



Real People. Real Solutions.

# Infrastructure Management Plan City of Hayfield, MN

November 2020

**Submitted by:**

Bolton & Menk, Inc.  
2900 43<sup>rd</sup> Street NW, Suite 100  
Rochester, MN 55906  
P: 507-208-4332



# Certification

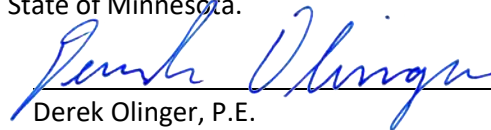
## 2020 Infrastructure Management Plan

City of Hayfield, Minnesota

November 2020

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By:



Derek Olinger, P.E.

License No. 54287

Date: 11/3/2020

REVISED 11/16/2020

# Table of Contents

I.	INTRODUCTION.....	2
A.	Purpose.....	2
B.	Method & Scope .....	2
II.	PAVEMENT MANAGEMENT .....	2
A.	Introduction & Approach.....	2
B.	Street Life Cycle .....	3
C.	Findings.....	5
III.	UTILITY MANAGEMENT .....	7
A.	Introduction .....	7
B.	Watermain.....	7
C.	Sanitary Sewer .....	7
IV.	EXECUTION.....	8
A.	Seal Coat & Crack Fill Program .....	8
B.	Overlay & Patching Program .....	9
C.	Reconstruction Program.....	9
V.	CONCLUSION & RECOMMENDATIONS .....	10

## Appendices

Appendix A: Pavement Management Terminology

Appendix B: Figures

- B-1: Pavement Ratings
- B-2: Sanitary Sewer Collection System
- B-3: Water Distribution System
- B-4: Street Maintenance Map
- B-5: Reconstruction Project Map

Appendix C: Cost Estimates

- C-1: Seal Coat/Crack Fill Projects (2 pages)
- C-2: Mill & Overlay Projects (1 page)
- C-3: Reconstruction Projects (4 pages)

## I. INTRODUCTION

### A. Purpose

The purpose of this report is to summarize the overall conditions of pavements and utilities within the City of Hayfield. Once the existing conditions are understood, the need for maintenance and replacement costs can be better understood. This report will provide the information needed for budgeting and planning future projects. This information can then be used for updating the City's Capital Improvement Plan.

### B. Method & Scope

Traditionally, cities approach infrastructure management from a reactive approach. As issues arise, a City will respond to the most immediate needs first. This type of infrastructure management may seem efficient since only the most critical elements are being replaced; however proactive management of these systems have proven to be a more effective and efficient.

This report describes an infrastructure management strategy that is more proactive than traditional methods. This approach recognizes that the street and utility systems within Hayfield are interwoven. Proper timing for maintenance and replacement of all elements will ensure that the useful life of all infrastructure within a given corridor is maximized prior to replacement. This approach will also improve the overall quality of infrastructure over its useful life and reduce the potential for unplanned and unforeseen replacements.

This report will discuss the existing conditions, maintenance, and replacement procedures for public streets, water distribution system piping, and sanitary collection system piping.

The following sections first include discussion on pavement management, followed by utility (watermain and sanitary sewer) management. The report is concluded with a summary of how to use this information for future infrastructure maintenance and replacement planning.

## II. PAVEMENT MANAGEMENT

### A. Introduction & Approach

The timing of maintenance and rehabilitation of bituminous pavements can greatly influence their effectiveness, costs, and overall pavement life. In general, once a pavement needs attention, the sooner maintenance or rehabilitation activity is undertaken, the more cost-effective it will be. Hayfield maintains approximately 9.6 miles of bituminous paved streets and alleys. An additional 1.5 miles of gravel streets and alleys also exist. This represents a significant portion of the City's capital worth and needs to be managed efficiently.

During the summer of 2020, Bolton & Menk, Inc. staff conducted a visual condition survey of City streets, including alleys. This process was undertaken to determine the current condition of these assets and rate their condition relative to each other. The City can use this baseline data for determining the appropriate timing of cost-effective road treatments.

The visual conditions were evaluated using the general guidelines of the Pavement Surface Evaluation and Rating (PASER) system, quantifying several different types of pavement distress. This rating system assigns a numerical rating to each street within the community. The City can use this data to prioritize needs and assign the proper level of maintenance for each street.

Total reconstruction of a street is a very costly procedure. Research shows that periodic maintenance of streets in good condition can extend their service life at a reduced cost. Maintenance of streets after reconstruction is more cost effective than undergoing multiple reconstructions without maintenance.

## B. Street Life Cycle

The condition of a street pavement is affected by a number of factors, including but not limited to:

- Street section (bituminous and gravel base thickness)
- Traffic characteristics and loading
- Subgrade soil (sand, clay, silt) and moisture conditions
- Drainage (street profile, cross section, storm sewer)
- Age

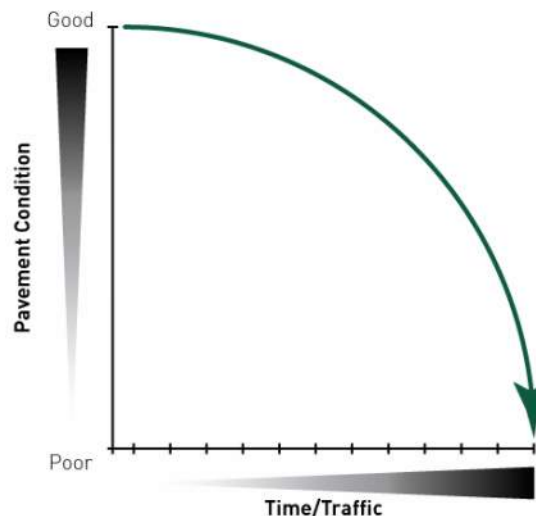
Each of the above listed items contributes to the overall condition and lifecycle of a public street. It is not uncommon for streets in the same area and constructed at the same time, to vary in condition.

In many cases, the approach utilized by cities includes rehabilitation and reconstruction to address the poorest condition road segments first with less attention paid to preventative maintenance. **The approach advocated by pavement experts recommends that more attention be placed on preventative maintenance and preserving the pavement condition to extend the useful life of the road segment.**

After the initial construction, bituminous pavements require periodic maintenance and rehabilitation to maximize life. In general, bituminous pavements deteriorate slowly during the first 15 to 20 years of the street lifecycle. Following this period, pavements tend to deteriorate more rapidly.

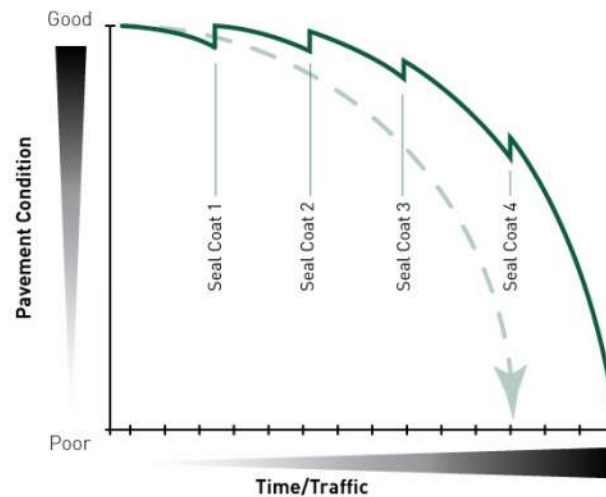
Figure 1 illustrates how the typical street condition will deteriorate with little to no maintenance or rehabilitation.

**Figure 1: Typical Pavement Lifecycle w/ No Seal Coat, Crack Fill or Overlay**



**The first and most cost-effective approach to extending the life of pavement is through seal coating and crack filling.** This type of maintenance slows the oxidation and associated weakening of bituminous surfaces and prevents the migration of surface water into the underlying soils. Collectively, seal coating and crack filling will increase the life of pavements moderately, if completed on a regular 5- to 7-year cycle. Figure 2 illustrates a comparative life cycle for pavements with regular seal coating and crack filling programs.

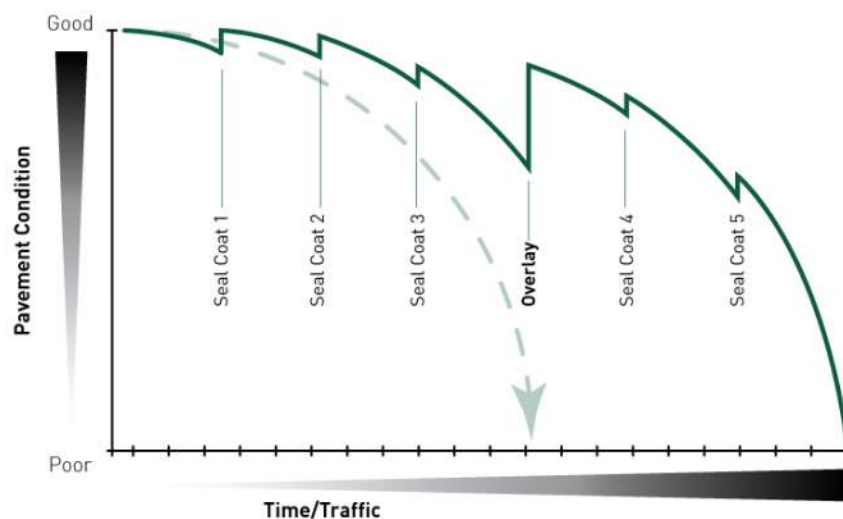
**Figure 2: Typical Pavement Lifecycle w/ Seal Coating & Crack Filling**



Eventually, pavements will deteriorate to a level where maintenance costs increase and the benefits of the sealing coating and crack filling decrease. In these cases, the next level of pavement management will generally include bituminous overlays and patching.

With the proper combination of crack filling, seal coating and periodic overlays, a pavement can be used for 50 years or more. Figure 3 shows how the pavement lifecycle can be maximized using the proper combination of maintenance and rehabilitation.

**Figure 3: Typical Pavement Lifecycle w/ Seal Coating, Crack Filling and Overlays**



In any scenario, pavements will eventually deteriorate to a point where low-cost maintenance or rehabilitation activities are no longer effective and a complete replacement of the street section (reconstruction) is required. The amount of effort a City puts into the street before it reaches this point will ultimately influence how often these costly reconstructions need to occur.

Table 1 provides an example cost analysis for comparing the costs of pavement management with and without an active maintenance program. Anticipated costs and general pavement conditions are provided over a 50-year time period.

Pavement Life Cycle Cost Example			
Item	Year	Approximate Pavement Cost (Per Foot)	
		With Maintenance	Without Maintenance
Initial Construction	0	\$300.00	\$300.00
Crack Fill & Chip Seal	5	\$12.00	
Crack Fill & Chip Seal	10	\$12.00	
Crack Fill & Chip Seal	15	\$12.00	
Mill & Overlay	20	\$100.00	
Crack Seal	22	\$2.00	
Reconstruction	25		\$260.00
Chip Seal	25	\$10.00	
Crack Fill & Chip Seal	30	\$12.00	
Crack Fill & Chip Seal	35	\$12.00	
Mill & Overlay	40	\$100.00	
Crack Fill	42	\$2.00	
Chip Seal	45	\$10.00	
Salvage Value Adjustment	50	\$200.00	\$300.00
Life Cycle Cost Per Foot		\$784.00	\$860.00
Difference		(-) \$76.00	-

	Good Pavement Condition
	Fair Pavement Condition
	Poor Pavement Condition

\*Costs indicated above are based on typical costs for the area in 2020 dollars. Unit pricing per foot is based on an average 36-ft wide residential bituminous street pavement.

