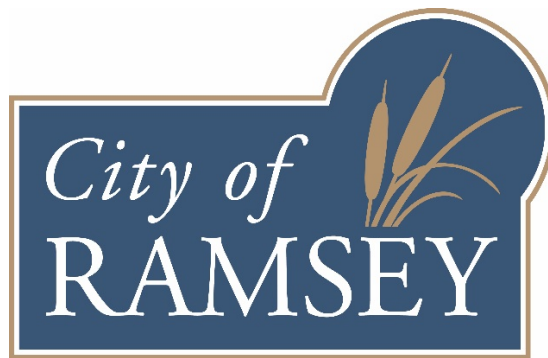


FEASIBILITY REPORT (DRAFT)

AMENDED 2020 PAVEMENT OVERLAY IMPROVEMENTS

CITY IMPROVEMENT PROJECT NO. 20-02A



March 13, 2020

Prepared By:

**City of Ramsey
Engineering Department
7550 Sunwood Drive NW
Ramsey, MN 55303
763-433-9839
763-433-9848 (Fax)**



March 13, 2020

Honorable Mayor and City Council
City of Ramsey
7550 Sunwood Drive NW
Ramsey, MN 55303

Re: Feasibility Report – City of Ramsey Improvement Project #20-02A
Amended 2020 Pavement Overlay Improvements

Dear Mayor and City Council Members:

Transmitted herewith is a Feasibility Report for the proposed 2020 Pavement Overlay Improvements, Improvement Project No. 20-02AA.

The report examines the feasibility of completing 2-inch bituminous pavement mill and overlay improvements on approximately 2.82 miles of public streets in the Regency Pond residential neighborhood and the Business Park 95 industrial park within the City of Ramsey, and necessary appurtenant improvements.

This Feasibility Report examines the scope of the proposed improvements, explores estimated costs and available funding sources, defines a preliminary project schedule, and determines the necessity, feasibility and general cost-effectiveness of the proposed improvements, including any alternate designs, as well as whether the improvements would best be completed separately or in conjunction with another project.

I would be happy to discuss this report with you at your convenience. Please feel free to contact me at 763-433-9825 or bwestby@cityoframsey.com with any questions.

Sincerely,
City of Ramsey

Bruce Westby, PE
City Engineer

Enclosure

C: Kurt Ulrich, City Administrator
Joe Feriancek, Civil Engineer II

CERTIFICATION

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.

Bruce Westby, PE

Date: March 13, 2020

License No. 40116

I hereby certify that this plan, specification or report was reviewed for Quality Control and Quality Assurance purposes and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Joe Feriancek, PE

Date: March 13, 2020

License No. 57095

TITLE SHEET

LETTER OF TRANSMITTAL

CERTIFICATION SHEET

TABLE OF CONTENTS

Table of Contents

1. EXECUTIVE SUMMARY 1

2. INTRODUCTION 2

 2.1 Authorization..... 2

 2.2 Program Overview 2

 2.3 Scope..... 2

3. EXISTING CONDITIONS 3

 3.1 Existing Streets..... 3

 3.1.a Regency Pond Residential Neighborhood 3

 3.1.b Business Park 95 Industrial Park 3

 3.2 Utilities..... 4

 3.2.a Watermain..... 4

 3.2.b Sanitary Sewer 4

 3.2.c Storm Sewer/Drainage..... 4

4. CONSIDERED IMPROVEMENTS 4

 4.1 Project Area Selection..... 4

 4.2 Pavement Condition Evaluations/Ratings..... 4

 4.3 Full-Depth Reclamation..... 4

5. CONCLUSIONS AND RECOMMENDATIONS..... 5

Appendix A

- Project Scope – Regency Pond
- Project Scope – Business Park 95

Appendix B

- Opinion of Probable Costs

Appendix C

- Street Segment Summary

Appendix D

- WSB Pavement Forensics Report

1. EXECUTIVE SUMMARY

City Improvement Project 20-02A proposes to complete 2-inch bituminous pavement mill and overlay improvements to 2.82 miles of public street segments within the City of Ramsey, including other associated appurtenant improvements as outlined in this report. The street segments are located in the residential neighborhoods of Regency Pond 1st, 2nd and 3rd Additions, as well as Business Park 95 1st, 2nd, 5th and 7th Additions. These streets were proposed to receive bituminous pavement overlay improvements in 2022 and 2024 respectively per the 2020 - 2029 Capital Improvement Program (CIP).

Appendix A includes exhibits showing the proposed project areas and scopes.

City Staff typically rates the pavement condition of all city streets on an annual basis using the Pavement Surface Evaluation and Rating (PASER) system. The last three years of PASER rating for each street segment proposed to receive an overlay with this project is included in the street segments summaries included in *Appendix B* of this report.

On December 10, 2019, the Ramsey City Council ordered this feasibility report which explores the necessity, feasibility and cost-effectiveness of the proposed improvements by examining the scope of the improvements, exploring estimated costs and available funding sources, and determining whether the improvements should be completed as proposed or in connection with other improvements.

