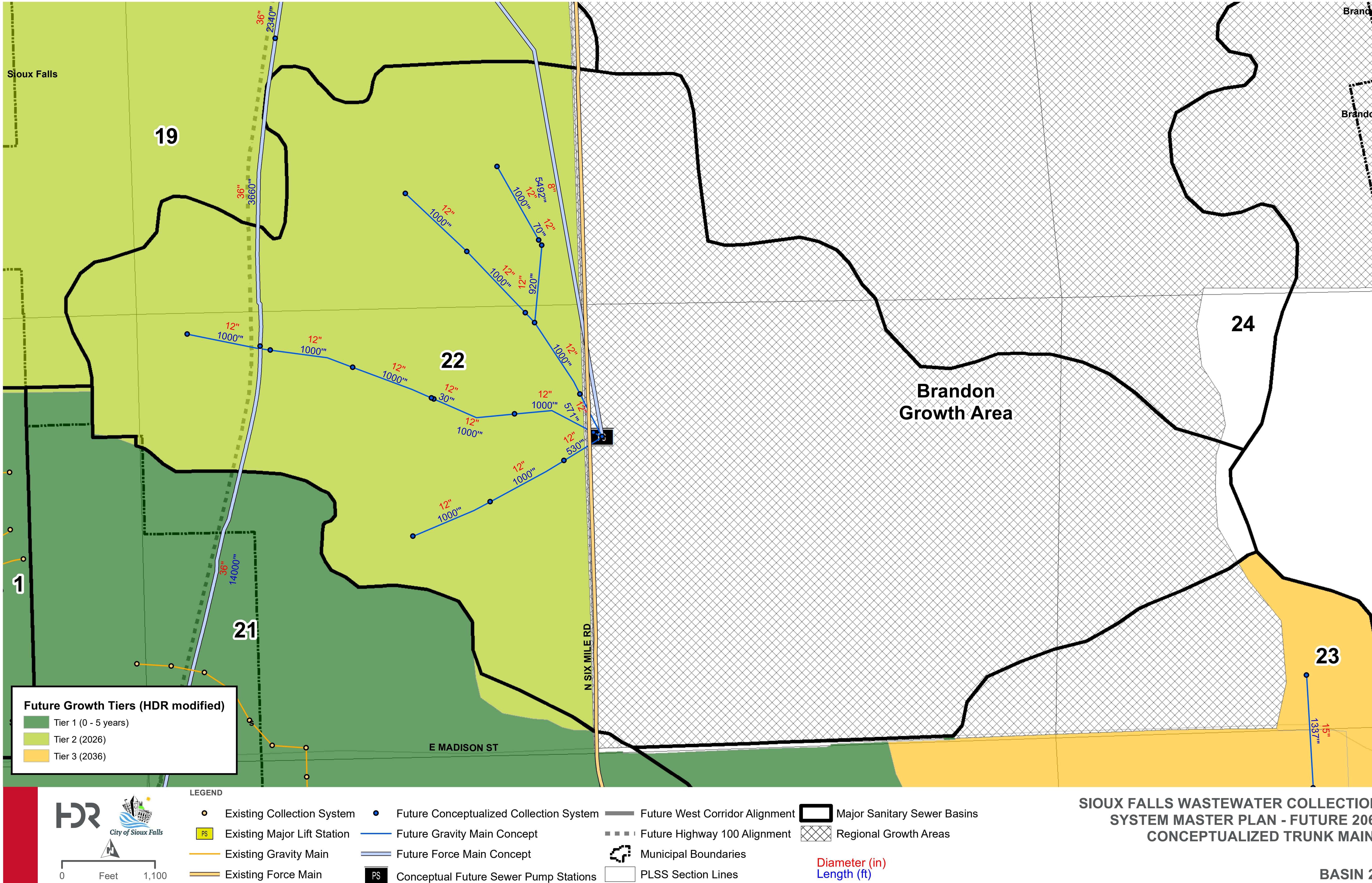
Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 19

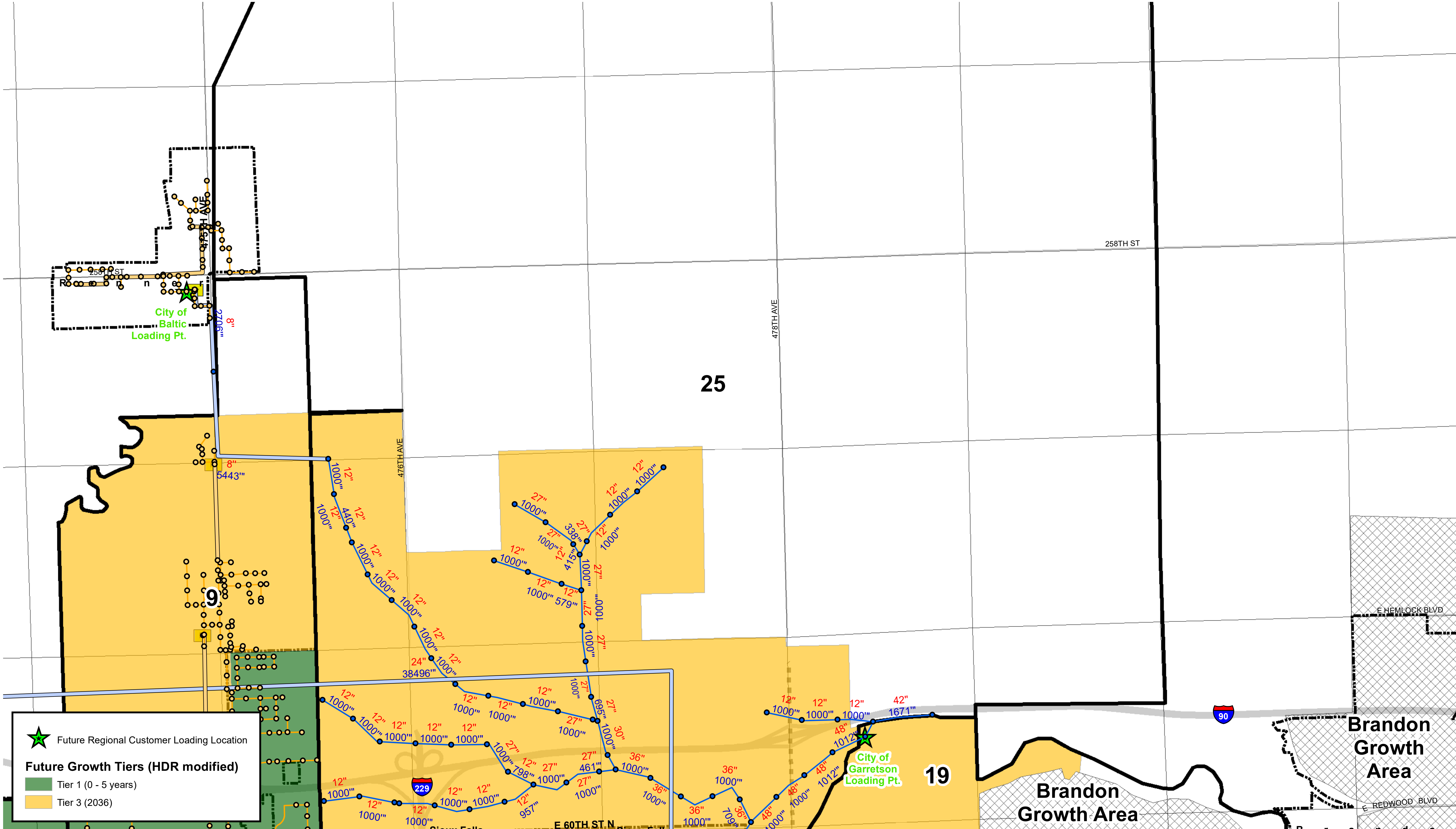
PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 22

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

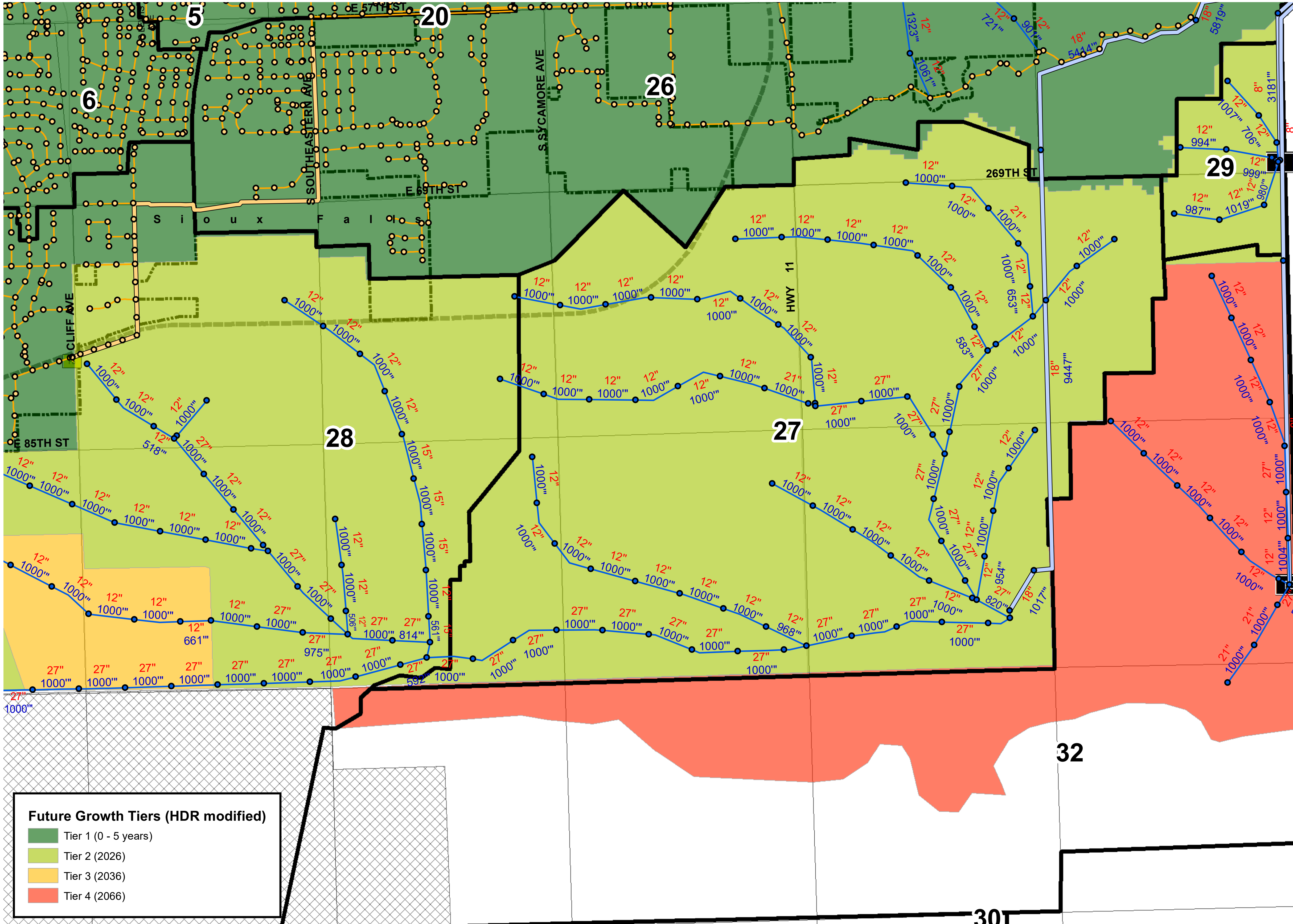
0 Feet 2,750

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 25

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



City of Sioux Falls

LEGEND

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- PS Existing Major Lift Station
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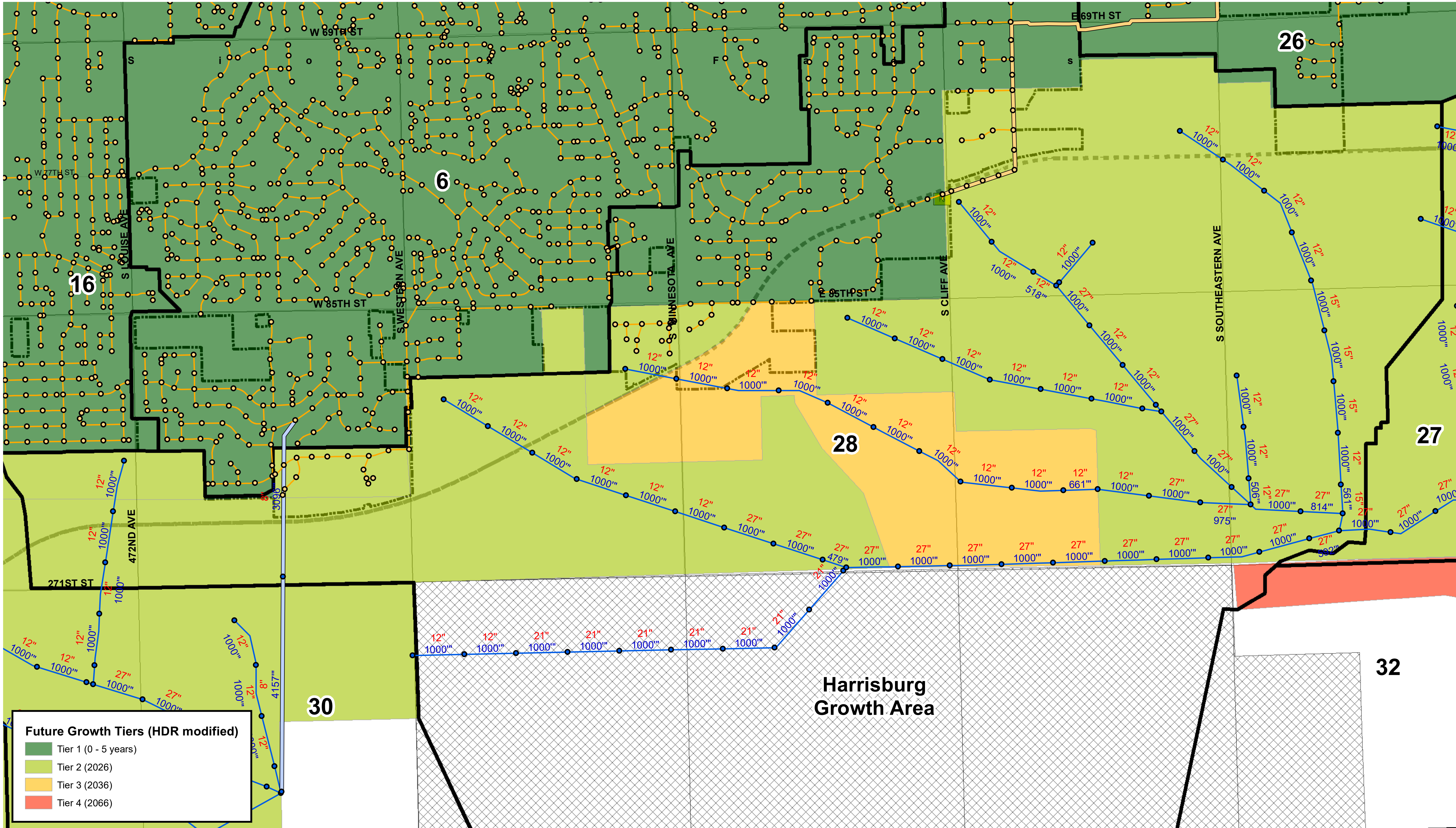
0 Feet 2,400