In this example, the overall life cycle costs for managing pavements with an active maintenance program results in a net savings in comparison to management without maintenance. In full disclosure, these costs are subjective and can vary significantly depending on many factors. Furthermore, the point at which a pavement has “failed” is subjective and will vary depending on the expectations of street users and City officials. The actual service life of any pavement is highly dependent on several factors and will vary from the scenarios presented in Table 1.

However, when holding all variables equal, the driving surface conditions are drastically improved when pavements are regularly addressed with preventative maintenance. It should also be noted that the additional reconstruction project required on the street without maintenance will require a major disruption to adjacent landowners for one construction season. In comparison, the street with regular maintenance will not require major disruption until after 50 years or more of service life.

### C. Findings

The bituminous streets in Hayfield were evaluated by visually observing the condition of the pavement surface. The pavement was rated using a numerical condition rating system for several types of pavement distress. The rating scale ranged from 10 for a newly surfaced street to 1 for a failed surface. Gravel surfaces were not included in this evaluation.

The pavement condition ratings are illustrated in *Appendix B-1*.

**Table 2**, below, shows a summary of typical recommended maintenance and rehabilitation options based on the current pavement condition rating.

<b>Table 2 – Pavement Conditional Ratings Description</b>		
<b>Conditional Rating</b>	<b>Condition Description</b>	<b>Typical Recommended Maintenance Activity</b>
7 – 10	Excellent to Good	Crack Fill & Seal Coat Program (every 5 years) <sup>1</sup>
5 – 6	Good to Fair	Mill & Overlay, Patching as needed
1 – 4	Fair to Very Poor	Full Depth Reconstruction

Note: Maximum recommended life of seal coat is 7-8 yrs.

**Table 3**, below, provides a summary of the overall pavement condition throughout the city.

<b>Table 3 – Pavement Conditional Ratings Summary</b>		
<b>Conditional Rating</b>	<b>Total Street Length (Miles)</b>	<b>Percentage of Total Miles</b>
7 – 10	3.3	35%
5 – 6	2.6	27%
1 – 4	3.6	38%
<b>Total</b>	<b>9.6</b>	<b>100%</b>
Gravel	1.6	-

As presented in Table 3, the City has 35% of streets in excellent to good condition (Rating 7 – 10). As discussed previously, the condition of these streets into the future is highly dependent on the City's ability to provide timely maintenance.

A smaller percentage (27%) of streets are designated as fair to good condition (Rating 5 – 6). These streets are beginning to deteriorate more rapidly. Preventative maintenance (such as seal coating and crack filling) within these streets will likely be costly and will not adequately address the needs of the street section. When considering options for pavement management alone, these streets are recommended for bituminous overlays with full depth patching, as needed.

A significant portion (38%) of the streets have a fair to poor rating due to their level of deterioration where neither seal coating nor overlays would be appropriate methods of rehabilitation. These streets are generally addressed through a full depth replacement of the pavement surface and aggregate base or other similar methods.

Approximately 1.6 miles of streets are gravel roads or alleys. Many of these segments are often in poor condition and require frequent grading and gravel replacement. The City may consider paving some of these surfaces at some point in the future to control maintenance costs associated with gravel. It is generally more cost effective to pave higher traffic volume alleys (downtown area) and less cost effective for low volume areas.

When prioritizing pavement management projects, it is important to first consider the streets in good conditions and continue with a regularly scheduled maintenance program. Once a seal coat and crack fill program is properly funded, a regular overlay and patching program can be funded. For most cities using this approach, these programs exhaust the street maintenance cash budget. As a result, the costlier reconstructions of heavily deteriorated streets are given a minimal amount of attention until a project can be financed for funded with



other alternative sources.

Prior to executing an effective pavement management plan, understanding the needs of underground public utility mains is crucial. In many cases, the needs of utilities will drastically change future pavement maintenance activities. The following section contains discussion on utility management, followed by recommendations for combining pavement and utility management into an effective infrastructure management program.

### III. UTILITY MANAGEMENT

#### A. Introduction

The following contains a brief review of the City of Hayfield's current sanitary collection system and water distribution pipe networks. The report does not address the condition of water storage tanks, wells, or treatment systems.

Over the past year, Bolton & Menk has been reviewing record drawing information for the sanitary and watermain pipe networks throughout the community. Information collected from these documents is summarized in this report. The following sections discuss the condition and needs of the water distribution and sanitary sewer pipe networks.

#### B. Watermain

The water distribution system within the City of Hayfield consists of pipe diameters between 4 inches and 12 inches in diameter. Pipe materials consist of mostly ductile iron pipe with a few segments of cast iron pipe. Most of the water pipe in Hayfield was installed after the 1970s after most communities switched to using ductile iron pipe. Generally, pipe installed prior to the 1970s is smaller diameter (4-inch to 6-inch) cast iron pipe.

While most of the pipe is ductile iron, there are some segments of this older cast iron pipe. Cast iron pipe tends to lose strength due to corrosion of pipe walls over time. Pipe which is severely corroded is susceptible to watermain breaks resulting in unplanned, costly repairs. In less severe cases, corrosion of the pipe can cause pin holes in pipe walls, leading to water loss within the system.

The City should begin the process of replacing small diameter and/or cast iron pipe within the existing water distribution system. Over time, the replacement of this pipe with new 8 inch or larger PVC or ductile iron pipe will reduce the occurrence of watermain breaks, decrease water loss, and provide increased hydraulic conductivity.

In many cases the replacement of watermain is most cost effective if completed with regularly scheduled street reconstruction projects. During these projects, the overlying pavement surface is already being replaced, which provides the opportunity to excavate and replace with new piping. This is also a good opportunity to replace water service lines and curb stops within the public right-of-way. Replacement of service lines during reconstructions allows the City to ensure that piping is buried to adequate depth for frost protection and curb stops are functional.

The layout of the existing water distribution system is illustrated in *Appendix B-2*.

#### C. Sanitary Sewer

The existing sanitary sewer collection system within Hayfield consists of mostly 8-inch through 12-inch diameter mainline pipe. Most of the sanitary collection system pipe materials installed prior to the 1970s consist of vitrified clay pipe (VCP). VCP sanitary sewer typically consists of short (3- to 5-foot) segments of pipe with cement mortar joints. Typically, VCP sanitary sewer is susceptible to increased groundwater infiltration into system, resulting in increased wastewater treatment costs, wastewater treatment permit violations, and increased potential for wastewater backups and emergency overflows during heavy rainfall events. In

areas with VCP sanitary main, it is common to find concrete block or brick manhole structures in use. These structures are also susceptible to groundwater infiltration.

The City of Hayfield will benefit from implementing a sanitary sewer rehabilitation and replacement plan. From a high-level planning standpoint, target areas of the system should generally include those with clay pipe sanitary main.

The layout of the existing sanitary collection system is illustrated in *Appendix B-3*.

Sanitary sewer can be replaced or rehabilitated using several different methods. In the most basic forms, these methods include either open excavation replacement or lining methods. If sanitary sewer replacement is planned with other street improvements, open excavation, removal of old piping and replacement with new pipe is the most cost-effective means of implementing improvements. In most cases, sanitary services are in similar or worse condition than the main located below the street. For this reason, replacement of sanitary service lines within the public right-of-way should also be planned with sanitary sewer improvement projects.

In other instances, lining methods can be used to rehabilitate existing mains. In most cases, lining is best utilized when there are few service connections and/or when mains are located in areas where surface excavations require costly challenges.

Over time, additional information on key problem areas can be added to the details of this report. Moving forward, the City should consider starting a regular televising and cleaning program. This form of inspection allows the City to prioritize sanitary sewer replacements in the future. More importantly, critical failures within the collection system can often be identified and addressed prior to the occurrence of backups. In most cases, Cities with televising and cleaning programs use around a 10-year cycle for all sanitary mains within the City. The City should also consider the implementing a sump pump inspection program. Regular inspection programs will better assure that few major clear water inflow contributors exist within the system over a long period of time.

## IV. EXECUTION

As discussed in the pavement management and utility management sections of this report, the infrastructure needs can be broken down into a few separate categories, as summarized in the table below.

Table 4 – Infrastructure Management Programs		
Improvement Type	Infrastructure Type	Goal
Seal Coat/Crack Fill	Pavement	Preserve condition of existing surface
Overlay & Patching	Pavement	Rehabilitate the existing surface
Full Reconstruction	Pavement	Replace the existing surface
	Watermain	Replace small diameter and/or cast-iron pipe
	Sanitary Sewer	Replace or Rehab clay (VCP) pipe

As provided above, infrastructure management within Hayfield can be divided into 4 separate programs including: Preventative Maintenance (Seal Coat & Crack Fill), Bituminous Overlay/Patching, Gravel Road Paving, and Full Reconstructions. Additional details for each program are included below.

### A. Seal Coat & Crack Fill Program

Regular seal coating and crack filling should be completed for all streets in good or better condition (Rating  $\geq 7$ ). These streets will only remain in their current condition with regular maintenance.

Streets to be considered for future seal coating and crack filling are illustrated in *Appendix B-4*. Planning level cost estimates for all streets in the seal coat and crack fill program are included in *Appendix C-1*.

**It is recommended that the City budget approximately \$44,000 annually for the seal coat and crack seal program.** This budget is based on the current street conditions and a 5-year cycle between new seal coat and crack fill applications. Over time, this annual budget for preventative maintenance will increase as more streets are overlaid or reconstructed. This budget includes the estimated cost for crack filling and seal coating only. Additional funding will be necessary for other street maintenance (pothole repairs, patching, etc.).

#### B. Overlay & Patching Program

A small portion of the existing streets have a current conditional rating which warrant bituminous overlays and partial pavement patching. These streets have the following in common:

- Pavement Conditional Rating of 5 or 6
- No public utilities below street or utilities below street in satisfactory condition

Please note that streets to be considered for a mill and overlay do not include those with known utility replacement needs below the pavement surface. Streets recommended for a bituminous overlay are illustrated in *Appendix B-4*. Planning level cost estimates are included in *Appendix C-2*.

**Currently, there is approximately \$840,000 worth of mill and overlay projects recommended.** The City may implement these improvements in phases; however, failure to address these streets within the next 5 to 10 years will likely result in deterioration of the pavement, requiring more robust repairs (such as a full reconstruction).

#### C. Reconstruction Program

Street and utility reconstruction projects are expensive and invasive. When planning for these projects, it is important that adequate funds are available. Proper timing of these projects will also ensure that a high degree of value with each project.