WSB and Associates performed pavement forensics for the proposed project areas, and submitted a pavement forensics report, which is included in *Appendix D*. The findings are discussed in section 3 of this report. In general, the existing pavement sections will not support 2-inch mill and overlay improvements. Staff therefore investigated costs for completing a full-depth reclamation (FDR) in Business Park 95 for comparison purposes.

The engineer's opinion of probable costs for all streets proposed to receive 2" mill and overlay improvements is \$1,037,385. Estimated costs include 10% contingency costs, plus 14% indirect costs for administrative, engineering, finance and legal costs. The improvements proposed with this project are identified in the City's current 10-year Capital Improvement Program, and can be funded using a combination of Road Reconstruction Funds, special assessments to benefitting properties, and Stormwater Funds. *Appendix C* includes a detailed opinion of probable costs.

The proposed improvements were not found to be feasible or cost-effective from an engineering standpoint so Staff does not support the amended 2020 pavement overlay improvements as proposed herein. The proposed street segments would be most cost-effectively reconstructed after their PASER ratings fall to 3 or below.

2. INTRODUCTION

2.1 Authorization

Preparation of this feasibility report was authorized by the Ramsey City Council on December 10, 2019.

2.2 Program Overview

This feasibility report explores proposed 2-inch bituminous pavement mill and overlay improvements to approximately 2.82 miles of public streets in the Regency Pond residential neighborhood and in the Business Park 95 industrial park, along with associated appurtenant improvements. This project is designated as Amended 2020 Pavement Overlay Improvements, Improvement Project No. 20-02A. Maps showing the scope of the proposed improvements are included in *Appendix A* of this report.

This feasibility report explores the necessity, feasibility and cost-effectiveness of the proposed improvements by examining the scope of the improvements, exploring estimated costs and available funding sources, and determining whether the improvements should be completed as proposed or in connection with other improvements.

2.3 Scope

The scope of this report addresses proposed 2-inch bituminous pavement mill and overlay improvements to approximately 2.82 miles of public streets in the Regency Pond residential neighborhood and in the Business Park 95 industrial park as shown in *Appendix A*.

3. EXISTING CONDITIONS

3.1 Existing Streets

3.1.a Regency Pond Residential Neighborhood

The existing right-of-ways along the street segments proposed to receive overlays as part of this project are 60-feet in width. The paved street width is 30-feet as measured from curb to curb. All streets in this project were constructed as urban sections with bituminous pavement and concrete curb and gutter between 1996 and 1998.

The streets segments proposed to receive overlays in 2020 have 2018 PASER ratings between 6 and 8, which are generally considered to be good candidates for mill and overlay improvements. To verify that the pavement sections were thick enough and had adequate structural capacity to support 2-inch mill and overlay improvements, Staff hired WSB and Associates to complete a pavement forensics analysis, which included the extraction of pavement cores from each street segment proposed to receive mill and overlay improvements. The pavement forensics report is included in *Appendix D* of this report.

Based on the general condition and thickness of the existing pavement sections, WSB and Associates and City Staff do not recommend completing mill and overlay improvements on these street segments as proposed. It is estimated that the existing streets should remain serviceable with moderate maintenance for up to 10 years. Once the PASER ratings fall to 3 or less a full-depth reclamation (FDR) or reconstruction project should be completed.

3.1.b Business Park 95 Industrial Park

The existing right-of-ways along the street segments proposed to receive overlays as part of this project range from 66 to 80-feet in width. The paved street widths range from 38 to 44-feet as measured from curb to curb. All streets in this project were constructed as urban sections with bituminous pavement and concrete curb and gutter between 1995 and 1998.

The streets segments proposed to receive overlays in 2020 have 2018 PASER ratings between 6 and 7, which are generally considered to be good candidates for mill and overlay improvements. To verify that the pavement sections were thick enough and had adequate structural capacity to support 2-inch mill and overlay improvements, Staff hired WSB and Associates to complete a pavement forensics analysis, which included the extraction of pavement cores from each street segment proposed to receive mill and overlay improvements. The pavement forensics report is included in *Appendix D* of this report.

Based on the general condition and thickness of the existing pavement sections, WSB and Associates and City Staff do not recommend completing mill and overlay improvements on these street segments as proposed. It is estimated that the existing streets should remain serviceable with

moderate maintenance for up to 10 years. Once the PASER ratings fall to 3 or less a full-depth reclamation (FDR) or reconstruction project should be completed.

3.2 Utilities

3.2.a Watermain

Watermain exists under all streets within the Regency Pond residential neighborhood and the Business Park 95 industrial park. No improvements to the watermain is proposed in conjunction with this project.

3.2.b Sanitary Sewer

Sanitary Sewer exists under all streets within the Regency Pond residential neighborhood and the Business Park 95 industrial park. No improvements to the sanitary sewer is proposed in conjunction with this project.

3.2.c Storm Sewer/Drainage

Storm sewer exists under several of the streets within the Regency Pond residential neighborhood and the Business Park 95 industrial park, but it is not proposed to complete any significant repairs or storm sewer construction as part of this project.