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASINS 27, 29, AND 32

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

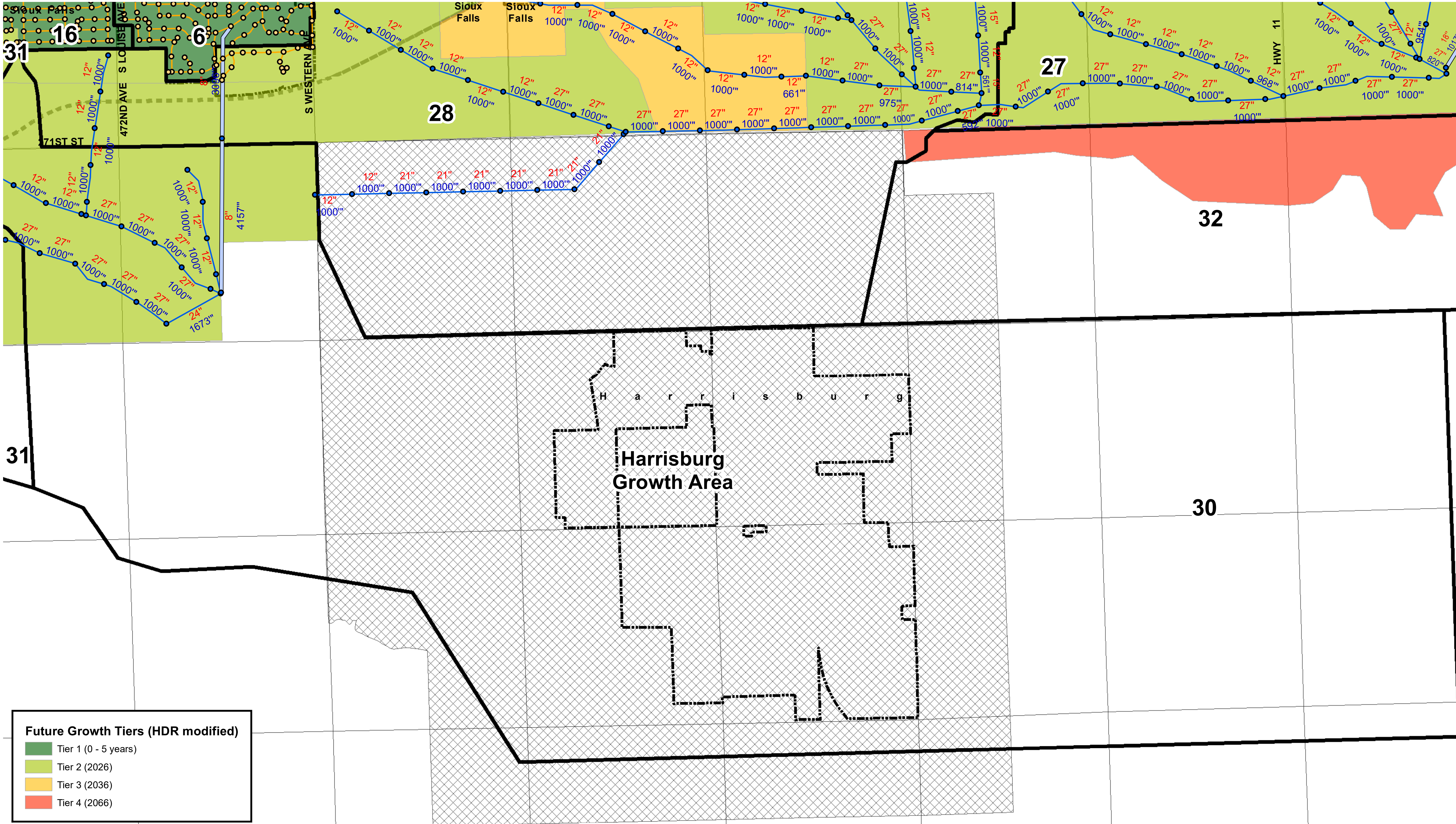
0 Feet 1,900

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 28

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

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Existing Major Lift Station	Future Gravity Main Concept
Existing Gravity Main	Future Force Main Concept
Existing Force Main	Conceptual Future Sewer Pump Stations
Future West Corridor Alignment	Major Sanitary Sewer Basins
Future Highway 100 Alignment	Regional Growth Areas
Municipal Boundaries	Diameter (in)
PLSS Section Lines	Length (ft)

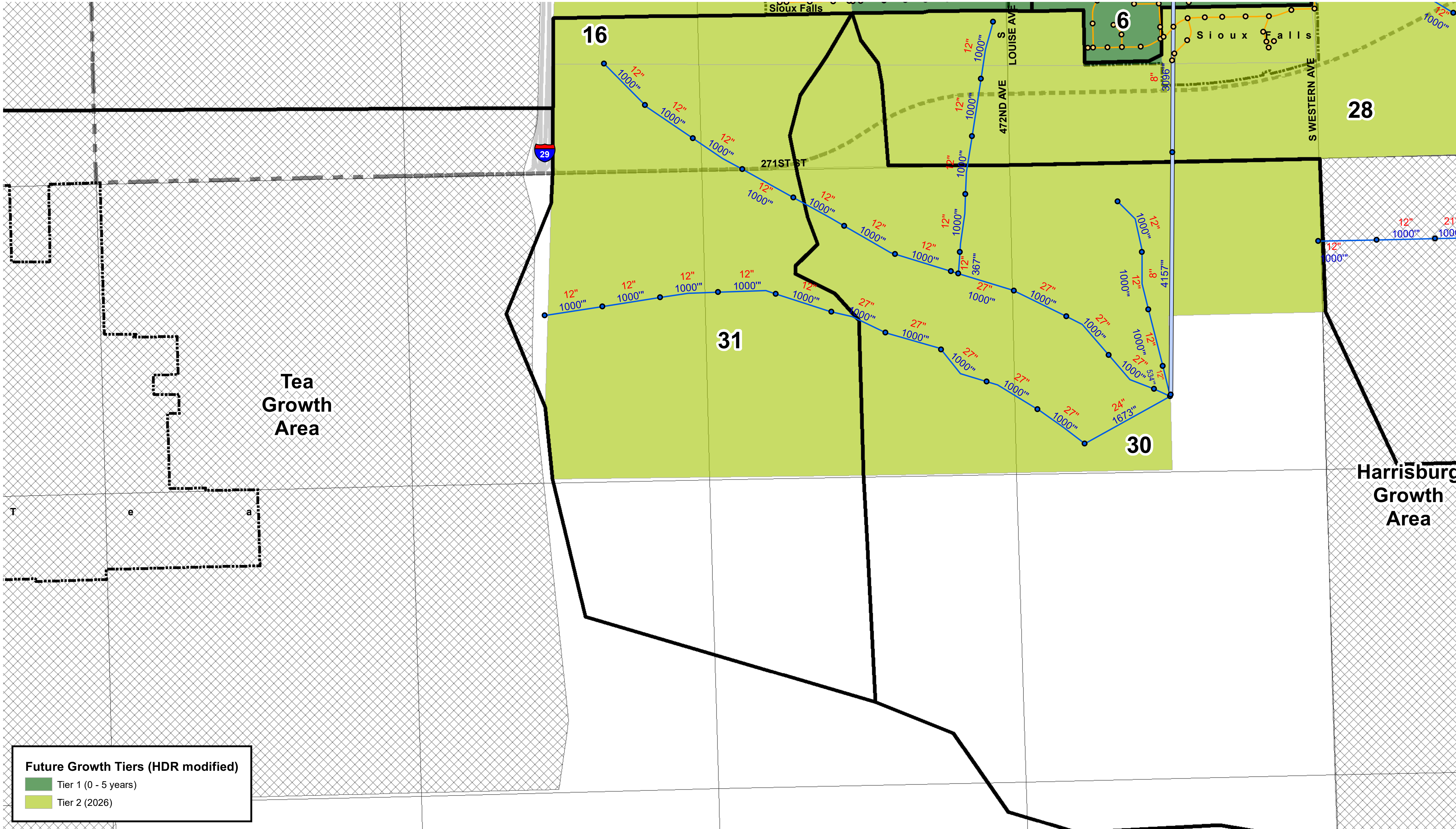
HDR
City of Sioux Falls

0 Feet 2,600

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 30

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



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Diameter (in)
Length (ft)

0 Feet 1,700

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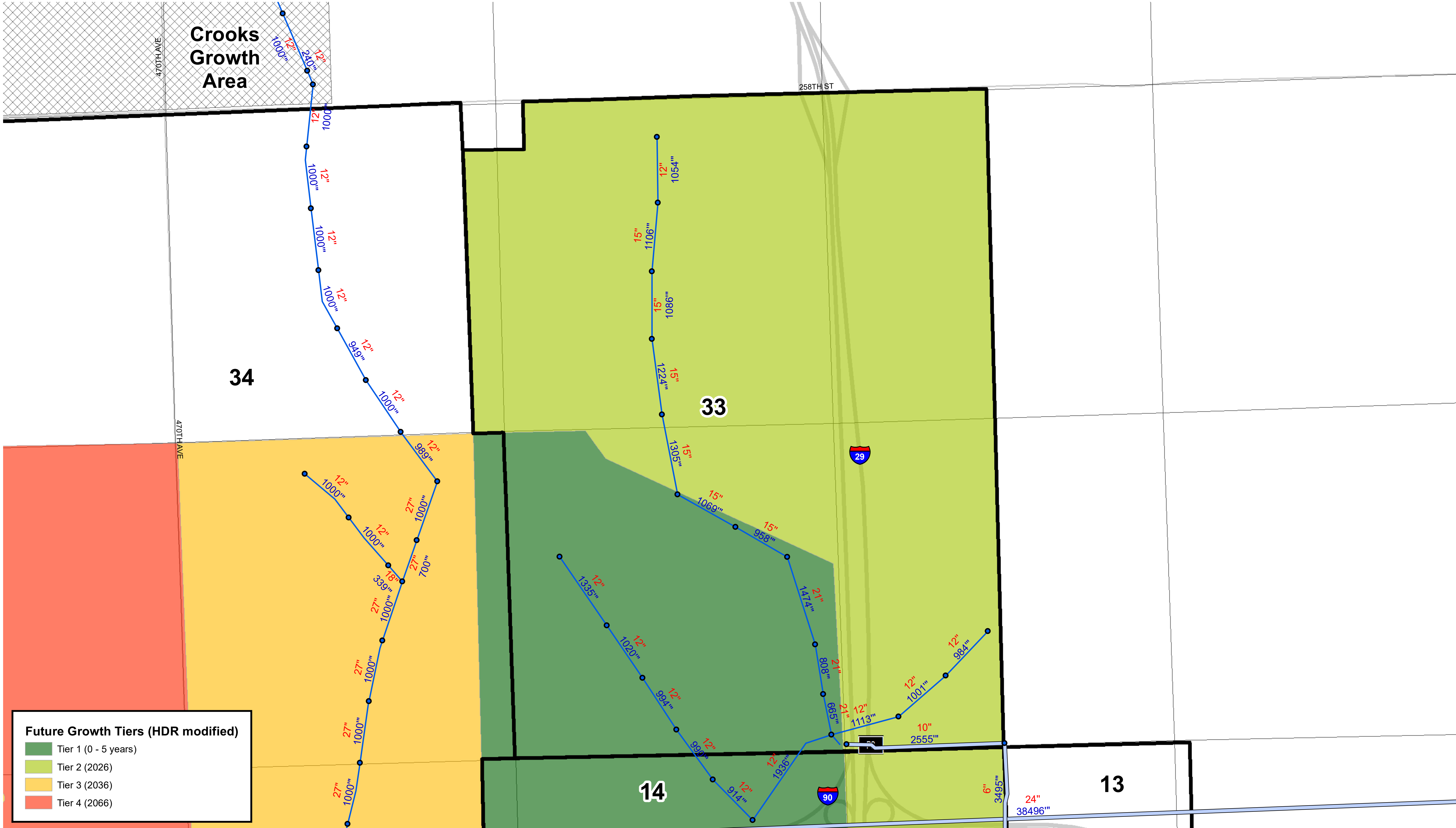
City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 31

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

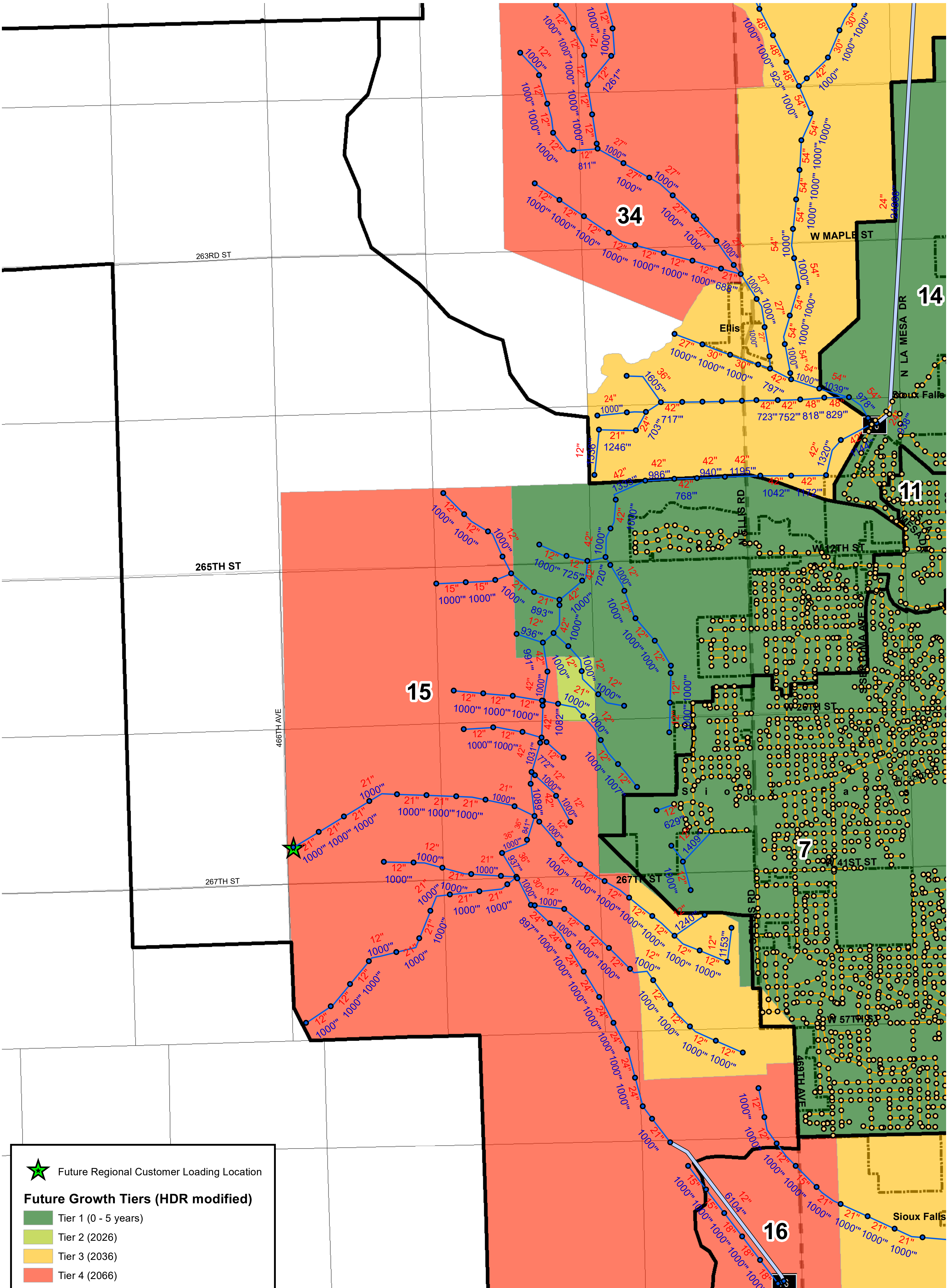
0 Feet 1,500

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 33

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 15

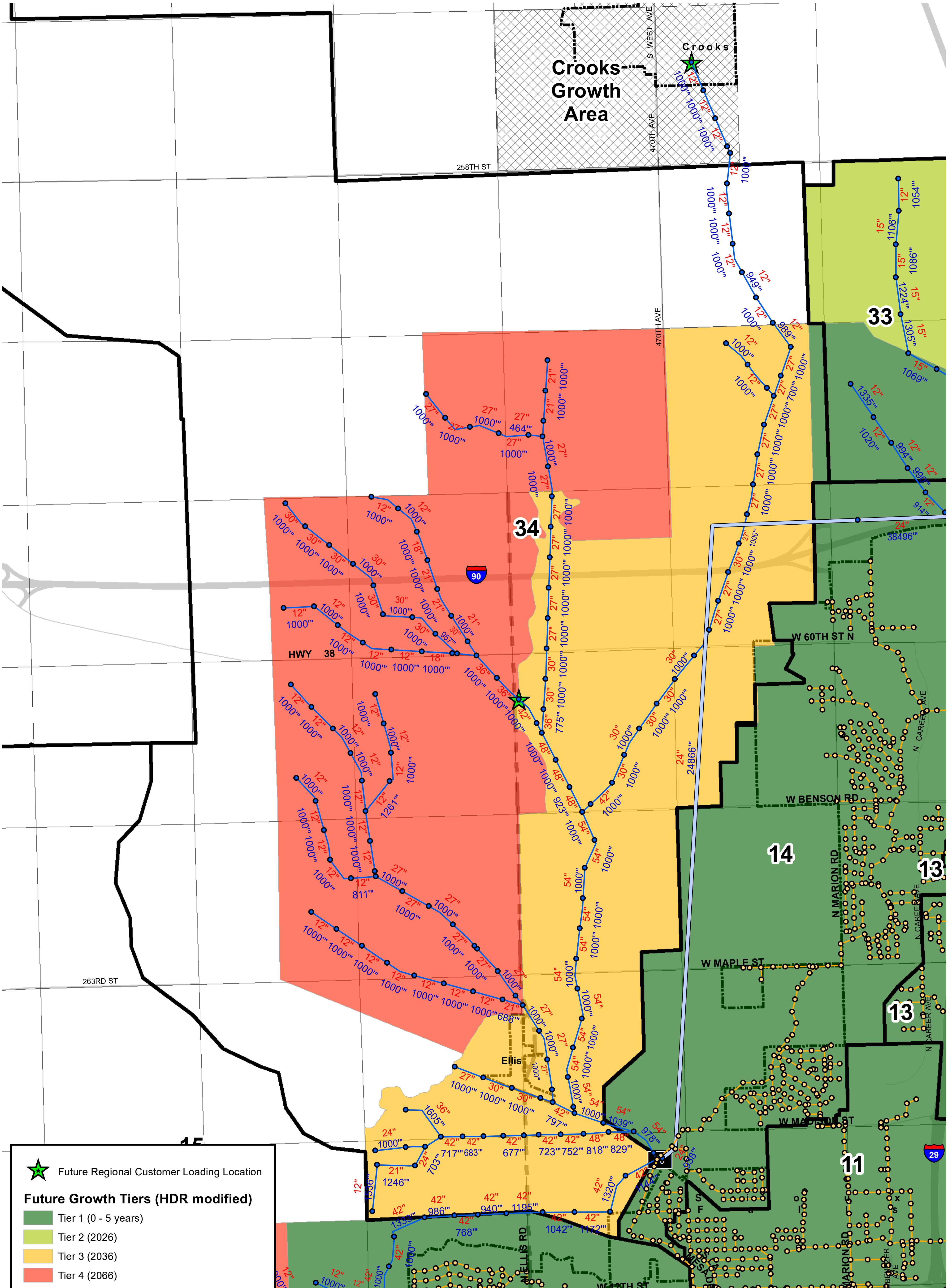
LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 3,000

