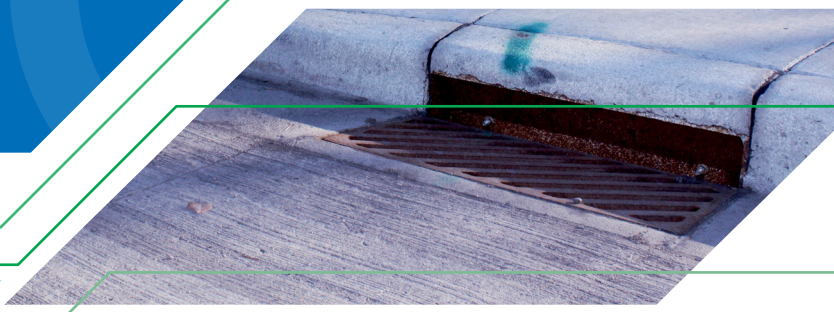


P05557-2017-001

CORE AREA INFRASTRUCTURE MASTER PLAN

EXECUTIVE SUMMARY JAN. 2020

Prepared By AE2S

City of WEST FARGO

INTRODUCTION

MASTER PLAN OBJECTIVE

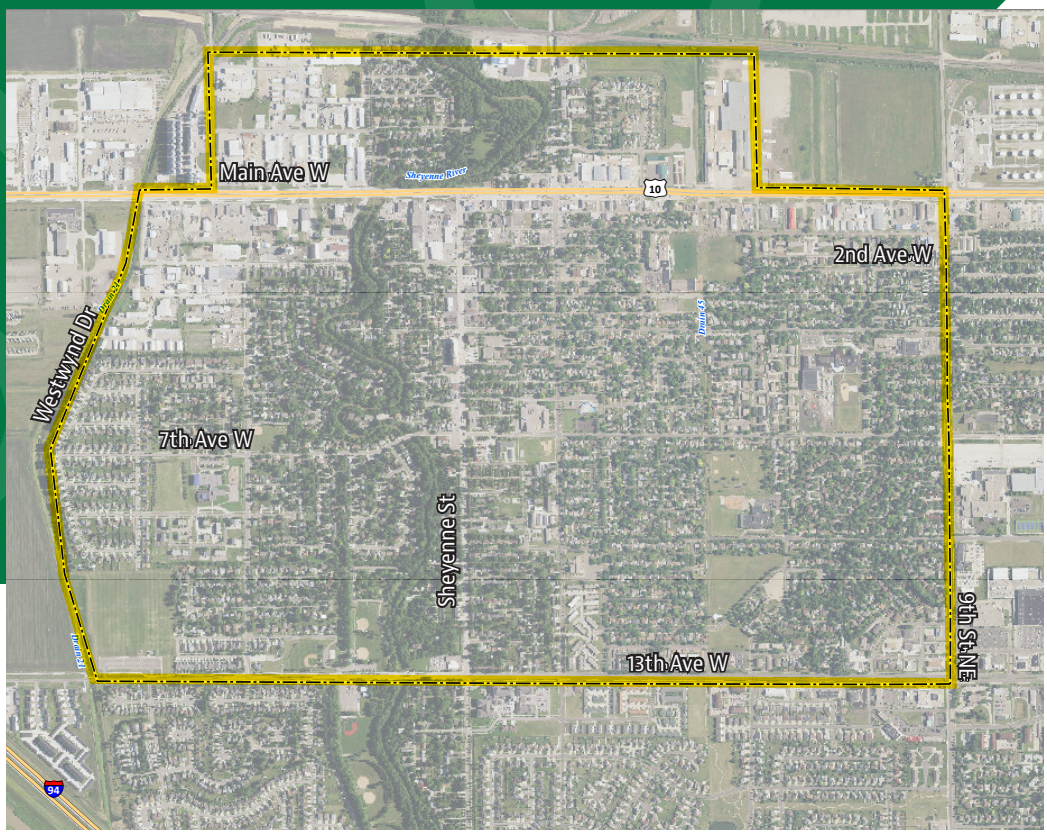
Identify and prioritize necessary infrastructure improvements in the form of a Capital Improvements Plan (CIP) to improve the overall functionality of systems while maximizing the remaining service life of existing infrastructure assets to ensure effective and efficient reconstruction is conducted in the Core Area.

CORE AREA INFRASTRUCTURE MASTER PLAN

FOR THE CITY OF WEST FARGO, NORTH DAKOTA

The City of West Fargo has been one of the fastest growing communities in North Dakota over the past several years, growing from approximately 15,000 people in the year 2000 to over 35,000 in the year 2017. Most of this growth has occurred south of Interstate-94 (I-94), resulting in the new construction of streets and associated underground utilities (water, sanitary sewer, and storm sewer) to support new developments. Meanwhile, infrastructure surrounding the downtown area of the City, which is also referred to as the "Core Area" of West Fargo, is primarily from original construction, with some areas dating back to the 1920's. The City has performed general maintenance and made repairs in the Core Area over the past several years to keep the infrastructure operational. However, there are numerous areas where underground utilities have failed, known areas of poor drainage, and there are concerns with the overall age and condition of this infrastructure. As a result, more substantial improvements and areas of replacement are anticipated in the future.

PROJECT AREA

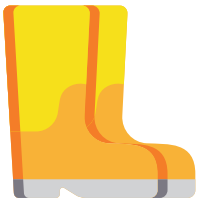


PROJECT COMPONENTS

MASTER PLANNING APPROACH
Having a Vision
Infrastructure master planning can establish priorities for the construction of necessary improvements within the context of a long-term plan to ensure compatibility, prudent management, and fiscal stewardship.

INFRASTRUCTURE OVERVIEW
Understanding What You Own and Operate
It's important to have a clear understanding of the existing infrastructure in order to properly assess the infrastructure and propose improvements.

WATER DISTRIBUTION SYSTEM MODEL
Answering the "What If" Questions for Water Distribution
The updated hydraulic model serves as a dynamic tool for identifying existing system deficiencies and planning for future infrastructure needs to support growth and redevelopment.



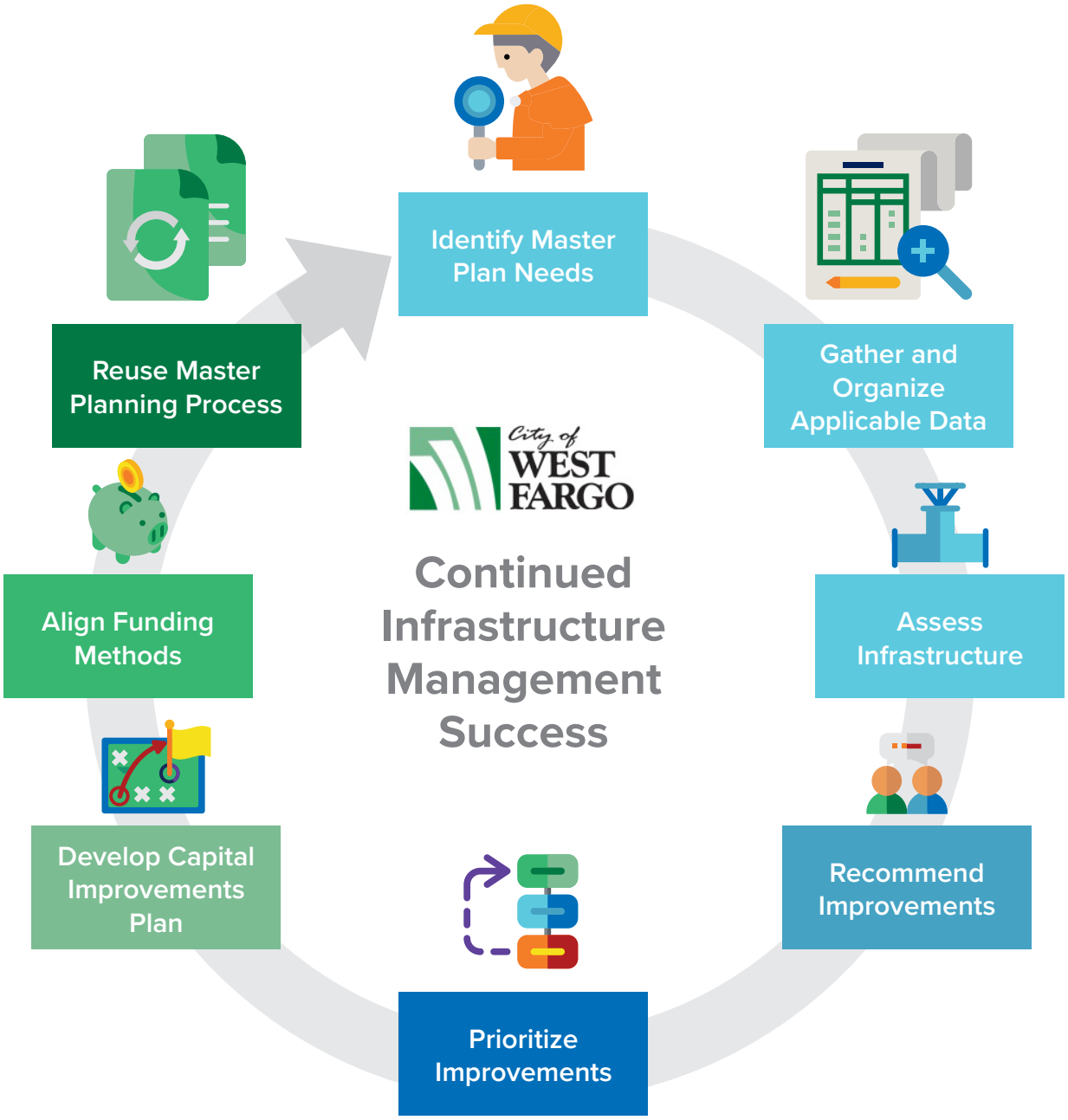
STORMWATER SYSTEM MODEL
Improving Flooding and Drainage Deficiencies
The regional stormwater model for the Sheyenne River wastershed within the study area provides for an evaluation of the storm sewer collection system and identifies effective options for mitigating drainage and flooding issues.

INFRASTRUCTURE RISK ASSESSMENT
Identifying High Risk Assets
The infrastructure assessment provides the basis for making prioritized improvement recommendations with the goal of minimizing the overall risk of infrastructure failures and emergency repairs.

CAPITAL IMPROVEMENTS PLAN
Planning in Order to Reach Our Goals
The City of West Fargo's Core Area Capital Improvements Plan (CIP) is a comprehensive, 10-year plan for capital investments in implementing, enhancing, and maintaining the City's public infrastructure assets located in the Core Area of West Fargo.