4. CONSIDERED IMPROVEMENTS

4.1 Project Area Selection

The City's 10-year Capital Improvement Program calls for proposed 2-inch mill and overlay improvements on the streets in the Regency Pond residential neighborhood in 2022, and in Business Park 95 in 2024. The scope of these proposed improvements is included in *Appendix A* of this report.

4.2 Pavement Condition Evaluations/Ratings

City Staff generally evaluates and rates the pavement conditions of all city streets on an annual basis using the Pavement Surface Evaluation and Rating (PASER) system. This system requires a visual evaluation of each pavement surface, which is reflected by a 0 to 10 scale, with 10 being a new street. A PASER rating summary of each street segment is included in *Appendix B* of this report.

4.3 Full-Depth Reclamation

Recently, including in 2017 and 2018, streets with pavement sections in similar condition were evaluated for mill and overlay improvements but were instead improved using the full-depth reclamation process. This involves grinding the existing bituminous pavement up, along with a portion of the underlying aggregate base, placing and compacting this reclaim material on top of

the existing aggregate base, removing 3½-inches of reclaim material, then placing 3½-inches of new bituminous pavement on top. In general, the streets are still at the stage where with maintenance, Staff feels they can be serviceable for up to 10 years, allowing the City's limited funds to be spent on streets which are better candidates for overlays, or are ready for reconstruction now.

Staff prepared a preliminary engineer's estimate for full-depth reclamation (FDR) improvements for streets in the Business Park 95 industrial park, which totaled \$918,332. Considering that the anticipated service life for FDR improvements is up to 60 years, FDR improvements would be significantly more cost-effective than mill and overlay improvements, which would cost more than half what FDR improvements cost, and generally have an anticipated service life of 15 to 20 years.

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the attached pavement forensics report findings, the existing pavement is not able to support 2-inch mill and overlay improvements.

It is also important to note that it is the middle of March and in the best case scenario if other street segments were evaluated and found to be able to support mill and overlay improvements in 2020, the earliest a mill and overlay project using special assessments as a funding source could realistically be bid would be late June or early July, meaning a contract would not be awarded until the middle of August.

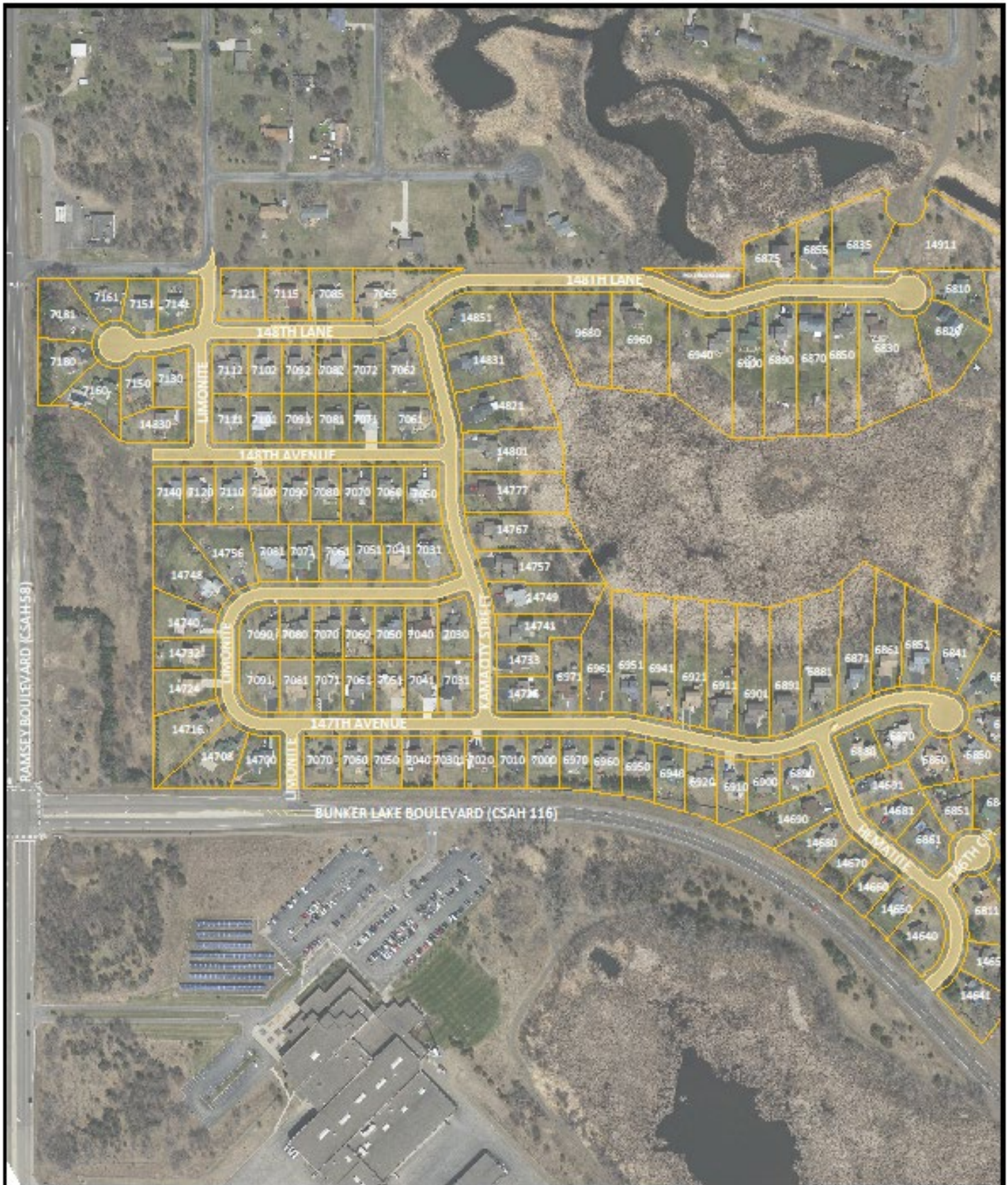
In addition, given that the City is again discussing funding options for pavement management program projects, levying additional assessments might not be the best course of action at this time.

