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Nixa City Council and Leadership Team,

The intent of this letter is to provide a comprehensive summary of the City of Nixa's Transportation Funding Needs Assessment and the Preventive Pavement Maintenance Program. These two documents, when considered together, present a unified strategy for addressing the City's transportation infrastructure through a combination of capital improvements and long-term maintenance planning. Given current growth trends and infrastructure conditions, the findings outlined in these reports are both timely and critical to the City's future planning for Capital Improvement Projects, Operations & Maintenance, and their funding needs.

As you know, over the past decade Nixa has experienced significant population growth, increasing by more than 20 percent since 2015. This growth has been driven by both residential expansion and the City's attractiveness as a place to live within the region. As a result, traffic volumes have increased, new developments have emerged, and demand for both roadway capacity and pedestrian infrastructure has intensified. The City's transportation system must now adapt to meet these expanding needs while continuing to provide safe, efficient mobility for residents and visitors alike.

The Transportation Funding Needs Assessment identifies a comprehensive list of roadway, sidewalk, and trail projects necessary to support both current and future demand. These projects include major roadway improvements such as widening key corridors, upgrading intersections, and improving connectivity across the network. In addition, the plan recognizes the importance of pedestrian infrastructure, including sidewalks and multi-use trails, to enhance safety, accessibility, and overall quality of life.

The total estimated cost of these identified projects is approximately \$35.6 million in current dollars. When projected over the next decade, accounting for inflation, this cost rises to nearly \$47.8 million. Of this total, roughly \$27.6 million is allocated to roadway improvements, while approximately \$8 million is designated for pedestrian-related projects. While some projects have already been completed or are currently funded and underway, a substantial portion remains unfunded and in need of alternative or additional financial support.

A central issue highlighted in the assessment is the significant gap between available funding and identified needs. Historically, the City has secured an

average of approximately \$570,000 per year in federal funding. While this funding has been instrumental in advancing certain projects, it is insufficient to address the full scope of required improvements. Local funding sources are similarly constrained, with recent budgets having limited or even negative funding available for new transportation projects or O&M needs.

In addition to limited funding, the City faces structural challenges associated with how transportation projects are financed. Many federal and state funding programs require local matching contributions. Furthermore, these programs normally, more often than not, operate on a reimbursement basis, requiring the City to provide full upfront funding before receiving reimbursement. This creates cash flow challenges that can limit the City's ability to fully leverage available funding opportunities.

Due to how funds are now allocated within the Ozarks Transportation Organization, funding projections indicate that limited additional grant funding will be available for the future. Expected funding levels are estimated at roughly \$570,000 annually, that cannot accumulate from year to year. This funding is far below the level needed to address the City's infrastructure demands. As a result, without significant changes to funding strategies, many of the identified transportation projects may face substantial delays or be postponed indefinitely.

Complementing the Transportation Funding Needs Assessment, the Preventive Pavement Maintenance Program focuses on preserving the City's existing roadway network. This program emphasizes a proactive approach to infrastructure management, recognizing that timely maintenance can significantly reduce long-term costs and extend the useful life of pavement.

A key finding of the maintenance program is that delaying necessary maintenance can result in dramatically higher costs. In some cases, postponing rehabilitation for a relatively short period can increase costs by as much as four times. This underscores the importance of performing maintenance at the optimal time before pavement conditions deteriorate to the point where full reconstruction is required.

The program categorizes maintenance activities into three types: routine, reactive, and preventive. Routine maintenance includes regularly scheduled activities such as crack sealing, pavement marking, and general upkeep. Reactive maintenance involves responding to unexpected issues such as potholes or pavement failures. Preventive maintenance, however, is identified as the most cost-effective strategy. It involves applying targeted treatments to

pavements that are still in relatively good condition in order to slow deterioration and extend their service life.

Several preventive maintenance techniques are recommended, including crack and joint sealing, micro-surfacing, pressure paving, and asphalt overlays. These treatments can extend pavement life by several years when applied appropriately. The program also emphasizes the importance of grouping streets geographically for maintenance activities, which can reduce construction costs and minimize disruption to residents. In addition, the plan calls for annual evaluations of pavement conditions to ensure that maintenance decisions are based on current data and priorities.

The maintenance program assumes an annual budget of approximately \$1.5 million to effectively implement these strategies. However, as with capital projects, funding availability remains an issue. The same reimbursement-based funding structures that affect new construction projects also impact maintenance efforts, requiring alternative and/or new funding sources, careful financial planning, and resource allocation.

Taken together, these two plans highlight the importance of adopting a balanced and strategic approach to transportation infrastructure and their funding needs. Nixa is at a critical point where continued growth, aging infrastructure, and limited funding intersect. Addressing these challenges will require not only securing additional funding but also making efficient use of existing resources through proactive maintenance and careful prioritization of projects.

In summary, the City must consider different strategies moving forward. First, it must continue to invest in new infrastructure to accommodate growth and improve connectivity. Second, it must prioritize the preservation of existing assets to avoid significantly higher costs in the future. Third, additional funding sources must be obtained for current maintenance, future improvements, and new construction. By integrating these approaches, Nixa can better position itself to maintain a safe, efficient, and sustainable transportation system.

Thank you for your time and consideration. Please do not hesitate to reach out if additional information or further discussion would be helpful.



Transportation Funding Needs Assessment

Prepared for the City of Nixa,
Missouri

Prepared By:

Bartlett & West

Driving community and industry forward, together.

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Preface

In 2015 the City of Nixa went through the exercise to identify and develop a Project Prioritization Plan for the upgrades to existing roadways and pedestrian enhancements. At the time this was due to the increase and forecasted population growth of the city. During that process, the City and the Nixa Transportation Action Team cultivated a list of 70 distinct projects. Many factors were used to determine these projects such as, but not limited to, traffic volume (current and future), current roadway conditions, partnerships with Christian County and Missouri Department of Transportation (MoDOT), and available funding sources. From there, these projects were presented to City officials, and it was determined that further input from the residents of Nixa was needed.

This next step, identified as public involvement, had a goal of understanding what roadway and pedestrian projects were most important to the citizens, as well as associating a priority of importance. The public was presented with 42 roadway and 44 sidewalk/pedestrian projects. From the online survey, both of these lists were refined to the top 15 projects for each category as noted. Additionally, the survey sought out public input on the prioritization of these top 15 projects in each category. After this step, a more technical approach was taken to understand and mesh the public's desire with metrics of technical evaluation, congestion, economic competitiveness, safety, condition, and connectivity.

With all of this data collected and analyzed, two tables were developed as the final recommendation of projects with prioritization in the categories of Existing Roadway Improvement and Pedestrian Enhancement projects. Below are those tables as they were presented in the 2015 Project Prioritization report with an update on the status of each project. Those highlighted in green are completed, yellow are funded, and white are not funded or partially funded and are yet to be completed.

City of Nixa – Transportation Funding Needs Assessment

Roadway Improvement Results from 2015 Prioritization				
	Street	Description	Status	Completion Level
1	State Highway 14	US Highway 160 to State Hwy M	Complete	Full
2	US Highway 160	Intersection with Rosedale Road	Complete	Partial
3	State Highway 14	US Hwy 160 to Cheyenne Road	Funded	
4	State Highway 14	Intersection with Nicholas Road	Complete	Full
5	US Highway 160	Intersection with South Street	Complete	Full
6	Main Street	Intersection with State Hwy CC	Funded	
7	US Highway 160	Add permissive left-turn flashers; from Hwy CC to Wasson Drive (yielding left-hand turns)	Complete	Full
8	Nicholas Road	State Hwy 14 to Tracker Road	Ongoing	Planning Phase
9	US Highway 160	Intersection with Tracker Road	Complete	Full
10	Main Street	Intersection with North Street (Part of Project 12)	Ongoing	Planning Phase
11	Main Street	Aldersgate Drive to Scott Wayne	Ongoing	Planning Phase
12	Main Street	Widening (North Street to Hwy 14)	Ongoing	Planning Phase
13	Tracker Road	Widening (US Hwy 160 to Old Castle Road)	Ongoing	Planning Phase

Pedestrian Enhancement Results from 2015 Prioritization				
	Street	Description	Status	Completion Level
1	US Highway 160	Improved Crosswalks Across US Hwy 160	Complete	Partial
2	Main Street	New sidewalk from State Hwy 14 to North Road	Ongoing	Planning Phase
3	Nicholas Road	New sidewalk from State Hwy 14 to West Tori Drive	Complete	Full
4	Cheyenne Road	New sidewalk from the elementary school to North Street/McCauley Farm Road	Funded	
5	Northview Road	New sidewalk from Gregg Road to Main Street	Ongoing	Planning Phase
6	North Street	New sidewalk from Waterford Way to Jericho St	Ongoing	Design Phase
7	Gregg Road	New sidewalk from State Hwy 14 to Crane Drive	Pending	To be initiated
8	State Highway 14	New sidewalk from Eastwood Drive to Main Street	Complete	Full
9	State Highway M	New sidewalk from State Hwy 14 to West Verna Lane	Complete	Full
10	Tracker Road	New sidewalk from Main Street to Rockingham Ave	Pending	To be initiated
11	North Street	New sidewalk from Old Castle Road to Cheyenne Road	Ongoing	Design Phase
12	Butterfield Drive	New sidewalk from Nicholas Road/State Hwy M to Norton Road	Pending	To be initiated
13	Off-road Trail	New sidewalk trail from the Forest South Subdivision to Gregg Road	Pending	To be initiated
14	Nixa High School	New sidewalk from the north parking lot to the track/football field	Complete	Full

Introduction

The City of Nixa, Missouri, has experienced significant growth in recent years, with a notable influx of residents from neighboring communities and other states. According to U.S. Census data, the population of Nixa has increased by over 20% from 2015 to 2023. The last roadway and pedestrian project prioritization was completed in 2015, and given the population growth, it is essential to reassess the city's infrastructure needs to ensure it meets the demands of current and future residents. This increase in population is partly due to family growth and the expansion of the city, below are the number of permits issued for newly constructed single-family homes since 2015. Additionally, several new apartment complexes have been built throughout the city.

Year	# of New Single Family Permits
2015	105
2016	127
2017	211
2018	250
2019	247
2020	206
2021	277
2022	199
2023	203
2024	171

This data indicates that Nixa is becoming an increasingly attractive place to live. Therefore, it is crucial to ensure that the city's infrastructure can support this growth while maintaining safety for its residents and visitors. This report will focus on roadway, sidewalk, and trail projects. The roadway system is vital for daily commutes within the city, and it also serves as an important route for visitors, as Nixa is located in a national tourist area. Additionally, the health and well-being of Nixa residents is a priority, with many engaging in outdoor activities such as walking, playing sports, and using playgrounds throughout the year. As such, the pedestrian infrastructure must remain up-to-date to ensure safety and enhance connectivity across the city.

Purpose of Study

The purpose of this study is to create a Transportation Funding Needs Assessment for the City of Nixa. This assessment will be presented to the City and made available to the public, providing a clear understanding of future plans for improvements to roadway and pedestrian infrastructure, along with the associated costs.

Study Process

A significant amount of time was spent identifying specific projects and analyzing their costs and priorities. The following steps outline how this process will be carried out:

1. Data Collection
 - a. Initial Meetings and Data Gathering:
Meet with City officials to obtain the original prioritization plan, the existing transportation plan, and relevant public data.
 - b. Review of Current Project Status:
Obtain and review the status of ongoing projects, including their costs, timelines, and specific requirements.
 - c. Develop a Map of Proposed Projects:
Create a map that visually represents the locations of the proposed transportation projects.
2. Preliminary Plan (Trails, Sidewalks, Roadway)
 - a. List Creation and Map Update:
Compile a list of all proposed projects and update the map with accurate project locations.
 - b. Cost Evaluation and Updates:
Evaluate and update the estimated costs for each project based on current information.
 - c. Assess Funding Sources:
Identify existing funding sources and explore potential additional funding opportunities.
3. Final Funding Needs
 - a. Develop a Comprehensive Funding Needs List:
Create a detailed list outlining the funding requirements for the proposed projects.
 - b. Presentation to City Council:
Prepare a presentation summarizing the proposed projects and funding needs to be presented to the City Council for further discussion.

Projects Identified

During the Data Collection phase of this analysis. The list of projects identified are listed in the table below. Projects from the 2015 Project Prioritization report are listed with their respective priority and new projects are added.