The Street Reconstruction Map is illustrated in *Appendix B-5*. These areas are characterized based on the need for a reconstruction. These categories include the following:

- *Reconstruction based on street and utility condition (High Value)*
  - Street condition requires overlay, patching or reconstruction
  - Sanitary and/or watermain requires replacement
- *Reconstruction based on unsatisfactory street condition only (High Value)*
  - Street requires reconstruction
  - Sanitary and/or watermain in satisfactory condition or does not exist
- *Reconstruction based on unsatisfactory utility condition only (Low Value)*
  - Street in good condition, no current need for reconstruction/rehabilitation
  - Sanitary and/or watermain requires replacement

Complete excavation and replacement of a pavement surface provides an opportunity for more cost-effective underground utility replacement. Streets requiring a reconstruction based on the poor conditions of both street and utility conditions will provide the most value to the City. A complete list of all streets currently recommended for reconstruction is provided in *Appendix C-3*.

Based on the review completed as part of this report, there are many needs throughout the City; however, approximately \$10 million are higher value projects which would not require premature replacement of pavement if completed in the near future. Although addressing the total needs of the City's infrastructure is financially infeasible within a standard capital improvement planning period of 5 to 10 years, it is important to note that the City will benefit from regular and steady progress. Over time, properly planned improvements will result in less costly maintenance and an overall increase to the quality of the street and utility systems.

The timing and size of each improvement project can be determined by the City's financial advisor when updating the Capital Improvement Plan. For the sake of discussion, most cities the size of Hayfield implement street and utility improvement projects between \$1 million and \$3 million. Projects smaller than \$1 million can sometimes result in increased costs, due to some of the fixed costs (i.e. mobilization, portions of design costs, etc.) associated with any project. Similarly, projects more than \$3 million usually result in a smaller pool of available bidders that are equipped to complete a larger project.

Although street improvement projects are most typically financed through the sale of bonds, other outside funding sources do arise from time to time. In some cases, these funding opportunities offer grants. The information contained in this report will allow the City to respond to funding/grant opportunities quickly.

## V. CONCLUSION & RECOMMENDATIONS

This report is intended to be used for high level pavement and utility management. The recommendations below summarize the key takeaways from this report.

- Continue an on-going **Seal Coat and Crack Fill Program** for streets in good or better condition (7-10 rating)
  - Current recommended budget: \$44,000/year
  - Preventative maintenance budgeting can be placed on a 5-year average rotation.
  - Budgeting for pavement management can be optimized by **aggressively targeting preservation improvements (Seal Coat and Crack Fill) first.**
- Begin **regularly scheduled Bituminous Overlay (and Patching) projects** for streets beginning to show signs of aging (5-6 rating)
  - Applies to street rating of 5 or 6.
  - Determine funding source for Overlay & Patching Program (Cash or Financing)
  - Complete recommended overlay projects within the next 5-10 years.
- Begin **regularly scheduled Street and Utility reconstruction projects**, as financially feasible.
  - When evaluating projects, consider needs of both pavement & utilities.
  - Update capital improvement plan and financing plan with City's financial advisor
  - Once Capital Improvement Plan is developed, prioritize streets with both pavement and utility needs for individual project selection.
- Information from **this report should be updated at least every five years**, or with every regularly scheduled reconstruction project, as part of the project selection process.

Information contained within this report is intended for reference in upcoming discussions with the City's financial advisor. At an upcoming meeting, we will present the findings of this report and

## Appendix A:

- Pavement Management Terminology

## **Pavement Management Terminology**

**Crack Fill** – A crack fill repair consists of routing cracks to create a reservoir that is filled with a hot sealant. This procedure reduces the amount of moisture and debris entering the pavement sub-grade through surface cracks. This protection provides for a more stable roadway base and can reduce pavement breakup and potholes due to the effects of freeze/thaw cycles. The City has used crack filling in the past to address pavement cracking. Crack filling is effective for a few years and then must be repeated. It is, however, a very effective way for lengthening the pavement life.

**Seal Coat** – A seal coat consists of an application of bituminous material on the roadway followed by a coating of fine aggregate. The aggregate (or “chip”) is typically left on the roadway for a period of time to allow for traffic to drive on it, before a road sweeper is used to remove any excess and loose aggregate. This treatment method is used to minimize the infiltration of water through the surface, reduce surface oxidation, and potentially improve skid resistance/surface roughness of the pavement. This treatment provides for an extension of the pavement surface life by minimizing the effects of the sun and weather on the existing bituminous material and re-establishing a wearing surface with a desired level of friction. This approach will not prevent ultimate pavement failure due to age or poor sub-grade conditions. The life expectancy of a seal coat is approximately 6 to 8 years. It is also recommended to seal coat new pavements within 6 to 8 years of initial construction.

**Patching** – Provides for the correction of localized pavement deterioration and is generally done to “buy time” until a rehabilitation or reconstruction procedure can be done. Street patching is generally cost effective on small sections of roadway that have experienced pavement failure due to a soft base material or other contributing conditions. A roadway’s need for patching generally increases each year and therefore the annual costs of street patching exceed the cost of major maintenance procedures at some point. Patching also provides for a smoother driving surface and extends the life of the pavement. From past practice, we understand the City has used patching most commonly to repair failed areas.

**Edge Mill and Overlay, Mill and Overlay or Simple Overlay** – A mill and overlay includes the milling (grinding and removal) of the upper 1.5 to 3 inches of pavement and placement of a new layer of asphalt pavement to maintain or increase from pre-existing thicknesses. In urban sections (streets with curb & gutter), edge milling is done adjacent to the curb and gutter to maintain the current surface elevations and then a pavement overlay is placed. In some situations, the City may want to consider a mill and inlay approach which would result in the removal, by milling, of a thin layer of pavement in the driving lanes and replacement of the bituminous layer.

Mill and overlay treatment can extend the life of the roadway by adding additional bituminous material to the surface, reestablishing the cross slope of the road to promote drainage and create a smooth driving surface. A mill and overlay does not address existing pavement cracking in the underlying pavement. Generally, these cracks will propagate through (reflective cracking) the new overlay pavement appearing in the new surface in as soon as 6 months but more typically within 1 to 3 years, at which point crack sealing would be necessary. The life expectancy of a mill and overlay can range from approximately 10 to 20 years, before the pavement has reached the original deficient condition. The life expectancy depends on existing pavement structure, traffic and other factors.

**Full Reconstruction** – A street reconstruction includes the complete removal of existing layers of asphalt and aggregate base and replacement with new base and pavement. In many cases, a portion of the existing subgrade soils are removed and replaced with a structural sand/rock layer (subgrade correction), and portions or all of the curb and gutter may be replaced in urban sections. This option requires the largest investment and is typically applied in areas where pavements are showing significant areas of major distress or the underlying municipal utility conditions warrant replacement. However, this option provides a period of 20-30 years before major rehabilitation is required.