It is therefore the recommendation of City Staff that the Amended 2020 Pavement Overlay Improvements as proposed within this Feasibility Report not be completed in 2020, and that other streets not be evaluated for mill and overlay improvements in 2020.

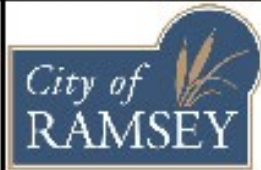
APPENDIX A

**Project Scope – Regency Pond
Project Scope – Business Park 95**

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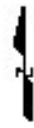


REGENCY POND PROJECT SCOPE





**BUSINESS PARK 95
PROJECT SCOPE**



APPENDIX B

Street Segment Summaries

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**IP 20-02A, AMENDED 2020 PAVEMENT OVERLAY IMPROVEMENTS
STREET SEGMENT SUMMARIES**

BUSINESS PARK 95 (1ST, 2ND, 5TH, 7TH)													
Street History									Pavement Coring Results (2020)				
Street	Segment Description	Length	Width	Curb	2018 PASER Rating	Year Built	Maintenance 1	Maintenance 2	Core No.	Bit Depth (Inches)	Agg. Depth (Inches)	WSB Recommended Maintenance	
140th Avenue	Radium St to Unity St	981	40	Conc.	7	1998	SC 1 - 2003	SC 2 - 2015	3	5	5.5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.	
McKinley Street	Unity St to Sunfish Lake Blvd	1,067	44	Conc.	6	1995	SC 1 - 2003	SC 2 - 2015	5	6.5	6.5	2 Inch Mill and Overlay	
McKinley Street	Unity St to CDS	1,320	40	Conc.	7	1996	SC 1 - 2003	SC 2 - 2015	6	6	9.5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.	
									7	4.75	9	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.	
Radium Street	McKinley St to 140th Ave	1,250	40	Conc.	7	1998	SC 1 - 2003	SC 2 - 2015	8	4	5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.	
Unity Street	CR 116 to McKinley St	1,696	38	Conc.	6	1995	SC 1 - 2003	SC 2 - 2015	1	6	6	2 Inch Mill and Overlay	
									2	7	8	2.5 Inch Mill and Overlay	
									4	8	5.5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.	
<i>Business Park 95 Subdivision Total</i>		<i>6,314</i>	<i>1.20</i>	<i>miles</i>									

**IP 20-02A, AMENDED 2020 PAVEMENT OVERLAY IMPROVEMENTS
STREET SEGMENT SUMMARIES**

REGENCY POND (1ST, 2ND, 3RD)												
Street History									Pavement Coring Results (2020)			
Street	Segment Description	Length	Width	Curb	2018 PASER Rating	Year Built	Maintenance 1	Maintenance 2	Core No.	Bit Depth (inches)	Agg. Depth (inches)	WSB Recommended Maintenance
146th Circle	Hematite St to CDS	196	30	Conc.	7	1996	SC 1 - 2004	SC 2 - 2013	20	2.5	11	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
147th Avenue	W EOP to Hematite St	916	30	Conc.	6	1996	SC 1 - 2005	SC 2 - 2014	17	3	4	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
147th Avenue	Hematite St to CDS	412	30	Conc.	7	1996	SC 1 - 2006	SC 2 - 2015	18	4	5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
147th Avenue	PC Limonite St to Kamacite St	586	30	Conc.	8	1997	SC 1 - 2007	SC 2 - 2016				
147th Lane	Kamacite St to PC Limonite St	604	30	Conc.	6	1997	SC 1 - 2008	SC 2 - 2017	15	2	7	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
148th Avenue	Kamacite St to Limonite St	639	30	Conc.	7	1998	SC 1 - 2009	SC 2 - 2018	13	2	6	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
148th Avenue	Limonite St to W EOP	112	30	Conc.	7	1998	SC 1 - 2010	SC 2 - 2019				
148th Lane	Limonite St to Kamacite St	548	30	Conc.	7	1998	SC 1 - 2011	SC 2 - 2020				
148th Lane	Limonite St to CDS	281	30	Conc.	7	1998	SC 1 - 2012	SC 2 - 2021	9	3	6	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
148th Lane	Kamacite St to CDS	1,351	30	Conc.	7	1998	SC 1 - 2013	SC 2 - 2022	10	3	4	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
									11	2.5	5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
Hematite Street	146th Cir to CR 116	339	30	Conc.	7	1996	SC 1 - 2014	SC 2 - 2023				
Hematite Street	147th Ave to 146th Cir	513	30	Conc.	7	1996	SC 1 - 2015	SC 2 - 2024	19	3.75	4.75	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
Kamacite Street	147th Ave to 147th Ln	374	30	Conc.	6	1997	SC 1 - 2016	SC 2 - 2025				
Kamacite Street	148th Ave to 149th Ln	375	30	Conc.	7	1998	SC 1 - 2017	SC 2 - 2026				
Kamacite Street	147th Ln to 148th Ave	320	30	Conc.	6	1998	SC 1 - 2018	SC 2 - 2027	14	2.75	3.75	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
Limonite Street	147th Ave to CR 116	219	30	Conc.	7	1997	SC 1 - 2019	SC 2 - 2028	16	2	5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
Limonite Street	147th Ln to 147th Ave	289	30	Conc.	7	1997	SC 1 - 2020	SC 2 - 2029				
Limonite Street	148th Ave to 149th Ln	314	30	Conc.	7	1998	SC 1 - 2021	SC 2 - 2030	12	2	4.5	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction.
Limonite Street	149th Ln to 149th Ave	171	30	Conc.	7	1998	SC 1 - 2022	SC 2 - 2031				
<i>Regency Pond Subdivision Total</i>		<i>8,559</i>	<i>1.62</i>	<i>miles</i>								
<i>Project Summary</i>		<i>14873 LF</i>	<i>2.82</i>	<i>miles</i>								