Roadway Projects		
Street	Description	2015 Priority
Main Street	Tracker Road to Route CC	6
Nicholas Road	Route 14 to Tracker Road	8
Main Street	Intersection with North Street	10
Main Street	Aldersgate Drive to Scott Wayne	11
Main Street	Route 14 to North Street	12
Tracker Road	Hwy 160 to Main Street	13
Tracker Road	Main Street to Old Castle Road	13
Northview Road	Hwy 160 to Main Street	
North Street	Maplewood Hills to Cheyenne	
Missouri Avenue	Route 14 to North Street	
Truman Blvd	Heather Glenn to Norton/Pembrook	

Pedestrian Projects		
Street	Description	2015 Priority
Main Street	Route 14 to North Street is included in the Roadway project above	2
Northview Road	Gregg Road to Main Street	5
North Street	Waterford Way to Jericho Street is included in the Roadway project above	6
Gregg Road	Route 14 to Crane Drive	7
Tracker Road	Main Street to Rockingham Avenue is included in the Roadway project above	10
North Street	Old Castle Road to Cheyenne Road is included in the Roadway project above	11
Butterfield Drive	Nicholas Road to Norton Road	12
Off-road Trail	Forest South Subdivision to Gregg Road	13
Hwy CC	Cheyenne Road to Chadwick Flyer	
Route 14	Ridgecrest Road to Cheyenne Road	
Old Wilderness	Wasson Drive to Cox Urgent Care	
Old Wilderness	Wasson Drive to Route 14	
Cheyenne Road	North Street to School	

Projects Currently Funded

During the Data Collection phase of this analysis, the City of Nixa has gathered and shared the information as it pertains to projects that are currently funded and in progress. The details of those projects and the points in progress are listed in the table below.

Street	Description	Phase	Total Cost	Funding Source	FY
North Street	Maplewood Hills to Cheyenne Road	Engineering	\$546,882	20 Local / 80 STBG-U (FHWA)	2022
Cheyenne Road	New Multi-use Path	Engineering / Construction	\$880,238	20 Local / 80 TAP (FHWA)	2024 & 2025
Main Street	Tracker Road to State Hwy CC	Engineering / ROW / Construction	\$2,341,432	20 Local / 80 STBG-U (FHWA)	2023 & 2024
Main Street	Route 14 to North Street	Engineering / ROW	\$497,516	Local / Other	2024
Truman Blvd	Heather Glenn to Norton/Pembrook	Engineering / Construction	\$1,913,188	Local / Other	2024

Projects in Need of Funding

The 2035 projected cost assumes a 3% increase per year in construction costs.

Street	Description	Status	Phase	2025 Est. Cost	2035 Proj. Cost
Nicholas Road	Route 14 to Tracker Road	Pending	To be initiated	\$4,100,000	\$5,510,057
Main Street	Intersection with North Street	Pending	To be initiated	\$750,000	\$1,007,937
Main Street	Aldersgate Drive to Scott Wayne	Pending	To be initiated	\$600,000	\$806,350
Main Street	Route 14 to North Street	Ongoing	Construction	\$5,346,000	\$7,184,577
Tracker Road	Hwy 160 to Main Street	Pending	To be initiated	\$2,100,000	\$2,822,224
Tracker Road	Main Street to Old Castle	Pending	To be initiated	\$3,300,000	\$4,434,924
Northview Road	Hwy 160 to Main Street	Pending	To be initiated	\$2,600,000	\$3,494,183
North Street	Maplewood Hills to Cheyenne	Ongoing	Construction	\$8,000,000	\$10,751,331
Missouri Avenue	Route 14 to North Street	Pending	To be initiated	\$775,000	\$1,041,535
Gregg Road	Sidewalk Route 14 to Crane Drive	Pending	To be initiated	\$425,000	\$1,007,937
Northview Road	Sidewalk Gregg Road to Main Street	Pending	To be initiated	\$700,000	\$806,350

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Tracker Road	Sidewalk Main Street to Rockingham Avenue	Pending	To be initiated	\$818,000	\$571,164
Butterfield Drive	Sidewalk Nicholas Road to Norton Road	Pending	To be initiated	\$450,000	\$940,741
Off-Road Trail	Forest South Sub to Gregg Road	Pending	To be initiated	\$900,000	\$1,099,324
Hwy CC	Trail Cheyenne Road to Chadwick Flyer	Pending	To be initiated	\$3,306,000	\$604,762
Route 14	Trail Ridgecrest Road to Cheyenne Road	Pending	To be initiated	\$1,000,000	\$1,209,525
Old Wilderness Road	Sidewalk Wasson Drive to Cox Urgent Care	Pending	To be initiated	\$150,000	\$4,442,988
Old Wilderness Road	Sidewalk Wasson Drive to Route 14	Pending	To be initiated	\$250,000	\$1,343,916
Totals				\$35,570,000	\$47,803,106

Current Funding Available

The City of Nixa receives funds through various sources. These change over the years depending on newly passed laws, past expiring fund sources, or grants applied for and obtained. Additionally, these sources come from different levels of government; local, state, and federal. Of course, with each of these different fund sources, certain stipulations must be met and maintained. Some of those stipulations include the scope of the project, timeline of project phases, etc. Currently, the City of Nixa has available the following revenue funding that can be used on roadways, trails, and sidewalk projects:

Department Budget				
Year	Federal Allocation	All other Revenue	Expenses	Funds Available for Projects without Grants
2021	\$326,182	\$2,713,339	\$2,065,538	\$647,801
2022	\$355,855	\$3,046,141	\$2,140,193	\$905,948
2023	\$1,538,565	\$3,525,451	\$2,334,013	\$1,191,438
2024	\$2,049,632	\$3,252,816	\$3,137,422	\$115,394
2025	\$2,466,402	\$3,324,599	\$3,358,254	-\$33,655

Based upon the 2025 budget and moving forward, the federal allocation is currently Nixa’s only available funding for these much-needed improvements.

Funding Overview

Over the past five years, the City has consistently secured an average of approximately \$1,300,000 in grant funding each year, which has been allocated toward a variety of essential transportation projects. These grants have been crucial in addressing the City’s growing needs, allowing for progress on key projects. However, despite this relatively steady stream of funding, the total amount required to fully fund the list of identified projects—referred to as the "Projects in Need of Funding"—is significantly higher, estimated at \$35,570,000. Of this total, \$27,570,000 is earmarked for roadway projects, which include much-needed road improvements. The remaining \$8,000,000 is designated for pedestrian projects, such as the development of sidewalks, trails, and other infrastructure improvements aimed at enhancing safety and accessibility for walkers and cyclists.

While the City has made progress in securing funding for some of these projects, the overall financial picture is more challenging. Based on budget reports from the last two years, the revenue allocated to the City’s general fund has been insufficient to provide substantial funding for these large-scale projects. As a result, the City faces a significant funding gap. With city revenues falling short of the projected needs, minimal funding is available through local sources for these critical projects, putting many of them on hold or delaying their completion.

Moreover, the outlook for future grant funding is equally concerning. According to projections from the Ozarks Transportation Organization (OTO), the table below shows the estimated grant funds available through 2028.

OTO Funding Estimates			
Year	Federal Allocation	Programmed Expense	Balance
2024			(\$897,973)
2025	\$530,122	(\$200,000)	(\$567,850)
2026	\$540,180		(\$27,670)
2027	\$550,411		\$522,740
2028	\$560,818		\$1,083,559

Per the table above, the city is not expected to have any additional transportation-related grant funds available until 2027 and is estimated to receive approximately \$600,000 per year for the next 10 years. This grant availability further complicates efforts to meet the City's infrastructure needs in the near term, especially as the population grows and demands on the transportation network continue to increase.

Given these circumstances, the City must explore alternative funding sources and strategies to address the significant shortfall, including potentially seeking new grant opportunities or considering other financial mechanisms to ensure that these critical projects can move forward. Without additional funding or a change in the grant timeline,

many of these vital infrastructure improvements may be delayed for decades, leading to further strain on the City's transportation systems and quality of life for its residents.

To help ensure the continued development of Nixa's transportation infrastructure, we recommend considering the following funding strategies:

MoDOT's Cost Share Program The Cost Share Program, administered by the Missouri Department of Transportation (MoDOT), helps local governments finance transportation projects that enhance safety and capacity. Nixa could apply for funding through this program to support projects that align with state priorities, such as road improvements and safety upgrades. While this program is competitive and funding is limited, it could help supplement our transportation budgets when combined with other sources of funding. This program requires a 50% match by the City.

State Earmarks In addition to MoDOT programs, Nixa could benefit from state earmarks, which are specific allocations of state funds designated for local transportation projects. Through collaboration with state legislators, Nixa can advocate for earmarks in the state budget to help fund essential transportation initiatives. Earmarks could be used to support projects such as road expansions, bridge repairs, or public transit improvements. By working closely with your local representatives in the Missouri General Assembly, you can secure direct funding from the state for transportation improvements.

Federal Earmarks Similarly, federal earmarks can provide direct funding for local transportation projects. These earmarks, typically secured through Congressional appropriations, are allocated by federal legislators specifically for projects in their districts or states. By working with our Missouri Congressional delegation, Nixa can advocate for these earmarks to fund vital transportation infrastructure projects. Federal earmarks are a valuable resource that can supplement other funding sources.

Rebuilding American Infrastructure with Sustainability and Equity (RAISE) The RAISE program is a federally funded program that seeks to invest in road, rail, transit, and port projects that promise to achieve national objectives. Specifically, the program seeks to build and repair critical pieces of our freight and passenger transportation networks. The eligibility requirements of RAISE allow project sponsors at the State and local levels to obtain funding for large, multi-modal, multi-jurisdictional projects that are more difficult to support through traditional programs. RAISE can provide funding directly to any public entity. Local funding matches vary depending on the income of the entity receiving the grant.

Transportation Alternatives Program (TAP) A federal program that funds projects related to pedestrian and bicycle paths, safe routes, and other alternative transportation solutions. This program is administered by the OTO and is allocated each year at OTO's discretion as well. This program typically requires a 20% match by the City.

Transportation Revenue Bonds Nixa could consider issuing transportation revenue bonds. These bonds are backed by future revenues, such as future sales tax revenue. With Nixa's rapid population growth and commercial development, this approach could help raise upfront capital needed for road and infrastructure improvements while allowing the city to repay investors over time. The city could also explore General Obligation Bonds, which would be repaid through property tax revenues, should residents agree to this financing mechanism. It should be noted that there is currently no revenue source to pay for the bonds and a source would have to be identified.

Increasing Local Sales Tax for Transportation To directly fund transportation projects, Nixa could explore the possibility of increasing its local sales tax to support transportation initiatives. This would require a voter referendum but could generate consistent revenue for road maintenance, new infrastructure, or public transportation services. A sales tax increase dedicated specifically to transportation could help address the city's ongoing needs without over-relying on state or federal funds. The City could also seek a capital improvement sales tax that could be used to fund transportation as well as other capital improvement projects. The City currently has a ½ cent transportation sales tax that generated almost \$1,900,000 in 2024.

Reallocating Existing General Revenue The City could review its current budget and identify areas where spending could be reduced or reallocated to support critical infrastructure projects. For instance, by reducing expenditures in non-essential areas, or by increasing efficiency in city operations, funds could be redirected toward transportation maintenance and improvement. A small, strategic shift in funding could provide a reliable revenue stream for road repairs, upgrades, or even new transit services. This approach can help ensure that Nixa's transportation projects remain a priority without relying solely on new taxes or external funding.

Summary

Based on the data available, the city of Nixa’s only funding available for these \$35,570,000 transportation-related projects is the approximately \$600,000 a year that is to be allocated by the OTO. Below is the projected department budget and revenue until 2035 to illustrate this statement. It also shows the annual deficit if the City was to complete all the projects within 10 years.

Department Budget						
Year	Federal Allocation	City Revenue	Expenses	Funds Available for Projects	Funds Needed to Complete all Projects within 10 years	Annual Deficit
2025	\$430,122	\$3,324,599	\$3,358,254	(\$33,655)		
2026	\$540,180	\$3,424,337	\$3,424,337	\$0	\$3,557,000	\$3,557,000
2027	\$550,411	\$3,527,067	\$3,527,067	\$522,740	\$3,663,710	\$3,140,970
2028	\$560,818	\$3,632,879	\$3,632,879	\$560,818	\$3,773,621	\$3,212,803
2029	\$571,417	\$3,741,865	\$3,741,865	\$571,417	\$3,886,830	\$3,315,412
2030	\$582,217	\$3,854,121	\$3,854,121	\$582,217	\$4,003,435	\$3,421,218
2031	\$593,221	\$3,969,745	\$3,969,745	\$593,221	\$4,123,538	\$3,530,317
2032	\$604,433	\$4,088,837	\$4,088,837	\$604,433	\$4,247,244	\$3,642,811
2033	\$615,857	\$4,211,503	\$4,211,503	\$615,857	\$4,374,661	\$3,758,805
2034	\$627,497	\$4,337,848	\$4,337,848	\$627,497	\$4,505,901	\$3,878,405
2035	\$639,356	\$4,467,983	\$4,467,983	\$639,356	\$4,641,078	\$4,001,722