## Appendix B: Figures

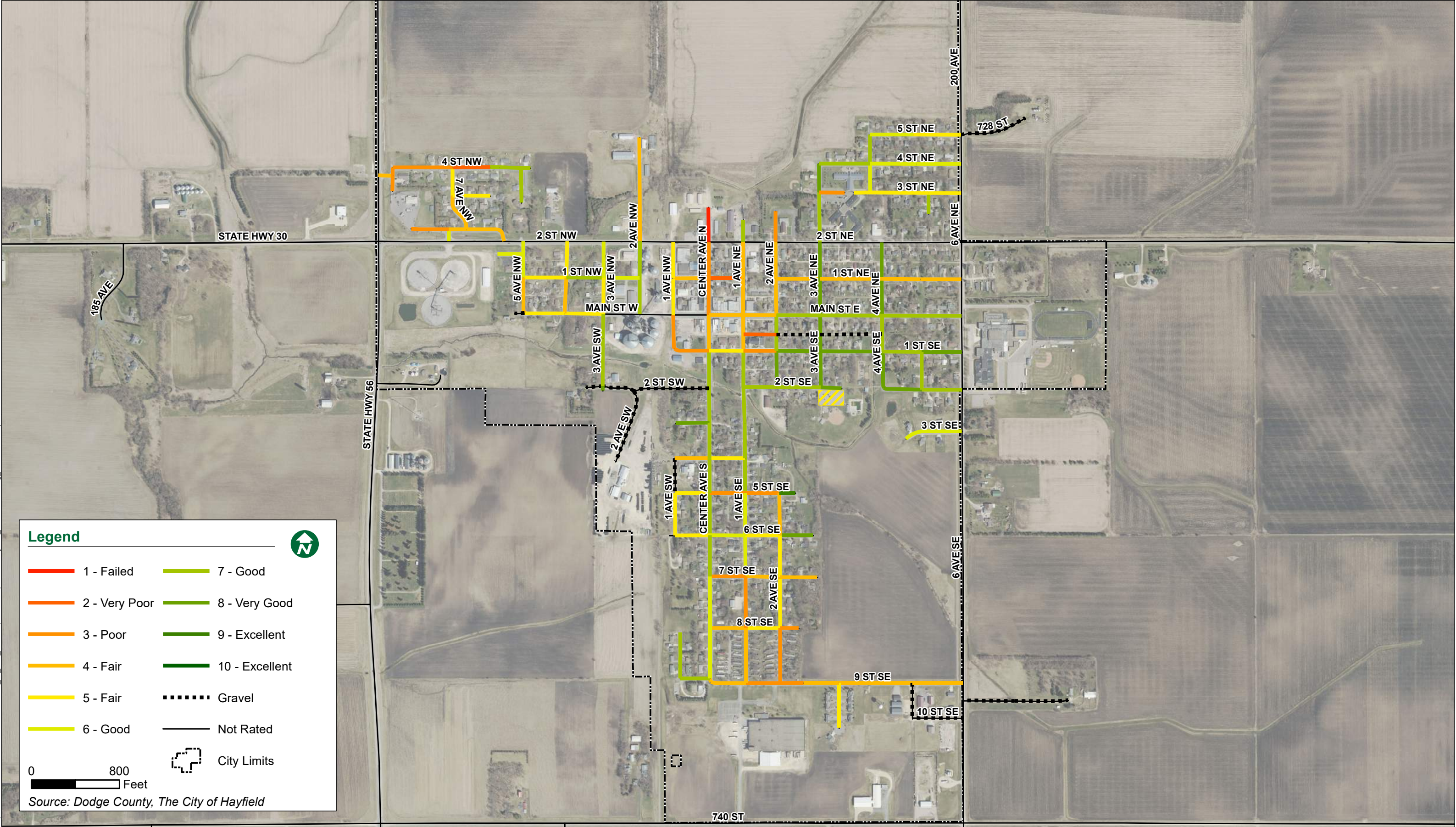




Pavement Ratings

Hayfield, MN

September 2020



Legend

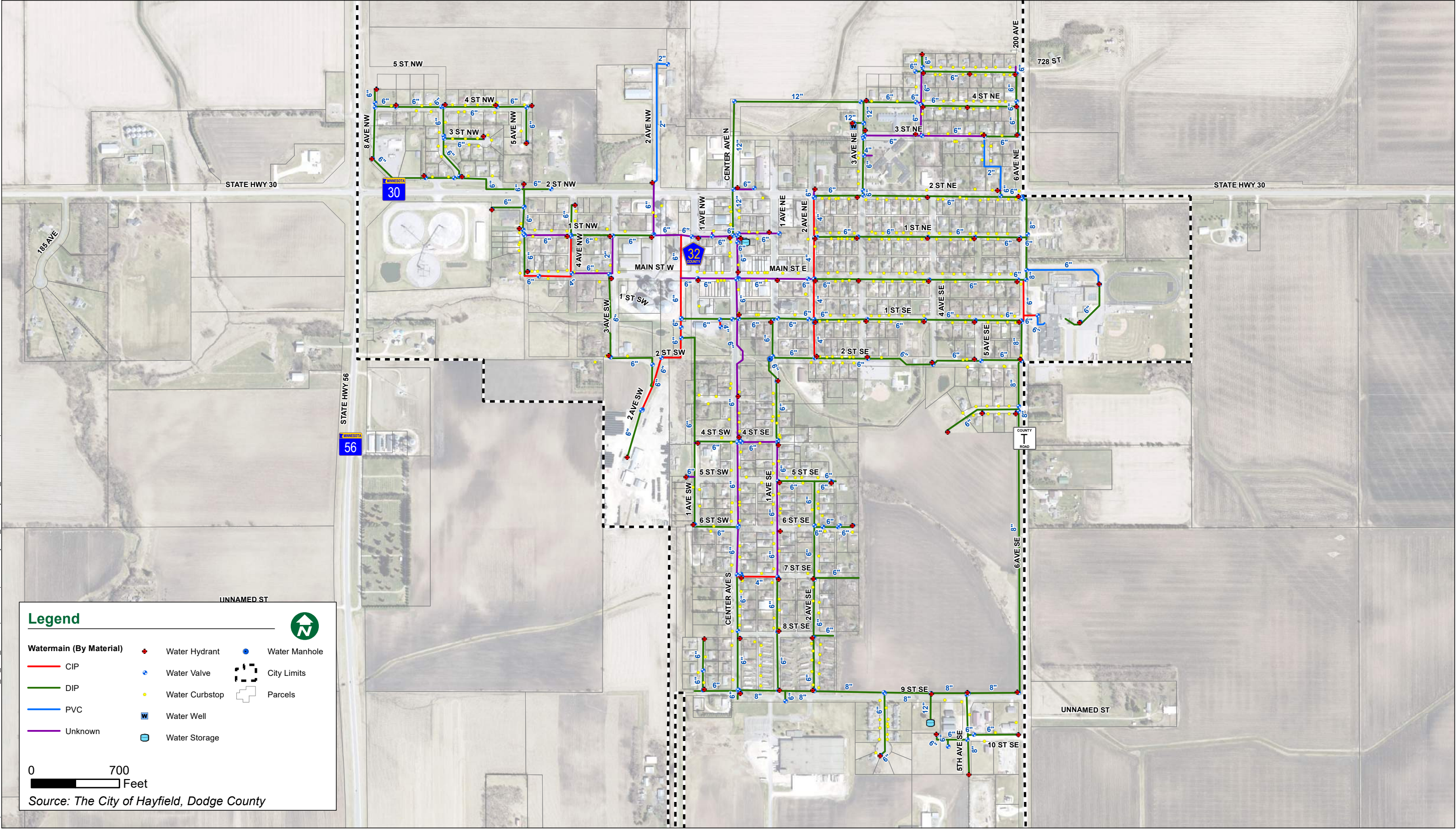
- |               |                |
|---------------|----------------|
| 1 - Failed    | 7 - Good       |
| 2 - Very Poor | 8 - Very Good  |
| 3 - Poor      | 9 - Excellent  |
| 4 - Fair      | 10 - Excellent |
| 5 - Fair      | Gravel         |
| 6 - Good      | Not Rated      |

0 800 Feet



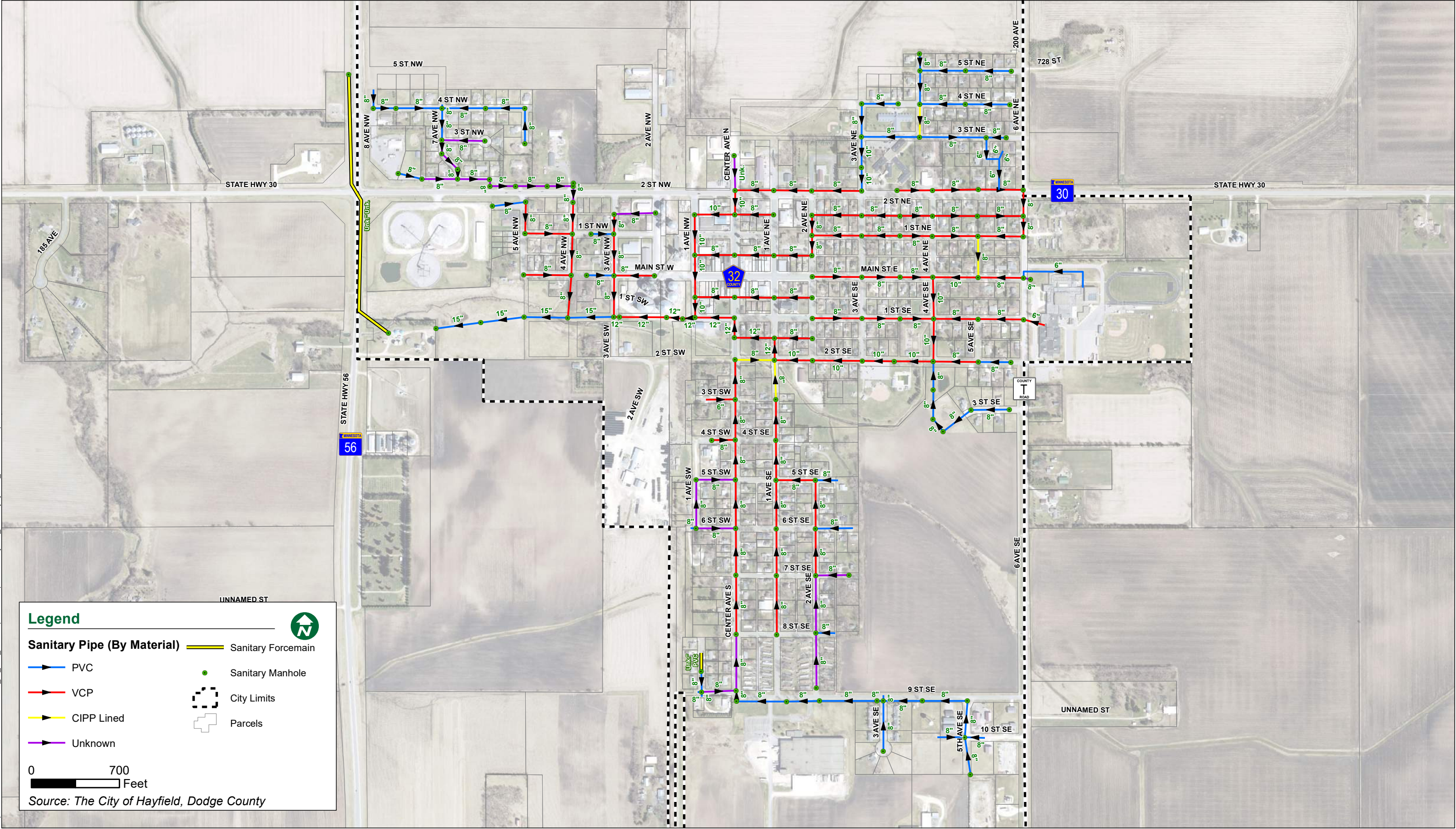
Source: Dodge County, The City of Hayfield





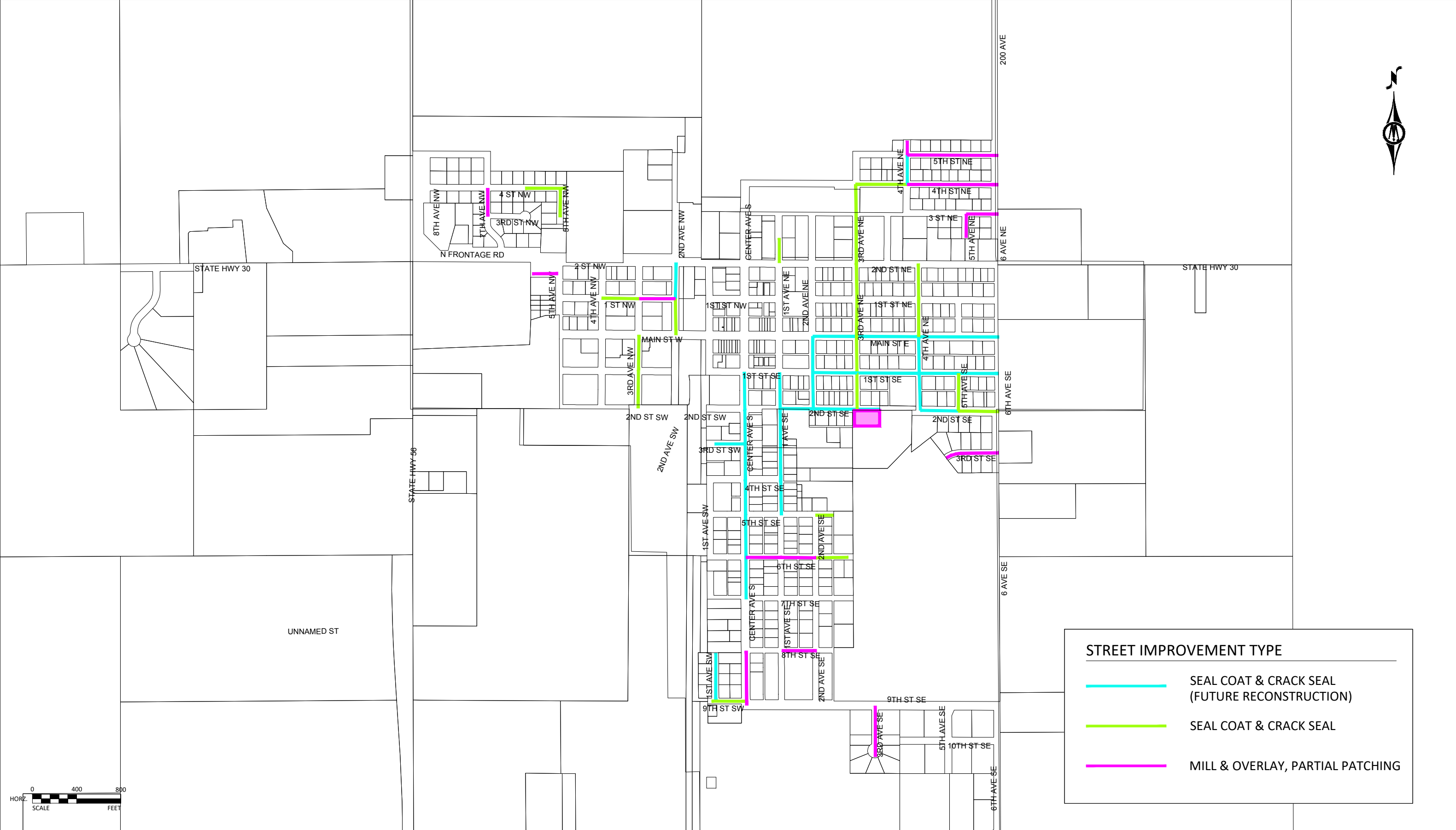
Map Document: \\arcserver1\GIS\HAYFIELD\_CI\_MN\Basemap\ESRI\Maps\2020\Hayfield\_WaterSystem\_11x17L.mxd | Date Saved: 9/28/2020 11:00:46 AM