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2066 CONCEPTUALIZED TRUNK MAINS

BASIN 34

HDR City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 3,000

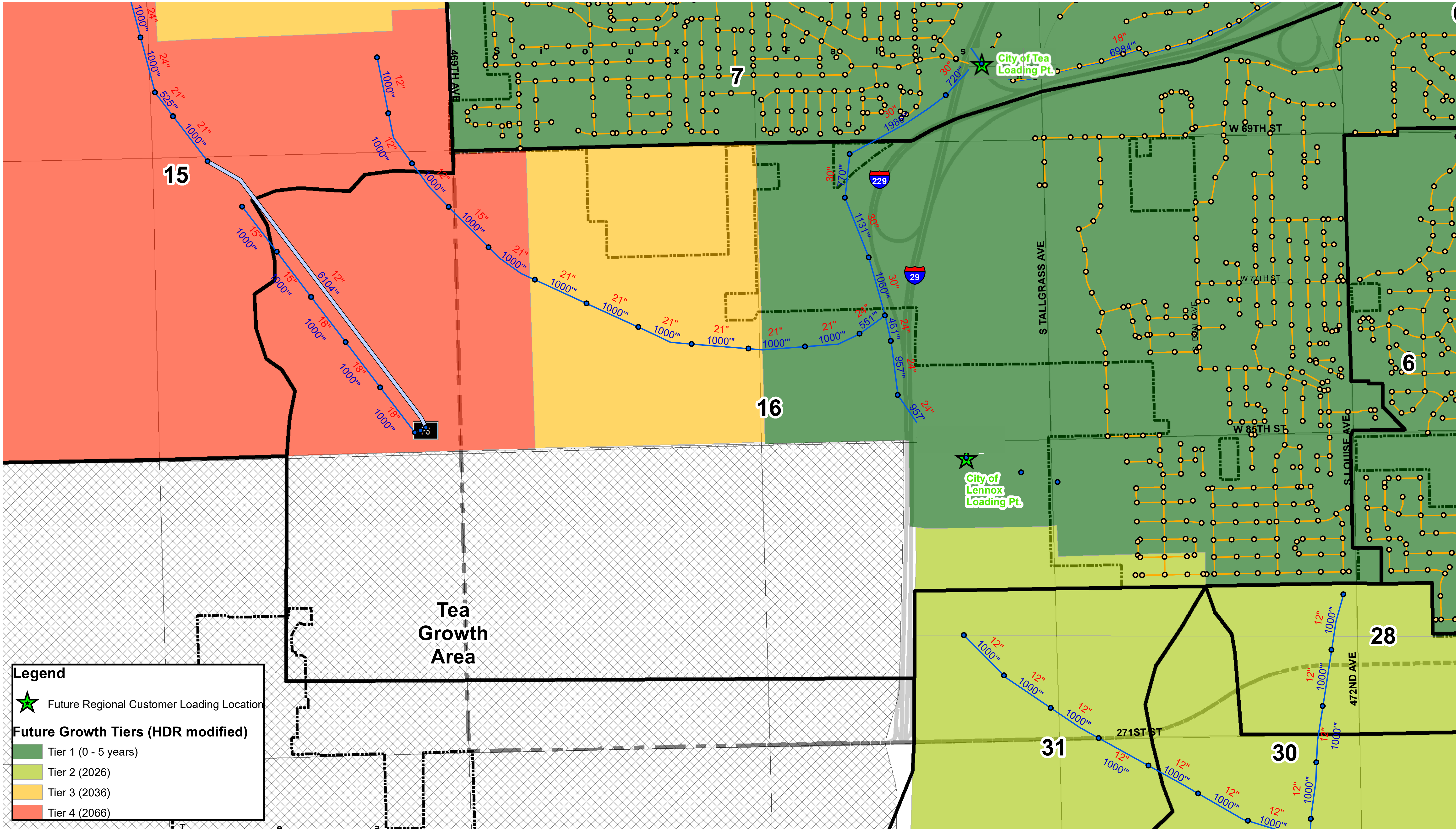
PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2066_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017

Appendix 11.C – Future Pipe Size Detailed

2116

Wastewater Treatment and
Collection System Master Plan

Sioux Falls, SD
February 2018



LEGEND

Existing Collection System	Future Conceptualized Collection System	Future West Corridor Alignment	Major Sanitary Sewer Basins
Existing Major Lift Station	Future Gravity Main Concept	Future Highway 100 Alignment	Regional Growth Areas
Existing Gravity Main	Future Force Main Concept	Municipal Boundaries	Diameter (in)
Existing Force Main	Conceptual Future Sewer Pump Stations	PLSS Section Lines	Length (ft)

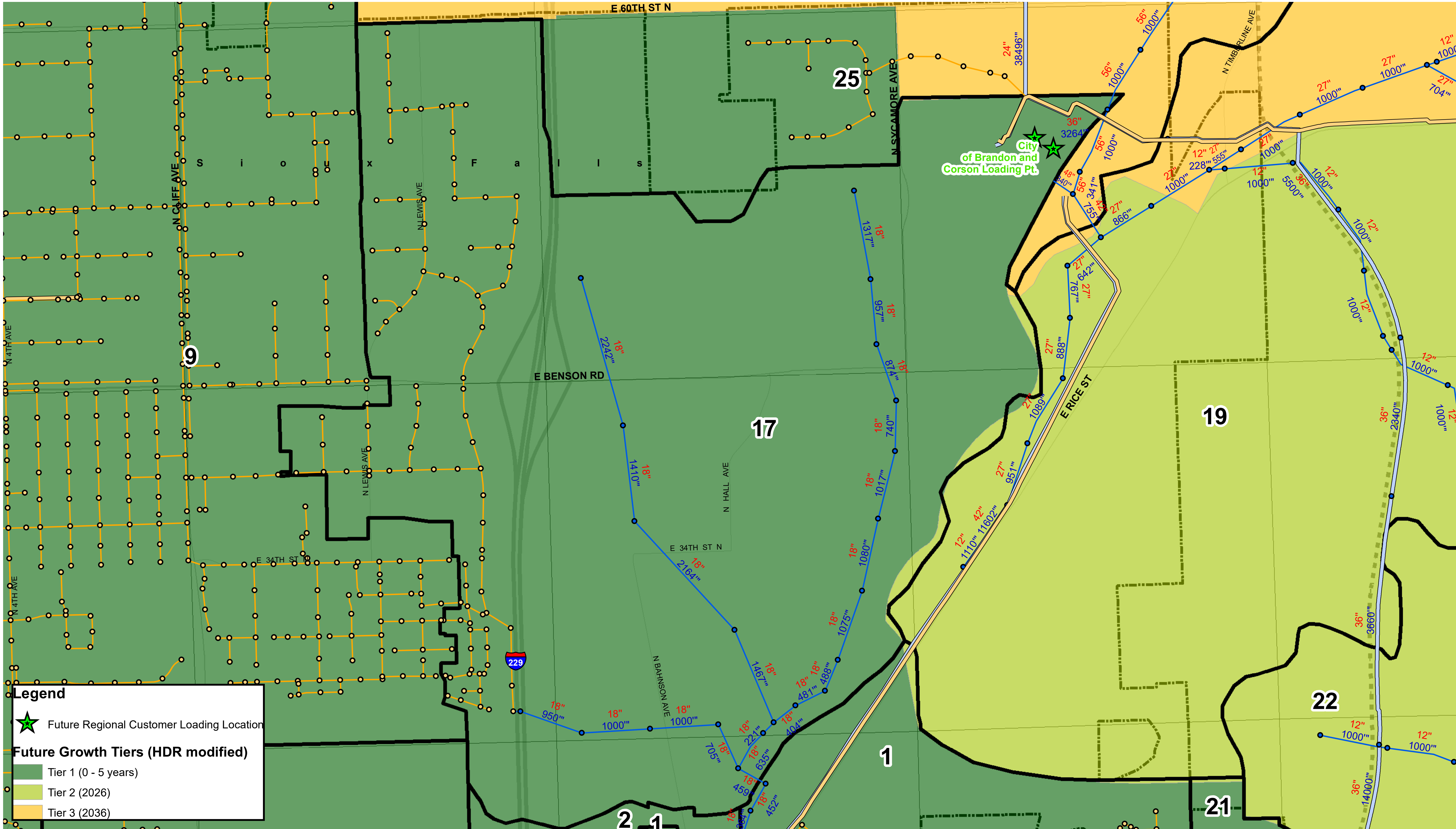
HDR — City of Sioux Falls

0 Feet 1,700

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 16

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

0 Feet 1,400

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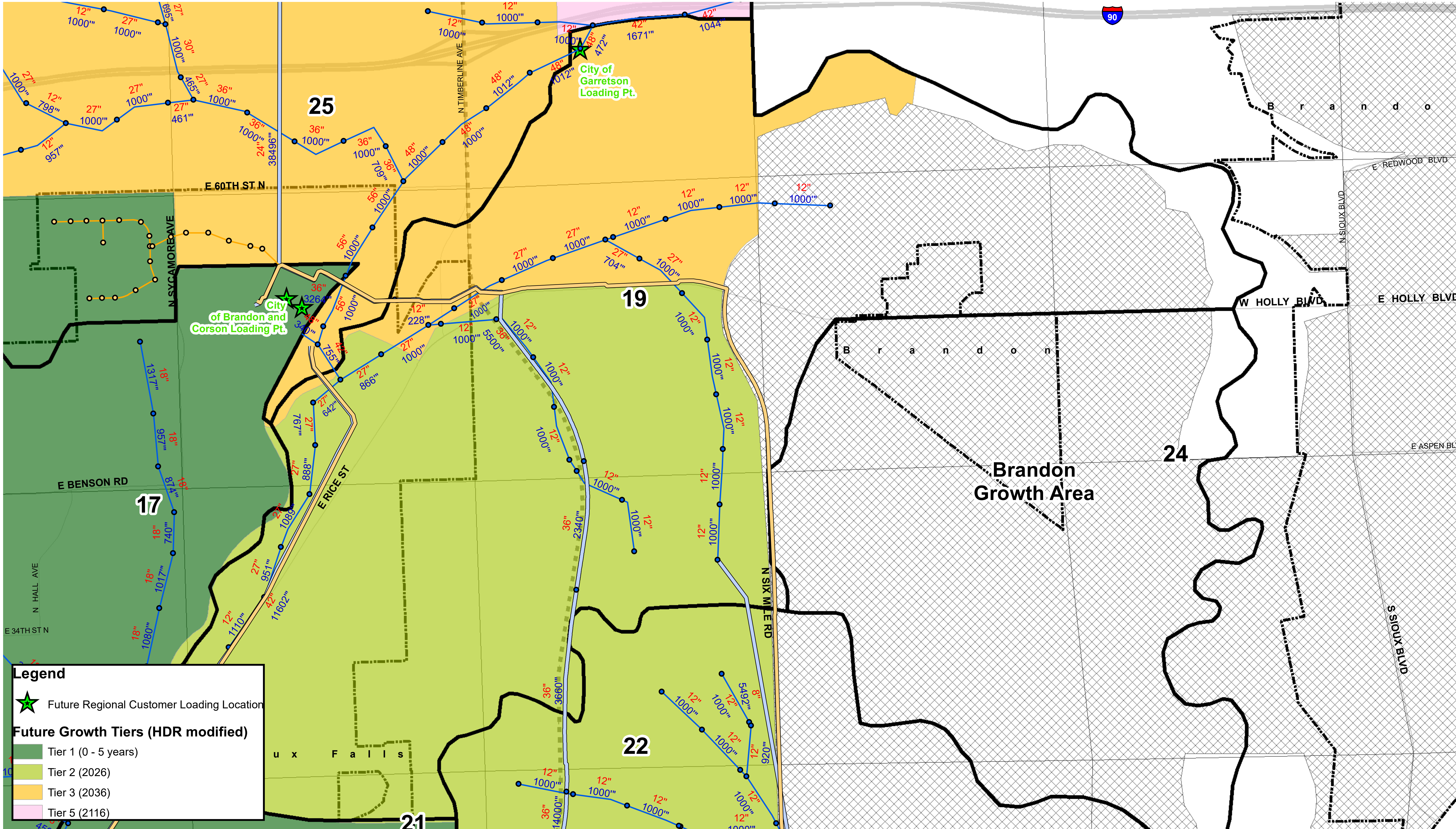
SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 17

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

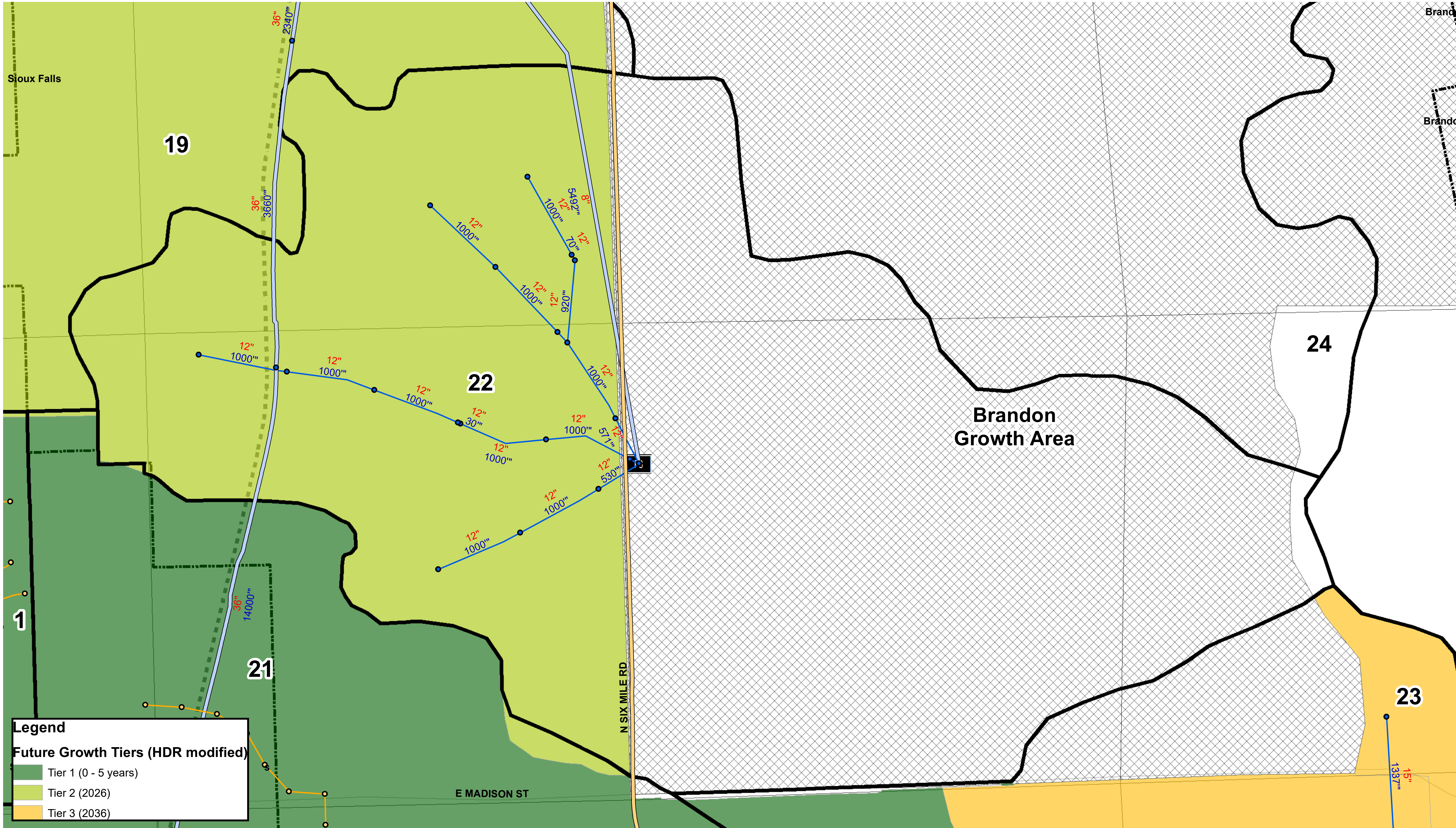
Diameter (in)
Length (ft)