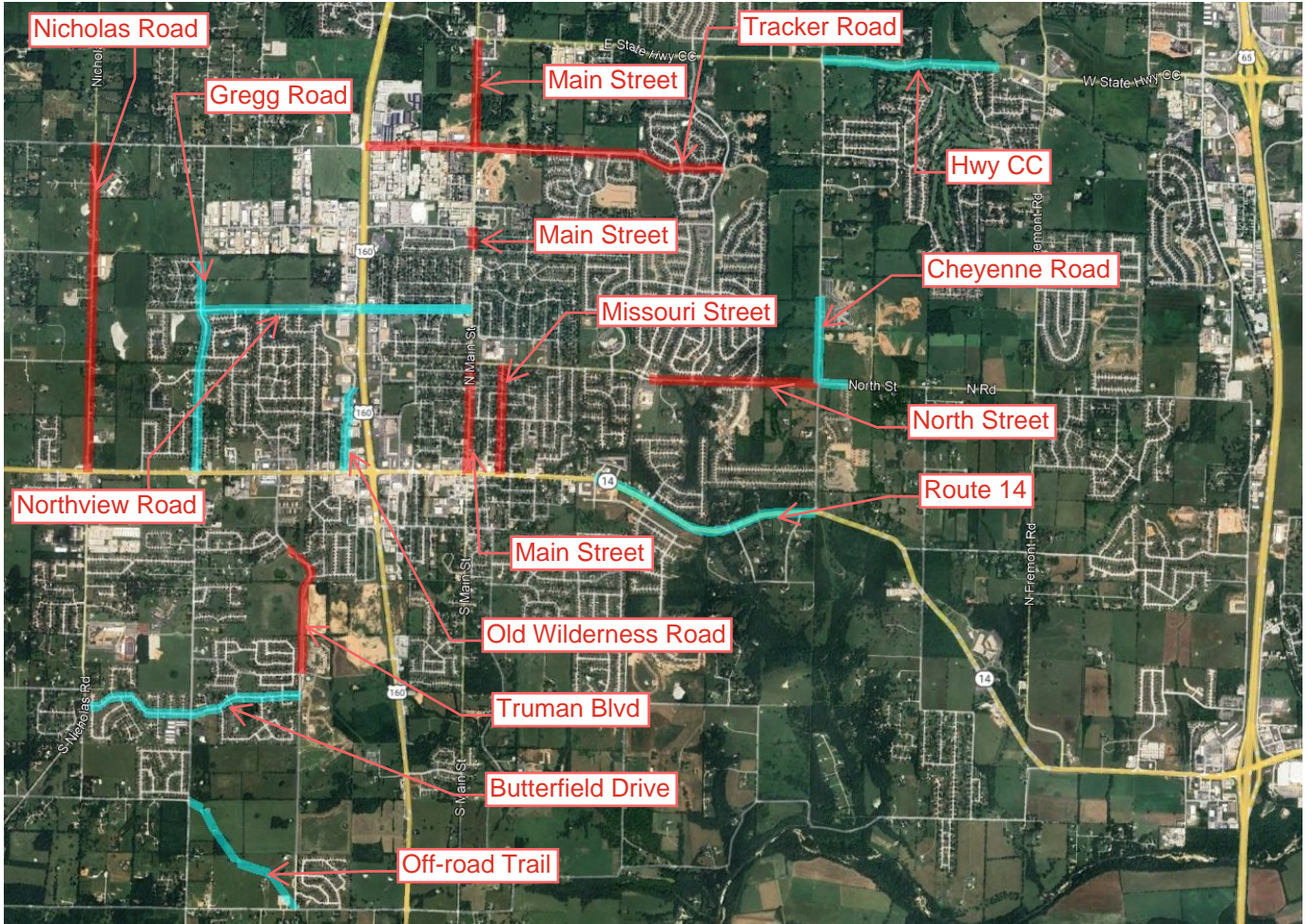
The table below shows the estimated average annual funding required for the City to complete the projects within the specified time frame, assuming a 3% yearly cost increase in construction:

Years to Complete	Avg Annual Deficit
15	\$2,980,000
20	\$2,450,000
25	\$2,155,000
30	\$1,992,000

The city faces a range of pressing needs and has already outlined projects aimed at addressing these challenges. To ensure progress, it is essential to secure additional funding and diversify funding sources. By doing so, the city can build more efficient and sustainable infrastructure while enhancing safety for all residents. As the community continues to grow and the cost of improvements rises, finding innovative funding solutions will be critical to meeting future demands and fostering a thriving, resilient city.

Appendix

PROJECT LOCATIONS



- Roadway Project
- Pedestrian Project

City of Nixa

Preventive Pavement Maintenance Plan



Prepared For:

City of Nixa,
Missouri

Prepared By:



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Introduction

Road pavements gradually deteriorate due to weather and daily traffic loads. Once the condition of a pavement deteriorates beyond a certain point, reconstruction is the only means of repair. Before the pavement reaches that point, relatively inexpensive preventive maintenance techniques can cut short the cycle of deterioration, improve the pavement condition, and postpone the need for expensive reconstruction.



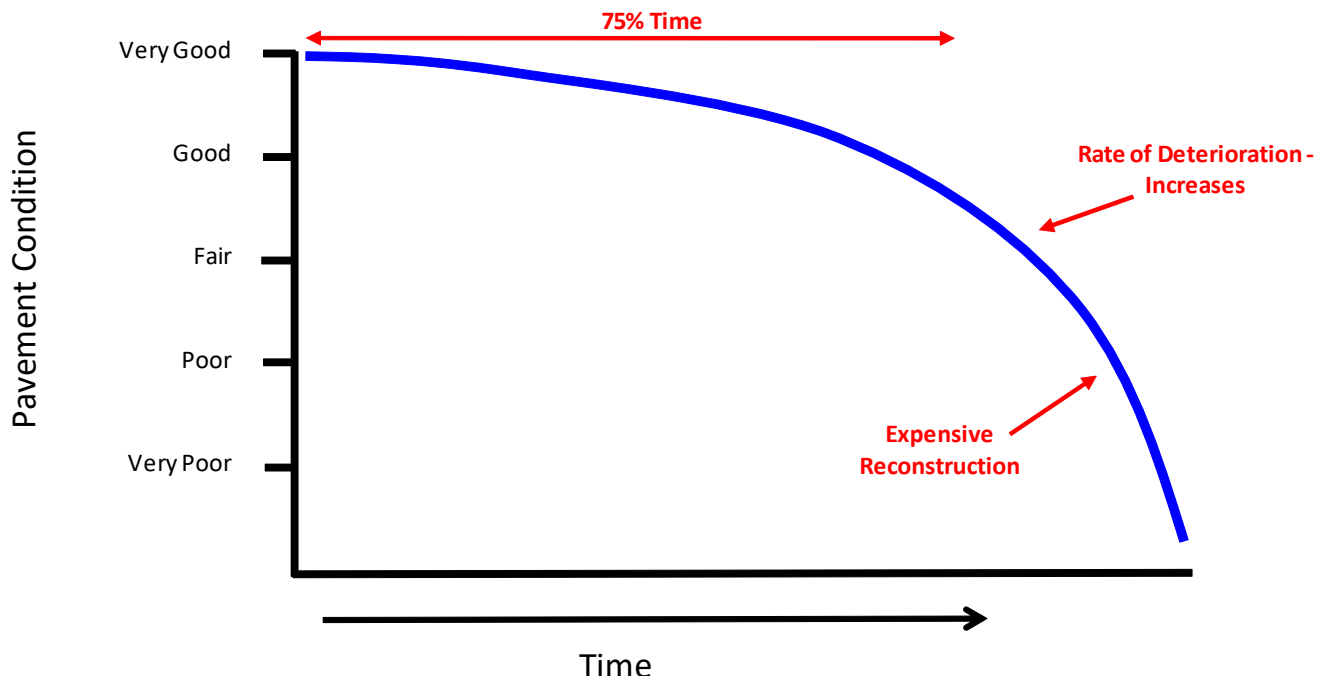
**Sarah Street
Expensive Reconstruction Required**

The goal of this Preventive Pavement Maintenance Program (PPMP) is to become pro-active with regard to pavement repairs, which will stop potholes before they start – thereby reducing regular maintenance costs – and stretch reconstruction dollars by extending the life of the pavement that has not yet deteriorated too severely. Ultimately, the program will not only improve the streets in City of Nixa, but help make better use of City funds as well.

Preventive Pavement Maintenance Program

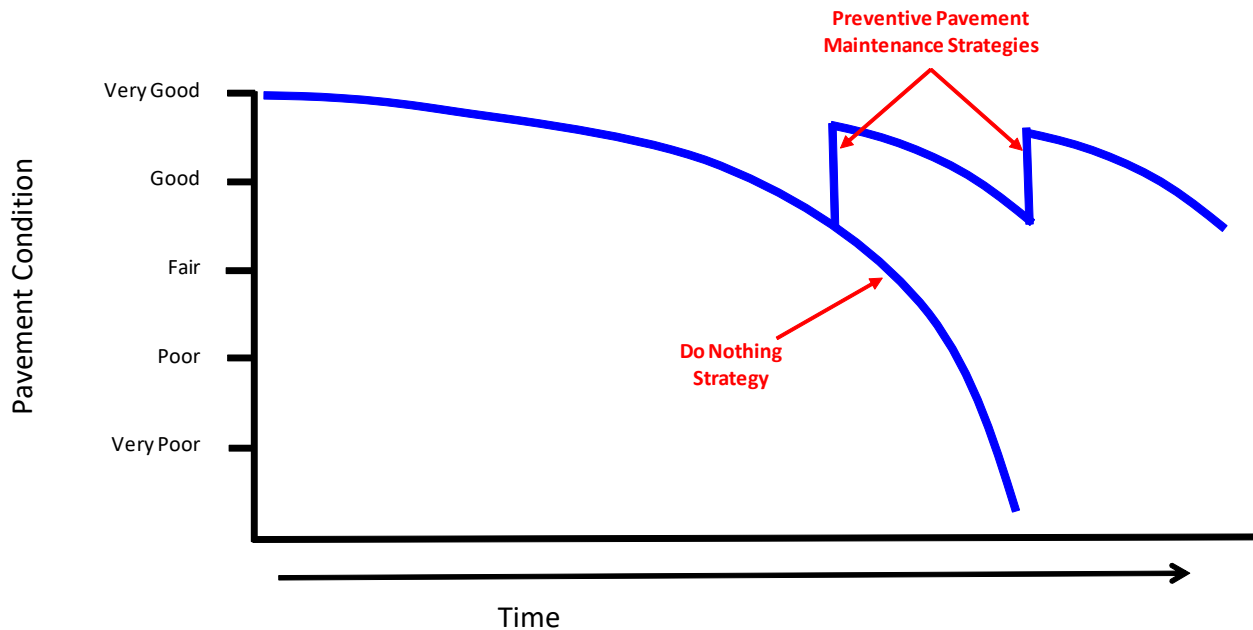
The figure below represents a pavement performance curve in terms of rehabilitation costs. You can see that rehabilitation costs increase by over 4 times if rehabilitation is deferred only 12% of a pavement’s design life. For typical pavements, 12% amounts to only about 2 years. In view of this fact, deferred rehabilitation is very expensive. Good pavement maintenance management dictates that rehabilitation occur at a time so as to derive the greatest benefit (or extension of serviceability) possible. The problem becomes very complex since each different pavement structure has a different performance curve and on similar structures with similar curves different pavements will be at a different point in their service lives.

An important point can be concluded here. Unless a jurisdiction has all the money for rehabilitation, it is almost certainly a mistake to program rehabilitation on a “worst-first” basis. Maximum benefit cannot be derived from the limited public funds available if an agency binds itself to a “worst-first” programming philosophy.



Our proposed Preventive Pavement Maintenance Program establishes a guideline to preserve the structural integrity and extend the service life of the City’s street network.

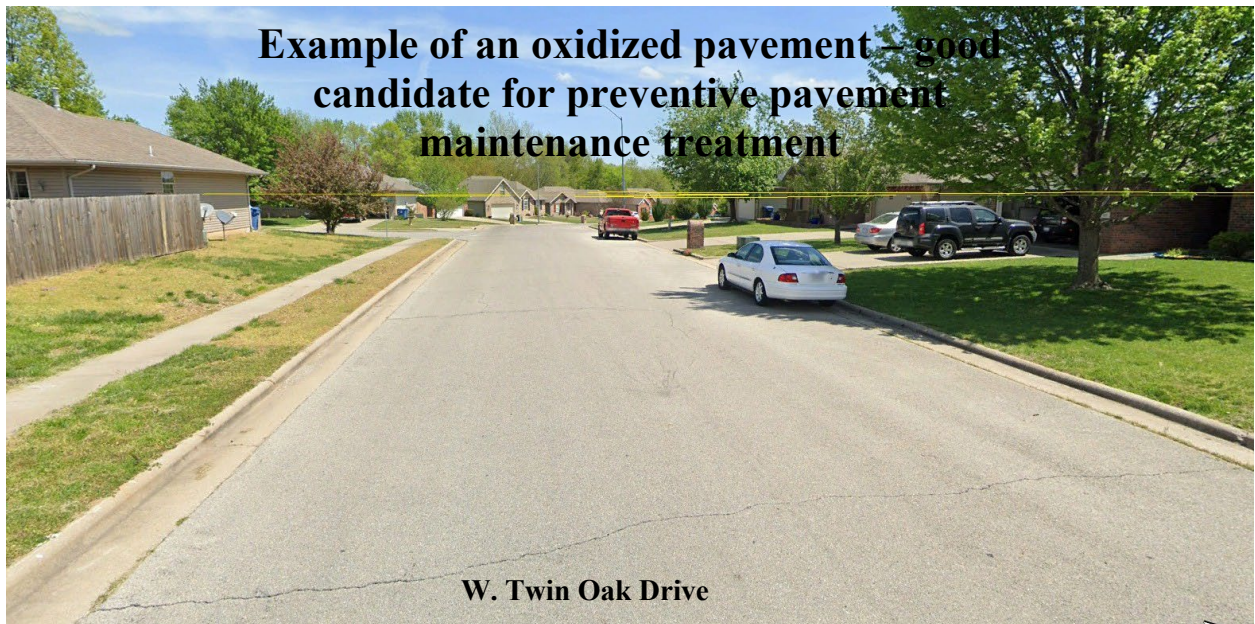
A preventive maintenance program is a systematic approach to using a series of preventive maintenance treatments over time. One treatment will improve the quality of the pavement surface and extend the pavement life, but the true benefits of pavement maintenance are realized when there is a consistent schedule for performing the preventive maintenance. The graphic below illustrates this process:



As a result, the performance of pavements depend upon the type, time of application, and quality of the maintenance it receives. Pavement maintenance can be classified into three types of pavement maintenance operations:

- **Routine maintenance** is the day-to-day maintenance activities that are scheduled or whose timing is within the control of our street maintenance personnel. Examples of routine maintenance include filling cracks in pavement as necessary, street sweeping, trash collection, and re-painting faded pavement markings.
- **Reactive Maintenance** are activities that must be done in response to events beyond the control of the City's Street Department. Some events require response as soon as possible to avoid serious consequences because a present or imminent danger exists. Reactive maintenance cannot be scheduled because they occur without warning and often must be immediately addressed. Examples of reactive maintenance activities include pothole patching, removing and patching pavement blowups.