Map Document: \\arcserver1\GIS\HAYFIELD\_CI\_MN\_BaseMap\ESRI\Map\2020\Hayfield\_SanitarySystem\_11x17L.mxd | Date Saved: 11/9/2020 8:42:08 AM

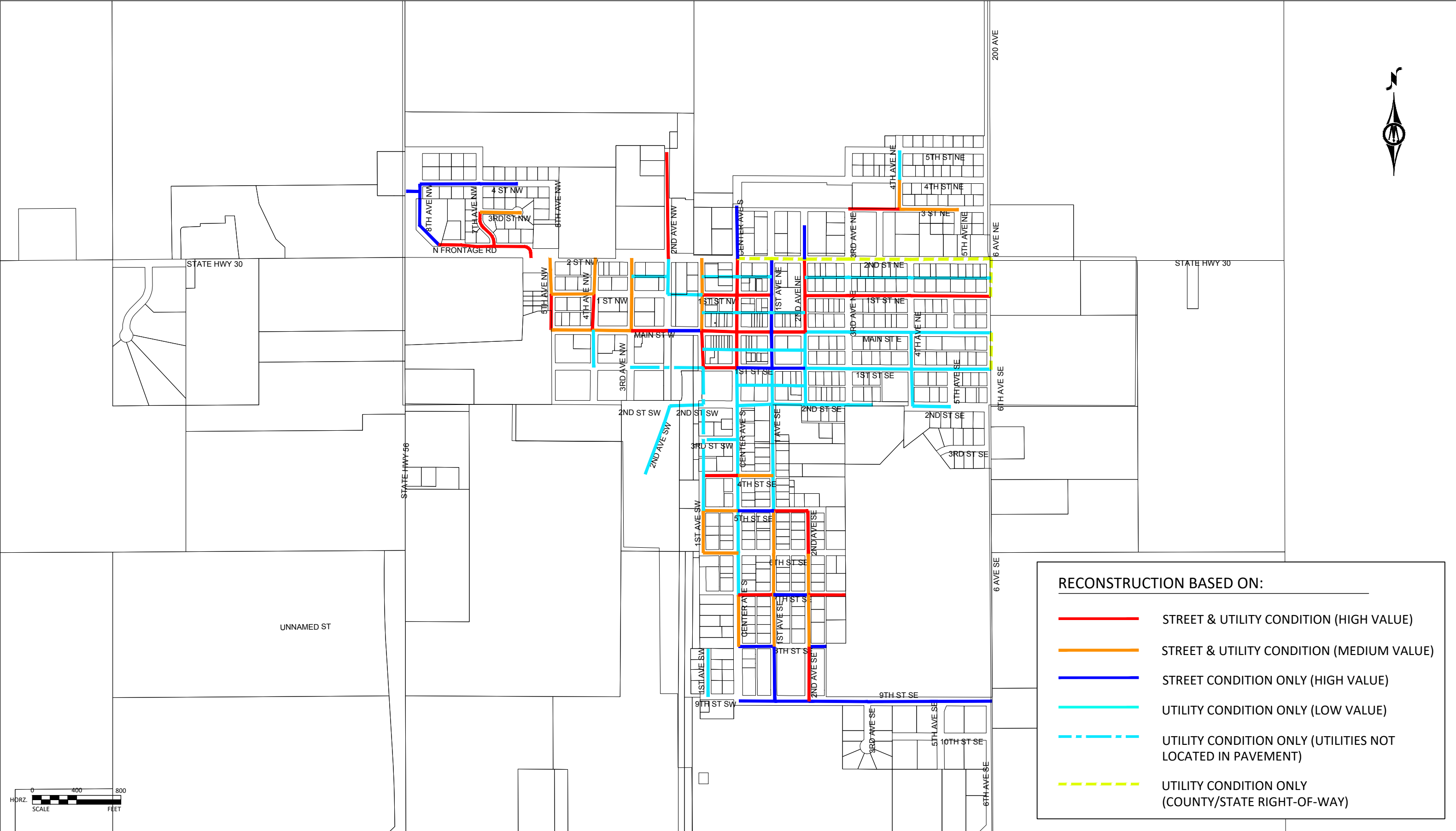




STREET IMPROVEMENT TYPE

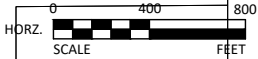
	SEAL COAT & CRACK SEAL (FUTURE RECONSTRUCTION)
	SEAL COAT & CRACK SEAL
	MILL & OVERLAY, PARTIAL PATCHING

H:\HAYFIELD\_CI\_MN\H14120395\CAD\C3D\FIGR-121668-RECONSTRUCTION MAP.dwg 11/11/2020 2:29:13 PM



RECONSTRUCTION BASED ON:

- STREET & UTILITY CONDITION (HIGH VALUE)
- STREET & UTILITY CONDITION (MEDIUM VALUE)
- STREET CONDITION ONLY (HIGH VALUE)
- UTILITY CONDITION ONLY (LOW VALUE)
- UTILITY CONDITION ONLY (UTILITIES NOT LOCATED IN PAVEMENT)
- UTILITY CONDITION ONLY (COUNTY/STATE RIGHT-OF-WAY)



H:\HAYFIELD\_GI\_MN\H14120395\CAD\FIGR-121668-RECONSTRUCTION MAP.dwg 11/11/2020 2:23:57 PM

## Appendix C: Cost Estimates

# APPENDIX C-1

SEAL COAT/CRACK FILL PROJECTS (by street segment)							
INFRASTRUCTURE MANAGEMENT PLAN							
CITY OF HAYFIELD, MN							
Street	From	To	Street Length	Street Width	Pavement Area	Seal Coat & Crack Fill Estimated Cost	Street Rating
			(Ft)	(Ft)	(Sq. Yd)	\$3.25 Per Sq. Yd	
East-West Streets							
4TH STREET NW	MIDBLOCK	4TH AVENUE NW	370	36	1360	\$4,420.00	7
4TH STREET NE	3RD AVENUE NE	4TH AVENUE NE	466	36	1710	\$5,557.50	7
1ST STREET NW	4TH AVENUE NW	3RD AVENUE NW	340	36	1250	\$4,062.50	7
MAIN STREET W	2ND AVENUE NE	3RD AVENUE NE	395	60	2510	\$8,157.50	7
MAIN STREET W	3RD AVENUE NE	4TH AVENUE NE	565	60	3580	\$11,635.00	7
MAIN STREET W	4TH AVENUE NE	6TH AVENUE NE	730	36	2680	\$8,710.00	7
1ST STREET SE	2ND AVENUE SE	3RD AVENUE SE	400	36	1470	\$4,777.50	7
1ST STREET SE	3RD AVENUE SE	4TH AVENUE SE	565	36	2080	\$6,760.00	8
1ST STREET SE	4TH AVENUE SE	5TH AVENUE SE	360	36	1320	\$4,290.00	7
1ST STREET SE	5TH AVENUE SE	6TH AVENUE SE	360	36	1320	\$4,290.00	8
2ND STREET SE	1ST AVENUE SE	2ND AVENUE SE	300	36	1100	\$3,575.00	7
2ND STREET SE	2ND AVENUE SE	3RD AVENUE SE	400	36	1470	\$4,777.50	7
2ND STREET SE	3RD AVENUE SE	WEST TERMINUS	210	36	770	\$2,502.50	8
2ND STREET SE	4TH AVENUE SE	5TH AVENUE SE	345	36	1270	\$4,127.50	8
2ND STREET SE	5TH AVENUE SE	6TH AVENUE SE	370	36	1360	\$4,420.00	7
3RD STREET SW	WEST TERMINUS	CENTER AVENUE S	275	36	1010	\$3,282.50	8
5TH STREET SE	2ND AVENUE SE	EAST TERMINUS	165	36	610	\$1,982.50	9
6TH STREET SE	2ND AVENUE SE	EAST TERMINUS	295	36	1090	\$3,542.50	8
9TH STREET SW	1ST AVENUE SW	CENTER AVENUE S	320	36	1180	\$3,835.00	7


**BOLTON  
& MENK**
**SEAL COAT/CRACK FILL PROJECTS (by street segment)**
**INFRASTRUCTURE MANAGEMENT PLAN**

CITY OF HAYFIELD, MN

Street	From	To	Street Length	Street Width	Pavement Area	Seal Coat & Crack Fill Estimated Cost	Street Rating
			(Ft)	(Ft)	(Sq. Yd)	\$3.25 Per Sq. Yd	
North-South Streets							
3RD AVENUE SW	2ND STREET SW	1ST STREET SE	345	28	960	\$3,120.00	7
3RD AVENUE SW	1ST STREET SE	MAIN STREET W	320	28	890	\$2,892.50	7
2ND AVENUE NW	MAIN STREET W	1ST STREET NW	330	40	1360	\$4,420.00	7
2ND AVENUE NW	1ST STREET NW	2ND STREET NW	325	40	1340	\$4,355.00	7
1ST AVENUE SW	9TH STREET SW	NORTH TERMINUS	435	36	1600	\$5,200.00	7
CENTER AVENUE S	7TH STREET S	6TH STREET S	380	40	1570	\$5,102.50	7
CENTER AVENUE S	6TH STREET S	5TH STREET S	385	40	1590	\$5,167.50	7
CENTER AVENUE S	5TH STREET S	4TH STREET S	320	40	1320	\$4,290.00	7
CENTER AVENUE S	4TH STREET S	3RD STREET S	325	40	1340	\$4,355.00	7
CENTER AVENUE S	3RD STREET S	2ND STREET S	310	40	1280	\$4,160.00	7
CENTER AVENUE S	2ND STREET S	1ST STREET S	345	40	1420	\$4,615.00	7
1ST AVENUE SE	5TH STREET SE	4TH STREET SE	320	36	1180	\$3,835.00	7
1ST AVENUE SE	4TH STREET SE	2ND STREET SE	645	36	2370	\$7,702.50	7
1ST AVENUE SE	2ND STREET SE	1ST STREET SE	325	36	1200	\$3,900.00	7
1ST AVENUE NE	2ND STREET NE	NORTH TERMINUS	225	36	830	\$2,697.50	7
2ND AVENUE SE	2ND STREET SE	1ST STREET SE	330	40	1360	\$4,420.00	8
2ND AVENUE SE	1ST STREET SE	MAIN STREET E	330	40	1360	\$4,420.00	7
3RD AVENUE SE	2ND STREET SE	1ST STREET SE	330	40	1360	\$4,420.00	8
3RD AVENUE SE	1ST STREET SE	MAIN STREET E	335	40	1380	\$4,485.00	8
3RD AVENUE NE	MAIN STREET E	1ST STREET NE	330	40	1360	\$4,420.00	8
3RD AVENUE NE	1ST STREET NE	2ND STREET NE	330	40	1360	\$4,420.00	8
3RD AVENUE NE	2ND STREET NE	3RD STREET NE	455	40	1880	\$6,110.00	7
3RD AVENUE NE	3RD STREET NE	4TH STREET NE	260	36	960	\$3,120.00	8
4TH AVENUE SE	2ND STREET SE	1ST STREET SE	335	36	1230	\$3,997.50	8
4TH AVENUE SE	1ST STREET SE	MAIN STREET E	330	36	1210	\$3,932.50	7
4TH AVENUE NE	MAIN STREET E	1ST STREET NE	330	36	1210	\$3,932.50	8
4TH AVENUE NE	1ST STREET NE	2ND STREET NE	330	36	1210	\$3,932.50	8
4TH AVENUE NE	4TH STREET NE	5TH STREET NE	265	36	980	\$3,185.00	7
5TH AVENUE NE	2ND STREET SE	1ST STREET SE	340	36	1250	\$4,062.50	7
Total Estimated Cost Per 5-Year Life Cycle						\$219,375.00	
Annual Seal Coating Cost						\$44,000.00	