0 Feet 1,750

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 19

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

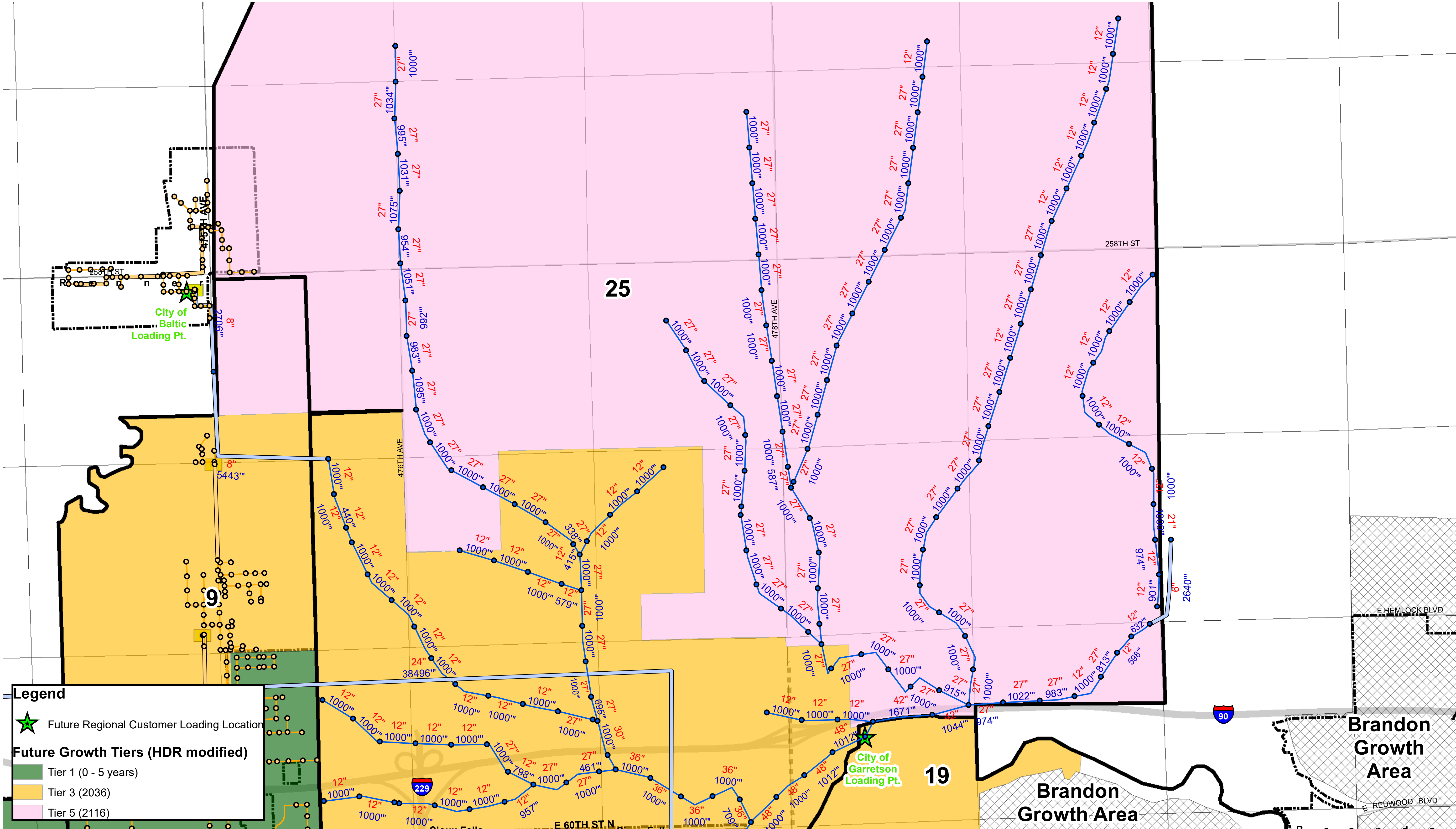
0 Feet 1,100

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 22

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



HDR

City of Sioux Falls

0 Feet 2,750

LEGEND

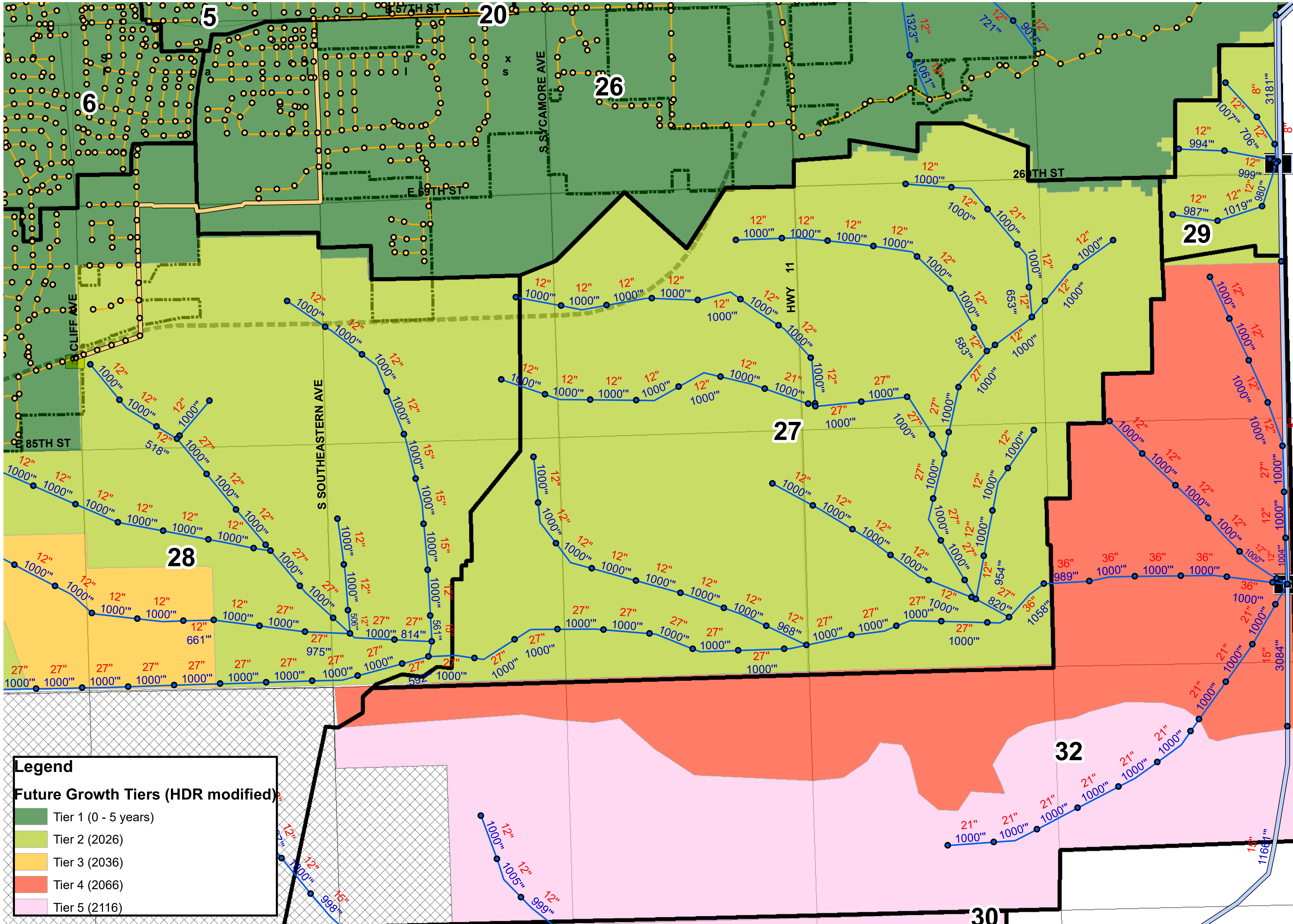
- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- PS Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 25

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

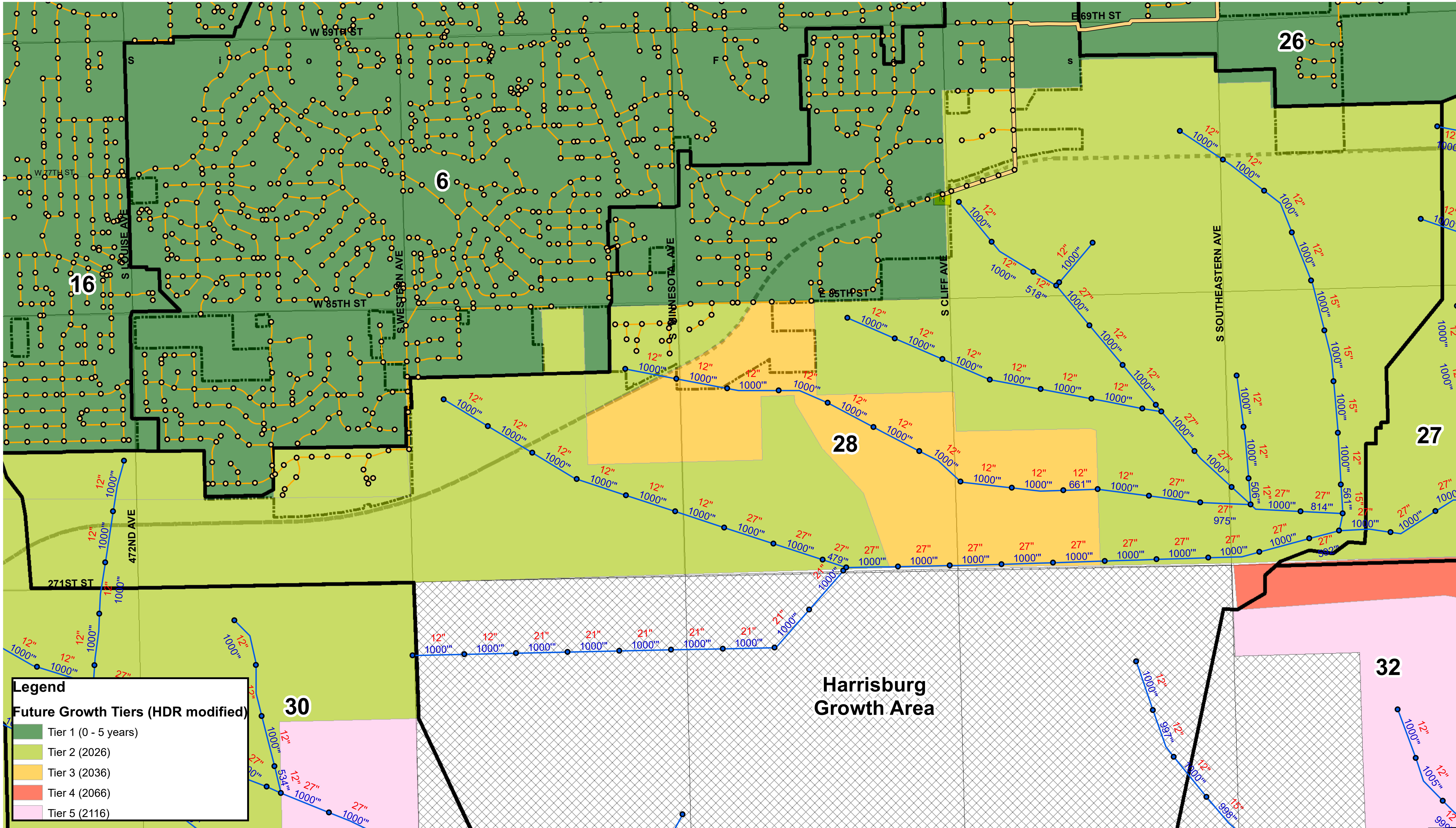
0 Feet 2,400

HDR
City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASINS 27, 29, AND 32

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



HDR
City of Sioux Falls

0 Feet 1,900

LEGEND

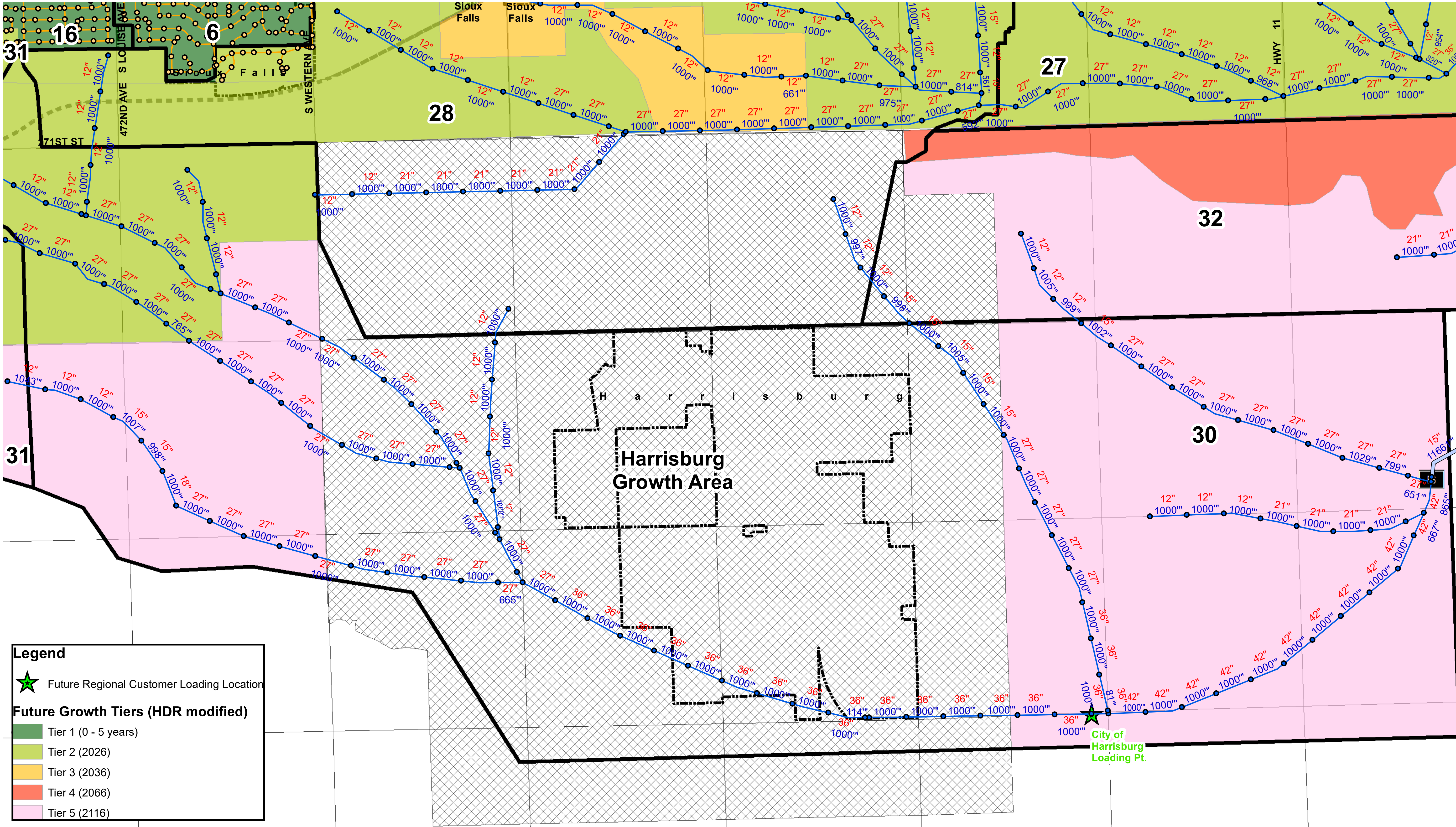
- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 28