- **Preventive Maintenance** is the planned strategy of cost-effective treatments to an existing roadway system that preserves the system, retards future deterioration and maintains or improves the functional condition of the system without significantly increasing structural capacity. In essence, preventive maintenance activities protect the pavement and decrease the rate of deterioration. Preventive maintenance should be performed on pavements that have oxidized (i.e. surface skin of oil has worn off), but not when significant cracking and joint separation is exhibited.



All types of maintenance are needed in a comprehensive pavement maintenance program. However, emphasizing preventive maintenance may prevent a pavement from requiring reactive maintenance. Although all three types of maintenance are important, we have created this PPMP to cost-effectively prolong the pavement service life of City of Nixa streets.

In Summary:

Delays in preventive maintenance increase the quantity of pavement defects and their severity so that, when corrected, the cost is much greater. The purpose of our PPMP is to protect the pavement structure, slow the rate of pavement deterioration and correct pavement surface deficiencies. As an aid to assess the effectiveness of the PPMP, a yearly review should be conducted on all City owned and maintained streets.

Providing proper funding at this time is critical in order to perform preventative maintenance on the large percentage of streets that are 20 to 30 years old. Without preventative maintenance, these streets will require full rehab in the future which will be a large burden on Public Works and the taxpayers.

Framework and Strategy – Program Development

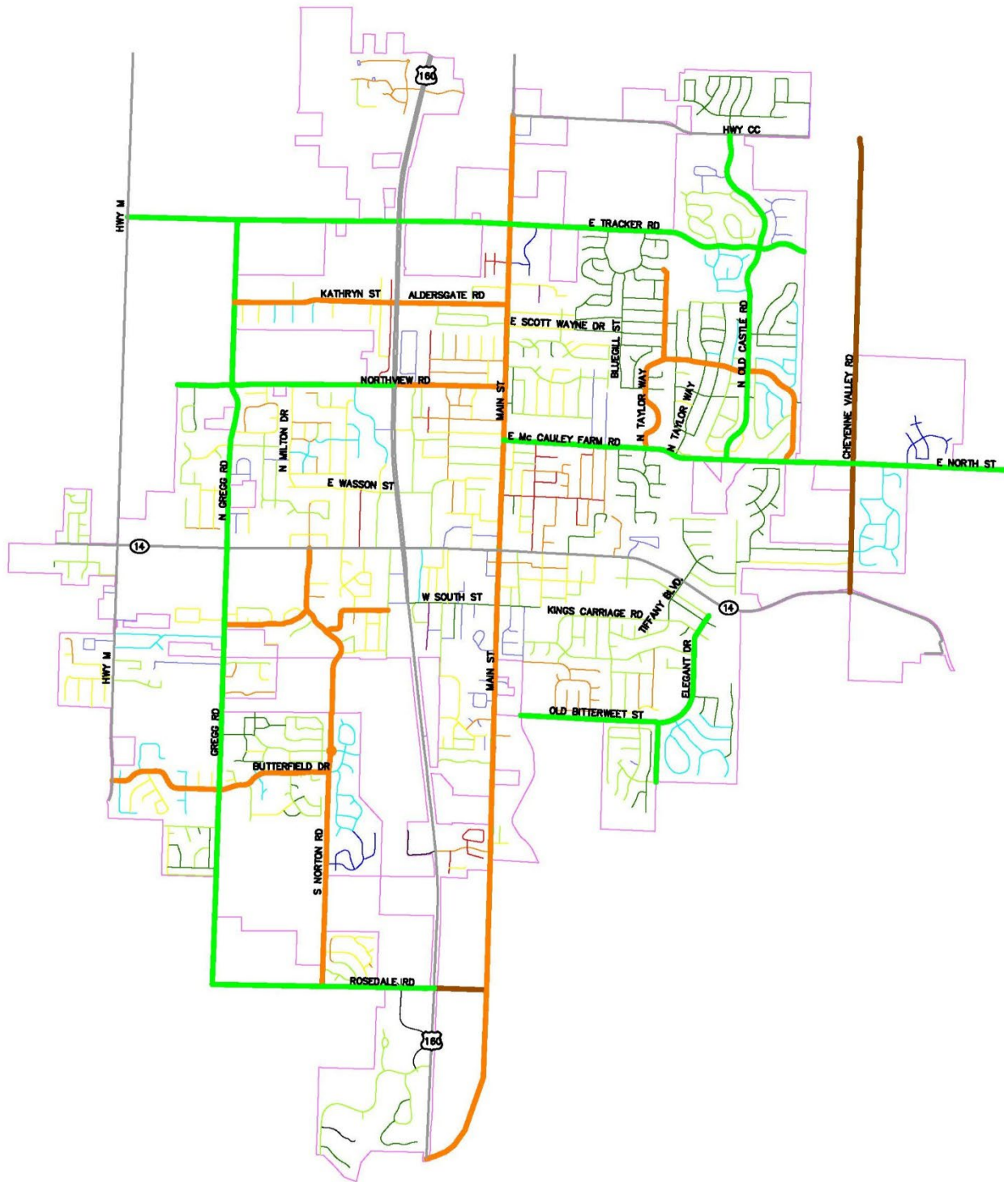
It is important to note that City representatives and Cochran staff met numerous times to: a) integrate ideas from different perspectives; and b) develop an implementation plan that aligned with both public perception and the City's budgeting perspective.

Through this collaborative process, both parties learned from each other and worked together to create a plan tailored to the unique characteristics of the City of Nixa Street network system. The resulting plan was shaped by the following issues and circumstances specific to this network.

1. **Existing Pavement Conditions** - we assessed the pavement conditions of all of the streets and determined the appropriate levels of maintenance that were/could be warranted.
2. **Classification by Roadway Type** - we grouped and clustered the roadways by type/characteristic. Specifically, we identified roadways into three categories: a) residential asphalt streets; b) arterial asphalt roadways; and c) roadways that qualify for federal funding.
3. **Roads Eligible for Federal Funding** - the Missouri Department of Transportation (MoDOT) maintains a master list of roadways eligible for federal funding. MoDOT is responsible for maintaining and updating the region's Roadway Functional Classification System mandated under federal law. Roadways are classified according to their urban or rural setting and the type of service they provide based on considerations such as: connectivity, mobility, accessibility, vehicle miles traveled, average annual daily traffic, and abutting land use. The purpose of roadway functional classification is to describe how travel is channelized through the roadway network and to determine project eligibility for inclusion in the Long Range Plan and short-range Transportation Improvement Program (TIP). A roadway must already be classified at minimum as a planned or existing Urban Collector or Rural Major Collector in order to be eligible for federal funds allocated in the TIP. The map on the following pages shows the current status of roadways eligible in the City of Nixa.

It shall be noted that OTO funds are reimbursement funds that require the city to have 100% of the project costs available. Once the funding is awarded, the city can receive up to 80% of the funds back. The city requires the proper cash flow in order to fully utilize the +/- \$475,000 yearly allotment.

The roadways that are colored are currently eligible for federal funding in Nixa.



4. **Group Concept** - we determined that it would be more cost effective from a bid pricing standpoint to combine roads in grouped areas. This would save extra mobilization costs and minimize disruption to the residents. This group concept would eliminate the need for the paving contractor to jump to three different areas in the City during a paving operation. It makes more sense to group streets together for maintenance/rehabilitation from a cost and mobilization standpoint. In addition, this idea would help prevent construction trucks driving over pavements that were resurfaced the year before.
5. **Construction Cost Estimating** – we quantified and estimated the cost of each street’s proposed treatment.
6. **Program Budget** - the program was developed in a way that the City could plan and budget to make the plan work. It is important to take into consideration of the City’s budget regarding when the streets would be treated. We assumed an approximately \$1,500,000 allocation of funds for the preventive pavement maintenance program.
7. **Pavement Treatment Selection** - final development of the plan based on the cost and performance of the preferred pavement treatments as described in the next section.

Preferred Pavement Treatment Types

This PPMP utilizes surface treatments as categories of work. These surface treatments are targeted at pavement surface defects primarily caused by the environment and vehicular loads. Preventive maintenance treatments used to protect the pavement structure and slow the rate of pavement deterioration include the following:

- Crack and Joint Sealing
- Microsurfacing
- Pressure Pave
- Nova Chip – Ultra Thin Asphalt
- Surface Milling and Asphalt Overlay
- Full Depth Pavement Replacement

Crack and Joint Sealing

Description: Crack and joint sealing consists of cleaning the crack in the pavement surface and placing the specified materials into and above the crack to substantially reduce infiltration of water and to reinforce the adjacent pavement. The fill method consists of cutting the desired reservoir shape at the working crack in the existing surface, cleaning the cut surfaces and placing the specified materials into the cavity to prevent the intrusion of water and incompressibles into the crack.



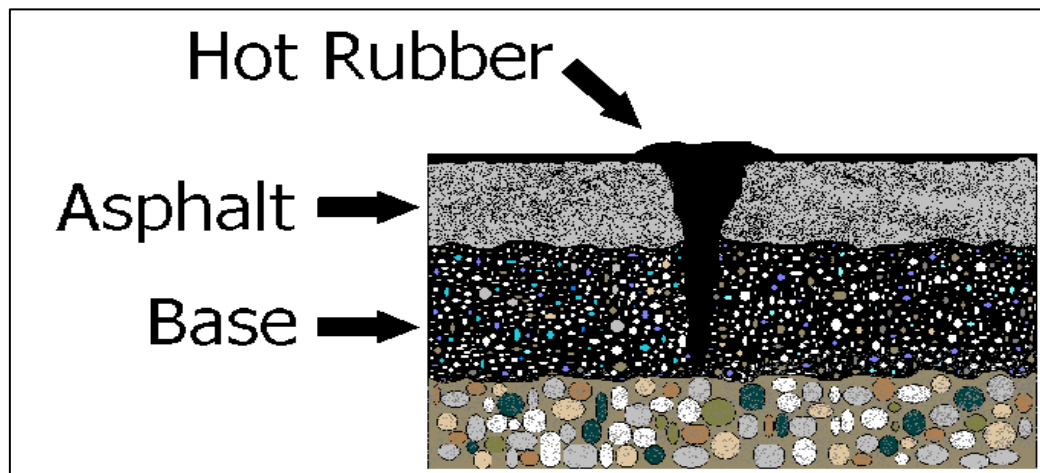
Purpose: The purpose of sealing and filling cracks in the pavement surface is to prevent water and incompressibles from entering the pavement structure.

Existing pavement condition: Concrete pavements should have cracks filled every two years. On asphalt pavements, crack filling should begin two to four years after resurfacing, and on a composite pavement, one to two years old. The visible surface distress may include: fairly straight open longitudinal and transverse cracks with slight secondary cracking and slight raveling at the crack face, and no patching or very few patches in excellent condition.

Existing pavement surface preparation: None.

Performance: The effectiveness of the seal will greatly depend upon the width of crack being sealed and the movement of the pavement structure at the crack.

Life Extension: This treatment is not a one shot operation. In order to maintain the sealed pavement surface, a routine maintenance crack sealing and filling operation should follow up this treatment, as additional cracks develop.



Micro-surfacing

Description: Micro-Surfacing is a mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed, and placed on a paved surface.



Purpose: A single course micro-surfacing will retard oxidation and improve skid resistance in the pavement surface. A multiple course micro-surfacing is used to correct certain pavement surface deficiencies including severe rutting, minor surface profile irregularities, polished aggregate or low skid resistance and light to moderate raveling. Micro-surfacing is typically used on flexible or composite pavements and can perform under all traffic volumes.