**BOLTON  
& MENK**

## MILL & OVERLAY PROJECTS (by street segment)

INFRASTRUCTURE MANAGEMENT PLAN

CITY OF HAYFIELD, MN

Street	From	To	Street Length (Ft)	Street Width (Ft)	Pavement Area (Sq. Yd)	Mill & Overlay, Partial Patch Estimated Cost \$32.00 Per Sq. Yd	Street Rating
East-West Streets							
5TH STREET NE	4TH AVENUE NE	6TH AVENUE NE	825	36	3300	\$105,600.00	5
4TH STREET NE	4TH AVENUE NE	6TH AVENUE NE	822	36	3288	\$105,216.00	6
3RD STREET NE	5TH AVENUE NE	6TH AVENUE NE	290	36	1160	\$37,120.00	5
FRONTAGE ROAD	WEST TERMINUS	5TH AVENUE	250	36	1000	\$32,000.00	6
1ST STREET NW	3RD AVENUE NW	2ND AVENUE NW	330	36	1320	\$42,240.00	6
POOL PARKING LOT	--	--	--	--	3510	\$112,320.00	5
3RD STREET SE	WEST TERMINUS	6TH AVENUE SE	485	36	1940	\$62,080.00	6
6TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	320	36	1280	\$40,960.00	6
6TH STREET SE	1ST AVENUE SE	2ND AVENUE SE	315	36	1260	\$40,320.00	5
8TH STREET SE	1ST AVENUE SE	2ND AVENUE SE	315	36	1260	\$40,320.00	5
7TH AVENUE NW	3RD STREET NW	4TH STREET NW	260	36	1040	\$33,280.00	5
CENTER AVENUE S	9TH STREET S	8TH STREET S	495	40	2200	\$70,400.00	6
3RD AVENUE SE	SOUTH TERMINUS	9TH STREET SE	520	36	2080	\$66,560.00	5
4TH AVENUE NE	5TH STREET NE	NORTH TERMINUS	130	36	520	\$16,640.00	6
5TH AVENUE NE	SOUTH TERMINUS	3RD STREET NE	275	36	1100	\$35,200.00	5
Total Estimated Mill & Overlay Costs						\$840,256.00	

Notes:

- 1) Refer to attached Street Maintenance Map for illustrations of referenced projects.
- 2) Costs presented above are in 2020 dollars including estimated design and construction.
- 3) Costs based on 2" mill & overlay with 15% of surface area requiring a full depth pavement patch, contingency and engineering.
- 4) Pricing for mill & overlay projects is highly dependent on bituminous prices.



RECONSTRUCTION PROJECTS (by street segment)																	
INFRASTRUCTURE MANAGEMENT PLAN																	
CITY OF HAYFIELD, MN																	
Street	From	To	Improvement Length (ft) & Cost												Estimated Total Project Cost	Reconstruction Based On:	
		Improvement	Street & Site Improvements					Utility Improvements									
			28' Street w/Curb	36' Street w/Curb	40' Street w/Curb	60' Street w/Curb	20' Alley	Total Street Cost	Storm Sewer		Sanitary Sewer		Watermain	Watermain Cost			
									\$140.00		\$150.00		\$190.00				
		Cost per Lineal Foot	\$460.00	\$520.00	\$580.00	\$890.00	\$220.00										
East-West Streets (page 1)																	
4TH STREET NW	HWY 56	8TH AVENUE NW	0	122	0	0	0	\$63,440.00	0	\$0.00	0	\$0.00	0	\$0.00	\$63,440.00		
4TH STREET NW	8TH AVENUE NW	7TH AVENUE NW	0	543	0	0	0	\$282,360.00	0	\$0.00	0	\$0.00	0	\$0.00	\$282,360.00		
4TH STREET NW	7TH AVENUE NW	MIDBLOCK	0	340	0	0	0	\$176,800.00	0	\$0.00	0	\$0.00	0	\$0.00	\$176,800.00		
3RD STREET NW*	7TH AVENUE NW	WEST TERMINAL	0	435	0	0	0	\$226,200.00	435	\$60,900.00	375	\$56,250.00	0	\$0.00	\$343,350.00		
3RD STREET NE	3RD AVENUE NE	4TH AVENUE NE	0	460	0	0	0	\$239,200.00	460	\$64,400.00	460	\$69,000.00	460	\$87,400.00	\$460,000.00		
3RD STREET NE	4TH AVENUE NE	5TH AVENUE NE	0	540	0	0	0	\$280,800.00	540	\$75,600.00	0	\$0.00	540	\$102,600.00	\$459,000.00		
N FRONTAGE ROAD*	8TH AVENUE NW	7TH AVE NW	0	400	0	0	0	\$208,000.00	400	\$56,000.00	400	\$60,000.00	0	\$0.00	\$324,000.00		
N FRONTAGE ROAD*	7TH AVE NW	HWY 30	0	560	0	0	0	\$291,200.00	560	\$78,400.00	560	\$84,000.00	0	\$0.00	\$453,600.00		
HWY 30	CENTER AVENUE	1ST AVENUE NE	0	310	0	0	0	Street Costs Dependant on Cooperative Agreement with State	0	Storm Sewer Costs Dependant on Cooperative Agreement with State	310	\$46,500.00	0	\$0.00	\$46,500.00		
HWY 30	1ST AVENUE NE	2ND AVENUE NE	0	300	0	0	0		0		300	\$45,000.00	0	\$0.00	\$45,000.00		
HWY 30	2ND AVENUE NE	3RD AVENUE NE	0	400	0	0	0		0		400	\$60,000.00	0	\$0.00	\$60,000.00		
HWY 30	3RD AVENUE NE	4TH AVENUE NE	0	560	0	0	0		0		280	\$42,000.00	0	\$0.00	\$42,000.00		
HWY 30	4TH AVENUE NE	6TH AVENUE NE	0	730	0	0	0		0		730	\$109,500.00	0	\$0.00	\$109,500.00		
ALLEY (HWY 30-1ST)	3RD AVENUE NW	2ND AVENUE NW	0	0	0	0	335	\$73,700.00	0	\$0.00	335	\$50,250.00	0	\$0.00	\$123,950.00		
ALLEY (HWY 30-1ST)	1ST AVENUE NW	CENTER AVENUE	0	0	0	0	0	\$0.00	0	\$0.00	300	\$45,000.00	0	\$0.00	\$45,000.00		
ALLEY (HWY 30-1ST)	CENTER AVENUE	1ST AVENUE NE	0	0	0	0	310	\$68,200.00	0	\$0.00	310	\$46,500.00	0	\$0.00	\$114,700.00		
ALLEY (HWY 30-1ST)	2ND AVENUE NE	3RD AVENUE NE	0	0	0	0	400	\$88,000.00	0	\$0.00	400	\$60,000.00	0	\$0.00	\$148,000.00		
ALLEY (HWY 30-1ST)	3RD AVENUE NE	4TH AVENUE NE	0	0	0	0	560	\$123,200.00	0	\$0.00	560	\$84,000.00	0	\$0.00	\$207,200.00		
ALLEY (HWY 30-1ST)	4TH AVENUE NE	6TH AVENUE NE	0	0	0	0	730	\$160,600.00	0	\$0.00	730	\$109,500.00	0	\$0.00	\$270,100.00		
1ST STREET NW	5TH AVENUE NW	4TH AVENUE NW	0	385	0	0	0	\$200,200.00	385	\$53,900.00	385	\$57,750.00	385	\$73,150.00	\$385,000.00		
1ST STREET NW	2ND AVENUE NW	1ST AVENUE NW	0	0	0	0	0	\$0.00	0	\$0.00	0	\$0.00	320	\$60,800.00	\$60,800.00		
1ST STREET NW	1ST AVENUE NW	CENTER AVENUE	0	0	315	0	0	\$182,700.00	315	\$44,100.00	0	\$0.00	315	\$59,850.00	\$286,650.00		
1ST STREET NE	CENTER AVENUE	1ST AVENUE NE	0	0	315	0	0	\$182,700.00	315	\$44,100.00	0	\$0.00	315	\$59,850.00	\$286,650.00		
1ST STREET NE	2ND AVENUE NE	3RD AVENUE NE	0	400	0	0	0	\$208,000.00	400	\$56,000.00	400	\$60,000.00	0	\$0.00	\$324,000.00		
1ST STREET NE	3RD AVENUE NE	4TH AVENUE NE	0	560	0	0	0	\$291,200.00	560	\$78,400.00	560	\$84,000.00	0	\$0.00	\$453,600.00		
1ST STREET NE	4TH AVENUE NE	6TH AVENUE NE	0	720	0	0	0	\$374,400.00	720	\$100,800.00	720	\$108,000.00	0	\$0.00	\$583,200.00		
ALLEY (1ST N-MAIN)	1ST AVENUE NE	CENTER AVENUE	0	0	0	0	320	\$70,400.00	0	\$0.00	320	\$48,000.00	0	\$0.00	\$118,400.00		
ALLEY (1ST N-MAIN)	CENTER AVENUE	1ST AVENUE NE	0	0	0	0	315	\$69,300.00	0	\$0.00	315	\$47,250.00	0	\$0.00	\$116,550.00		
ALLEY (1ST N-MAIN)	1ST AVENUE NE	2ND AVENUE NE	0	0	0	0	305	\$67,100.00	0	\$0.00	305	\$45,750.00	0	\$0.00	\$112,850.00		
MAIN STREET W	5TH AVENUE NW	4TH AVENUE NW	0	0	375	0	0	\$217,500.00	375	\$52,500.00	375	\$56,250.00	375	\$71,250.00	\$397,500.00		
MAIN STREET W	4TH AVENUE NW	3RD AVENUE NW	0	0	355	0	0	\$205,900.00	355	\$49,700.00	0	\$0.00	355	\$67,450.00	\$323,050.00		
MAIN STREET W	3RD AVENUE NW	2ND AVENUE NW	0	0	335	0	0	\$194,300.00	335	\$46,900.00	335	\$50,250.00	0	\$0.00	\$291,450.00		
MAIN STREET W	2ND AVENUE NW	1ST AVENUE NW	0	0	300	0	0	\$174,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$174,000.00		
MAIN STREET W	1ST AVENUE NW	CENTER AVENUE	0	0	0	320	0	\$284,800.00	320	\$44,800.00	0	\$0.00	320	\$60,800.00	\$390,400.00		
MAIN STREET W	CENTER AVENUE	1ST AVENUE NE	0	0	0	315	0	\$280,350.00	315	\$44,100.00	0	\$0.00	315	\$59,850.00	\$384,300.00		
MAIN STREET W	1ST AVENUE NE	2ND AVENUE NE	0	0	0	305	0	\$271,450.00	305	\$42,700.00	0	\$0.00	305	\$57,950.00	\$372,100.00		
MAIN STREET W	2ND AVENUE NE	3RD AVENUE NE	0	0	395	0	0	\$229,100.00	395	\$55,300.00	395	\$59,250.00	0	\$0.00	\$343,650.00		
MAIN STREET W	3RD AVENUE NE	4TH AVENUE NE	0	0	565	0	0	\$327,700.00	565	\$79,100.00	565	\$84,750.00	0	\$0.00	\$491,550.00		
MAIN STREET W	4TH AVENUE NE	6TH AVENUE NE	0	0	730	0	0	\$423,400.00	730	\$102,200.00	730	\$109,500.00	0	\$0.00	\$635,100.00		