MASTER PLANNING APPROACH

Infrastructure master planning provides policymakers and the public with a detailed report on infrastructure needs as well as the recommended steps to meet those needs. Master planning can establish priorities for the construction of necessary improvements within the context of a long-term plan to ensure compatibility and prudent management. Lastly, an infrastructure system master plan can be used as a tool to pursue, and as the basis to support, capital improvement funding. For these reasons and many others, an infrastructure master plan is a useful tool for municipalities to utilize when establishing a vision for the management and continued development of infrastructure.



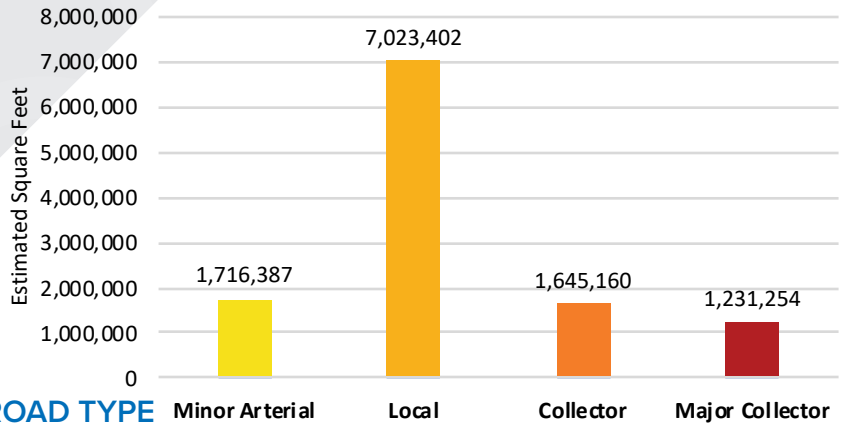
CORE AREA INFRASTRUCTURE OVERVIEW

PAVEMENT

37+ CENTERLINE MILES

18% CONCRETE

82% ASPHALT



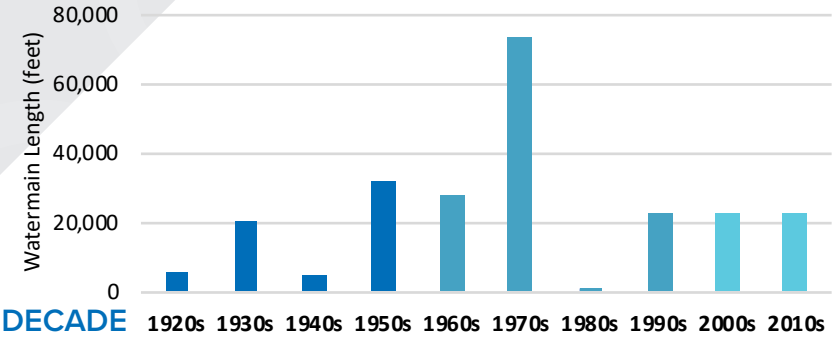
APPROXIMATELY 60% OF ROADWAYS NEED REHABILITATION OR RECONSTRUCTION

WATER

40+ MILES OF WATER MAIN

4"-16" SIZES

37% PVC **63%** ACP



A RECENT STUDY SHOWED THAT ASBESTOS CEMENT PIPE (ACP) HAS SEEN AN INCREASE IN PIPE BREAK RATES OF 46% FROM 2012 TO 2018. *Source: Folkman, Steven, "Water Main Break Rates In the USA and Canada: A Comprehensive Study" (2018).*

32+ MILES OF SANITARY SEWER

4"-18" SIZES

69% PVC **29%** CLAY **2%** OTHER

28+ MILES OF STORM SEWER

SIZES **8"-72"**

88% RCP **6%** PVC **6%** OTHER

7 STORM SEWER LIFT STATIONS

10 SANITARY SEWER LIFT STATIONS

16 drawdown tests were completed on Sanitary Sewer Lift Stations to determine their pumping capacity.

Sanitary Sewer Lift Station Pumping Capacity Range

70 gpm - 1,080 gpm

WATER DISTRIBUTION SYSTEM MODEL

The development of an accurately calibrated model provides the City with the ability to analyze countless scenarios and answer the looming "What If" questions as the City grows and considers redevelopment.

VALUABLE TOOL TO DIAGNOSE AND ANALYZE THE FOLLOWING

- System Pressure
- Storage Requirements
- Storage Operation
- Transmission Capacity
- Fire Flow
- Water Main Sizing
- Water Age

The water model was updated and calibrated for the entire City distribution system as part of this Master Plan.

30 HYDRANT FLOW TEST

12 EXTENDED PERIOD TESTS

Fire flow and extended period simulation (EPS) tests were conducted to ensure the model was calibrated correctly and accurately simulates system operations.

MODEL DEVELOPMENT AND CALIBRATION

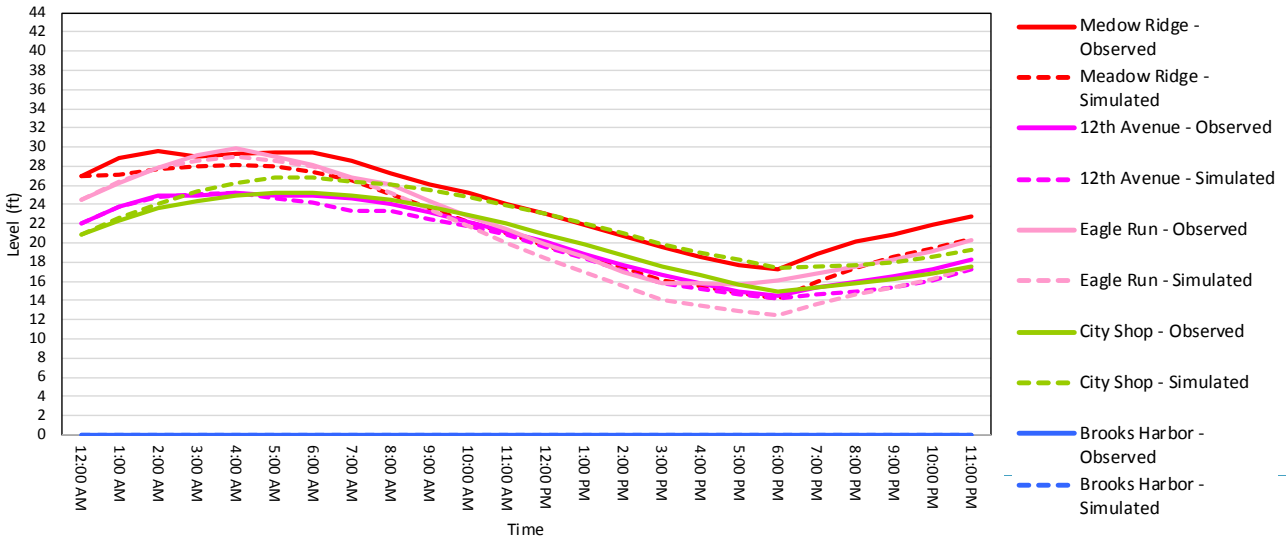
Creating a model that accurately simulates a water distribution system is essential to ensure its usefulness of the model. Actual water usage was spatially allocated in the model to accurately simulate the demand on the system.

"ALL PIPE" MODEL PROVIDES ACCURATE SIMULATION

The new hydraulic model is an "all pipes" model, meaning that it maintains a one-to-one relationship between individual elements in the City's Geographic Information System (GIS) database and pipes in the model. An all pipes model results in a more accurate simulation, and enables continuous model updates and maintenance with changes in the City's GIS database (that reflect changes in its infrastructure). This is critical for a City growing as fast as West Fargo and to avoid the model becoming outdated. The City now has a valuable tool that can be utilized with a high degree of confidence and accuracy.

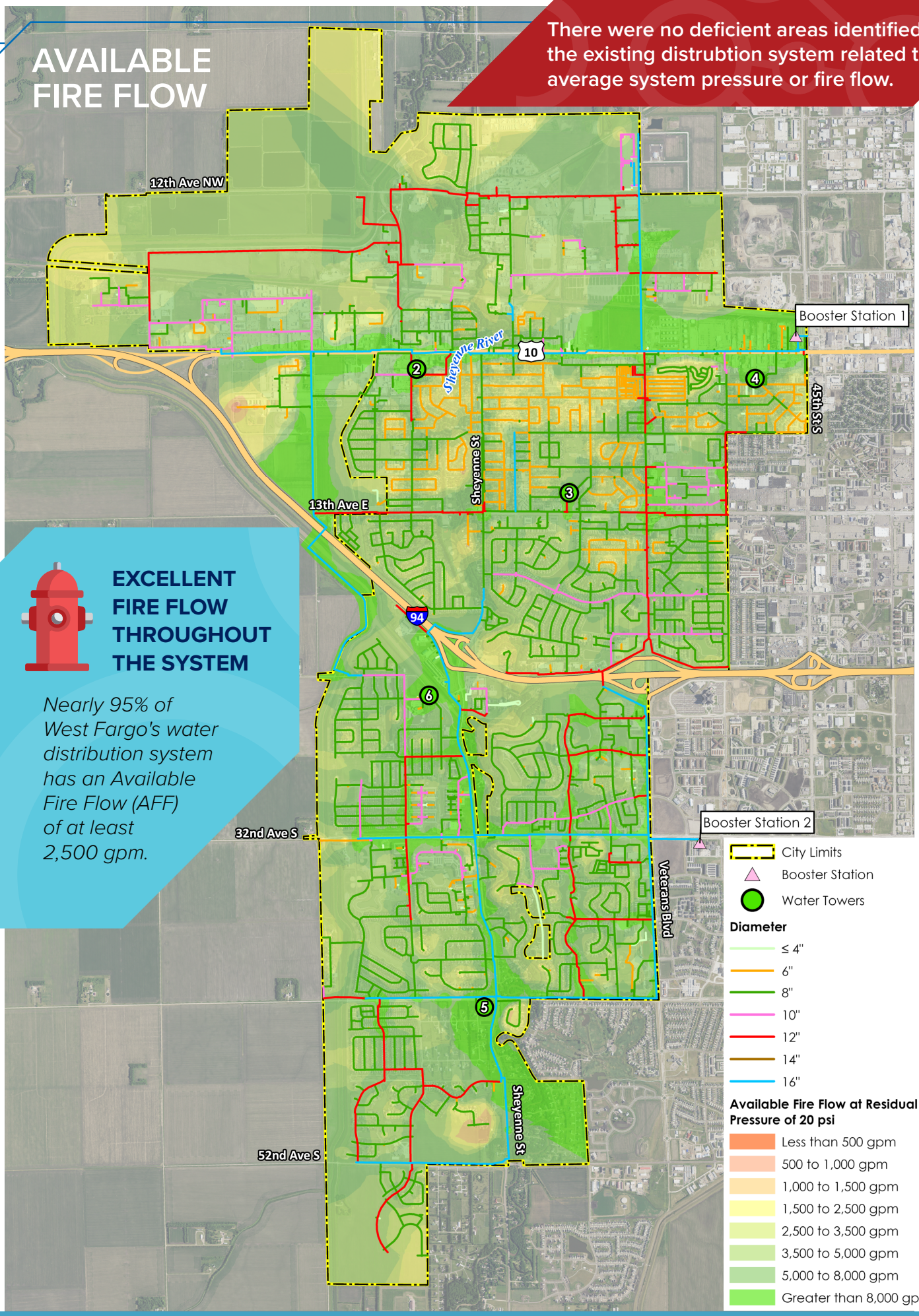
West Fargo Water Tower Level Comparison

July 19, 2018



AVAILABLE FIRE FLOW

There were no deficient areas identified in the existing distrubtion system related to average system pressure or fire flow.