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

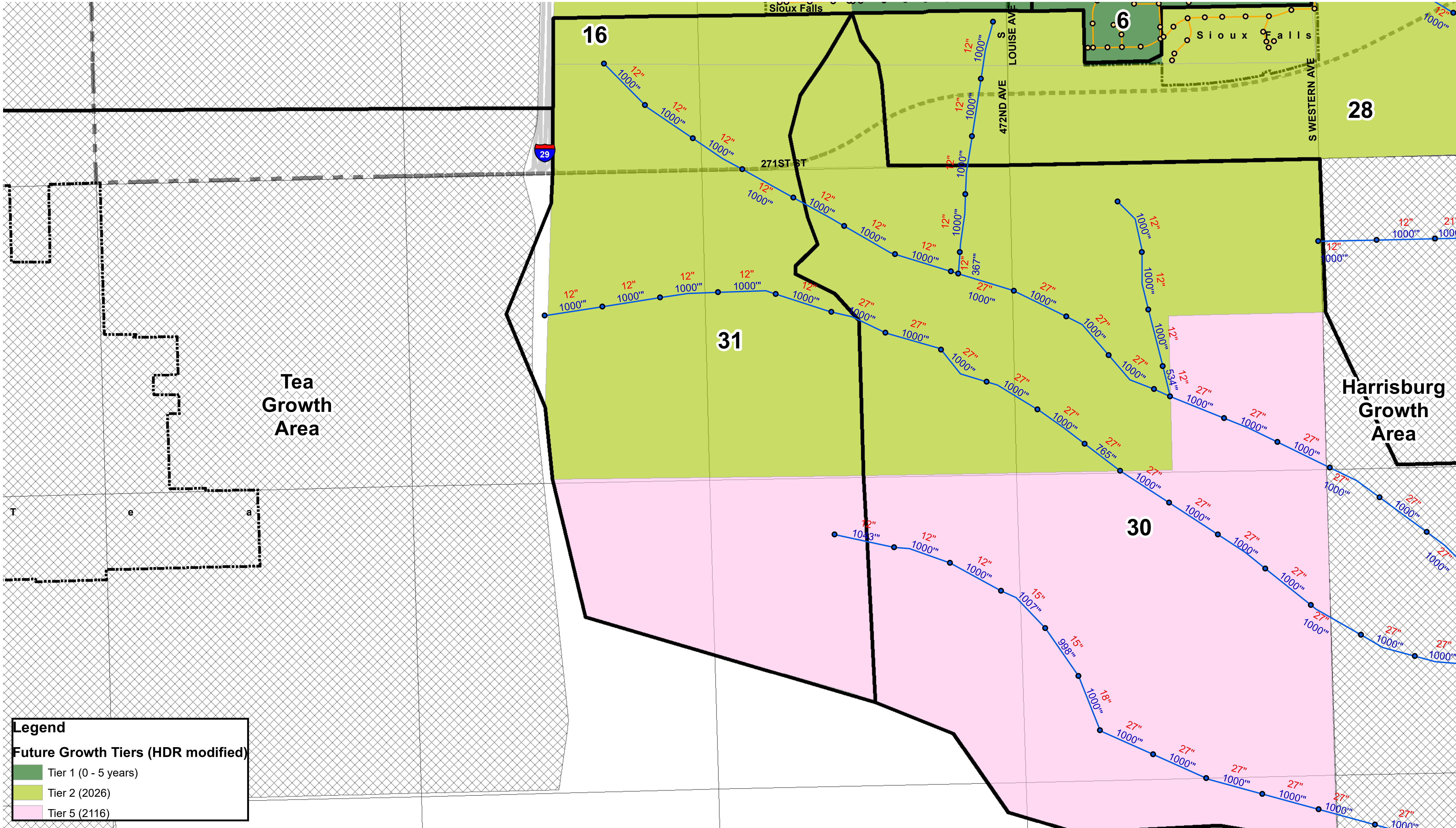
0 Feet 2,600

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 30

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



HDR

City of Sioux Falls

0 Feet 1,700

LEGEND

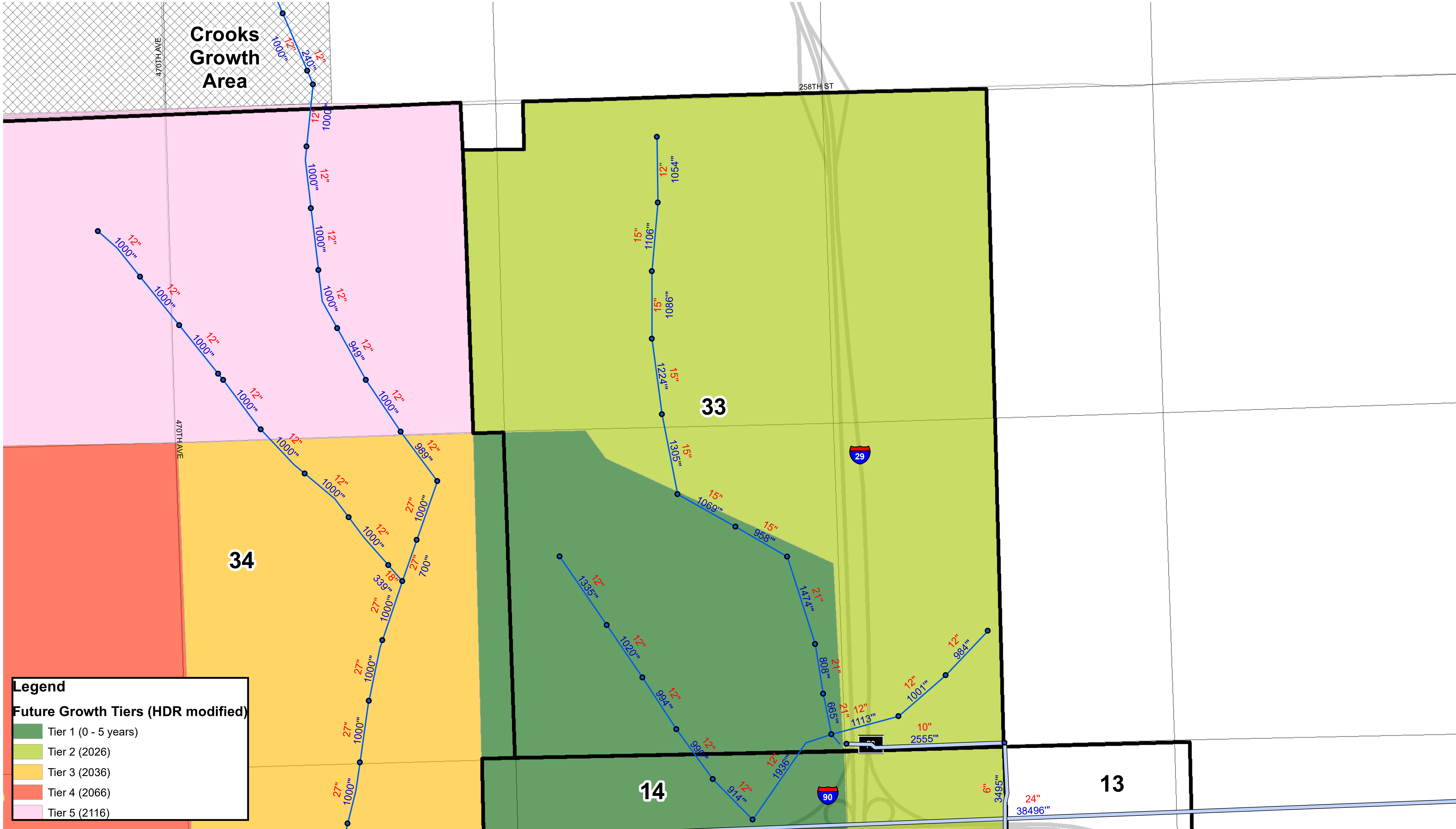
- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 31

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future Conceptualized Collection System
- Future Gravity Main Concept
- Future Force Main Concept
- Conceptual Future Sewer Pump Stations
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines
- Major Sanitary Sewer Basins
- Regional Growth Areas

Diameter (in)
Length (ft)

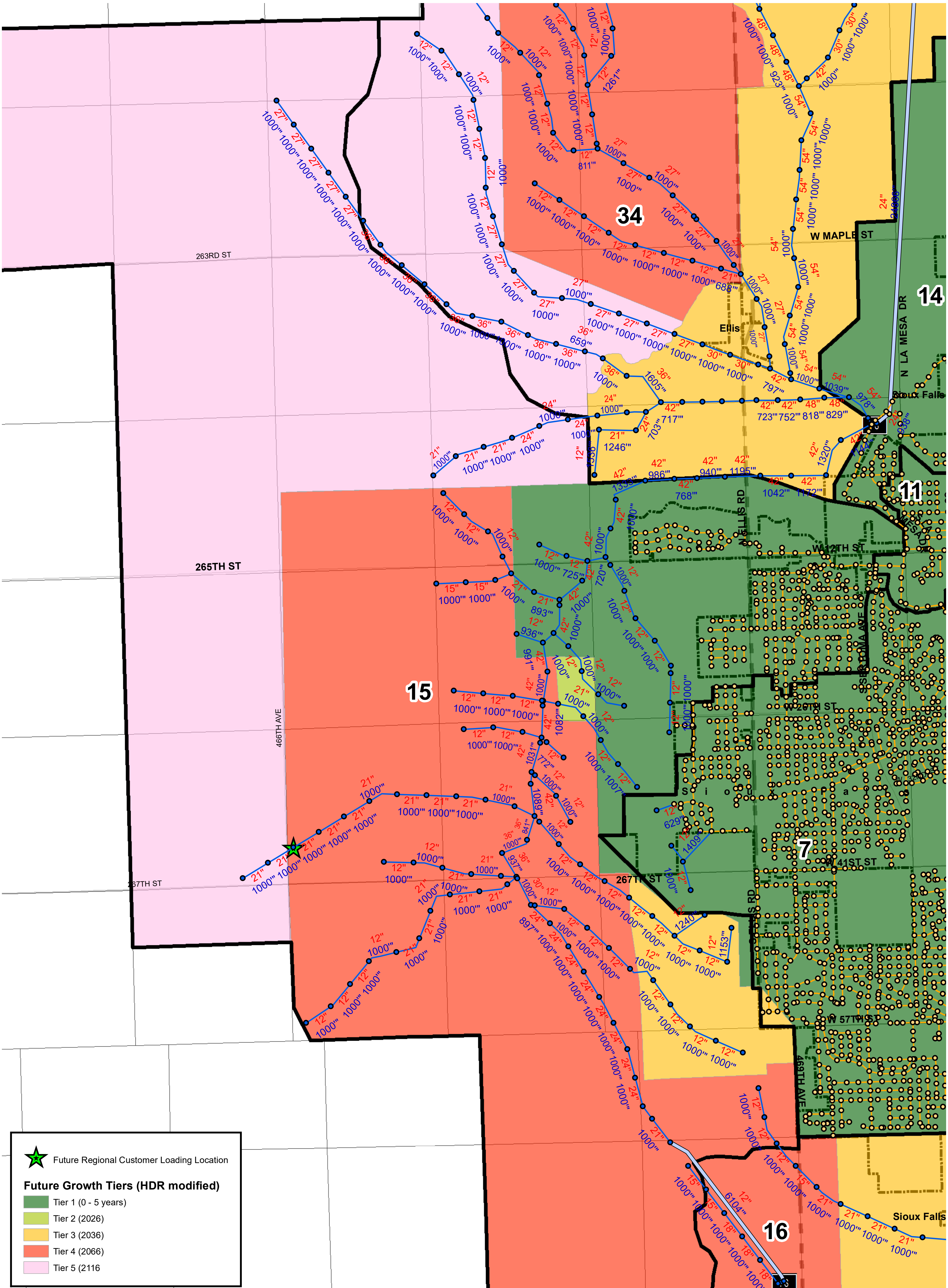
City of Sioux Falls

0 Feet 1,500

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 33

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_LANDSCAPE.MXD - USER: KVANDEKA - DATE: 12/18/2017



SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 15

City of Sioux Falls

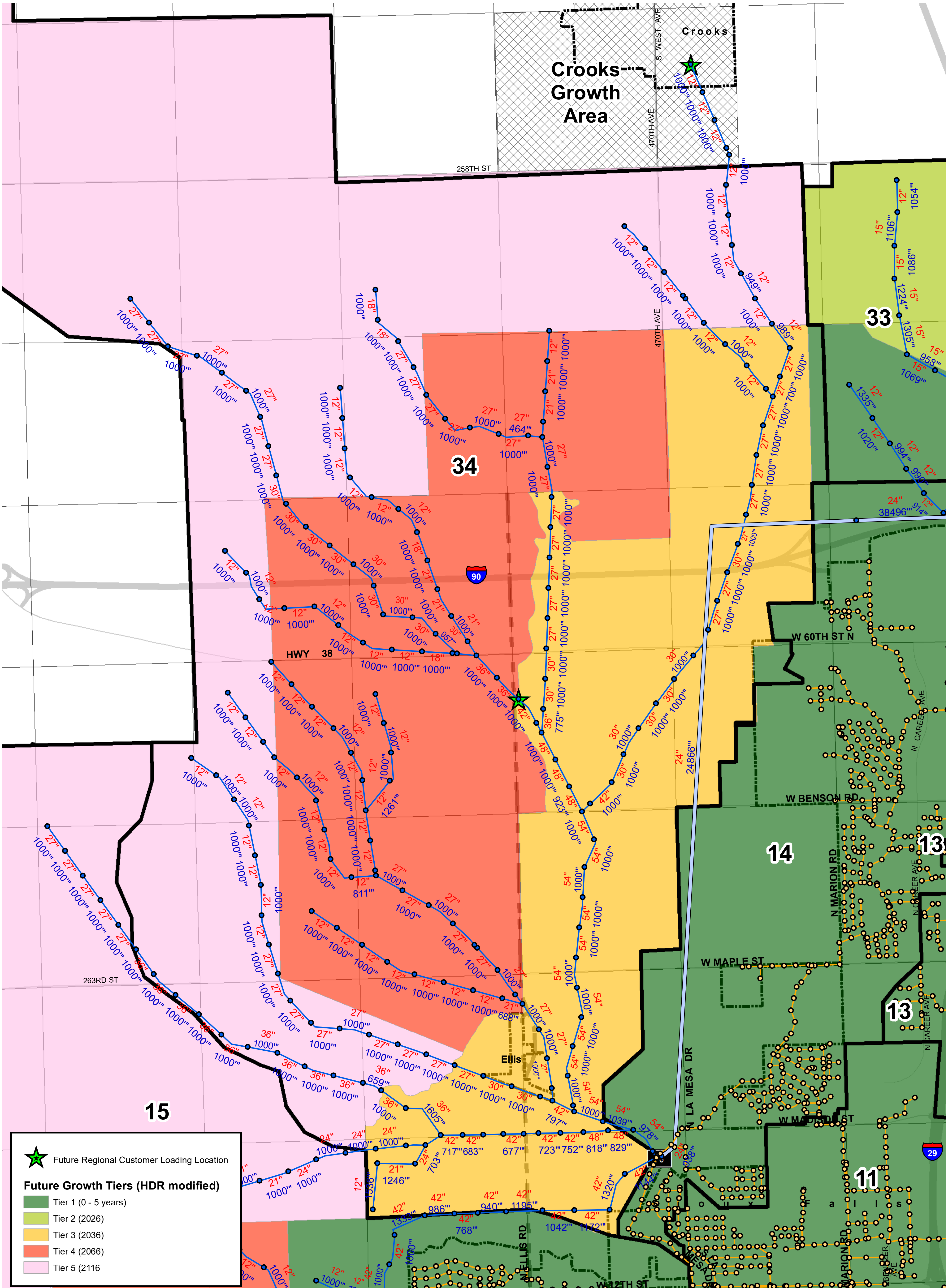
LEGEND

Existing Collection System	Future Conceptualized Collection System	Future West Corridor Alignment
Existing Major Lift Station	Future Gravity Main Concept	Future Highway 100 Alignment
Existing Gravity Main	Future Force Main Concept	Municipal Boundaries
Existing Force Main	Conceptual Future Sewer Pump Stations	PLSS Section Lines
Major Sanitary Sewer Basins	Regional Growth Areas	

0 Feet 3,300

Diameter (in)
Length (ft)