RECONSTRUCTION PROJECTS (by street segment)																	
INFRASTRUCTURE MANAGEMENT PLAN																	
CITY OF HAYFIELD, MN																	
Street	From	To	Improvement Length (ft) & Cost												Estimated Total Project Cost	Reconstruction Based On:	
		Improvement	Street & Site Improvements						Utility Improvements							Utility Condition	Street Condition
			28' Street w/Curb	36' Street w/Curb	40' Street w/Curb	60' Street w/Curb	20' Alley	Total Street Cost	Storm Sewer		Sanitary Sewer		Watermain	Watermain Cost			
									\$140.00		\$150.00		\$190.00				
Cost per Lineal Foot	\$460.00	\$520.00	\$580.00	\$890.00	\$220.00			Storm Sewer Cost									
East-West Streets (page 2)																	
ALLEY (MAIN-1ST S)	1ST AVENUE NE	CENTER AVENUE	0	0	0	0	300	\$66,000.00	0	\$0.00	300	\$45,000.00	0	\$0.00	\$111,000.00		
ALLEY (MAIN-1ST S)	CENTER AVENUE	1ST AVENUE NE	0	0	0	0	320	\$70,400.00	0	\$0.00	320	\$48,000.00	0	\$0.00	\$118,400.00		
ALLEY (MAIN-1ST S)	1ST AVENUE NE	2ND AVENUE NE	0	0	0	0	300	\$66,000.00	0	\$0.00	300	\$45,000.00	0	\$0.00	\$111,000.00		
SANITARY CONNECTION	3RD AVENUE SW	1ST AVENUE SW	0	635	0	0	0	\$330,200.00	635	\$88,900.00	635	\$95,250.00	0	\$0.00	\$514,350.00		
1ST STREET SW	1ST AVENUE NW	CENTER AVENUE S	0	300	0	0	0	\$156,000.00	300	\$42,000.00	300	\$45,000.00	0	\$0.00	\$243,000.00		
1ST STREET SE	CENTER AVENUE S	1ST AVENUE SE	0	320	0	0	0	\$166,400.00	0	\$0.00	0	\$0.00	0	\$0.00	\$166,400.00		
1ST STREET SE	1ST AVENUE SE	2ND AVENUE SE	0	0	300	0	0	\$174,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$174,000.00		
1ST STREET SE	2ND AVENUE SE	3RD AVENUE SE	0	400	0	0	0	\$208,000.00	400	\$56,000.00	400	\$60,000.00	0	\$0.00	\$324,000.00		
1ST STREET SE	3RD AVENUE SE	4TH AVENUE SE	0	565	0	0	0	\$293,800.00	565	\$79,100.00	565	\$84,750.00	0	\$0.00	\$457,650.00		
1ST STREET SE	4TH AVENUE SE	5TH AVENUE SE	0	360	0	0	0	\$187,200.00	360	\$50,400.00	360	\$54,000.00	0	\$0.00	\$291,600.00		
1ST STREET SE	5TH AVENUE SE	6TH AVENUE SE	0	360	0	0	0	\$187,200.00	360	\$50,400.00	360	\$54,000.00	0	\$0.00	\$291,600.00		
ALLEY (1ST S - 2ND S)	CENTER AVENUE	1ST AVENUE NE	0	0	0	0	320	\$70,400.00	0	\$0.00	320	\$48,000.00	0	\$0.00	\$118,400.00		
ALLEY (1ST S - 2ND S)	1ST AVENUE NE	2ND AVENUE NE	0	0	0	0	300	\$66,000.00	0	\$0.00	300	\$45,000.00	0	\$0.00	\$111,000.00		
2ND STREET SE	1ST AVENUE SE	2ND AVENUE SE	0	300	0	0	0	\$156,000.00	300	\$42,000.00	300	\$45,000.00	300	\$57,000.00	\$300,000.00		
2ND STREET SE	2ND AVENUE SE	3RD AVENUE SE	0	400	0	0	0	\$208,000.00	400	\$56,000.00	400	\$60,000.00	0	\$0.00	\$324,000.00		
2ND STREET SE	3RD AVENUE SE	WEST TERMINUS	0	210	0	0	0	\$109,200.00	210	\$29,400.00	565	\$84,750.00	0	\$0.00	\$223,350.00		
2ND STREET SE	4TH AVENUE SE	5TH AVENUE SE	0	345	0	0	0	\$179,400.00	345	\$48,300.00	345	\$51,750.00	0	\$0.00	\$279,450.00		
3RD STREET SW	WEST TERMINUS	CENTER AVENUE S	0	275	0	0	0	\$143,000.00	275	\$38,500.00	200	\$30,000.00	0	\$0.00	\$211,500.00		
4TH STREET SW	1ST AVENUE SW	CENTER AVENUE S	0	310	0	0	0	\$161,200.00	310	\$43,400.00	250	\$37,500.00	0	\$0.00	\$242,100.00		
4TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	0	320	0	0	0	\$166,400.00	320	\$44,800.00	0	\$0.00	320	\$60,800.00	\$272,000.00		
5TH STREET SE	1ST AVENUE SW	CENTER AVENUE S	0	315	0	0	0	\$163,800.00	315	\$44,100.00	315	\$47,250.00	0	\$0.00	\$255,150.00		
5TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	0	325	0	0	0	\$169,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$169,000.00		
5TH STREET SE	1ST AVENUE SE	2ND AVENUE SE	0	310	0	0	0	\$161,200.00	310	\$43,400.00	310	\$46,500.00	0	\$0.00	\$251,100.00		
6TH STREET SW	1ST AVENUE SW	CENTER AVENUE S	0	320	0	0	0	\$166,400.00	320	\$44,800.00	320	\$48,000.00	0	\$0.00	\$259,200.00		
7TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	320	0	0	0	0	\$147,200.00	320	\$44,800.00	0	\$0.00	320	\$60,800.00	\$252,800.00		
7TH STREET SE	1ST AVENUE SE	2ND AVENUE SE	315	0	0	0	0	\$144,900.00	0	\$0.00	0	\$0.00	0	\$0.00	\$144,900.00		
7TH STREET SE	2ND AVENUE SE	EAST TERMINUS	335	0	0	0	0	\$154,100.00	335	\$46,900.00	335	\$50,250.00	0	\$0.00	\$251,250.00		
8TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	0	320	0	0	0	\$166,400.00	0	\$0.00	0	\$0.00	0	\$0.00	\$166,400.00		
8TH STREET SE	2ND AVENUE SE	EAST TERMINUS	0	160	0	0	0	\$83,200.00	0	\$0.00	0	\$0.00	0	\$0.00	\$83,200.00		
9TH STREET SE	CENTER AVENUE S	1ST AVENUE SE	0	325	0	0	0	\$169,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$169,000.00		
9TH STREET SE	1ST AVENUE SE	2ND AVENUE SE	0	310	0	0	0	\$161,200.00	0	\$0.00	0	\$0.00	0	\$0.00	\$161,200.00		
9TH STREET SE	2ND AVENUE SE	3RD AVENUE SE	530	0	0	0	0	\$243,800.00	0	\$0.00	0	\$0.00	0	\$0.00	\$243,800.00		
9TH STREET SE	3RD AVENUE SE	5TH AVENUE SE	635	0	0	0	0	\$292,100.00	0	\$0.00	0	\$0.00	0	\$0.00	\$292,100.00		
9TH STREET SE	5TH AVENUE SE	6TH AVENUE SE	490	0	0	0	0	\$225,400.00	0	\$0.00	0	\$0.00	0	\$0.00	\$225,400.00		