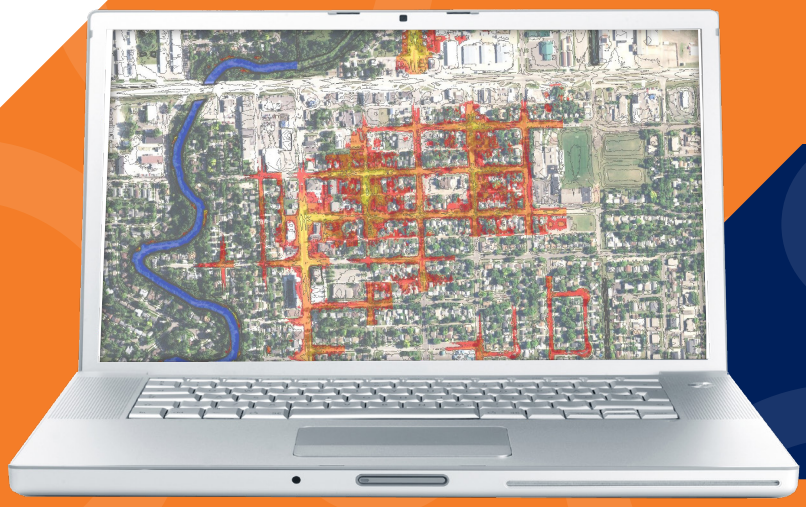


EXCELLENT FIRE FLOW THROUGHOUT THE SYSTEM

Nearly 95% of West Fargo's water distribution system has an Available Fire Flow (AFF) of at least 2,500 gpm.

STORMWATER SYSTEM MODEL

The development of a regional stormwater model for the Sheyenne River watershed area provides the City with the ability to better understand the reasons for drainage and flooding issues, and answer the questions of how to mitigate these issues.

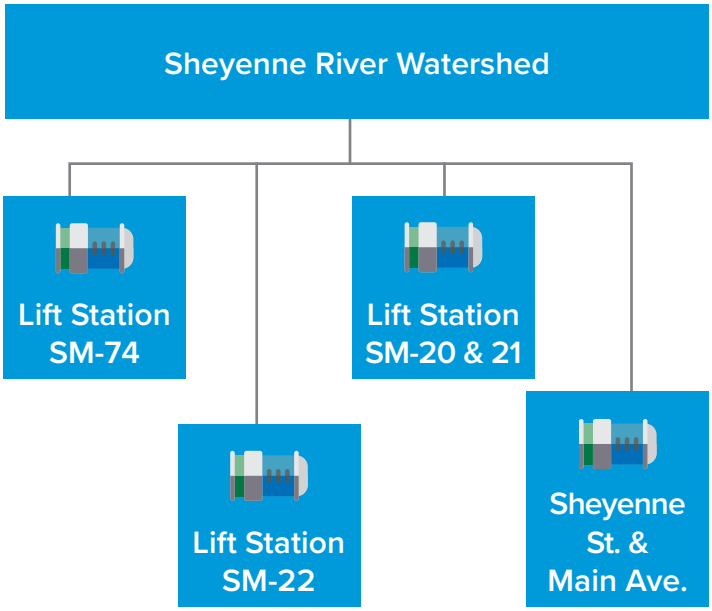


VALUABLE TOOL TO ANALYZE SYSTEM DEFICIENCIES AND PLAN FOR IMPROVEMENTS

- Flooding Mitigation
- Drainage Issues
- Hydrologic and Hydraulic Analysis
- Determine Impact of Sheyenne River on the Storm Sewer

WATERSHED AREAS

The study area contains three separate watersheds: Drain 21, Sheyenne River, and Drain 45. Stormwater modeling services included within the scope of this CAIMP included the Sheyenne River drainage basin only. Stormwater modeling services for the Drain 21 and Drain 45 watersheds were provided by others under a separate contract with the City. The Sheyenne River watershed was further separated into service areas.



MODELED RAINFALL EVENTS

Two rainfall events were considered for the project.

Rainfall Event	Depth (inches)
5-Year, 24-Hour	3.14
100-Year, 24-Hour	6.50

INFLUENCE OF THE SHEYENNE RIVER

Estimated flow in the Sheyenne River is 600-800 cubic feet per second (CFS) based on recent discharge rates from the Devils Lake basin. The stormwater modeling analysis assumed a constant base flow of 700cfs in the Sheyenne River. This base flow has a significant influence on the stormwater improvement recommendations.

Project Area

Sheyenne River Drainage Boundary

Drainage Area Issues

Proposed Storm Water

Existing Storm Water System

Lift Station

Storm Sewer Main

Post Storm Water Improvements - 5 Year Flood Event (Feet)

0' - 0.5'

0.5' - 1'

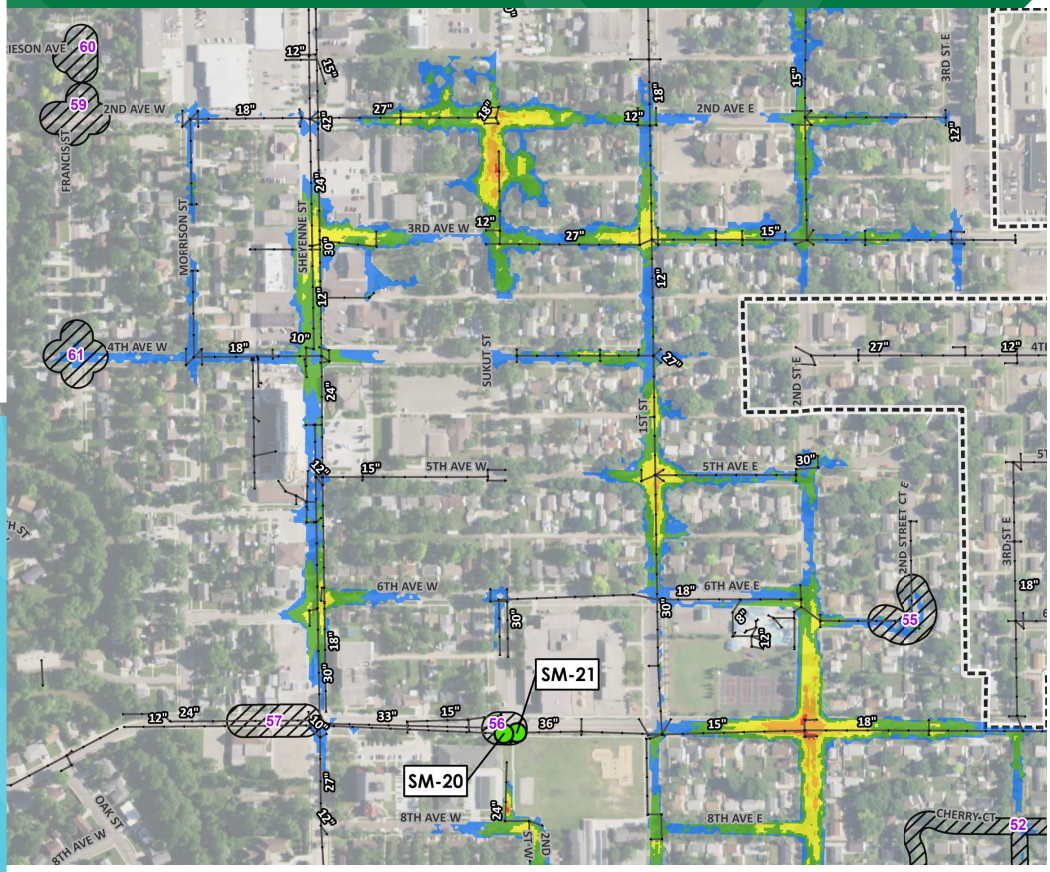
1' - 1.5'

1.5' - 2'

2' - 5'

5-YEAR STORM EVENT

EXISTING CONDITIONS

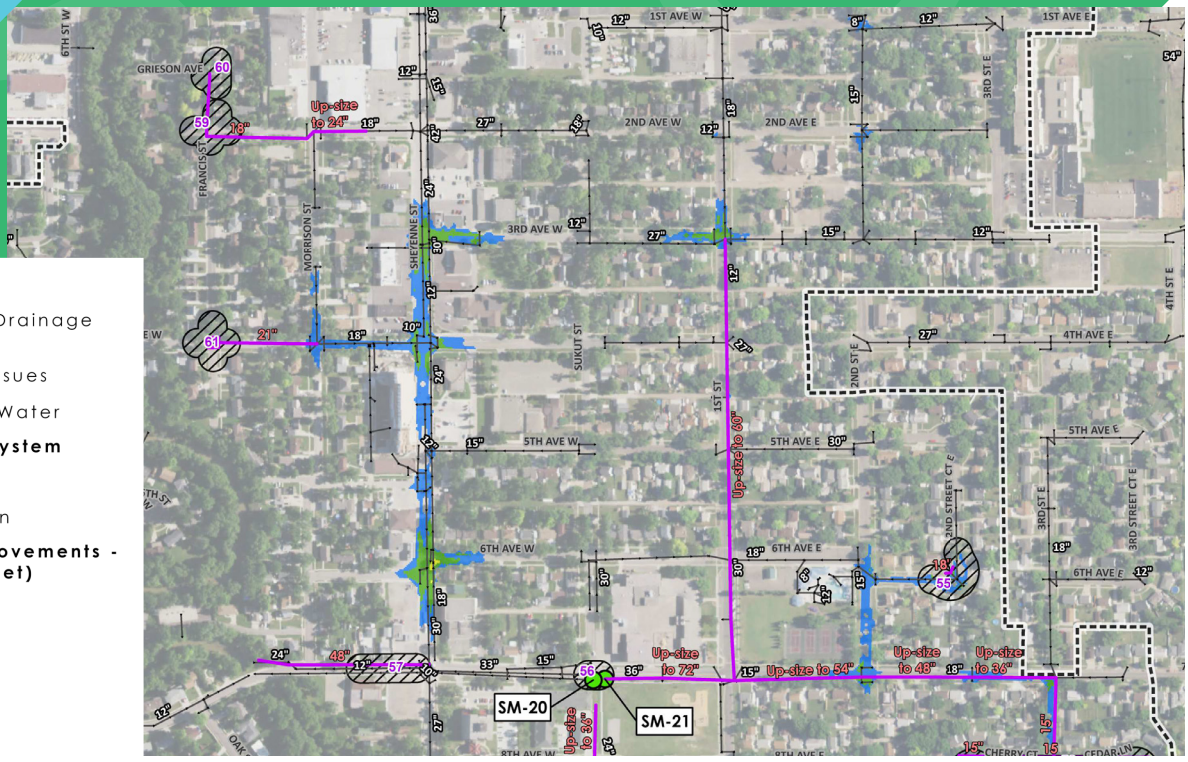


REGIONAL MODEL

The regional stormwater model was developed and utilized to effectively evaluate improvement alternatives to mitigate localized flooding and drainage concerns throughout the study area.