Existing pavement condition: The existing pavement should exhibit a uniform cross section and a good base. The visible distress may include slight cracking, rutting, minor surface irregularities, flushed or polished surface and/or moderate raveling.

Existing pavement surface preparation: Surface preparation typically includes crack fill, bump removal if necessary, removal of thermoplastic pavement markings and seal patching for large voids and potholes.

Performance: A micro-surface performs well on roadways to correct pavement surface conditions described above.

Life Extension: We expect that micro-surfacing applied at warranted conditions will provide a life extension of 5 years on arterial streets and 6 years on residential/low volume streets.

Performance Limitations: A standard micro-surfacing formulation should not be used on a pavement with moderate to heavy surface cracks. Due to its brittle nature, it is a poor crack sealer. Because micro-surfacing mixes require warm to moderate temperatures for curing, the City should plan to only perform this work in the middle of the summer.



Pressure Pave

Description: The Pressure Pave paving process places a thin, coarse aggregate hot mix over a special asphalt membrane, on an existing asphalt surface. Pressure Pave combines a surface seal with a hot mix level-paving surface and the flexibility of a thin maintenance treatment, which results in a durable surface



Purpose: The special NovaBond membrane prevents water leakage and provides a superior bond to the old asphalt or concrete surface.

Existing pavement condition: NovaChip can be used as preventative maintenance or as a surface rehabilitation treatment. The NovaChip results in a thinner surface than hot mix, making it suitable where over height clearance and drainage profile problems may occur. It's good for high traffic areas because the process moves quickly and all in one pass. This means the road will be opened sooner resulting in less traffic delays.

Existing pavement surface preparation: Surface preparation typically includes minor milling at commercial entrances, bump removal if necessary, removal of thermoplastic pavement markings and patching for large voids and potholes.

Performance: This type of treatment will protect the remaining pavement structure, slow the rate of deterioration and improve the ride quality.

Nova Chip (Ultra Thin Asphalt)

Description: The Nova Chip (Ultra Thin Asphalt) paving process places a thin, coarse aggregate hot mix over a special asphalt membrane, on an existing asphalt surface. NovaChip combines a surface seal with a hot mix level-paving surface and the flexibility of a thin maintenance treatment, which results in a durable surface



Purpose: The special NovaBond membrane prevents water leakage and provides a superior bond to the old asphalt or concrete surface.

Existing pavement condition: NovaChip can be used as preventative maintenance or as a surface rehabilitation treatment. The NovaChip results in a thinner surface than hot mix, making it suitable where over height clearance and drainage profile problems may occur. It's good for high traffic areas because the process moves quickly and all in one pass. This means the road will be opened sooner resulting in less traffic delays.

Existing pavement surface preparation: Surface preparation typically includes minor milling at commercial entrances, bump removal if necessary, removal of thermoplastic pavement markings and patching for large voids and potholes.

Performance: This type of treatment will protect the remaining pavement structure, slow the rate of deterioration and improve the ride quality.

Life Extension: We expect that NovaChip applied at warranted conditions will provide a life extension of 6-8 years on arterial streets and 7-9 years on residential/low volume streets.

Performance Limitations: This treatment should not be used on an existing pavement that shows evidence of a weak base.



Surface Milling with Bituminous Overlay

Description: The removal of an existing bituminous surface by the cold milling method, placement of paving fabric, and the placement of a dense graded bituminous mixture. In most streets in Nixa we recommend the MoDOT BP-2 mixture of asphalt.

Purpose:

Milling - The cold milling operation is used to: (1) correct specific existing surface deficiencies, and (2) correct the shape of the existing cross section. The cold milling operation is used to correct rutting in the existing bituminous surface layer where the rutting is not caused by a weak base and when the condition of the existing pavement has deteriorated to a point where it is not practical to correct the problem by a more economical treatment. The cold milling operation is also used to remove an existing bituminous course that is debonding and to remove the existing bituminous surface to retain the existing curb face.



Paving Fabric - The paving fabric is used as a water proofing membrane and increases pavement life in three ways:

1. Substantially eliminates the number one cause of pavement deterioration, water intrusion through the asphalt.
2. Slows reflective cracking from existing asphalt or concrete pavements. FHWA studies show that cracks as small as 1/8 inch will allow 97% of the water striking the pavement to pass through to the base. Slight movements associated with old cracks or joints are dissipated by the membrane. More importantly, even if the crack reflects through, the membrane remains intact and continues to waterproof.
3. Studies show that paving fabrics increase the fatigue life by 100% to 300%. Asphalt is a flexible pavement and research has shown that pavements with a paving fabric can flex two to three times more before fatigue failure.



Asphaltic Surface Course - The bituminous overlay replaces the bituminous material that is removed.



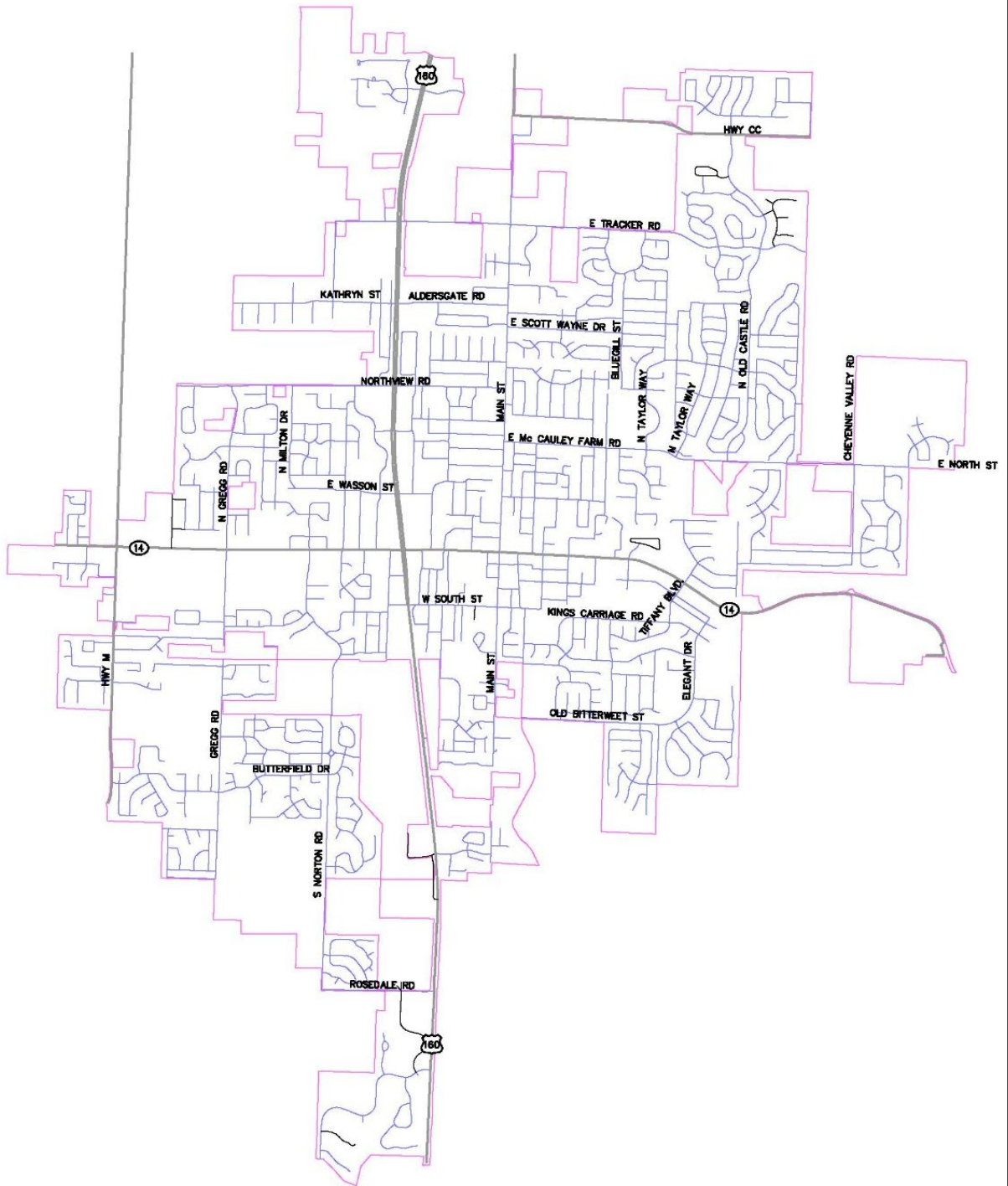
Existing Pavement Condition: The existing pavement should exhibit a good base condition. The visible surface distress may include: severe surface raveling, multiple longitudinal and transverse cracking with slight raveling, a small amount of block cracking, patching in fair condition, debonding surface and slight to moderate rutting.

Performance: This type of treatment will protect the remaining pavement structure, slow the rate of deterioration and improve the ride quality.

Performance Limitations: This treatment should not be used on an existing pavement that shows evidence of a weak base.







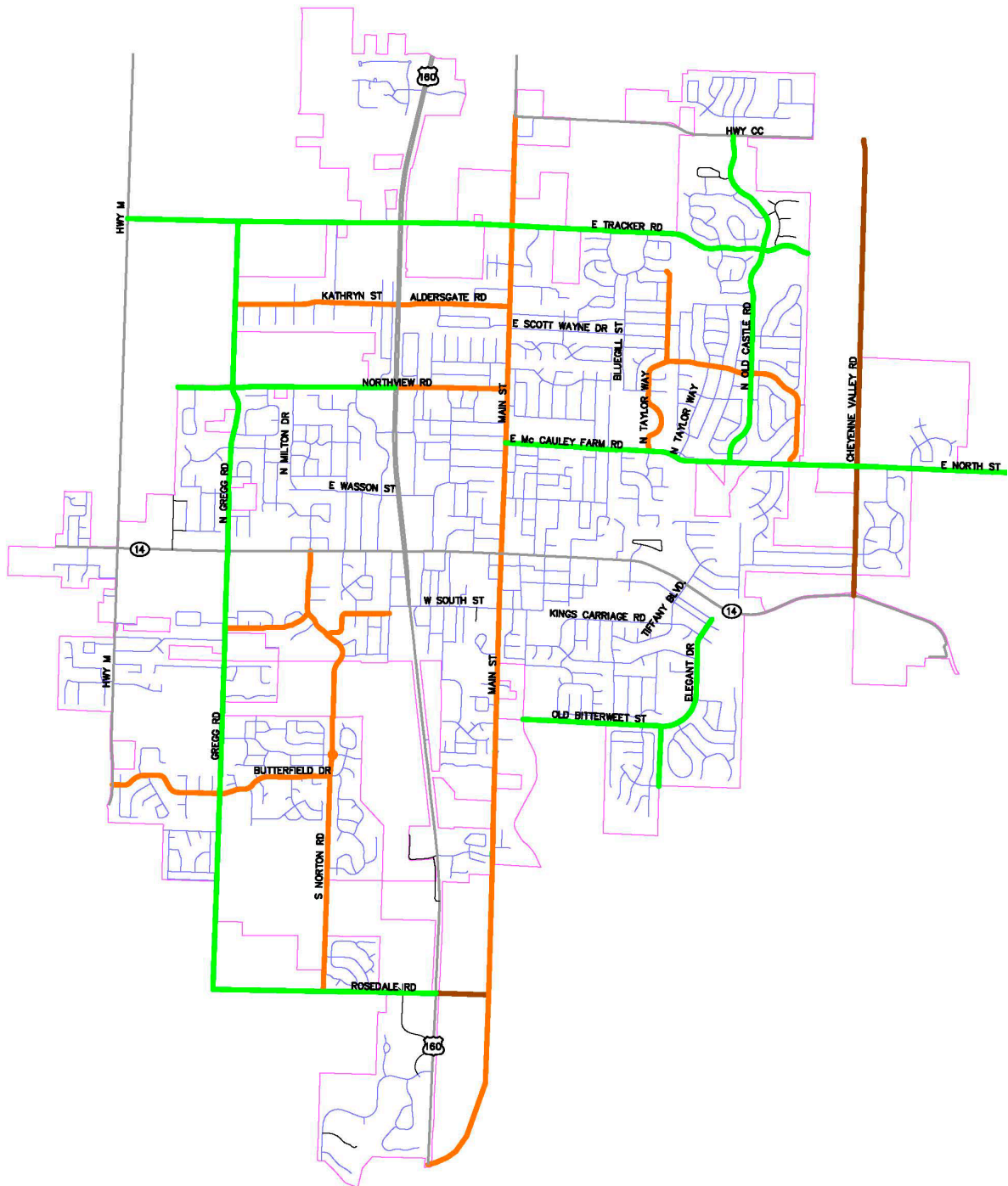
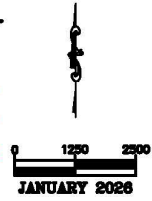
City of Nixa Street Map