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



HDR
City of Sioux Falls

LEGEND

0 Feet 3,200

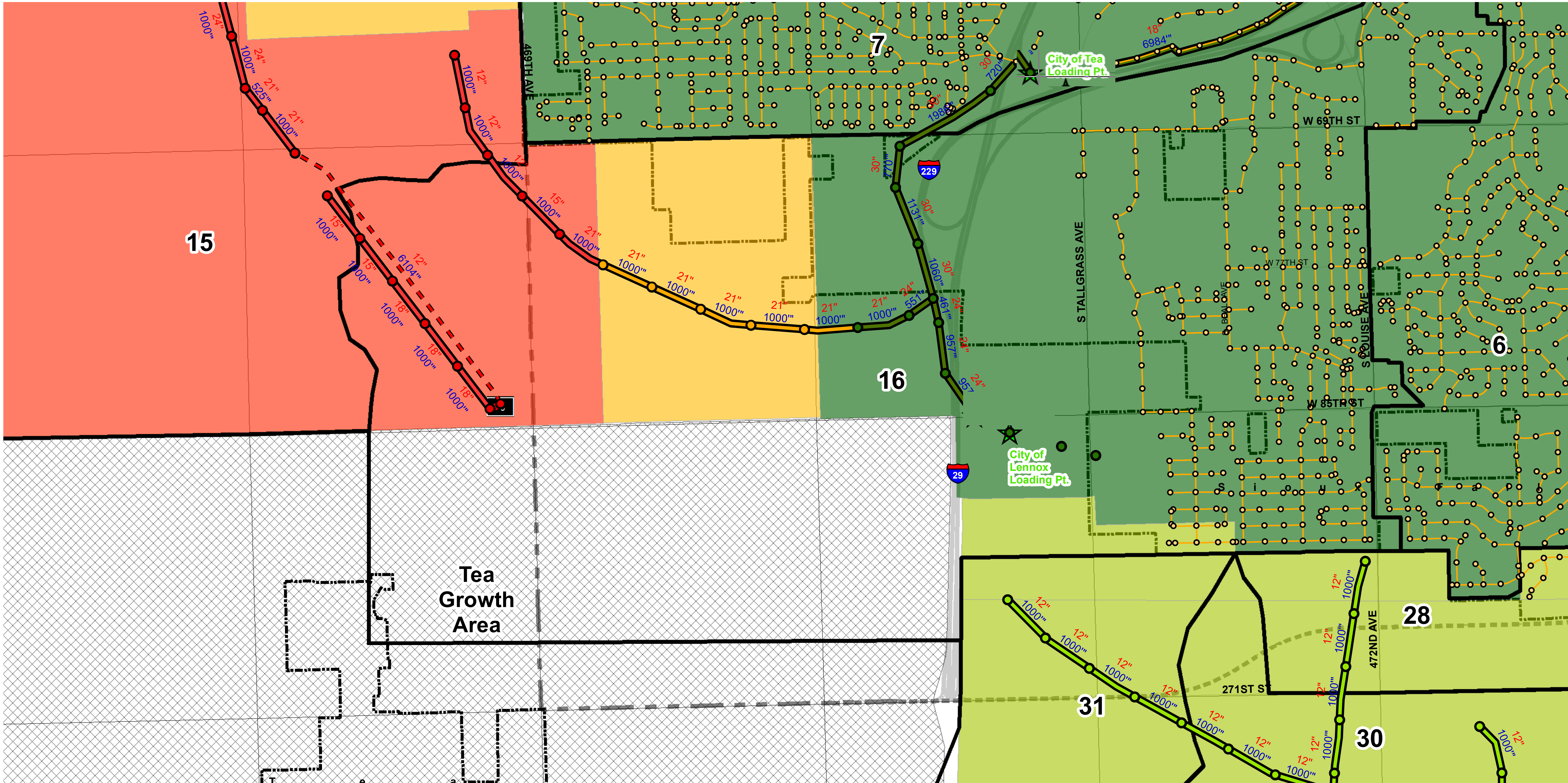
Existing Collection System	Future Conceptualized Collection System
PS Existing Major Lift Station	Future Gravity Main Concept
Existing Gravity Main	Future Force Main Concept
Existing Force Main	PS Conceptual Future Sewer Pump Stations
Future West Corridor Alignment	Major Sanitary Sewer Basins
Future Highway 100 Alignment	Regional Growth Areas
Municipal Boundaries	
PLSS Section Lines	

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 34

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZES2116_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



Future Conceptualized Collection System By Tier

Manholes: Tier 1, Tier 2, Tier 3, Tier 4

Gravity Mains: Tier 1, Tier 2, Tier 3, Tier 4

Force Mains: Tier 4

PS Conceptual Future Sewer Pump Stations

Major Sanitary Sewer Basins

Regional Growth Areas

Future Regional Customer Loading Location

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

0 Feet 2,000

HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 16

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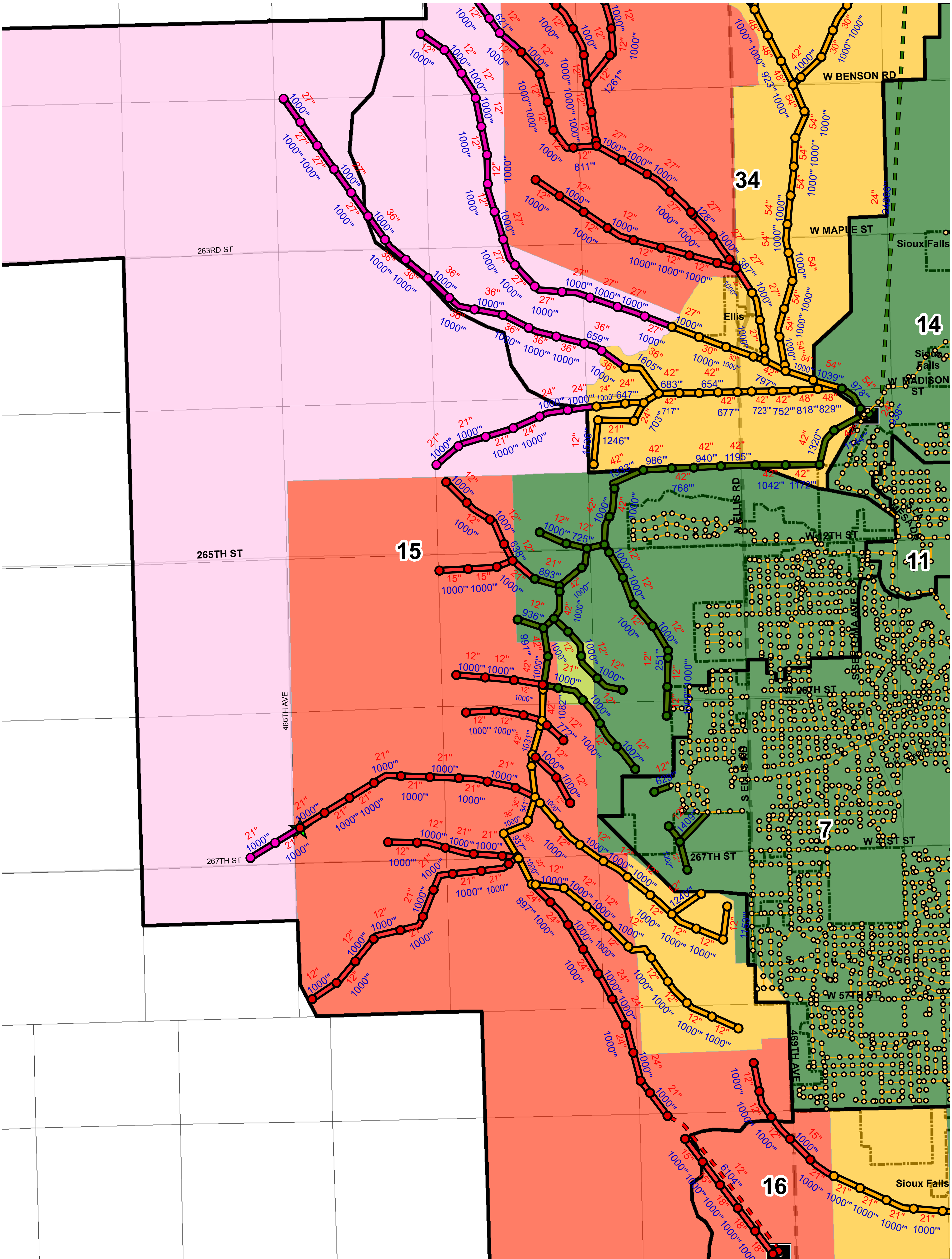


LEGEND

- Existing Collection System
- Existing Gravity Main
- Existing Force Main
- PS Existing Major Lift Station
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Future Conceptualized Collection System

Manholes	Gravity Mains	Force Mains
Tier 1	Tier 1	Tier 1
Tier 2	Tier 2	Tier 2
Tier 3	Tier 3	Tier 3
Tier 4	Tier 4	Tier 4
Tier 5	Tier 5	Tier 5

- PS Conceptual Future Sewer Pump Stations
- Major Sanitary Sewer Basins
- Regional Growth Areas
- Future Regional Customer Loading Location

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

Diameter (in)
Length (ft)

0 Feet 3,400

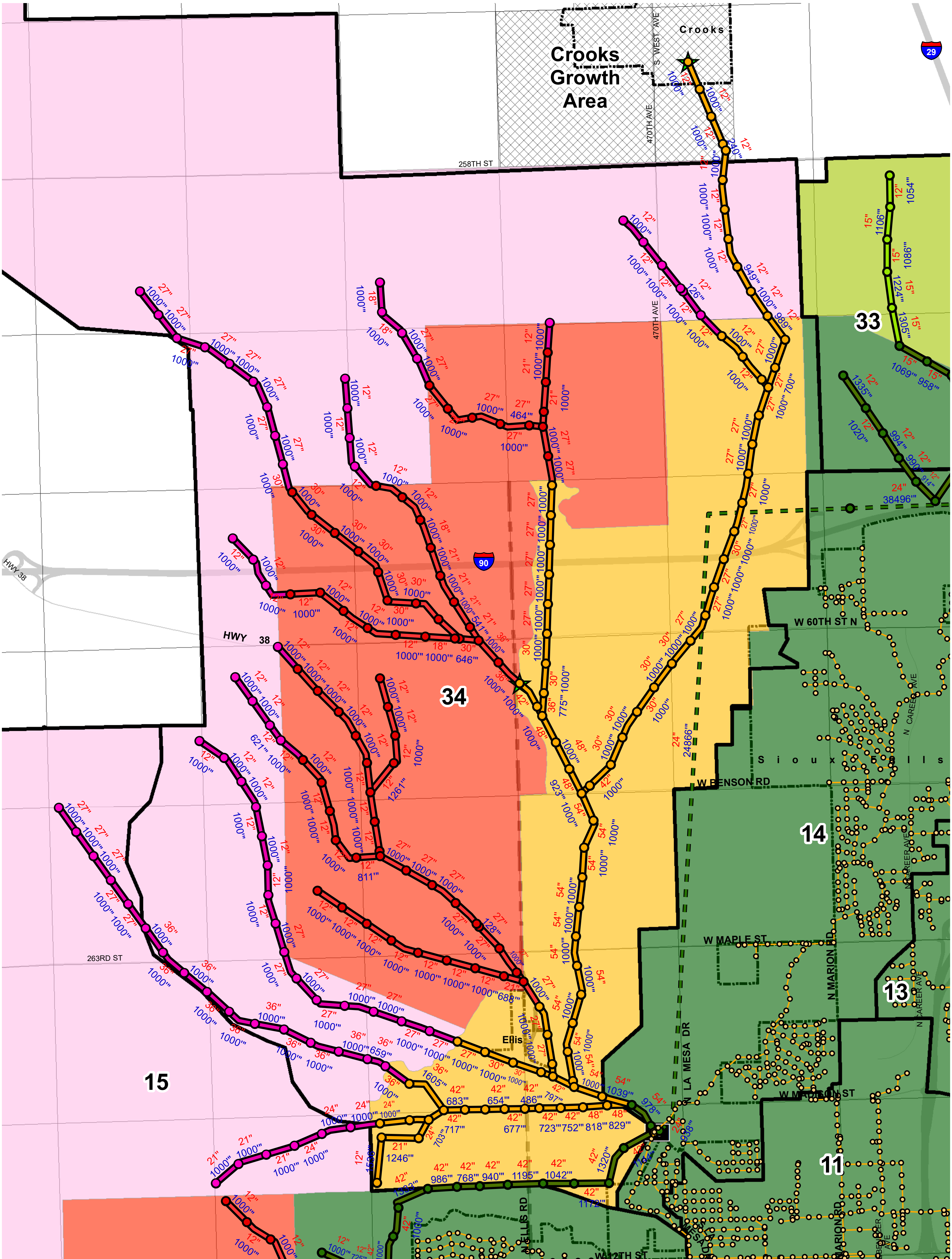
FDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 15

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZESBYTIER_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



LEGEND

- Existing Collection System
- Existing Gravity Main
- Existing Force Main
- PS Existing Major Lift Station
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Future Conceptualized Collection System

Manholes	Gravity Mains	Force Mains
Tier 1	Tier 1	Tier 1
Tier 2	Tier 2	Tier 2
Tier 3	Tier 3	Tier 3
Tier 4	Tier 4	Tier 4
Tier 5	Tier 5	Tier 5

- Future Regional Customer Loading Location
- PS Conceptual Future Sewer Pump Stations
- Major Sanitary Sewer Basins
- Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

Diameter (in)
Length (ft)

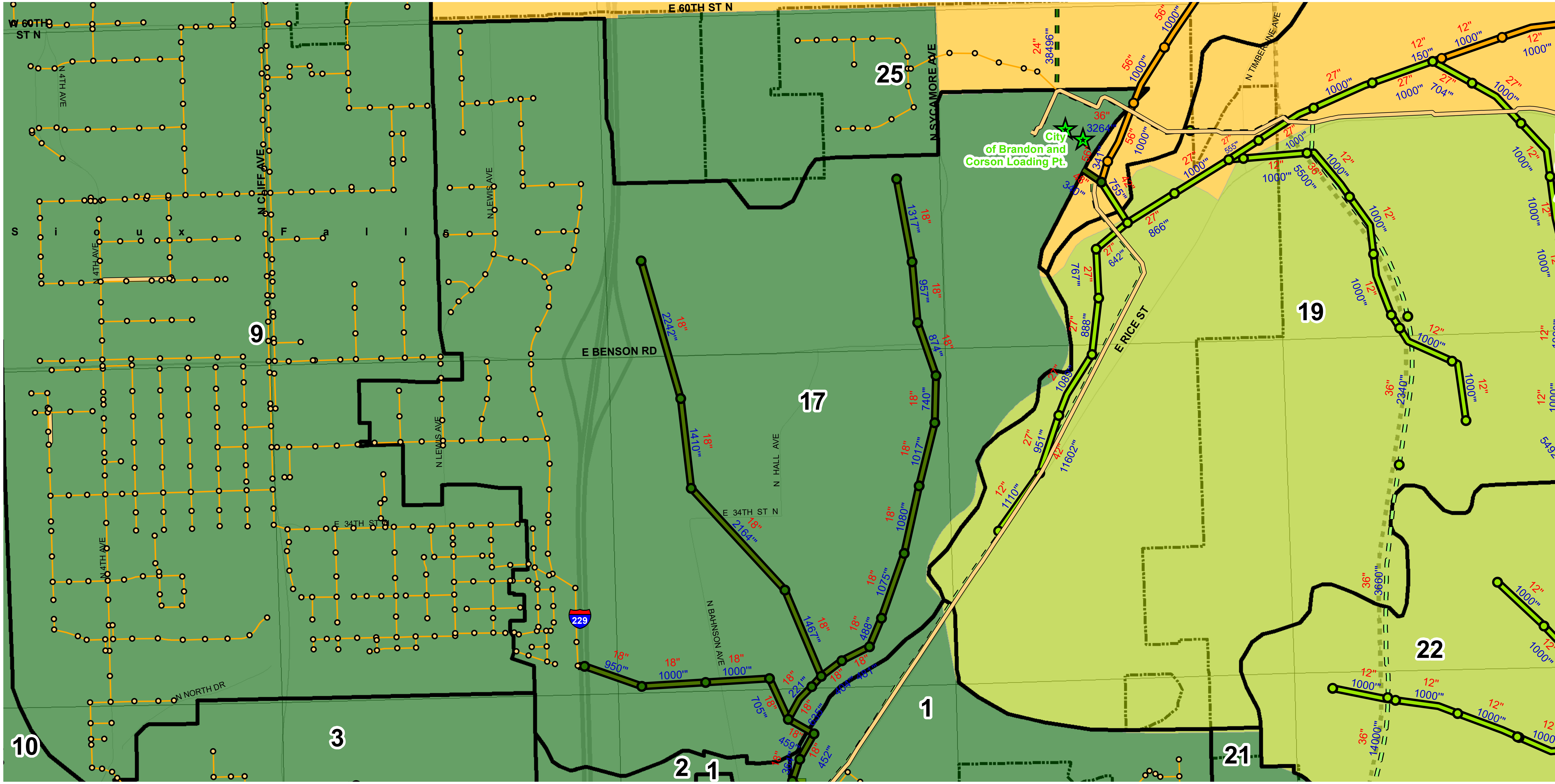
0 Feet 3,300

HDR
City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS

BASIN 34

PATH: H:\GIS\PROJECTS\CITY_SIOUX_FALLS\275541_SF_COLLECTIONS_MASTERPLAN\7.0_GIS_MODELS\7.2_WORK_IN_PROGRESS\MAP_DOCS\DRAFT\TM FIGURES\TM_11\FUTUREPIPESIZESBYTIER_PORTRAIT.MXD - USER: KVANDEKA - DATE: 12/18/2017