5-YEAR STORM EVENT

PROPOSED CONDITIONS



Project Area

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0' - 0.5'

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1' - 1.5'

1.5' - 2'

2' - 5'

INFRASTRUCTURE RISK ASSESSMENT

The infrastructure risk assessment provides a consistent approach of analyzing the risk of infrastructure failures, which allows improvement projects to be developed and prioritized. The infrastructure assessment is the basis for making prioritized improvement recommendations for executing full utility reconstructions, partial infrastructure replacements, and other projects to minimize the overall risk of infrastructure failures.

THE RISK EQUATION

COF CONSEQUENCE OF FAILURE × **LOF** LIKELIHOOD OF FAILURE = **RISK**

COF provides a better understanding of how critical the asset is to the infrastructure system, as well as the over-arching consequence in the event of failure.

LOF provides a better understanding of how susceptible the asset is to failure. Asset material and condition is the focal point of the likelihood of failure for each system.

PRIORITIZING

Prioritizing infrastructure improvements based on risk ensures investments are made towards the infrastructure that is **most critical** *and* **most likely to fail.**

WHY PRACTICE RISK ASSESSMENT?

Risk assessment can assist in identifying the City's higher risk assets and identify action and improvements to mitigate those identified risks.

DYNAMIC RISK ASSESSMENT MODEL

The infrastructure risk assessment process is not intended to be a "one time use approach". Utilizing a spreadsheet model provides the City with a robust and updateable risk assessment model designed to be utilized in the future.

ESTIMATED USEFUL LIFE (EUL) RISK ASSUMPTIONS

A major component of the horizontal asset assessment was evaluating the remaining life of pipes that are currently in service. The Estimated Useful Life (EUL) of assets is defined as the estimated time period (expressed in years) assets will perform their intended function before failure. By combining the EUL with the plat year when the infrastructure was installed, the Estimated Remaining Useful Life (ERUL) can be calculated. Evaluating pipe age in terms of ERUL (which varies with pipe material) is much more effective compared to analyzing pipe age uniformly for all pipes because different pipe materials are proven to be more resilient than others.

HOW EUL & ERUL WERE UTILIZED DURING THE INFRASTRUCTURE ASSESSMENT

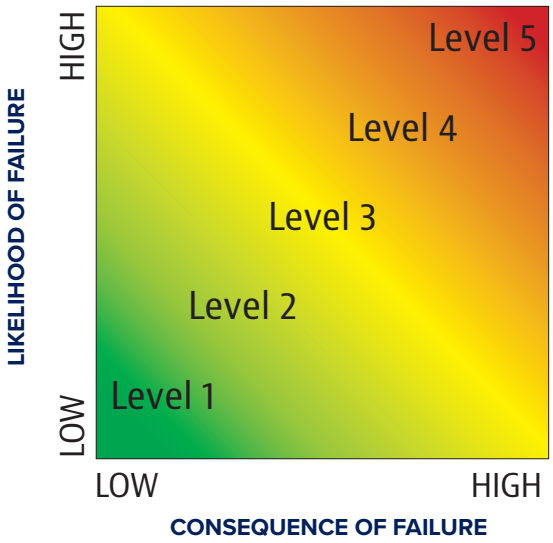
PLAT YEAR + EUL ESTIMATED USEFUL LIFE − CIP YEAR = ERUL ESTIMATED REMAINING USEFUL LIFE

INFRASTRUCTURE RISK ASSESSMENT

Infrastructure risks for this project were categorized in one of five risk levels, ranging from minimal risk to extreme risk. Every water main, sanitary sewer, storm sewer, pavement section, and lift station within the Core Area received a risk level based on its respective risk score.

It's important to prioritize investments towards infrastructure that has the greatest risk - infrastructure risks can be quickly visualized in a risk matrix

RISK	RISK LEVEL
Extreme	Level 5
High	Level 4
Moderate	Level 3
Low	Level 2
Minimal	Level 1



Infrastructure evaluated in this assessment includes the City's core area streets, water mains, sanitary sewers, and storm sewers. Each system was assessed independently based on criteria pertinent to that system. Once the individual assessments were complete the data was compiled and consolidated into a comprehensive corridor assessment.

PAVEMENT SYSTEM RISK ASSESSMENT

WATER MAIN SYSTEM RISK ASSESSMENT

SANITARY SEWER SYSTEM RISK ASSESSMENT

STORM SEWER SYSTEM RISK ASSESSMENT

CORRIDOR ASSESSMENT SCORE

333 CORRIDORS ASSESSED

PAVEMENT SYSTEM ASSESSMENT

The pavement system risk assessment utilized two criteria sets including pavement type and the estimated overall condition index (OCI) grade. The pavement system within the study area can be categorized into five types, includes, parking lots, local streets, collector streets, major collectors, and minor arterials. OCI grades (provided by the City) were used to provide a LOF score component to the pavement risk assessment. In total, there were 171 pavement segments assessed for the study area pavement system.

PAVEMENT TYPE × **PAVEMENT OCI GRADE** = **PAVEMENT RISK**

Pavement classification category.

Overall condition index for pavement as provided by the City.

Pavement System Risk Assessment Results (Sample Set)

PAVE. ID	TYPE	TYPE (COF) 20%	OCI GRADE	OCI LOF 80%	WEIGHTED RISK	PAVE. RISK LEVEL
85	Collector	3.0	97.37	1.0	1.40	Level 1
65	Local	2.0	23.03	3.0	2.80	Level 3
23	Local	2.0	33.17	2.0	2.00	Level 2

Pavement System Criteria Weights

CRITERIA	WEIGHT
Consequence of Failure	
Pavement Type	20%
Likelihood of Failure	
Pavement OCI Grade	80%
Total Weight	**100%**

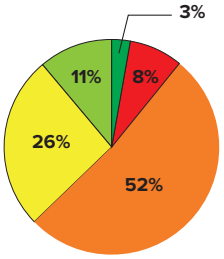
PAVEMENT RISK SCORES

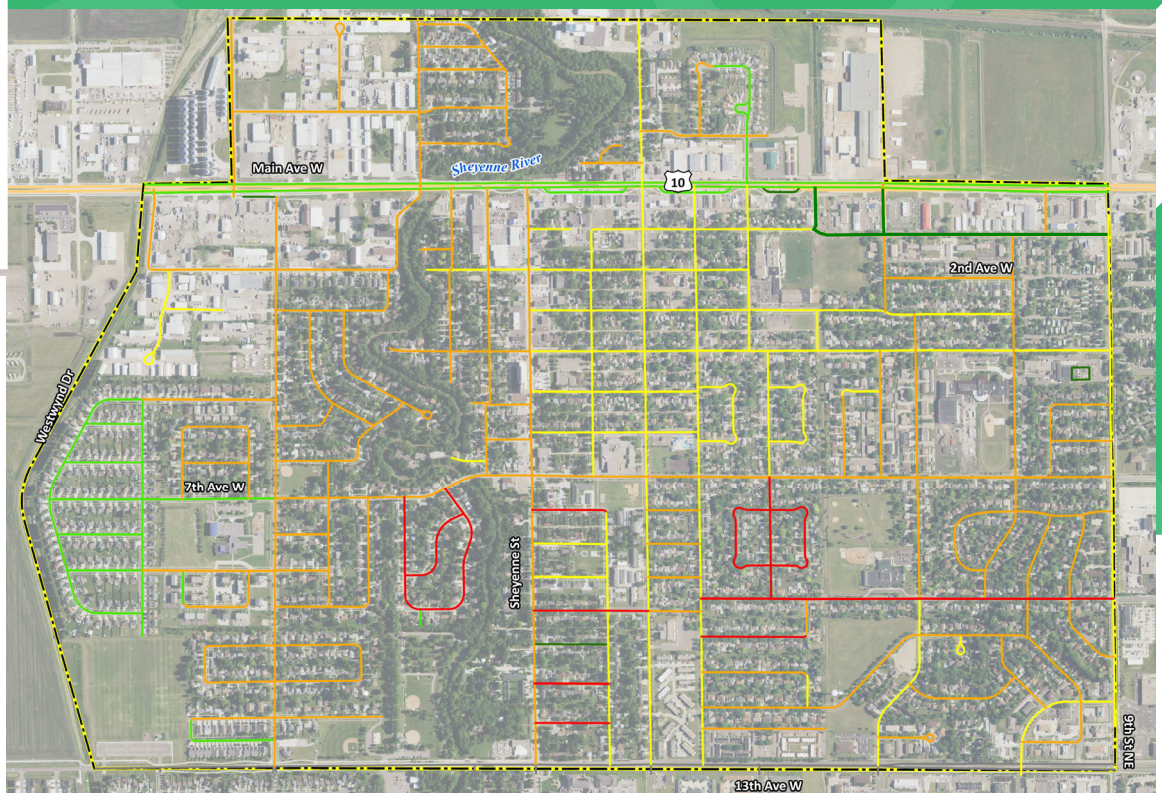
Project Area

Pavement - Risk Score

- Level 5
- Level 4
- Level 3
- Level 2
- Level 1
- No Pavement Data

RISK SCORE DISTRIBUTION





WATER MAIN SYSTEM ASSESSMENT

The water main system risk assessment utilized three criteria sets including pipe diameter, pipe material, and estimated remaining useful life (ERUL) of pipe. In total, there were 1,739 pipes (totaling 212,000 linear feet) assessed for the water main system. Although a total of 1,739 pipe sections were assessed, there are only 333 corridors within the study area, meaning some corridors contain multiple water mains. Therefore, the individual water main risk scores were consolidated based on the individual water main risk scores and the respective water main length.

PIPE DIAMETER × **PIPE MATERIAL** × **PIPE ERUL** = **WATER MAIN RISK**

Water main pipe diameter in inches

Material: Water main pipe material of construction
ERUL: Estimated remaining useful life of water main pipe.