APPENDIX C

Engineer's Estimates

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**IP 20-02A, Amended 2020 Street Overlay Improvements
Engineer's Estimate**

2" Mill & Overlay Regency Pond 1st, 2nd, 3rd (1.6 miles)						
ITEM No.	MNDOT No.	DESCRIPTION	UNIT	Project Pavement Area		COST EXTENSION
				ESTIMATED QUANTITY	26,081 UNIT COST	
1	2021.501	MOBILIZATION (5%)	LS	1	\$ 20,229.08	\$ 20,229.08
2	2231.604	BITUMINOUS PATCH	SY	1,304	\$ 20.00	\$ 26,082.00
4	2232.501	MILL BITUMINOUS PAVEMENT	SY	26,081	\$ 1.50	\$ 39,121.50
5	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	1,826	\$ 3.00	\$ 5,477.10
6	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (SPWEA340C) (2.0")	TON	2,869	\$ 90.00	\$ 258,201.00
7	2506.602	RESET CATCH BASIN / MANHOLE CASTING	EA	31	\$ 1,000.00	\$ 31,000.00
8	2531.501	REMOVE & REPLACE CONCRETE CURB & GUTTER DESIGN SURMOUNTABLE	LF	801	\$ 50.00	\$ 40,060.00
9	2531.604	REMOVE & REPLACE 7" CONCRETE VALLEY GUTTER	SY	33	\$ 80.00	\$ 2,640.00
10	2563.601	TRAFFIC CONTROL	LS	1	\$ 2,000.00	\$ 2,000.00
<i>Non-Assessable Construction Cost</i>						\$ 26,082.00
<i>Street Construction Cost</i>						\$ 367,728.68
<i>Storm Sewer Construction Cost</i>						\$ 31,000.00
<i>Regency Pond Overlay Program Construction Cost</i>						\$ 424,810.68
<i>10% Contingency Cost</i>						\$ 42,481.07
Regency Pond Overlay Project Cost (14% Indirect Cost)						\$ 532,712.59
<i>Total Project Assessments (25% of Assessable Cost)</i>						\$ 125,001.44
<i>Stormwater Utility Fund</i>						\$ 29,155.50
<i>Road Reconstruction / Overlay Fund</i>						\$ 378,555.65

IP 20-02A, Amended 2020 Pavement Overlay Improvements

Engineer's Estimate

2" Mill & Overlay

Business Park 95 (1.2 miles)

ITEM No.	MNDOT No.	DESCRIPTION	UNIT	Project Pavement Area		COST EXTENSION
				ESTIMATED QUANTITY	25,773 square yards	
1	2021.501	MOBILIZATION (5%)	LS	1	\$ 19,164.29	\$ 19,164.29
2	2231.604	BITUMINOUS PATCH	SY	1,289	\$ 20.00	\$ 25,774.00
4	2232.501	MILL BITUMINOUS PAVEMENT	SY	25,773	\$ 1.50	\$ 38,659.50
5	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	1,804	\$ 3.00	\$ 5,412.30
6	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (SPWEA340C) (2.0")	TON	2,835	\$ 90.00	\$ 255,150.00
7	2506.602	RESET CATCH BASIN / MANHOLE CASTING	EA	22	\$ 1,000.00	\$ 22,000.00
8	2531.501	REMOVE & REPLACE CONCRETE CURB & GUTTER DESIGN SURMOUNTABLE	LF	585	\$ 50.00	\$ 29,250.00
9	2531.604	REMOVE & REPLACE 7" CONCRETE VALLEY GUTTER	SY	63	\$ 80.00	\$ 5,040.00
10	2563.601	TRAFFIC CONTROL	LS	1	\$ 2,000.00	\$ 2,000.00
<i>Non-Assessable Construction Cost</i>						\$ 25,774.00
<i>Street Construction Cost</i>						\$ 354,676.09
<i>Storm Sewer Construction Cost</i>						\$ 22,000.00
<i>Business Park 95 Overlay Program Construction Cost</i>						\$ 402,450.09
<i>10% Contingency Cost</i>						\$ 40,245.01
Business Park 95 Overlay Project Cost (14% Indirect Cost)						\$ 504,672.41
<i>Total Project Assessments (25% of Assessable Cost)</i>						\$ 118,087.95
<i>Stormwater Utility Fund</i>						\$ 20,691.00
<i>Road Reconstruction / Overlay Fund</i>						\$ 365,893.46