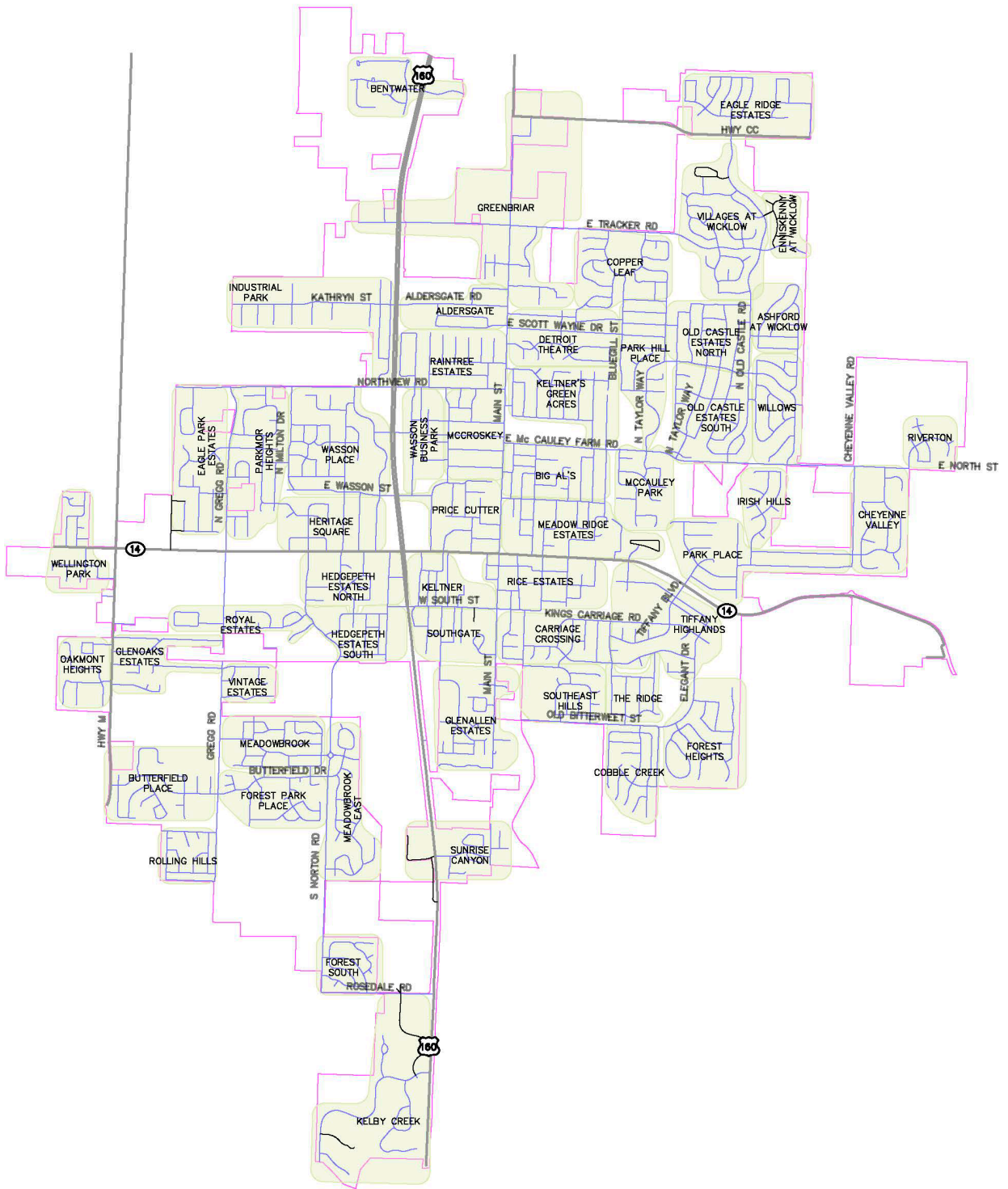
City of Nixa Arterials and Collectors

LEGEND

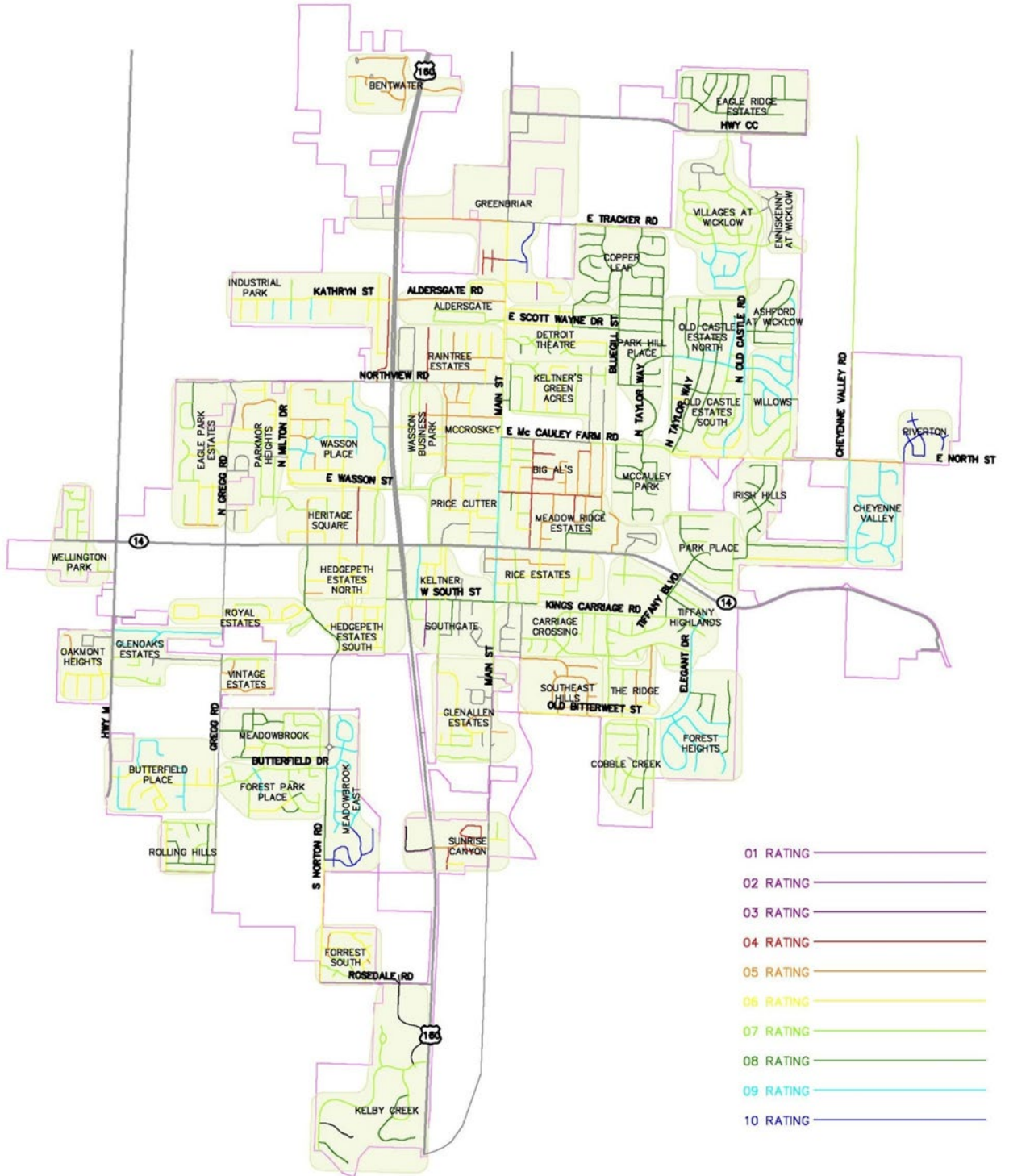
- NIXA CITY STREETS 
- MAJOR COLLECTOR 
- PRIMARY ARTERIAL 
- SECONDARY ARTERIAL 