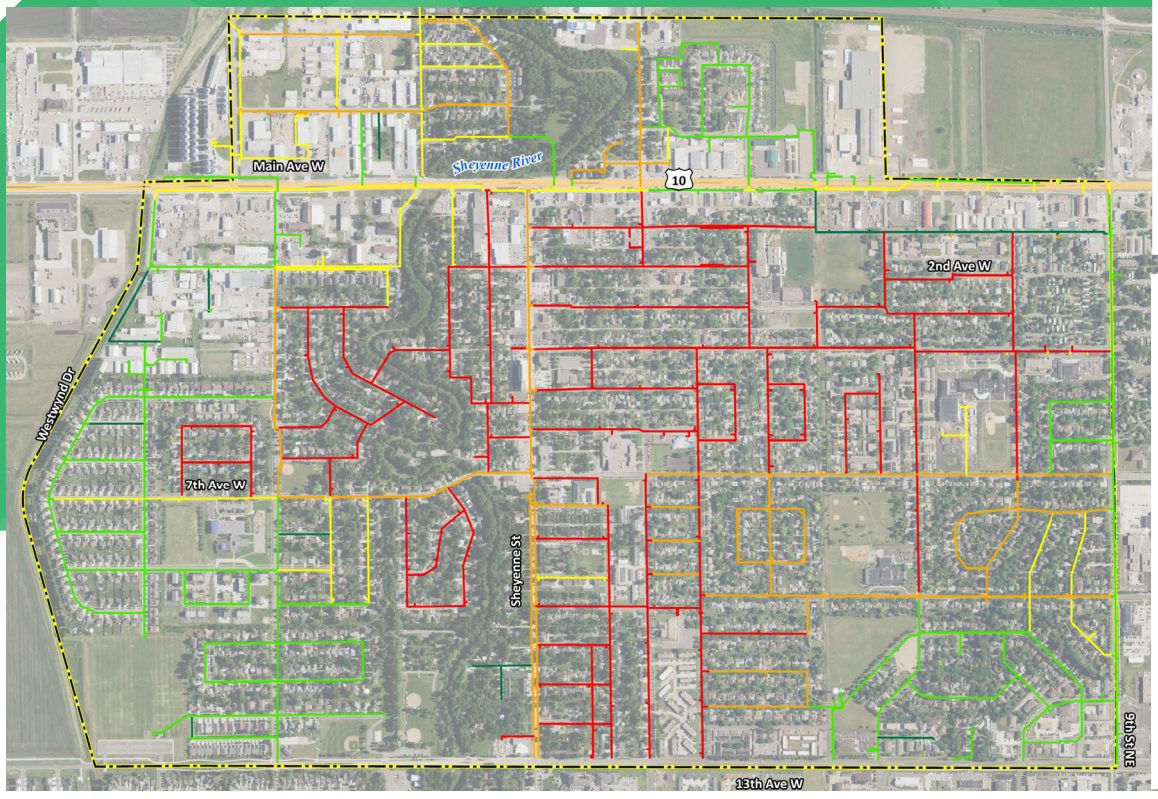
Water Main System Risk Assessment Results (Sample Set)

WM ID	DIAMETER	DIAMETER (COF) 20%	MATERIAL	MATERIAL (LOF) 40%	ERUL	ERUL (LOF) 40%	WEIGHTED RISK	WM RISK LEVEL
4401	8-inches	1.0	PVC	1.0	84 Years	1.0	1.00	Level 1
2242	12-inches	3.0	ACP	5.0	29 Years	3.0	3.80	Level 4
485	16-inches	5.0	ACP	5.0	-19 Years	5.0	5.00	Level 5

Water Main System Criteria Weights

CRITERIA	WEIGHT
Consequence of Failure	
Water Main Pipe Diameter	20%
Likelihood of Failure	
Water Main Pipe Material	40%
Water Main Pipe ERUL	40%
Total Weight	**100%**

WATER MAIN RISK SCORES

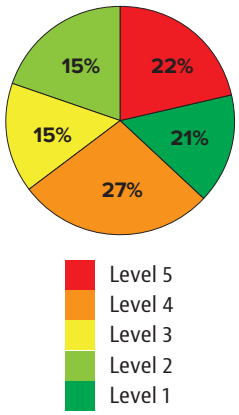


Project Area

Water System - Risk Score

- Level 5
- Level 4
- Level 3
- Level 2
- Level 1
- No Water Main Data

RISK SCORE DISTRIBUTION



SANITARY SEWER SYSTEM RISK ASSESSMENT

Like the water main system risk assessment, the sanitary sewer system risk assessment utilized three criteria sets including pipe diameter, pipe material, and pipe ERUL. Risk levels were also calculated based on the Closed-circuit Television (CCTV) assessment (further detailed on the following page) and were utilized for all pipes that had CCTV videos. In total, there were 687 pipes (totaling 170,000 linear feet) assessed for the sanitary sewer system.

PIPE DIAMETER × **PIPE MATERIAL** × **PIPE ERUL** = **SANITARY SEWER RISK**

Sanitary sewer pipe diameter in inches

Material: Sanitary sewer pipe material of construction
ERUL: Estimated remaining useful life of sanitary sewer pipe.

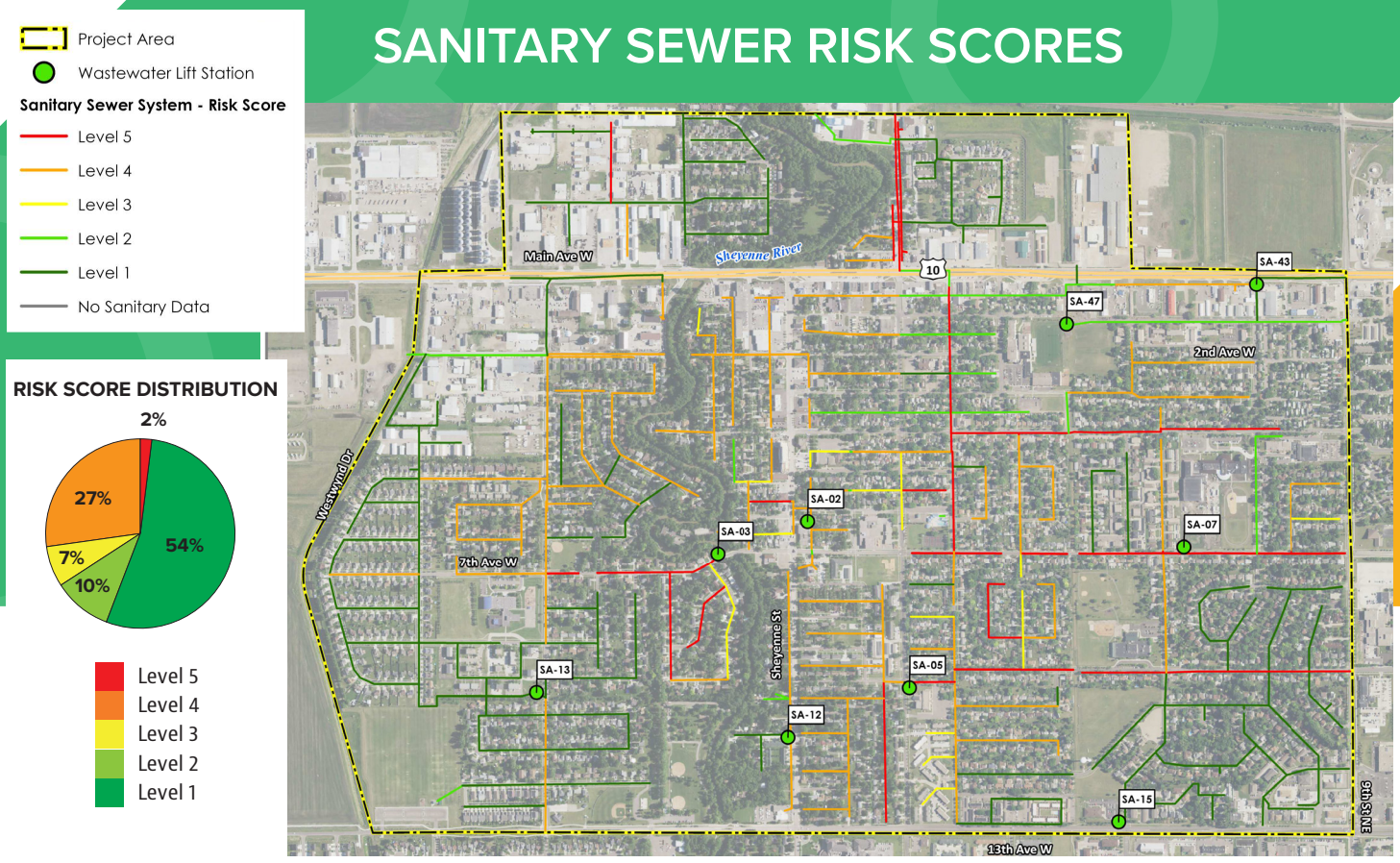
Sanitary Sewer System Risk Assessment Results (Sample Set)

SA ID	DIAMETER	DIAMETER (COF) 20%	MATERIAL	MATERIAL (LOF) 40%	ERUL	ERUL (LOF) 40%	WEIGHTED RISK	SA RISK LEVEL
110	8-inches	1.0	VCP	5.0	-15	5.0	4.20	Level 4
425	18-inches	4.0	PVC	1.0	44	2.0	2.00	Level 2
708	Unknown	5.0	Unknown	5.0	-44	5.0	5.00	Level 5

Sanitary Sewer System Criteria Weights

CRITERIA	WEIGHT
Consequence of Failure	
Sanitary Sewer Pipe Diameter	20%
Likelihood of Failure	
Sanitary Sewer Pipe Material	40%
Sanitary Sewer Pipe ERUL	40%
Total Weight	**100%**

SANITARY SEWER RISK SCORES



SANITARY SEWER SYSTEM CCTV ASSESSMENT

The City provided CCTV data of roughly 20% of the entire sanitary sewer system within the study area. A web-based GIS map was created of the City's sanitary sewer system to help field staff spatially reference the videos in the future. Once the videos were reviewed the pipe risk score was calculated based on observed defects.