Full-Depth Reclamation (FDR)

Business Park 95 (1.2 miles)

ITEM No.	MNDOT No.	DESCRIPTION	UNIT	Project Pavement Area		COST EXTENSION
				ESTIMATED QUANTITY	25,773 square yards	
1	2021.501	MOBILIZATION (5%)	LS	1	\$ 32,000.00	\$ 32,000.00
2	2215.501	BITUMINOUS PAVEMENT RECLAMATION (FULL DEPTH)	SY	25,773	\$ 1.25	\$ 32,216.25
3	2331.607	HAUL AND DISPOSE BIT PAVEMENT RECLAMATION (LV)	CY	3,580	\$ 15.00	\$ 53,694.00
4	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	1,804	\$ 3.00	\$ 5,412.30
5	2360.502	TYPE SP 12.5 NON-WEARING COURSE MIXTURE (SPNWB330C) (2.0")	TON	2,835	\$ 85.00	\$ 240,975.00
6	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (SPWEA340C) (2.0")	TON	2,835	\$ 90.00	\$ 255,150.00
7	2506.602	RESET CATCH BASIN / MANHOLE CASTING	EA	22	\$ 1,000.00	\$ 22,000.00
8	2531.501	REMOVE & REPLACE CONCRETE CURB & GUTTER DESIGN SURMOUNTABLE	LF	585	\$ 50.00	\$ 29,250.00
9	2531.604	REMOVE & REPLACE 7" CONCRETE VALLEY GUTTER	SY	63	\$ 80.00	\$ 5,040.00
10	2563.601	TRAFFIC CONTROL	LS	1	\$ 3,000.00	\$ 3,000.00
<i>Street Construction Cost</i>						\$ 656,737.55
<i>Storm Sewer Construction Cost</i>						\$ 22,000.00
<i>Business Park 95 Overlay Program Construction Cost</i>						\$ 678,737.55
<i>10% Contingency Cost</i>						\$ 67,873.76
Business Park 95 Overlay Project Cost (23% Indirect Cost)						\$ 918,331.91
<i>Total Project Assessments (25% of Assessable Cost)</i>						\$ 229,582.98
<i>Stormwater Utility Fund</i>						\$ 22,324.50
<i>Road Reconstruction / Overlay Fund</i>						\$ 666,424.43

APPENDIX D

WSB Pavement Forensics Report

DRAFT

Memorandum

To: Joe Feriancek, PE

From: Andrea Blanchette, PE
Tom Wood
Sheue Torng Lee

Date: March 4, 2020

Re: Pavement Coring Forensic Report
City of Ramsey
WSB Project No. 015656-000

Introduction

WSB is pleased to submit this pavement forensics report detailing the results of the pavement coring which was completed on March 2, 2020 in the City of Ramsey. The various characteristics of the pavement cores were summarized to provide information to the City to assist in determining the appropriate pavement maintenance or rehabilitation method for the roadways.

A total of 8 (6 of which were taken in a patched area) pavement cores were obtained in the Business Park 95 Project Area and a total of 12 cores were obtained in the Regency Pond Project Area. The locations of the pavement cores are summarized in **Figure 1** and **Figure 2**. A summary of the pavement depths and conditions for the streets are shown in **Table 1**. Pictures of the cores obtained can be found in the **Appendix**.