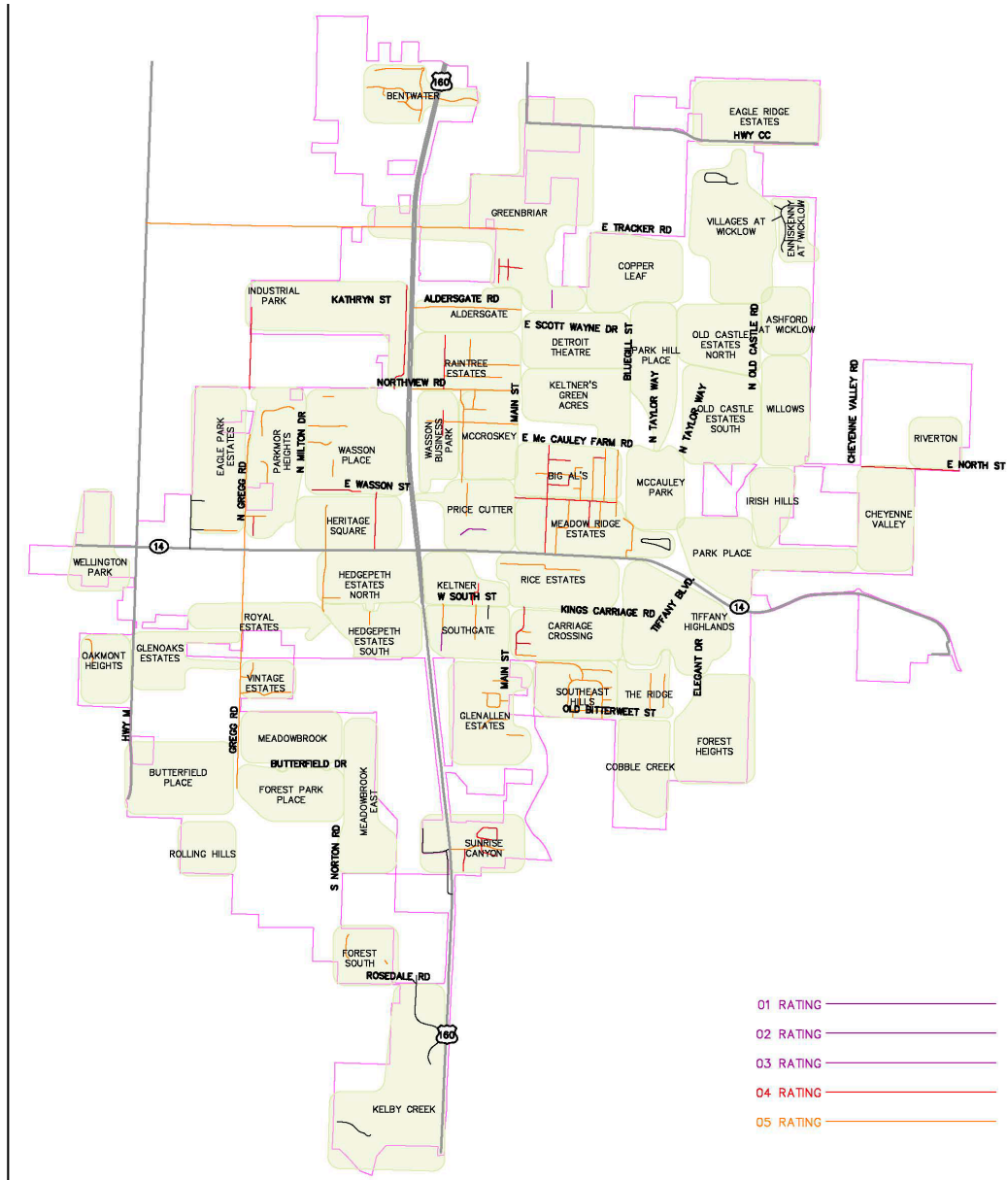
Group Map



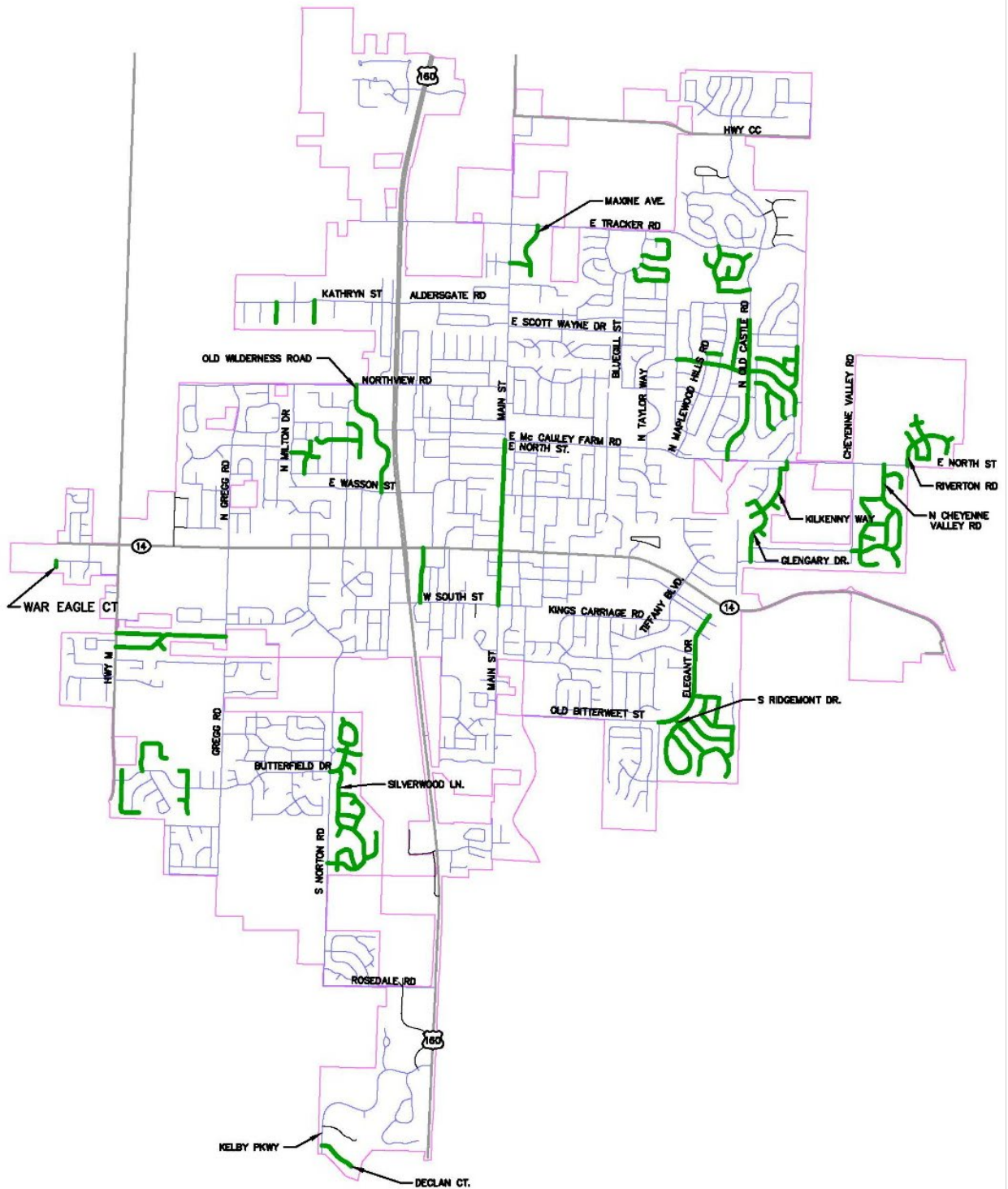
Street Rating Map



City of Nixa Failing Street Map



History - Previous Pavement Treatments/New Development – the following table shows the past several years of the City’s pavement treatments.

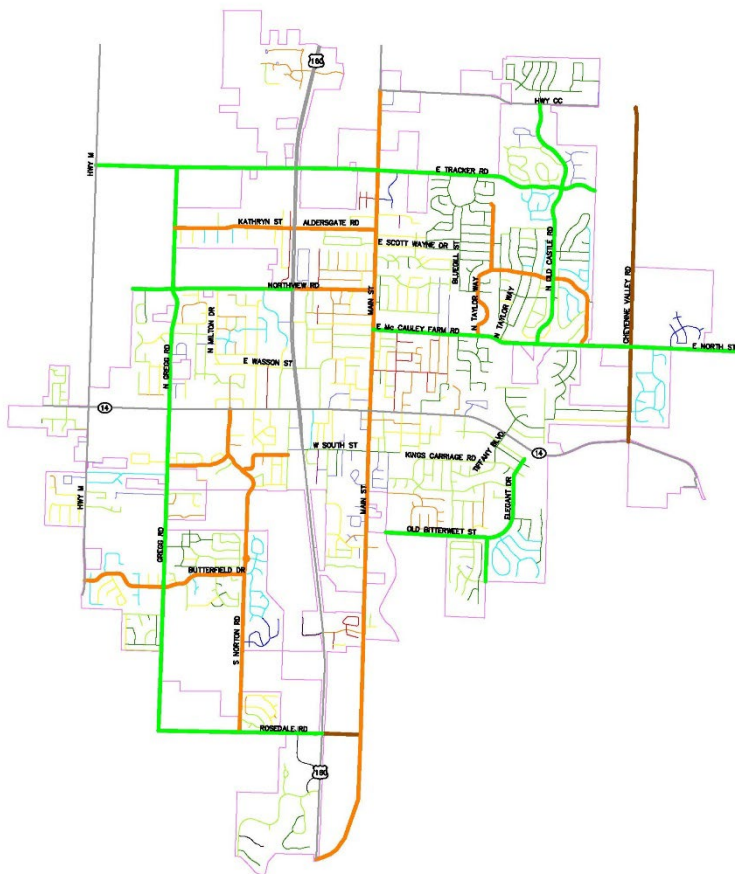


Group Concept – as discussed above, we determined that it would be more cost effective from a bid pricing standpoint to combine certain roads into grouped areas. This would save extra mobilization costs and minimize disruption to the residents. This group concept would eliminate the need for the paving contractor to jump to three different areas in the City during a paving operation. It makes more sense to group streets together for maintenance/rehabilitation from a cost and mobilization standpoint. In addition, this idea would help prevent construction trucks driving over pavements that were resurfaced the year before.

Asphalt Paving Groups:

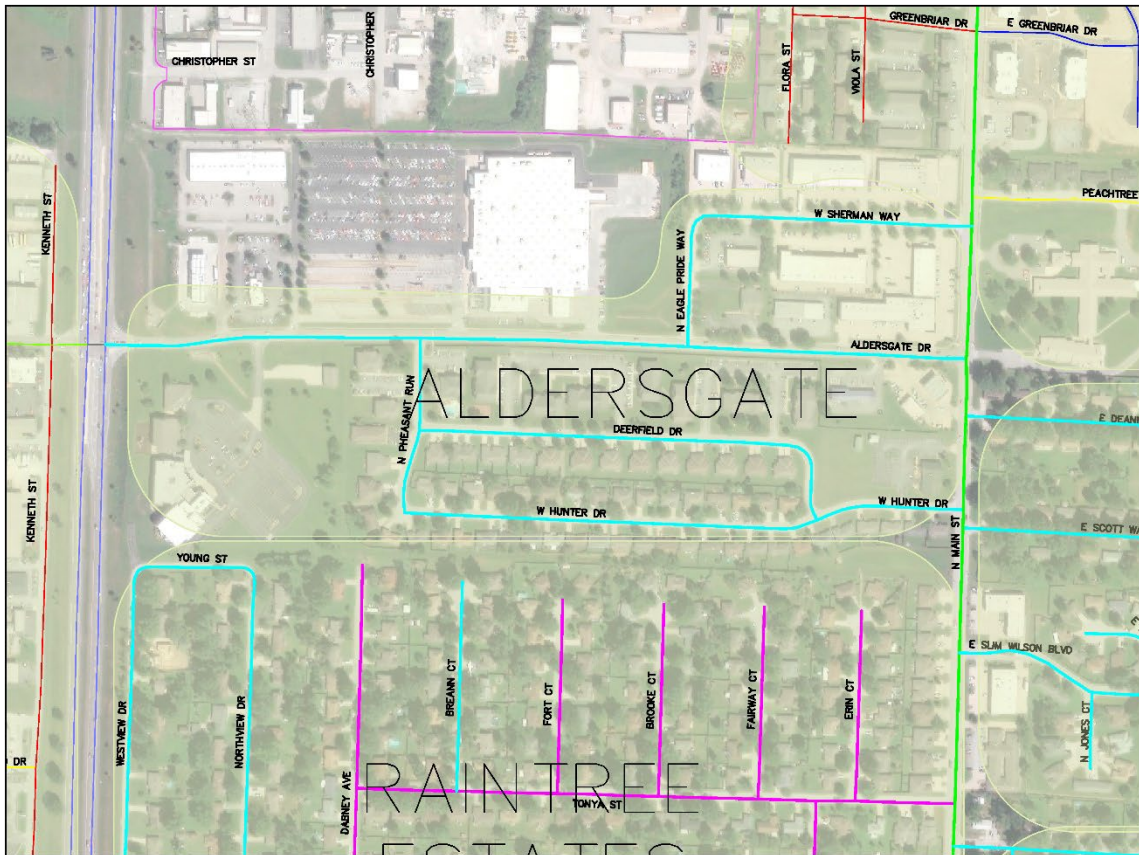
Collectors and Arterials (Possible OTO Funding)

- E. Tracker Rd
- Northview Rd
- Gregg Rd
- S. Norton Rd
- Main St
- E. McCauley Farm Rd
- Cheyenne Rd
- North St



Aldersgate Group

- Aldersgate
- W. Deerfield
- N. Eagle Pride Way
- W. Hunter
- Pheasant Run
- W. Sherman Way