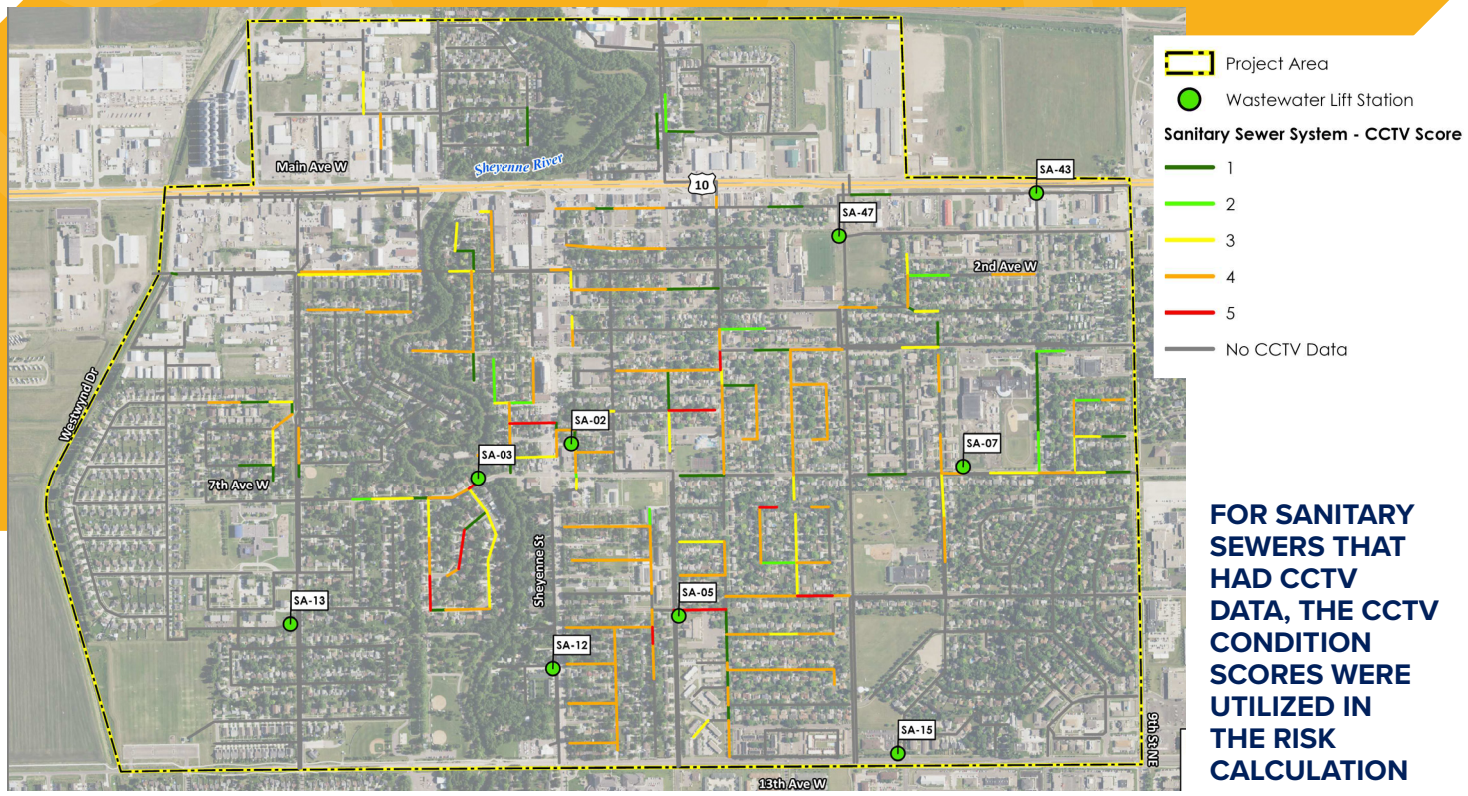
CCTV sewer inspection is a very effective method for assessing sewer systems. The Pipeline Assessment Certification Program (PACP) by the National Association of Sewer Service Companies (NASSCO) is an industry recognized method for assessing the structural and operational defects of sewers and was

Broken Pipe located along 10th Ave. East

NOTE ABOUT TELEVISED PIPES

Not all sanitary sewer pipe within the study area was televised but it was a goal of the project team to televise all known areas of clay pipe sanitary sewer.

SANITARY SEWER CCTV CONDITION SCORES



FOR SANITARY SEWERS THAT HAD CCTV DATA, THE CCTV CONDITION SCORES WERE UTILIZED IN THE RISK CALCULATION

STORM SEWER SYSTEM ASSESSMENT

Identical to the water main and sanitary sewer system risk assessments, the storm sewer system risk assessment utilized the same three criteria sets including pipe diameter, pipe material, and pipe ERUL. In total, there were 1,458 pipes (totaling 149,000 linear feet) assessed for the storm sewer system.

PIPE DIAMETER × **PIPE MATERIAL** × **PIPE ERUL** = **STORM SEWER RISK**

Storm sewer pipe diameter in inches

Material: Storm sewer pipe material of construction
ERUL: Estimated remaining useful life of storm sewer pipe.

Storm Sewer System Risk Assessment Results (Sample Set)

SM ID	DIAMETER	DIAMETER (COF) 10%	MATERIAL	MATERIAL (LOF) 10%	ERUL	ERUL (LOF) 80%	WEIGHTED RISK	SM RISK LEVEL
434	24-inches	2.0	RCP	1.0	55 years	1.0	1.10	Level 1
1867	30-inches	3.0	RCP	1.0	58 years	1.0	1.20	Level 1
2018	18-inches	2.0	RCP	1.0	-6 years	5.0	4.30	Level 4

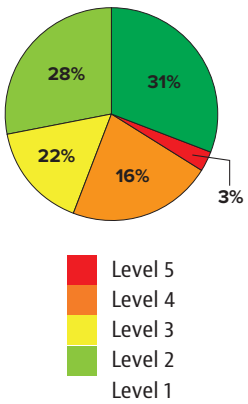
Storm Sewer System Criteria Weights

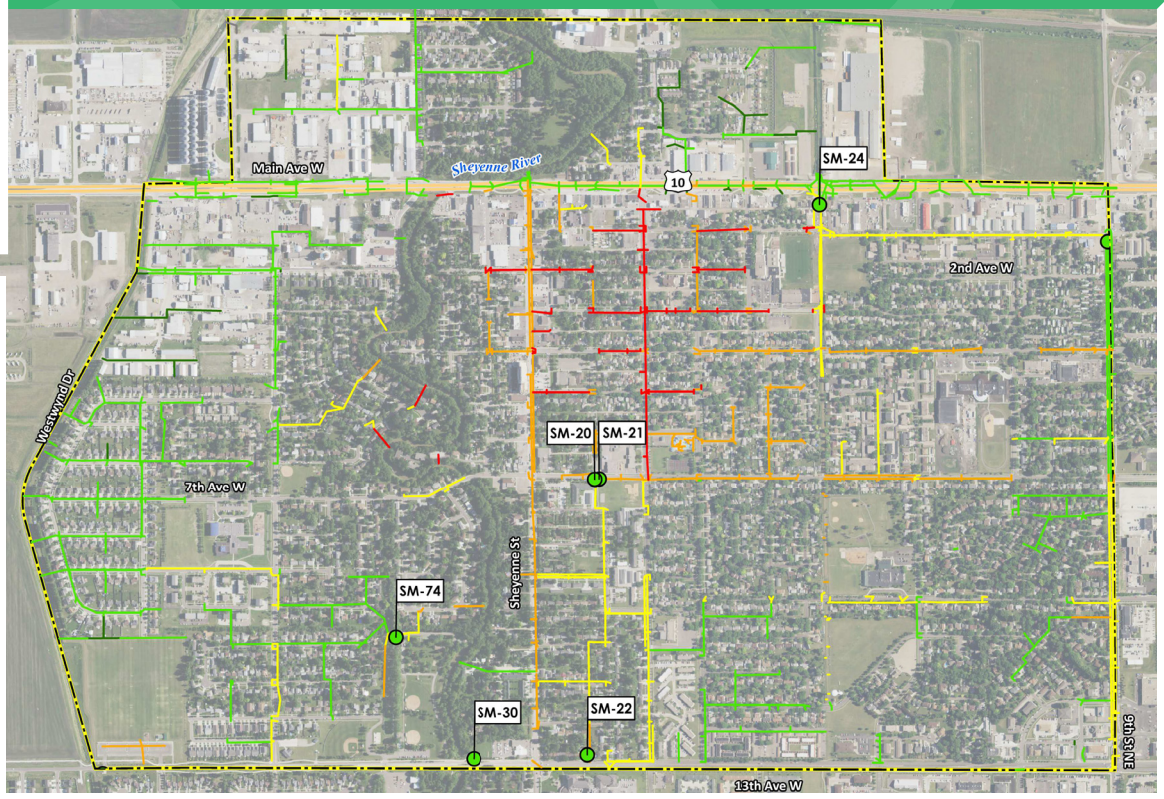
CRITERIA	WEIGHT
Consequence of Failure	
Storm Sewer Pipe Diameter	10%
Likelihood of Failure*	
Storm Sewer Pipe Material	10%
Storm Sewer Pipe ERUL	80%
Total Weight	**100%**

STORM SEWER RISK SCORES

Project Area
Lift Station
Storm Sewer System - Risk Score
Level 5
Level 4
Level 3
Level 2
Level 1
No Storm Sewer Data

RISK SCORE DISTRIBUTION





CORRIDOR ASSESSMENT

Determining the optimal time to replace underground infrastructure is a challenge all communities face. Performing a corridor assessment provides a comprehensive approach to addressing infrastructure challenges because every asset within that corridor is being considered. By taking this corridor-specific approach, West Fargo will have the ability to not only consider the replacement needs of individual utilities but also rank the overall needs of key corridors as part of its capital improvements process.

- 20% PAVEMENT TYPE
- 80% PAVEMENT OCI GRADE

→ 35% PAVEMENT RISK SCORE

- 20% WATER MAIN PIPE DIAMETER
- 40% PIPE MATERIAL
- 40% PIPE ERUL

→ 20% WATER MAIN RISK SCORE

- 20% SANITARY SEWER PIPE DIAMETER
- 40% PIPE MATERIAL
- 40% PIPE ERUL

→ 30% SANITARY SEWER RISK SCORE

- 10% STORM SEWER PIPE DIAMETER
- 10% PIPE MATERIAL
- 80% PIPE ERUL

→ 15% STORM SEWER RISK SCORE

CORRIDOR ASSESSMENT SCORE

There were 1,739 water mains, 687 sanitary sewers, and 1,458 storm sewers located within the study area and only 333 corridors, which means that many corridors contain various pipes of the same asset system.

The individual water main, sanitary sewer, and storm sewer pipe risk levels were combined into a system-specific corridor risk level.