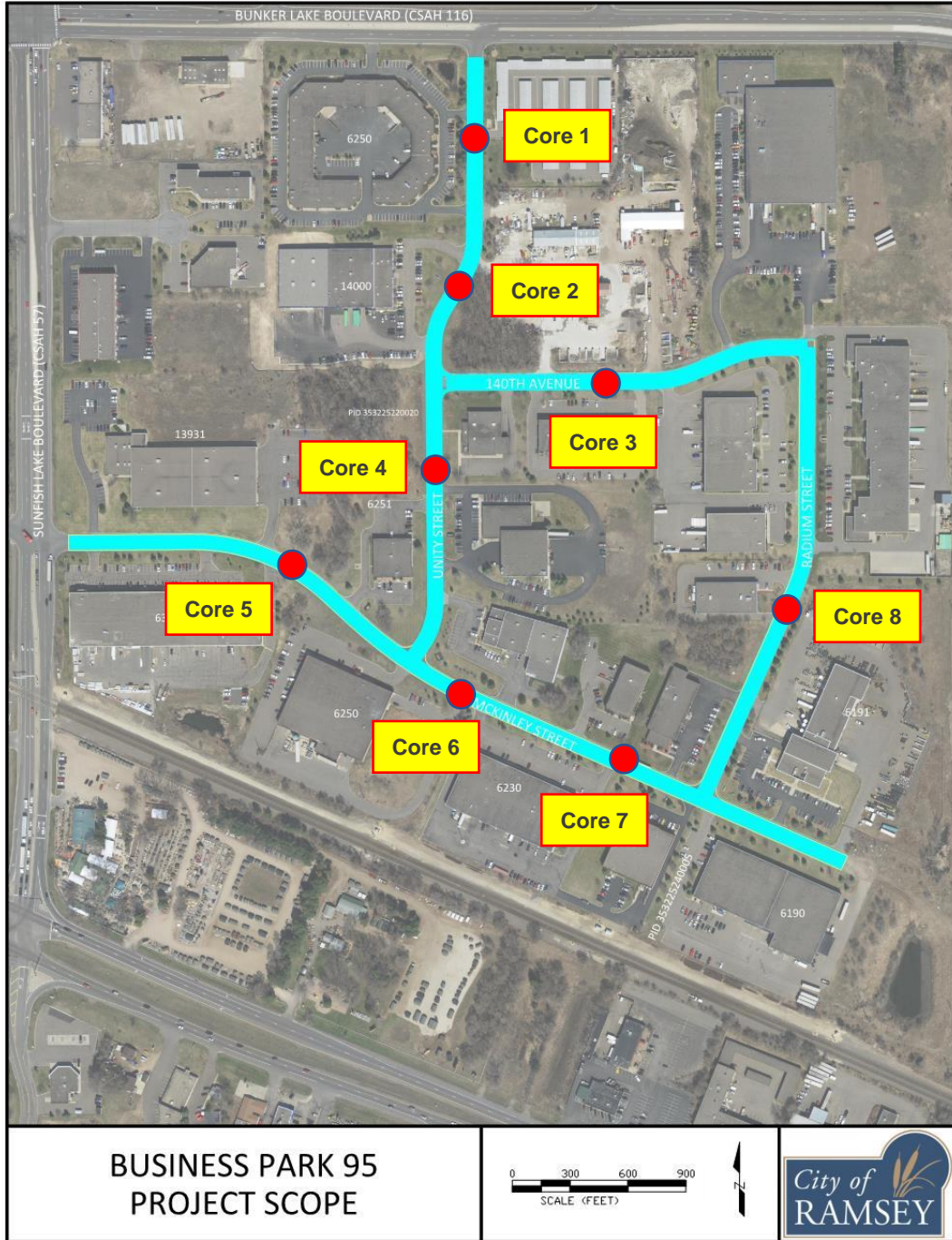


Figure 1. Pavement core locations in Business Park 95 Project Area

Table 1. Pavement core location and information

Core ID	Location	Bit Depth (inches)	Agg. Depth ¹ (inches)	Notes	Recommended Maintenance
1	Unity Street	6	6	The top lift of pavement was 1.25 inches. This layer was starting to show signs of deterioration losing fines and binder. The rest of the core was bonded and showing minimal signs of aging.	2 Inch Mill and Overlay
2	Unity Street (On a Patched Area)	7	8	The top lift of pavement was 2 inches. This layer was starting to show signs of deterioration losing fines and binder. The patch was not bonded to the pavement section and was completely delaminated. The rest of the core was in decent shape.	2.5 Inch Mill and Overlay
3	140 th Avenue (On a Patched Area)	5	5.5	The top lift of pavement was 2.5 inches. The core completely fell apart upon removal from the hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
4	Unity Street (On a Patched Area)	8	5.5	The top lift of pavement was 2 inches. The top 4 inches of pavement broke off from the rest of the core and showed parts were delaminated with no bond. Below the top 4 inches, the core completely fell apart.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
5	McKinley Street	6.5	6.5	The top lift of pavement was 1.75 inches. The core was in good shape, all the layers were bonded together well.	2 Inch Mill and Overlay

6	McKinley Street (On a Patched Area)	6	9.5	The top 3 inches of pavement was completely raveled and broke apart upon removal from the core hole. The bottom 3 inches was bonded together. Because the top 3 inches crumbled the lift thickness of the wear course could not be determined.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
7	McKinley Street (On a Patched Area)	4.75	9	This core was in very poor condition with delamination of the patch as well as a severe loss of fines and binder throughout.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
8	Radium Street (On a Patched Area)	4	5	This core was in very poor condition with delamination of the patch as well as a severe loss of fines and binder throughout. The core broke apart upon removal from the core hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
9	148 th Lane	3	6	The core was in fair condition. The layers were bonded together. The core was starting to show signs of aging losing fines and binder.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
10	148 th Lane	3	4	This core was in very poor condition and broke apart upon removal from the core hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
11	148 th Lane	2.5	5	The core was in fair to poor condition. The layers were bonded together. The core was starting to show signs of aging losing fines and binder.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
12	Limonite	2	4.5	The core was in fair condition. This was a very thin lift of	Full Depth Reclamation, Full Bituminous Removal