<div><div><div><div></div></div><div><div>BOLTON &amp; MENK</div></div></div><div>RECONSTRUCTION PROJECTS (by street segment)</div><div>INFRASTRUCTURE MANAGEMENT PLAN</div><div>CITY OF HAYFIELD, MN</div></div>																	
Street	From	To	Improvement Length (ft) & Cost												Estimated Total Project Cost	Reconstruction Based On:	
		Improvement	Street & Site Improvements					Utility Improvements									
			28' Street w/Curb	36' Street w/Curb	40' Street w/Curb	60' Street w/Curb	20' Alley	Total Street Cost	Storm Sewer		Sanitary Sewer		Watermain	Watermain Cost			
									\$140.00		Storm Sewer Cost		\$150.00			Sanitary Sewer Cost	\$190.00
Cost per Lineal Foot	\$460.00	\$520.00	\$580.00	\$890.00	\$220.00											Utility Condition	Street Condition
North-South Streets (page 1)																	
8TH AVENUE NW	N FRONTAGE RD	4TH STREET NW	0	200	0	0	0	\$104,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$104,000.00		
7TH AVENUE NW	N FRONTAGE RD	3RD STREET NW	0	355	0	0	0	\$184,600.00	355	\$49,700.00	355	\$53,250.00	0	\$0.00	\$287,550.00		
5TH AVENUE NW	MAIN STREET W	1ST STREET NW	0	325	0	0	0	\$169,000.00	0	\$0.00	0	\$0.00	0	\$0.00	\$169,000.00		
5TH AVENUE NW	1ST STREET NW	2ND STREET NW	0	325	0	0	0	\$169,000.00	325	\$45,500.00	325	\$48,750.00	0	\$0.00	\$263,250.00		
SANITARY CONNECTION	SANITARY LINE TO PLANT	MAIN STREET	0	0	0	0	0	\$0.00	0	\$0.00	335	\$50,250.00	0	\$0.00	\$50,250.00		
4TH AVENUE NW	MAIN STREET W	1ST STREET NW	330	0	0	0	0	\$151,800.00	330	\$46,200.00	330	\$49,500.00	330	\$62,700.00	\$310,200.00		
4TH AVENUE NW	1ST STREET NW	2ND STREET NW	325	0	0	0	0	\$149,500.00	325	\$45,500.00	325	\$48,750.00	0	\$0.00	\$243,750.00		
3RD AVENUE SW	1ST STREET SE	MAIN STREET W	320	0	0	0	0	\$147,200.00	320	\$44,800.00	320	\$48,000.00	0	\$0.00	\$240,000.00		
3RD AVENUE NW	MAIN STREET W	1ST STREET NW	0	330	0	0	0	\$171,600.00	330	\$46,200.00	330	\$49,500.00	330	\$62,700.00	\$330,000.00		
3RD AVENUE NW	1ST STREET NW	2ND STREET NW	0	330	0	0	0	\$171,600.00	330	\$46,200.00	165	\$24,750.00	0	\$0.00	\$242,550.00		
2ND AVENUE SW	SOUTH TERMINUS	2ND STREET SW	625	0	0	0	0	\$287,500.00	625	\$87,500.00	0	\$0.00	625	\$118,750.00	\$493,750.00		
2ND AVENUE NW	1ST STREET NW	2ND STREET NW	0	0	325	0	0	\$188,500.00	325	\$45,500.00	0	\$0.00	325	\$61,750.00	\$295,750.00		
2ND AVENUE NW	2ND STREET NW	NORTH TERMINUS	965	0	0	0	0	\$443,900.00	965	\$135,100.00	0	\$0.00	965	\$183,350.00	\$762,350.00		
1ST AVENUE SW	9TH STREET SW	NORTH TERMINUS	0	435	0	0	0	\$226,200.00	435	\$60,900.00	435	\$65,250.00	435	\$82,650.00	\$435,000.00		
1ST AVENUE SW	6TH STREET SW	5TH STREET SW	0	385	0	0	0	\$200,200.00	385	\$53,900.00	385	\$57,750.00	385	\$73,150.00	\$385,000.00		
1ST AVENUE SW	5TH STREET SW	4TH STREET SW	315	0	0	0	0	\$144,900.00	315	\$44,100.00	0	\$0.00	315	\$59,850.00	\$248,850.00		
WATER CONNECTION	4TH STREET SW	1ST STREET SW	0	0	0	0	0	\$0.00	0	\$0.00	0	\$0.00	850	\$161,500.00	\$161,500.00		
1ST AVENUE SW	1ST STREET SW	MAIN STREET W	0	335	0	0	0	\$174,200.00	335	\$46,900.00	335	\$50,250.00	0	\$0.00	\$271,350.00		
1ST AVENUE NW	MAIN STREET W	1ST STREET NW	0	0	325	0	0	\$188,500.00	325	\$45,500.00	325	\$48,750.00	325	\$61,750.00	\$344,500.00		
1ST AVENUE NW	1ST STREET NW	2ND STREET NW	0	0	330	0	0	\$191,400.00	330	\$46,200.00	160	\$24,000.00	0	\$0.00	\$261,600.00		
CENTER AVENUE S	8TH STREET S	7TH STREET S	0	0	465	0	0	\$269,700.00	465	\$65,100.00	465	\$69,750.00	0	\$0.00	\$404,550.00		
CENTER AVENUE S	7TH STREET S	6TH STREET S	0	0	380	0	0	\$220,400.00	380	\$53,200.00	380	\$57,000.00	380	\$72,200.00	\$402,800.00		
CENTER AVENUE S	6TH STREET S	5TH STREET S	0	0	385	0	0	\$223,300.00	385	\$53,900.00	385	\$57,750.00	385	\$73,150.00	\$408,100.00		
CENTER AVENUE S	5TH STREET S	4TH STREET S	0	0	320	0	0	\$185,600.00	320	\$44,800.00	320	\$48,000.00	320	\$60,800.00	\$339,200.00		
CENTER AVENUE S	4TH STREET S	3RD STREET S	0	0	325	0	0	\$188,500.00	325	\$45,500.00	325	\$48,750.00	325	\$61,750.00	\$344,500.00		
CENTER AVENUE S	3RD STREET S	2ND STREET S	0	0	310	0	0	\$179,800.00	310	\$43,400.00	310	\$46,500.00	310	\$58,900.00	\$328,600.00		
CENTER AVENUE S	2ND STREET S	1ST STREET S	0	0	345	0	0	\$200,100.00	345	\$48,300.00	170	\$25,500.00	345	\$65,550.00	\$339,450.00		
CENTER AVENUE S	1ST STREET S	MAIN STREET	0	0	0	325	0	\$289,250.00	325	\$45,500.00	0	\$0.00	325	\$61,750.00	\$396,500.00		
CENTER AVENUE S	MAIN STREET	1ST STREET N	0	0	0	330	0	\$293,700.00	330	\$46,200.00	0	\$0.00	330	\$62,700.00	\$402,600.00		
CENTER AVENUE S	1ST STREET N	2ND STREET N	0	0	0	330	0	\$293,700.00	330	\$46,200.00	165	\$24,750.00	0	\$0.00	\$364,650.00		
CENTER AVENUE S	2ND STREET N	NORTH TERMINUS	0	0	315	0	0	\$182,700.00	0	\$0.00	0	\$0.00	0	\$0.00	\$182,700.00		

<div><div><div><div></div></div><div><div>BOLTON &amp; MENK</div></div></div><div>RECONSTRUCTION PROJECTS (by street segment)</div><div>INFRASTRUCTURE MANAGEMENT PLAN</div><div>CITY OF HAYFIELD, MN</div></div>																		
Street	From	To	Improvement Length (ft) & Cost													Estimated Total Project Cost	Reconstruction Based On:	
		Improvement	Street & Site Improvements						Utility Improvements								Utility Condition	Street Condition
			28' Street w/Curb	36' Street w/Curb	40' Street w/Curb	60' Street w/Curb	20' Alley	Total Street Cost	Storm Sewer	Storm Sewer Cost	Sanitary Sewer	Sanitary Sewer Cost	Watermain	Watermain Cost				
									\$140.00		\$150.00		\$190.00					
Cost per Lineal Foot	\$460.00	\$520.00	\$580.00	\$890.00	\$220.00													
North-South Streets (page 2)																		
1ST AVENUE SE	9TH STREET SE	8TH STREET SE	0	495	0	0	0	\$257,400.00	0	\$0.00	0	\$0.00	0	\$0.00	\$257,400.00			
1ST AVENUE SE	8TH STREET SE	7TH STREET SE	0	465	0	0	0	\$241,800.00	465	\$65,100.00	465	\$69,750.00	0	\$0.00	\$376,650.00			
1ST AVENUE SE	7TH STREET SE	6TH STREET SE	0	375	0	0	0	\$195,000.00	375	\$52,500.00	375	\$56,250.00	375	\$71,250.00	\$375,000.00			
1ST AVENUE SE	6TH STREET SE	5TH STREET SE	0	385	0	0	0	\$200,200.00	385	\$53,900.00	385	\$57,750.00	385	\$73,150.00	\$385,000.00			
1ST AVENUE SE	5TH STREET SE	4TH STREET SE	0	320	0	0	0	\$166,400.00	320	\$44,800.00	320	\$48,000.00	320	\$60,800.00	\$320,000.00			
1ST AVENUE SE	4TH STREET SE	2ND STREET SE	0	645	0	0	0	\$335,400.00	645	\$90,300.00	320	\$48,000.00	0	\$0.00	\$473,700.00			
1ST AVENUE SE	2ND STREET SE	1ST STREET SE	0	325	0	0	0	\$169,000.00	325	\$45,500.00	160	\$24,000.00	0	\$0.00	\$238,500.00			
1ST AVENUE SE	1ST STREET SE	MAIN STREET E	0	0	325	0	0	\$188,500.00	0	\$0.00	0	\$0.00	0	\$0.00	\$188,500.00			
1ST AVENUE NE	MAIN STREET E	1ST STREET NE	0	0	335	0	0	\$194,300.00	0	\$0.00	0	\$0.00	0	\$0.00	\$194,300.00			
1ST AVENUE NE	1ST STREET NE	2ND STREET NE	0	0	330	0	0	\$191,400.00	330	\$46,200.00	0	\$0.00	200	\$38,000.00	\$275,600.00			
2ND AVENUE SE	9TH STREET SE	8TH STREET SE	0	495	0	0	0	\$257,400.00	495	\$69,300.00	495	\$74,250.00	0	\$0.00	\$400,950.00			
2ND AVENUE SE	8TH STREET SE	7TH STREET SE	0	465	0	0	0	\$241,800.00	465	\$65,100.00	465	\$69,750.00	0	\$0.00	\$376,650.00			
2ND AVENUE SE	7TH STREET SE	6TH STREET SE	0	375	0	0	0	\$195,000.00	375	\$52,500.00	375	\$56,250.00	0	\$0.00	\$303,750.00			
2ND AVENUE SE	6TH STREET SE	5TH STREET SE	0	385	0	0	0	\$200,200.00	385	\$53,900.00	385	\$57,750.00	0	\$0.00	\$311,850.00			
2ND AVENUE SE	2ND STREET SE	1ST STREET SE	0	0	330	0	0	\$191,400.00	330	\$46,200.00	0	\$0.00	330	\$62,700.00	\$300,300.00			
2ND AVENUE SE	1ST STREET SE	MAIN STREET E	0	0	330	0	0	\$191,400.00	330	\$46,200.00	0	\$0.00	330	\$62,700.00	\$300,300.00			
2ND AVENUE NE	MAIN STREET E	1ST STREET NE	0	0	330	0	0	\$191,400.00	330	\$46,200.00	175	\$26,250.00	330	\$62,700.00	\$326,550.00			
2ND AVENUE NE	1ST STREET NE	2ND STREET NE	0	0	330	0	0	\$191,400.00	330	\$46,200.00	175	\$26,250.00	330	\$62,700.00	\$326,550.00			
2ND AVENUE NE	2ND STREET NE	NORTH TERMINUS	0	305	0	0	0	\$158,600.00	0	\$0.00	0	\$0.00	0	\$0.00	\$158,600.00			
4TH AVENUE SE	2ND STREET SE	1ST STREET SE	0	335	0	0	0	\$174,200.00	335	\$46,900.00	335	\$50,250.00	0	\$0.00	\$271,350.00			
4TH AVENUE SE	1ST STREET SE	MAIN STREET E	0	330	0	0	0	\$171,600.00	330	\$46,200.00	330	\$49,500.00	0	\$0.00	\$267,300.00			
4TH AVENUE NE	3RD STREET NE	4TH STREET NE	0	265	0	0	0	\$137,800.00	265	\$37,100.00	0	\$0.00	265	\$50,350.00	\$225,250.00			
4TH AVENUE NE	4TH STREET NE	5TH STREET NE	0	265	0	0	0	\$137,800.00	265	\$37,100.00	0	\$0.00	265	\$50,350.00	\$225,250.00			
6TH AVENUE SE	1ST STREET SE	MAIN STREET E	0	0	0	0	0	\$0.00	0	\$0.00	0	\$0.00	330	\$62,700.00	\$62,700.00			
6TH AVENUE NE	1ST STREET NE	2ND STREET NE	0	0	0	0	0	\$0.00	0	\$0.00	340	\$51,000.00	0	\$0.00	\$51,000.00			
Totals			5505	24500			4815	\$22,718,450.00		\$4,496,100.00		\$4,665,000.00		\$3,041,900.00	\$34,921,450.00			
High Value Totals								\$6,628,550.00		\$1,552,600.00		\$1,056,750.00		\$942,400.00	\$10,180,300.00			

- Notes:
- 1) Refer to attached Project Area Maps for illustrations of referenced projects.

2) Street & Site costs include estimated pavement, aggregate base, curb & gutter, sidewalk (1 side), driveways, turf reestablishment

3) Utility costs include mainline pipe, structures/fittings, and service line replacement.

4) Costs presented above are in 2020 dollars, including estimated design and construction.

5) "High Priority" projects include those with both street and utility needs based on known condition and pipe material.