Future Conceptualized Collection System By Tier

Manholes: Tier 1, Tier 2, Tier 3

Gravity Mains: Tier 1, Tier 2, Tier 3

Force Mains: Tier 1, Tier 2

Major Sanitary Sewer Basins

Regional Growth Areas

Future Regional Customer Loading Location

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

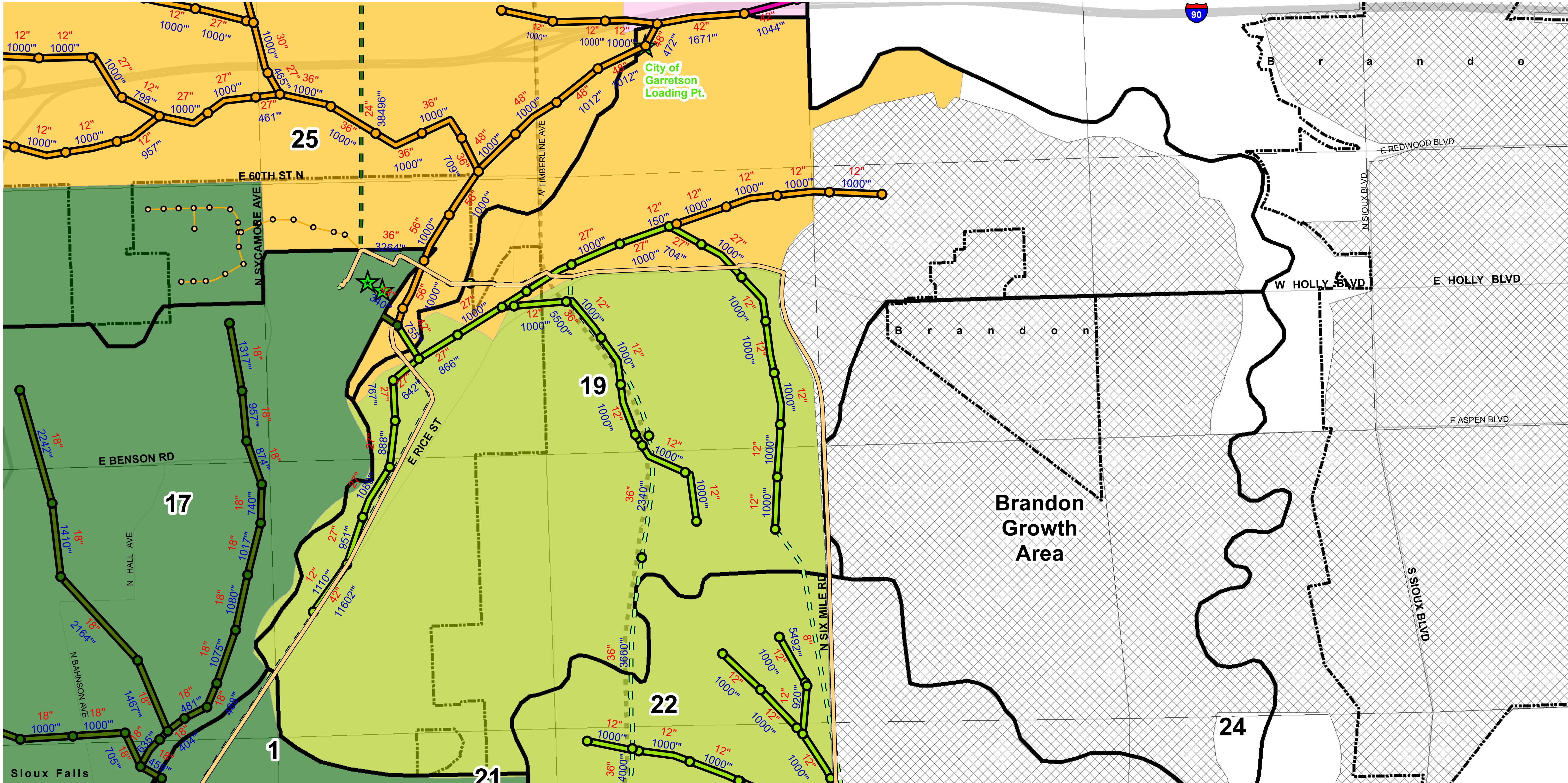
Diameter (in)
Length (ft)

0 Feet 1,600

HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 17



Future Regional Customer Loading Location

Future Conceptualized Collection System By Tier

Manholes — Tier 1, Tier 2, Tier 3, Tier 5

Gravity Mains — Tier 1, Tier 2, Tier 3, Tier 5

Force Mains — Tier 1, Tier 2

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 5 (2116)

0 Feet 2,000

HDR

City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station (PS)
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 19

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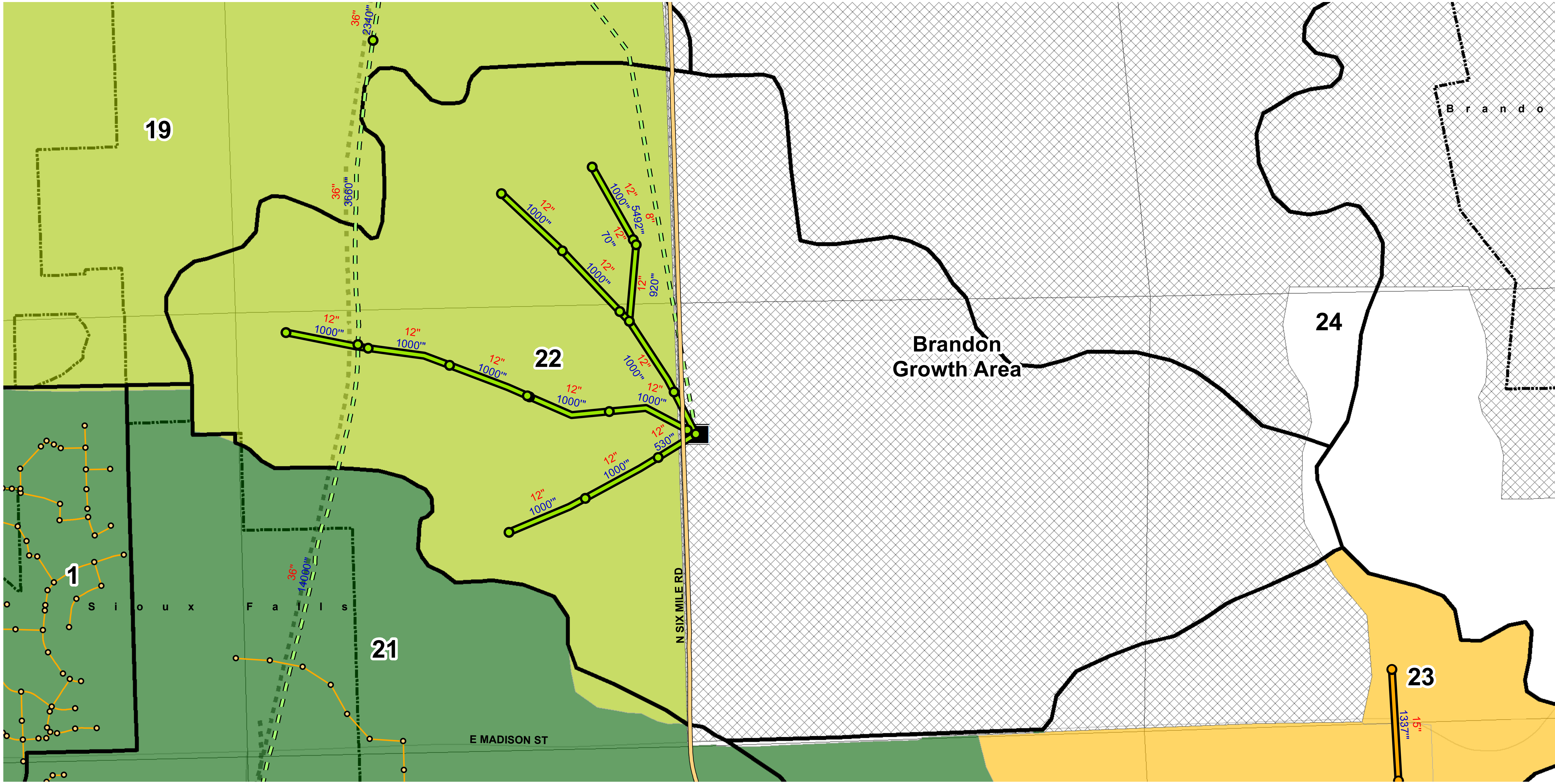

Future Conceptualized Collection System By Tier

Manholes	Gravity Mains	Force Mains
Tier 2, Tier 3	Tier 2, Tier 3	Tier 2

PS Conceptual Future Sewer Pump Stations

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

0 Feet 1,250

HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 22

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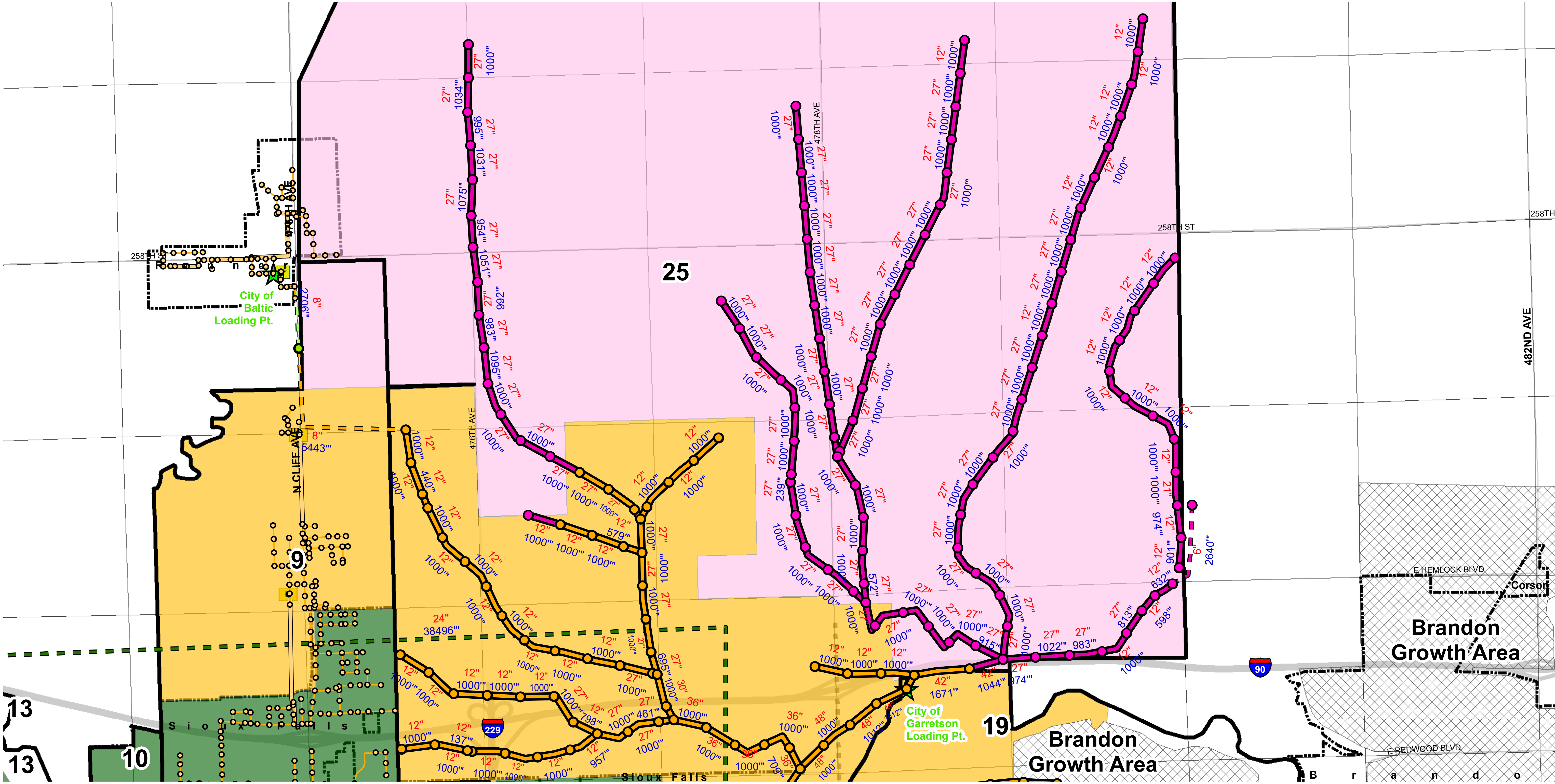

Future Conceptualized Collection System By Tier

Manholes: Tier 2, Tier 3, Tier 5
Gravity Mains: Tier 3, Tier 5
Force Mains: Tier 1, Tier 2, Tier 3, Tier 5
Major Sanitary Sewer Basins
Regional Growth Areas

Future Regional Customer Loading Location

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 3 (2036)
- Tier 5 (2116)

LEGEND

- Existing Collection System
- Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

0 Feet 3,100

HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 25

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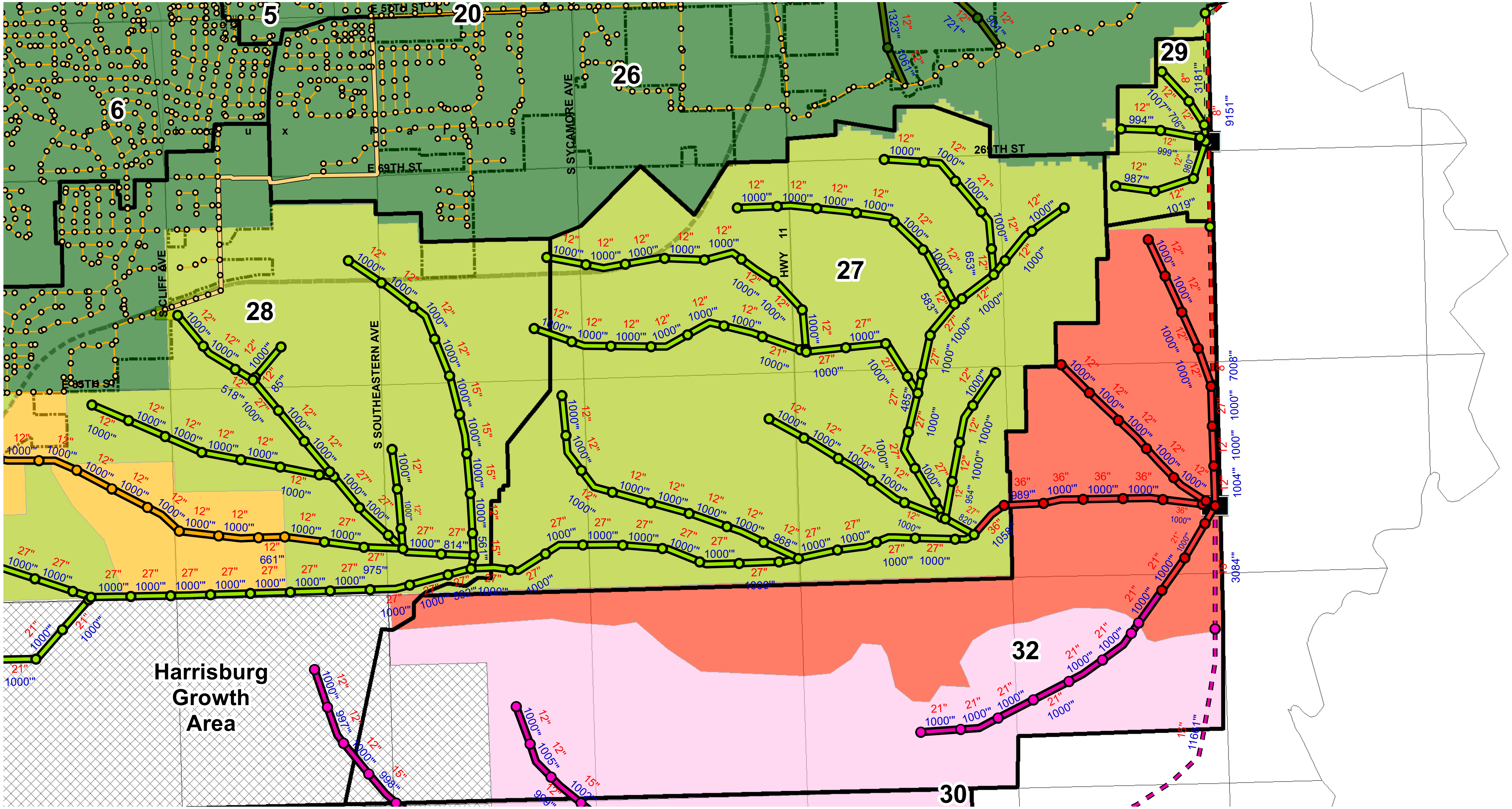