CORRIDOR ASSESSMENT

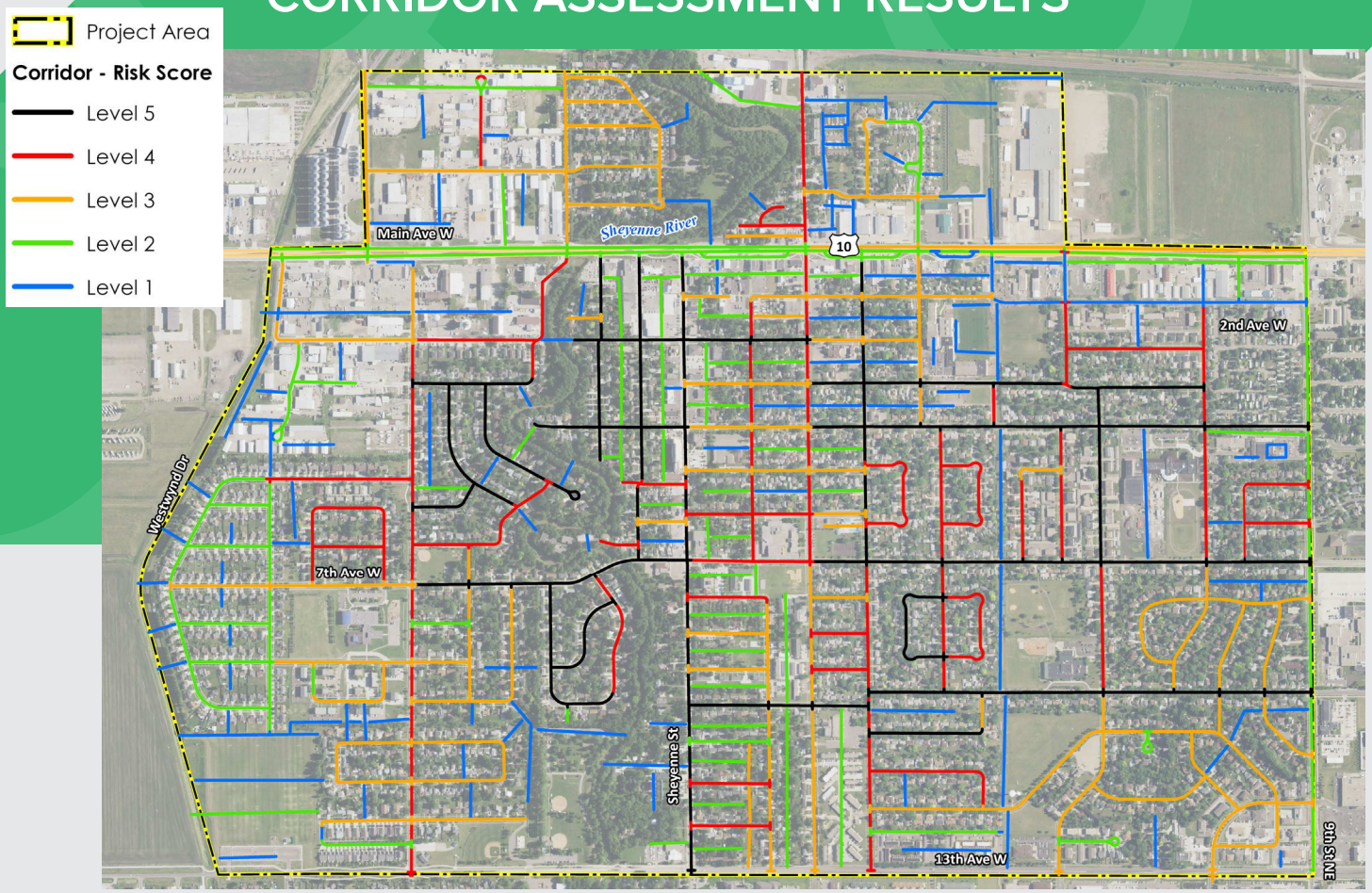
Like the individual system risk assessments, the corridor assessment utilized a five-level scoring system to identify corridors that are in significant need of investment versus corridors that are in excellent condition. The corridor assessment levels utilized are shown below.

Corridor Assessment Levels

CORRIDOR SCORE RANGES	CORRIDOR ASSESSMENT LEVEL	GENERAL RECOMMENDATION
0.00 – 0.99	Level 1	No Project Recommended; Routine Monitoring
1.00 – 1.99	Level 2	No Project Recommended; Routing Monitoring
2.00 – 2.99	Level 3	No Project Recommended; Increased Monitoring
3.00 – 3.99	Level 4	Project Recommended in 1-10 Years
4.00 – 5.00	Level 5	Project Recommended Immediately

Projects were recommended for all corridors that received a risk level of 5. However, just because a corridor received a score of 1-4, it doesn't mean a project is not recommended. The purpose of the corridor assessment is to identify the corridors that are at the highest risk of having a single asset fail, which encourages prioritized and fiscally responsible infrastructure investments. A corridor that received a risk level 1 could still have an asset that's considered a high failure risk. In this case, the other assets within said corridor likely have a low failure risk, which is why said corridor received a risk level of one.

CORRIDOR ASSESSMENT RESULTS



LIFT STATION ASSESSMENT

Due to variability in the data that was available for the two lift station types, specific criteria and criteria weights were separately established for performing an assessment of the sanitary sewer and storm sewer lift stations. Upon collecting additional data, assessment criteria and weights were developed through a collaborative approach between AE2S and key City of West Fargo personnel. Each lift station was then assessed to determine the corresponding risk score and prioritization in which improvements should be conducted.

LIFT STATION INSPECTION AND O&M HISTORY SCORING SCALE

High Risk of Failure

Low Risk of Failure

Score	Condition Category	General Condition Description	General Functionality Description
5	Not Functioning	Component severely compromised	Component is not currently functioning as intended
4	Poor Condition	Component moderately compromised	In-service, but function is highly impaired
3	Fair Condition	Visible degradation	In-service, but function is impaired and higher than expected O&M
2	Good Condition	Slight visible degradation	In-service and functioning satisfactorily, but higher than expected O&M
1	Excellent Condition	New or nearly new; no signs of degradation	Component functioning as intended

Criteria scores were then multiplied by their respective weights to calculate an improvement priority score.

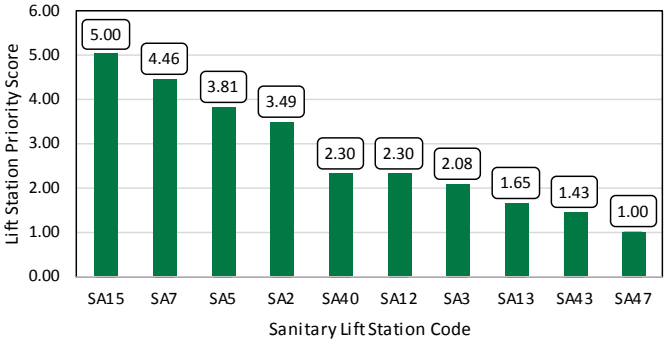
Sanitary (SA) Lift Station Criteria Weights

CRITERIA	WEIGHT
Consequence of Failure	
Lift Station Pumping Capacity	30%
Likelihood of Failure	
Lift Station ERUL	30%
Lift Station Inspection and O&M History	40%
Total Weight	**100%**

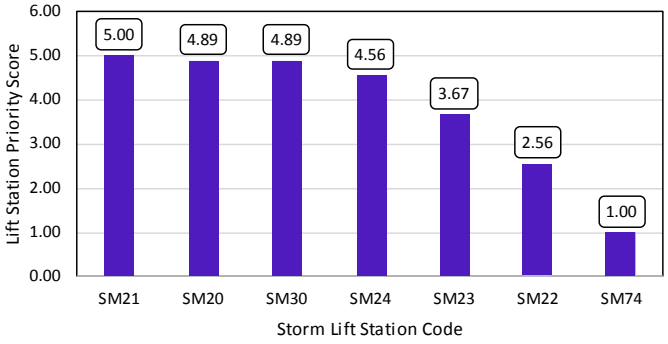
Storm (SM) Lift Station Criteria Weights

CRITERIA	WEIGHT
Consequence of Failure	
Lift Station Pump Horsepower	10%
Likelihood of Failure	
Lift Station ERUL	40%
Lift Station Inspection and O&M History	50%
Total Weight	**100%**

Sanitary Sewer Lift Station Assessment Results



Storm Sewer Lift Station Assessment Results



CAPITAL IMPROVEMENTS PLAN

The City of West Fargo's Core Area CIP is a comprehensive, 10-year plan for capital investments in implementing, enhancing, and maintaining the City's public infrastructure assets located within the study area of this master plan. The CIP provides a forecast of estimated funds needed for capital projects and identifies planned capital improvement projects located in the study area and their estimated costs over a 10-year planning horizon. The CIP developed in this master plan is intended to be used to supplement West Fargo's city-wide CIP.

The Core Area CIP includes project priorities to address infrastructure needs within the study area. However, it may be determined by City staff to be more economical and/or feasible to complete projects in a different order than recommended. Factors such as financial limitations tied to available funding sources, progress on ongoing projects , existing funding commitments and ongoing work to leverage outside funding sources and methods are all components that could influence the timing of undertaking a new project.

PROJECT CATEGORIES

FULL RECONSTRUCTION
Full reconstruction of all utilities in a given corridor is recommended.

PARTIAL REPLACEMENT AND REHABILITATION (R&R)
One utility is in need of immediate attention while other utilities are in adequate condition.

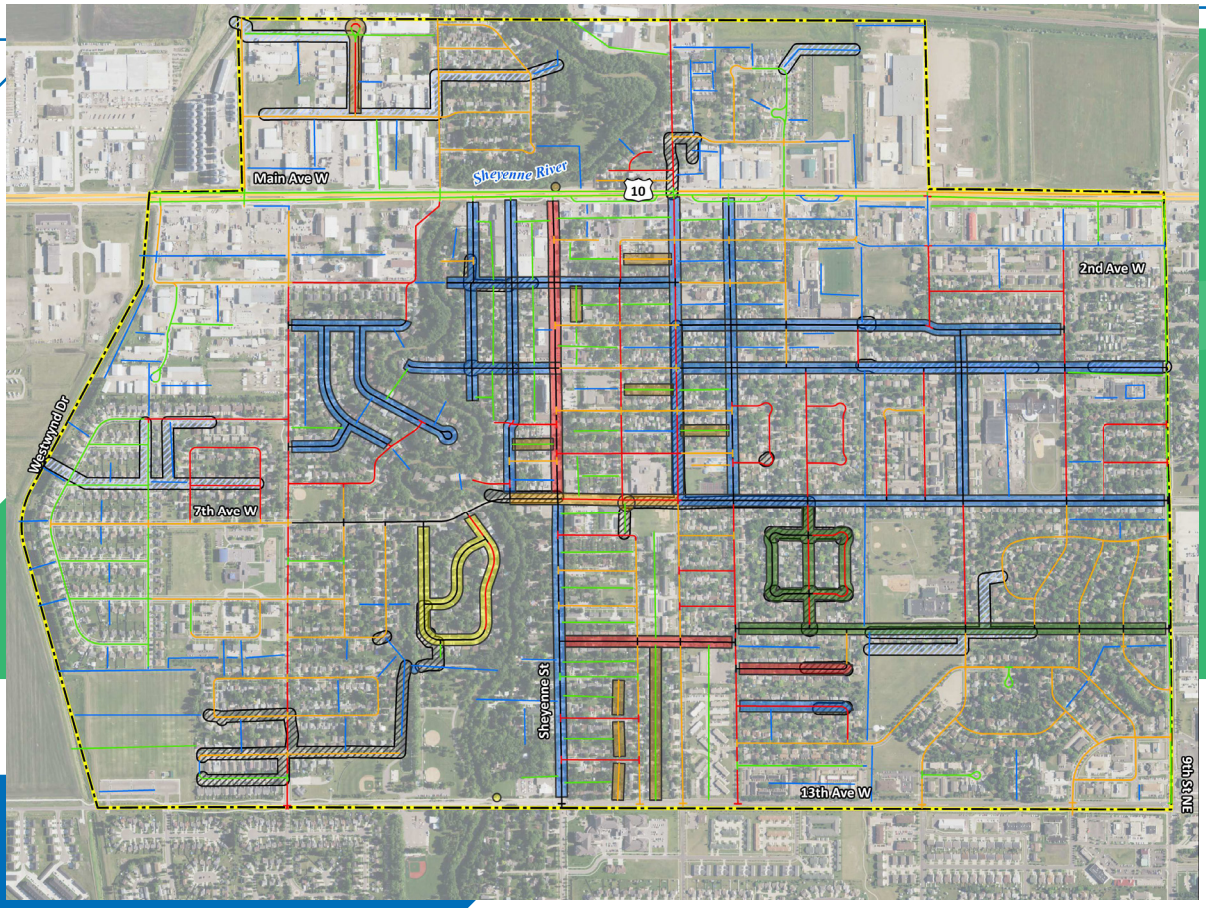
WATER SYSTEM HYDRAULIC IMPROVEMENTS
Recommendations to support redevelopment and water system operations.