				pavement and was starting to show signs of aging, losing fines and binder.	and Replacement or Reconstruction
13	148 th Avenue	2	6	This core was in very poor condition and broke apart upon removal from the core hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
14	Kamacity Street	2.75	3.75	The core was in fair to poor condition. The layers were bonded together. The core was starting to show signs of aging losing fines and binder.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
15	Limonite	2	7	This core was in very poor condition and broke apart upon removal from the core hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
16	Limonite	2	5	The core was in fair condition. This was a very thin lift of pavement.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
17	147 th Avenue	3	4	The core was in fair condition. The layers were bonded together. The core was starting to show signs of aging losing fines and binder.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
18	147 th Avenue	4	5	This core was in very poor condition and broke apart upon removal from the core hole.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
19	Hematite	3.75	4.75	The core was in fair condition. The layers were bonded together. The core was starting to show signs of aging losing fines and binder.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
20	146 th Circle	2.5	11	The core was in good to fair condition. This was a thin lift of pavement.	Full Depth Reclamation, Full Bituminous Removal and Replacement or Reconstruction
¹ Subgrade material was observed to be sand material on Cores 1 through 10 and sand/gravel on Cores 11 through 20.					

Summary of Findings

Business Park 95

The cores taken along the roadways in this project area varied in bituminous thickness from 4 to 8 inches. Cores 1, 2 and 5 were in good condition with the layers bonded together well and the bituminous condition not yet showing signs of aging. However, the remainder of the pavements in this project area were either showing severe signs of aging below the pavement surface, including crumbling upon removal from the core hole. Because of this, it is recommended to perform either a full depth reclamation, full depth bituminous removal and replacement or full reconstruction in this project area. There is not enough sound material in these locations to do a partial depth mill and overlay.

Regency Pond

The cores taken along the roadways in this project area varied in bituminous thickness from 2 to 4 inches. In general, the bituminous was either very thin, or shown to be in very poor condition. Because of this, it is recommended to perform either a full depth reclamation, full depth bituminous removal and replacement or full reconstruction in this project area. There is not enough sound material in these locations to do a partial depth mill and overlay.

Appendix

City of Ramsey

Coring Pictures

Core 1 (Unity Street)



Core 2 (Unity Street on Patched Area)



Core 3 (140th Avenue on a Patched Area)

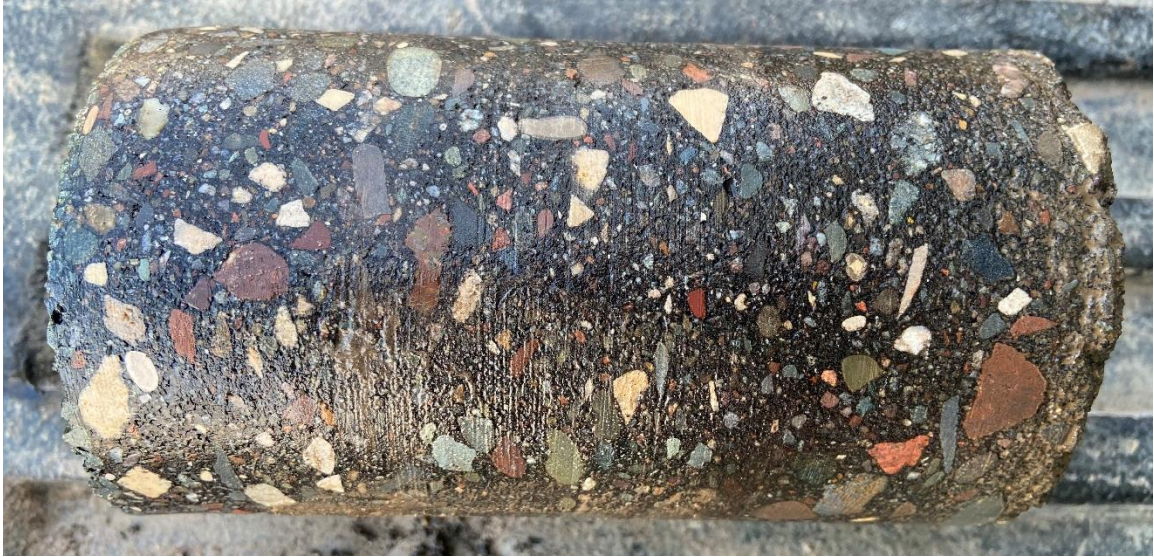




Core 4 (Unity Street on Patched Area)



Core 5 (McKinley Street)



Core 6 (McKinley Street on a Patched Area)



Core 7 (McKinley Street on a Patched Area)



Core 8 (Radium Street on a Patched Area)



Core 9 (148th Lane)



Core 10 (148th Lane)



Core 11 (148th Lane)



Core 12 (Limonite)



Core 13 (148th Avenue)



Core 14 (Kamacity Street)



Core 15 (Limonite)



Core 16 (Limonite)



Core 17 (147th Avenue)



Core 18 (147th Avenue)



Core 19 (Hematite)



Core 20 (146th Circle)