Future Conceptualized Collection System By Tier

Manholes: Tier 1, Tier 2, Tier 3, Tier 4, Tier 5

Gravity Mains: Tier 1, Tier 2, Tier 3, Tier 4, Tier 5

Force Mains: Tier 2, Tier 4, Tier 5

PS Conceptual Future Sewer Pump Stations

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

0 Feet 2,750

HDR

City of Sioux Falls

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASINS 27, 29, AND 32

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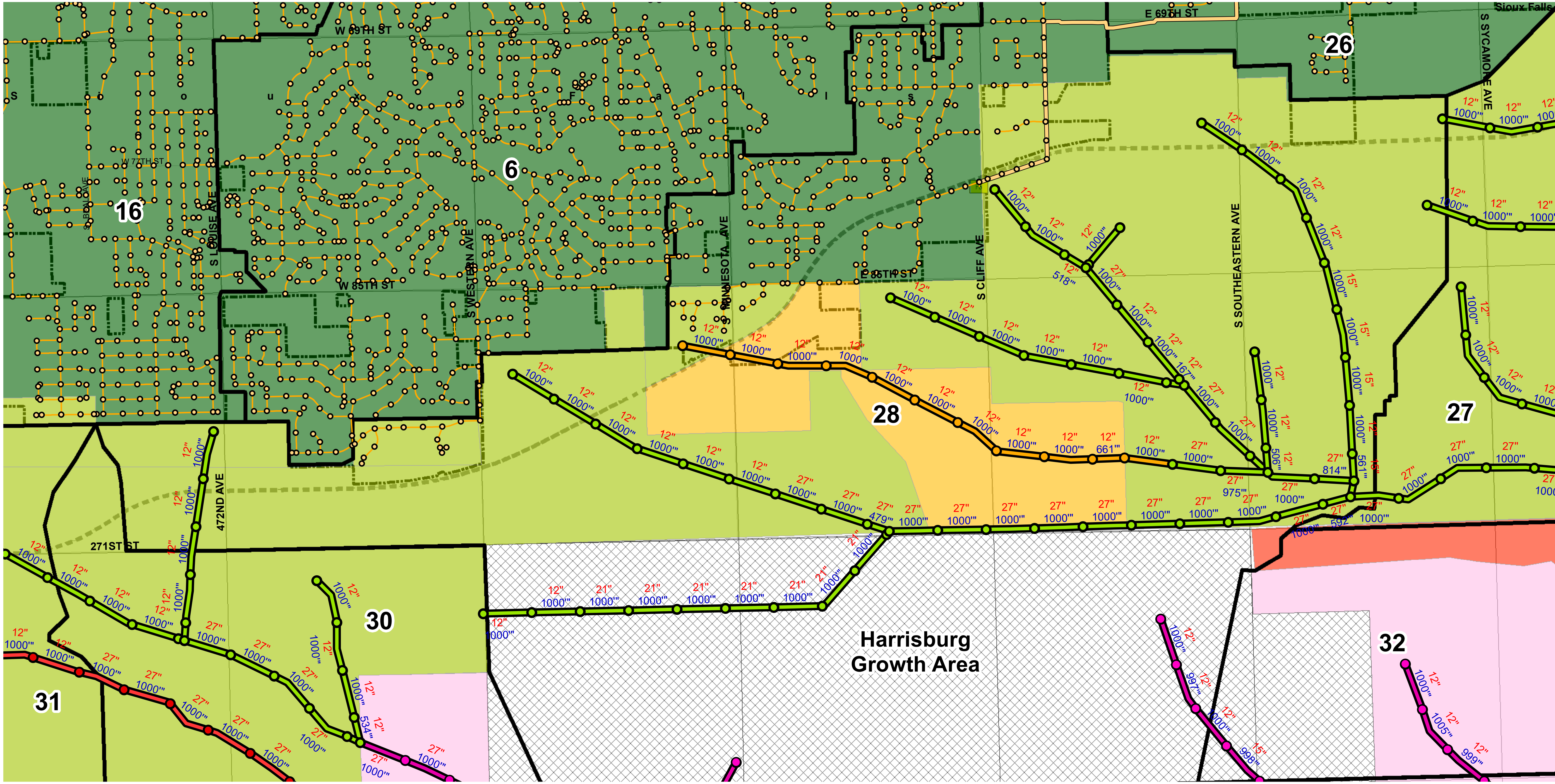

Future Conceptualized Collection System By Tier

Manholes: Tier 2, Tier 3, Tier 4, Tier 5

Gravity Mains: Tier 2, Tier 3, Tier 4, Tier 5

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

0 Feet 2,200

City of Sioux Falls

LEGEND

- Existing Collection System
- Existing Major Lift Station (PS)
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 28

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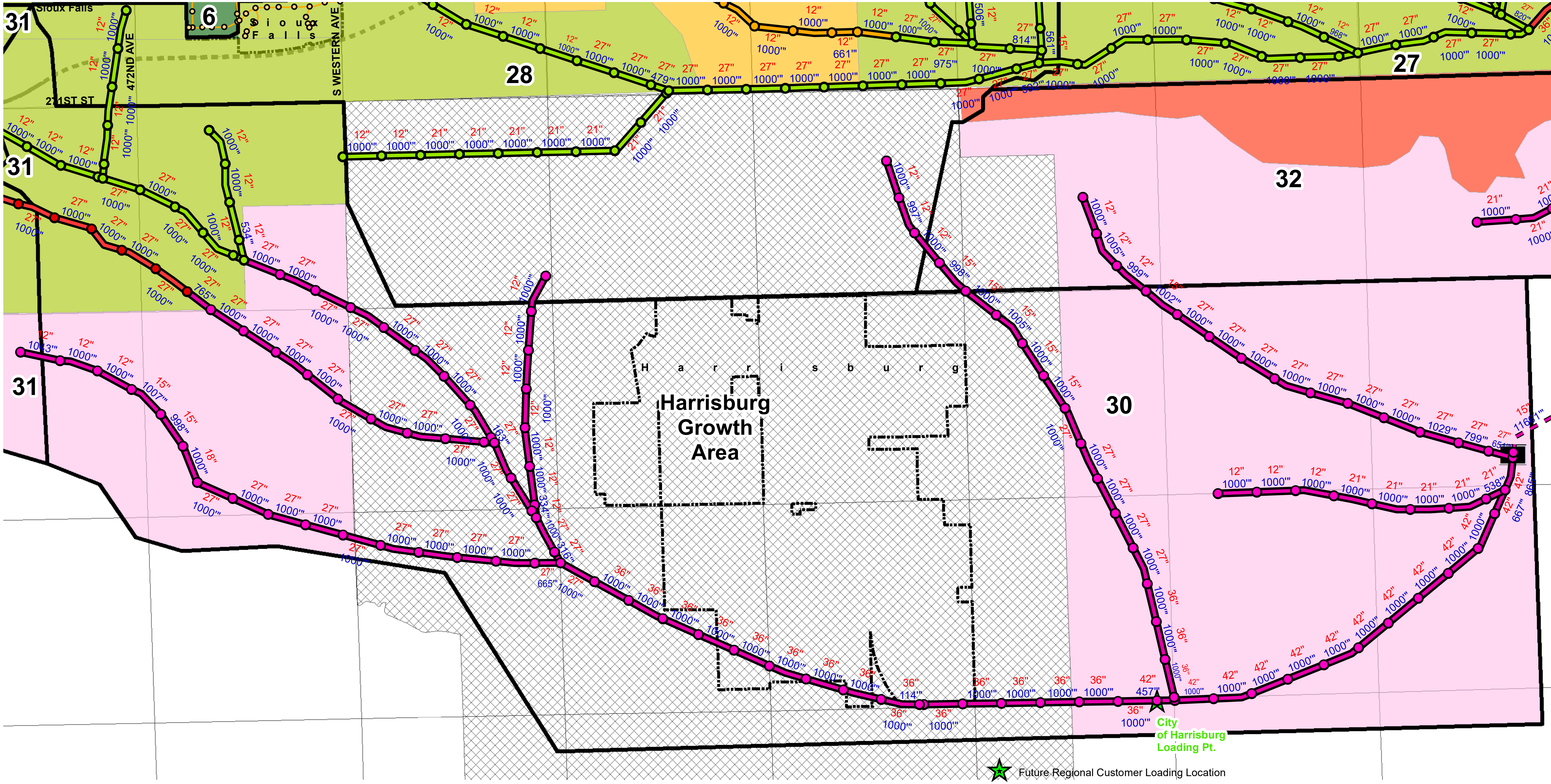

Future Conceptualized Collection System By Tier

Manholes: Tier 2, Tier 3, Tier 4, Tier 5

Gravity Mains: Tier 2, Tier 3, Tier 4, Tier 5

Force Mains: Tier 5

PS Conceptual Future Sewer Pump Stations

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

0 Feet 2,700

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 30

City of Sioux Falls

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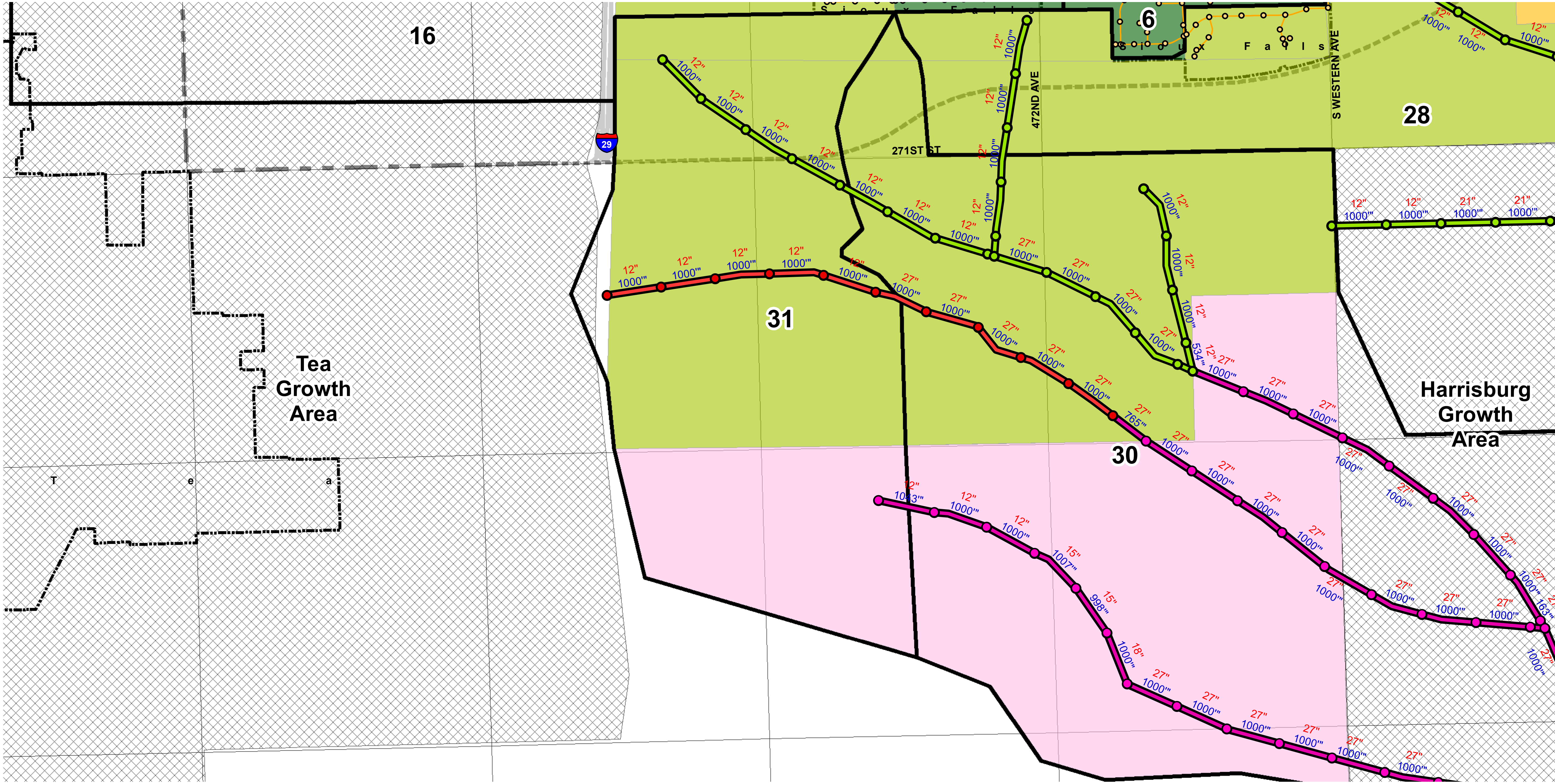

Future Conceptualized Collection System By Tier

Manholes — Tier 2, Tier 4, Tier 5

Gravity Mains — Tier 2, Tier 4, Tier 5

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 5 (2116)

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

0 Feet 1,900

HDR

City of Sioux Falls

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 31

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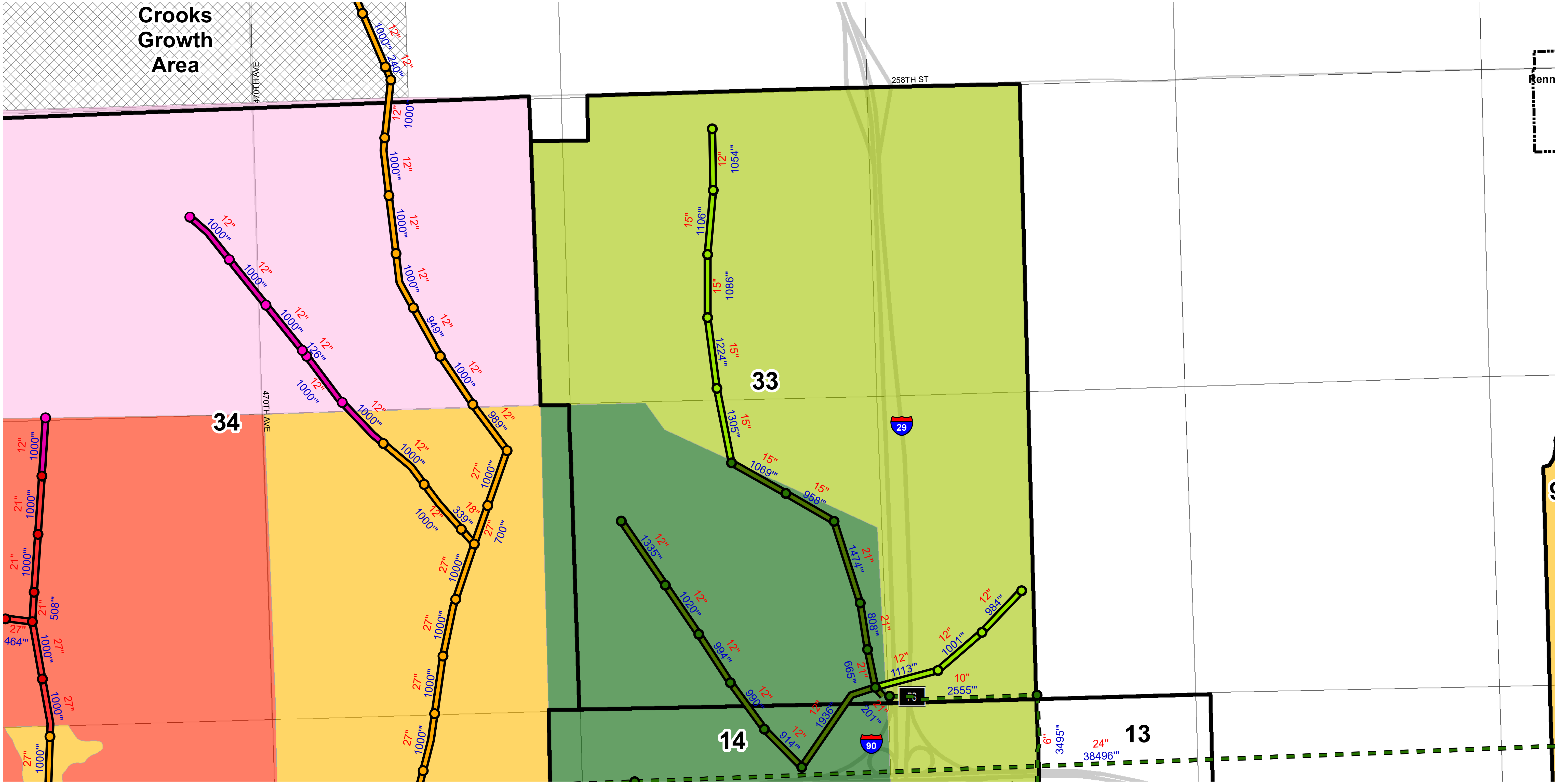

Future Conceptualized Collection System By Tier

Manholes: Tier 1, Tier 2, Tier 3, Tier 4, Tier 5

Gravity Mains: Tier 1, Tier 2, Tier 3, Tier 4, Tier 5

Force Mains: Tier 1

PS Conceptual Future Sewer Pump Stations

Major Sanitary Sewer Basins

Regional Growth Areas

Future Growth Tiers (HDR modified)

- Tier 1 (0 - 5 years)
- Tier 2 (2026)
- Tier 3 (2036)
- Tier 4 (2066)
- Tier 5 (2116)

0 Feet 1,800

City of Sioux Falls

LEGEND

- Existing Collection System
- PS Existing Major Lift Station
- Existing Gravity Main
- Existing Force Main
- Future West Corridor Alignment
- Future Highway 100 Alignment
- Municipal Boundaries
- PLSS Section Lines

Diameter (in)
Length (ft)

SIOUX FALLS WASTEWATER COLLECTION SYSTEM MASTER PLAN - FUTURE 2116 CONCEPTUALIZED TRUNK MAINS BASIN 33

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