STORMWATER SYSTEM HYDRAULIC IMPROVEMENTS
Recommendations to mitigate drainage and/or flooding issues.

LIFT STATION IMPROVEMENTS
Condition and/or capacity related improvements.

STUDIES AND OPTIMIZATION
More information is needed before the City makes costly investments.

WEST FARGO CAIMP 10-YEAR CIP PROJECT MAP



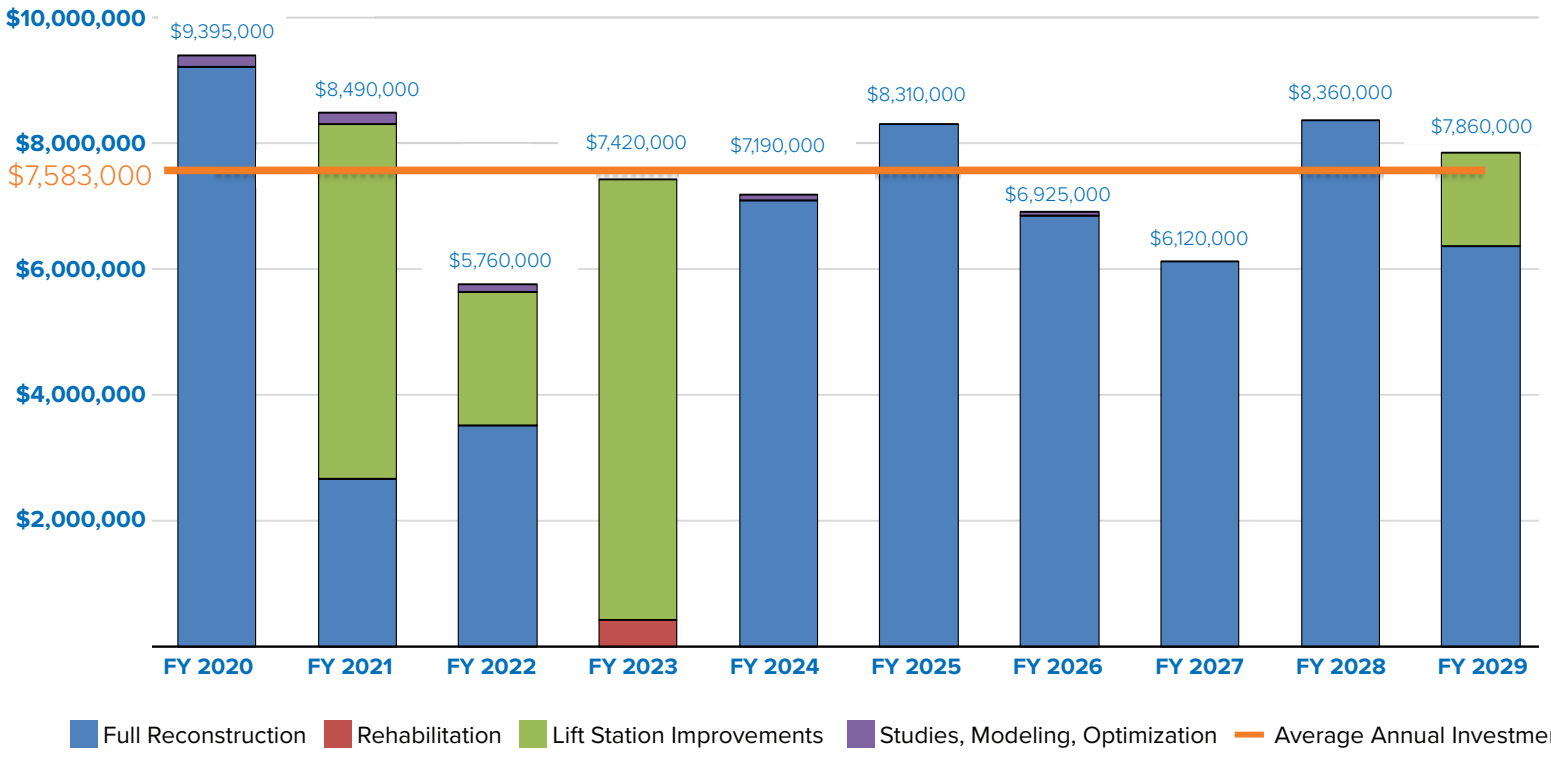
Project Area
AE2S - Proposed Storm Sewer Improvements
Moore Engineering - Proposed Storm Sewer Improvements

Corridor - Risk Score
- Level 5
- Level 4
- Level 3
- Level 2
- Level 1

Estimated Project Year
- Year 1
- Year 2
- Year 3
- Year 4
- Year 5
- Year 6+

10-YEAR CIP - INVESTMENT PLAN

WEST FARGO CORE AREA INFRASTRUCTURE MASTER PLAN



Priority	Project ID	Project Name	Project Category	Estimated Total Project Costs (2019$)	Year
1	FR-01	10th 1/2 Ave. E Reconstruction	Full Reconstruction	$950,000	2020
2	SMO-01	SM20 & SM21 Lift Station Replacement Study	Studies, Modeling, Optimization	$75,000	2020
3	FR-02	10th Ave. Reconstruction	Full Reconstruction	$1,300,000	2020
4	SMO-02	Sheyenne Street Storm Lift Station Study	Studies, Modeling, Optimization	$100,000	2020
5	FR-17-N	Sheyenne St. Reconstruction (North Segment)	Full Reconstruction	$6,970,000	2020
6	SMO-03	Sewer Televising Optimization Study	Studies, Modeling, Optimization	$50,000	2021
7	SMO-04	I/I Reduction Study	Studies, Modeling, Optimization	$130,000	2021
8	LS-01	SM20 & SM21 Lift Station Replacement	Lift Station Improvements	$5,640,000	2021
9	FR-03	7th Ave. W. Reconstruction	Full Reconstruction	$2,670,000	2021
10	FR-04	Elm St. and Oak St. Neighborhood Reconstruction	Full Reconstruction	$3,510,000	2022
11	SMO-05	SM22 Storm Lift Station Study	Studies, Modeling, Optimization	$50,000	2022
12	LS-02	SM30 Storm Lift Station Replacement	Lift Station Improvements	$2,120,000	2022
13	SMO-06	SA15 Sanitary Lift Station Study	Studies, Modeling, Optimization	$80,000	2022
14	LS-03	Sheyenne Street Regional Storm Lift Station Addition	Lift Station Improvements	$7,000,000	2023
15	RR-01	Alley/Backyard Sanitary Sewer Rehabilitation Project	Rehabilitation	$420,000	2023
16	FR-05	Cherry Court - Cedar Lane Neighborhood Reconstruction	Full Reconstruction	$3,190,000	2024

Priority	Project ID	Project Name	Project Category	Estimated Total Project Costs (2019$)	Year
17	SMO-07	Cartegraph Optimization Study	Studies, Modeling, Optimization	$80,000	2024
18	FR-06	10th Ave. E. Reconstruction	Full Reconstruction	$3,920,000	2024
19	FR-07	Francis St., 2nd Ave. W, and 4th Ave. W Reconstruction	Full Reconstruction	$3,570,000	2025
20	FR-08	4th Ave. E. Reconstruction	Full Reconstruction	$4,740,000	2025
21	SMO-08	SM74 Storm Lift Station Capacity Study	Studies, Modeling, Optimization	$75,000	2026
22	FR-09	7th Ave. E. Reconstruction	Full Reconstruction	$4,790,000	2026
23	FR-10	Morrison St. Reconstruction	Full Reconstruction	$2,060,000	2026
24	FR-11	2nd St. E Reconstruction	Full Reconstruction	$2,130,000	2027
25	FR-12	6th St. E Reconstruction	Full Reconstruction	$1,230,000	2027
26	FR-13	3rd Ave. E Reconstruction	Full Reconstruction	$2,760,000	2027
27	FR-14	6th St. W, 7th St. W, 3rd Ave. W, and 5th Ave. W Reconstruction	Full Reconstruction	$4,730,000	2028
28	FR-15	1st St. Reconstruction	Full Reconstruction	$2,710,000	2028
29	FR-16	11th Ave. E. Reconstruction	Full Reconstruction	$920,000	2028
31	FR-17-S	Sheyenne St. Reconstruction (South Segment)	Full Reconstruction	$6,360,000	2029
31	LS-04	SM74 Lift Station Capacity Upgrade	Lift Station Improvements	$1,500,000	2029
			Total Estimated Project Costs	**$75,830,000**	

MOVING FORWARD

As time passes, some uncertainties and changes are to be expected to the CIP due to a variety of social, environmental, and economical factors. The impacts of these changes can be best managed through a fluid planning approach. Positively responding to changes and differences will be most appropriately accomplished through a routine planning process that enables the City to maintain a clear vision and consistent direction for infrastructure reconstruction and improvement in the Core Area of West Fargo.

For additional details on the CAIMP, please refer to the full master plan report in the possession of the City of West Fargo Engineering Department.

Prepared By:

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