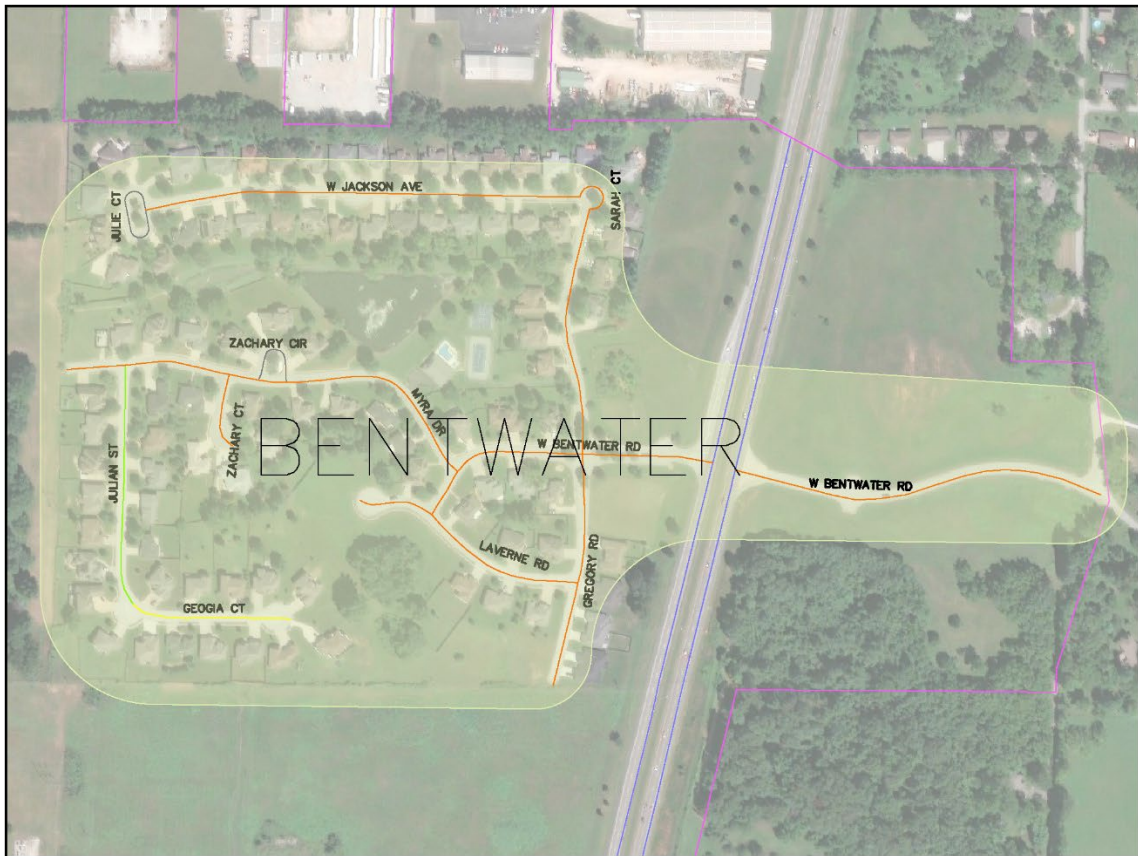
Ashford at Wicklow Group

- Downshire Dr
- N. Foxhill Cir
- Greer Ave
- E. Powers Ct
- Thorndale



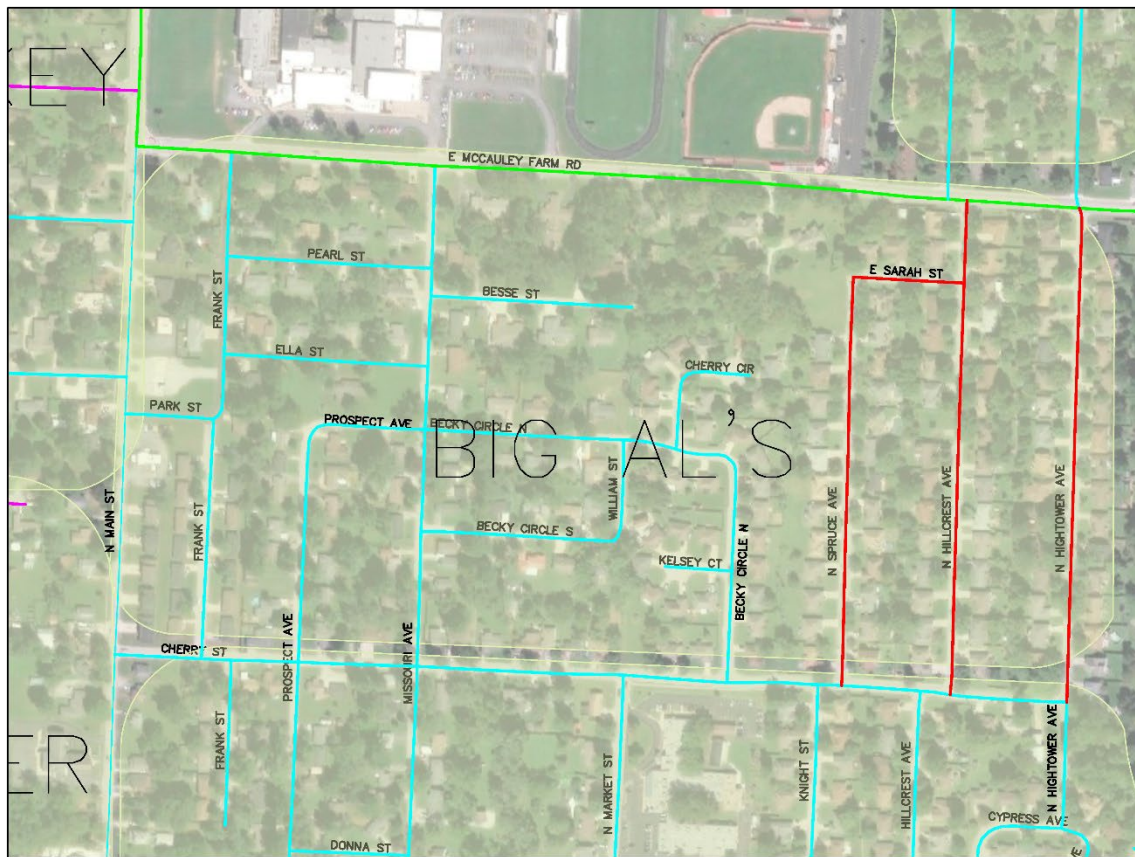
Bentwater Group

- W. Bentwater
- W. Georgia
- N. Gregory
- W. Jackson
- N. Julian
- W. Laverne
- W. Myra
- Zachary Ct.



Big Al's Group

- S. Becky Cir
- N. Becky Cir
- Cherry Cir
- Ella
- Frank
- Hightower
- Hillcrest N.
- Kelsey Ct.
- Park
- Pearl
- Prospect
- Sarah
- Spruce



Butterfield Place Group

- Aurora Ct.
- Ballard Dr
- Batson Pl.
- Benson Pl.
- Bluegrass Rd
- Butterfield Dr
- Cedarwood Ct.
- S. Curtis
- W. Dunn Place
- Foxx Ln
- S. Pinewood Ln
- Pinhook Dr.
- S. Redwood
- Sherwood Ct.



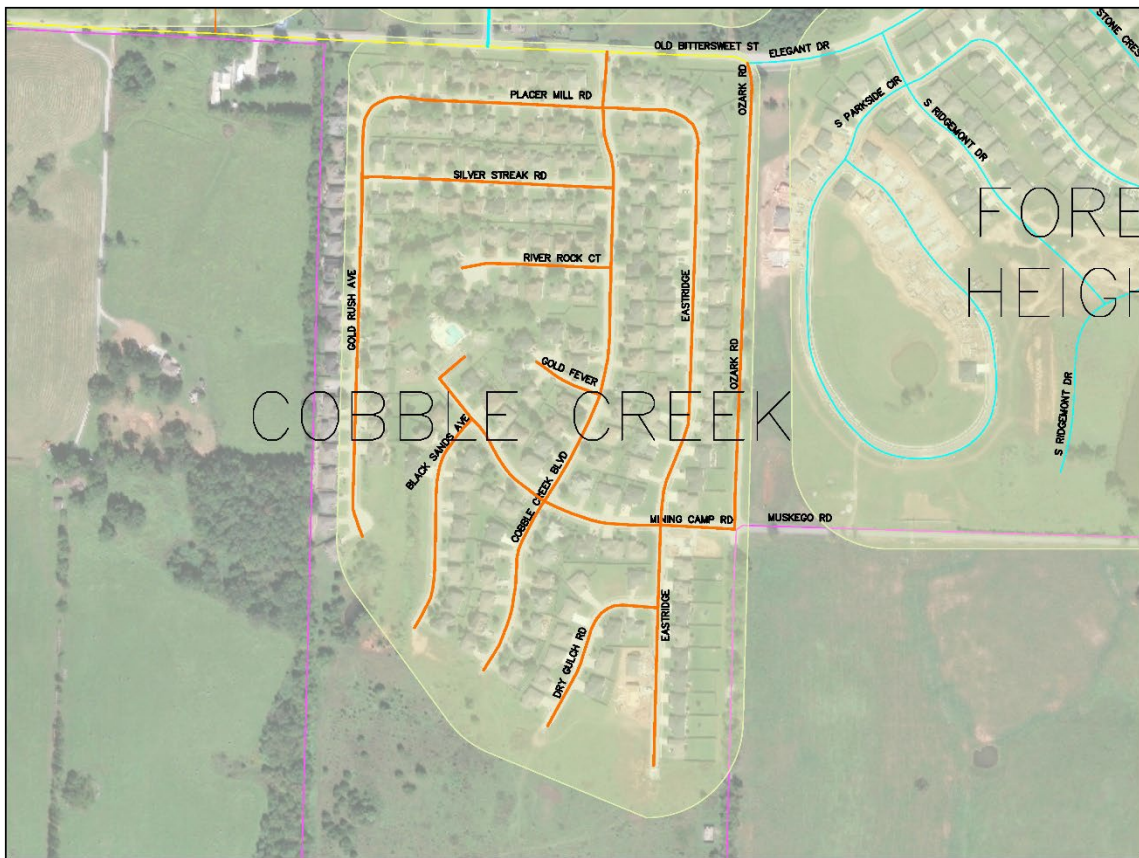
Cheyenne Valley Group

- Big Horn Rd.
- N. Bison Ct.
- Buffalo Ct.
- N. Cheyenne Valley Rd.
- Great Plains St.
- E. Lakota St.
- Little Rock Ct.
- Manitou Ct.
- N. Pine Leaf Rd.
- E. Plum Creek Rd.



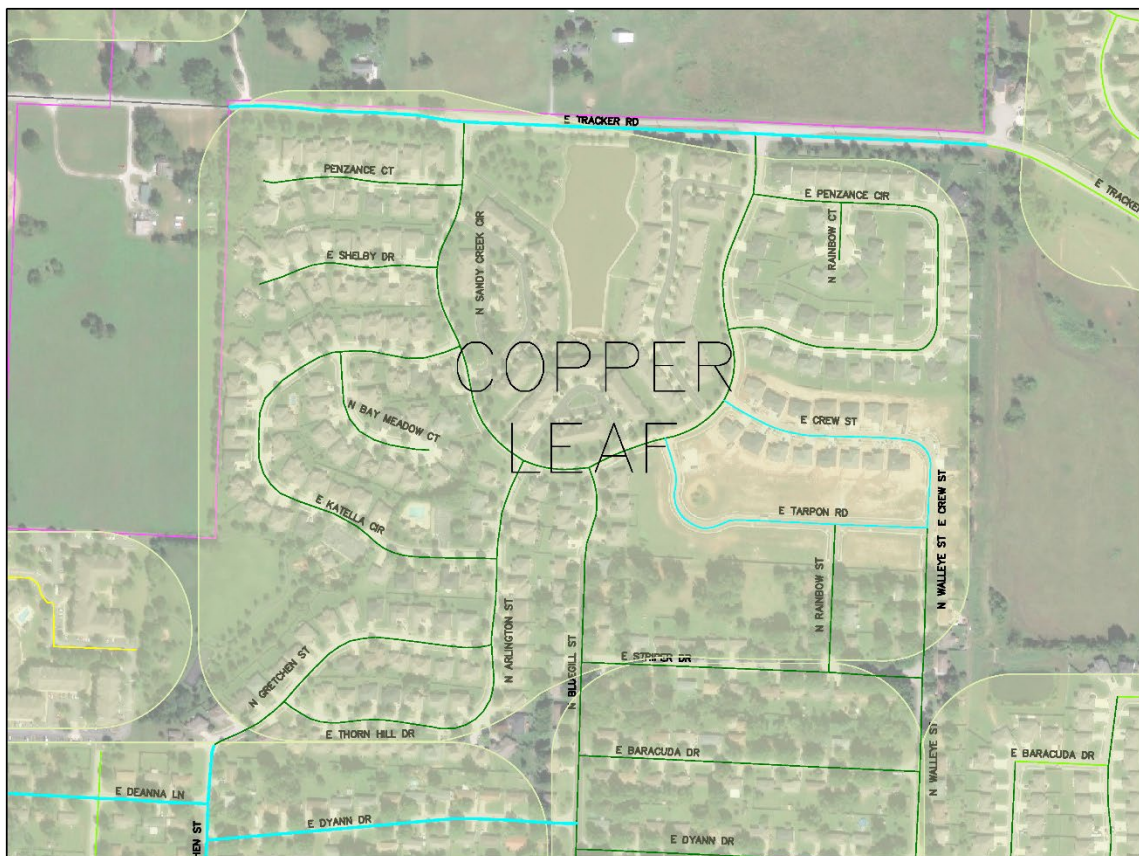
Cobble Creek Group

- S. Black Sands Ave
- S. Cobble Creek
- S. Dry Gulch
- S. Eastridge
- Gold Fever Ct.
- Gold Rush Ave.
- Mining Camp Rd.
- E. Old Bittersweet
- Ozark Rd.
- E. Placer Mill Rd
- River Rock Ct.
- Silver Streak Rd.



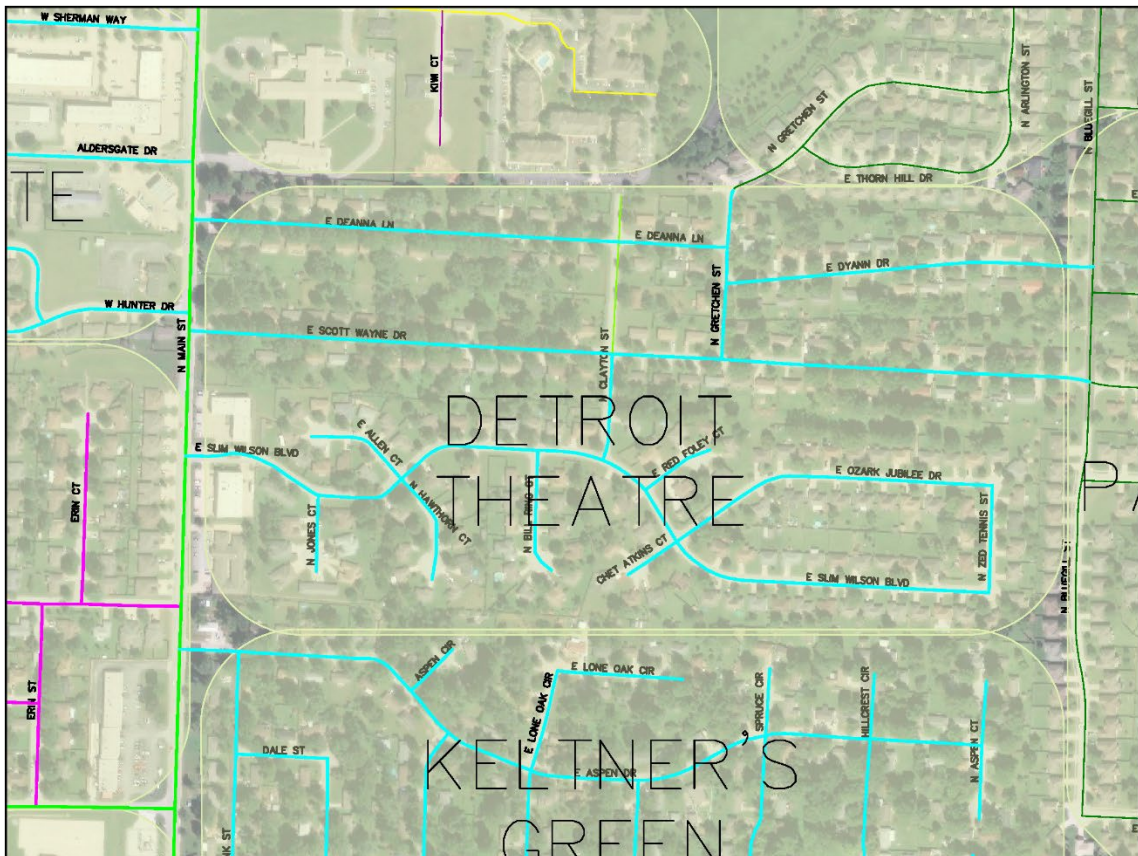
Copper Leaf Group

- N. Arlington St.
- N. Bay Meadow Ct.
- Bluegill St.
- E. Crew St
- Gretchen
- E. Katella Cir
- E. Penzance
- Penzance Ct.
- N. Rainbow St.
- N. Rainbow Ct.
- N. Sandy Creek
- E. Shelby
- E. Tarpon
- Thron Hill



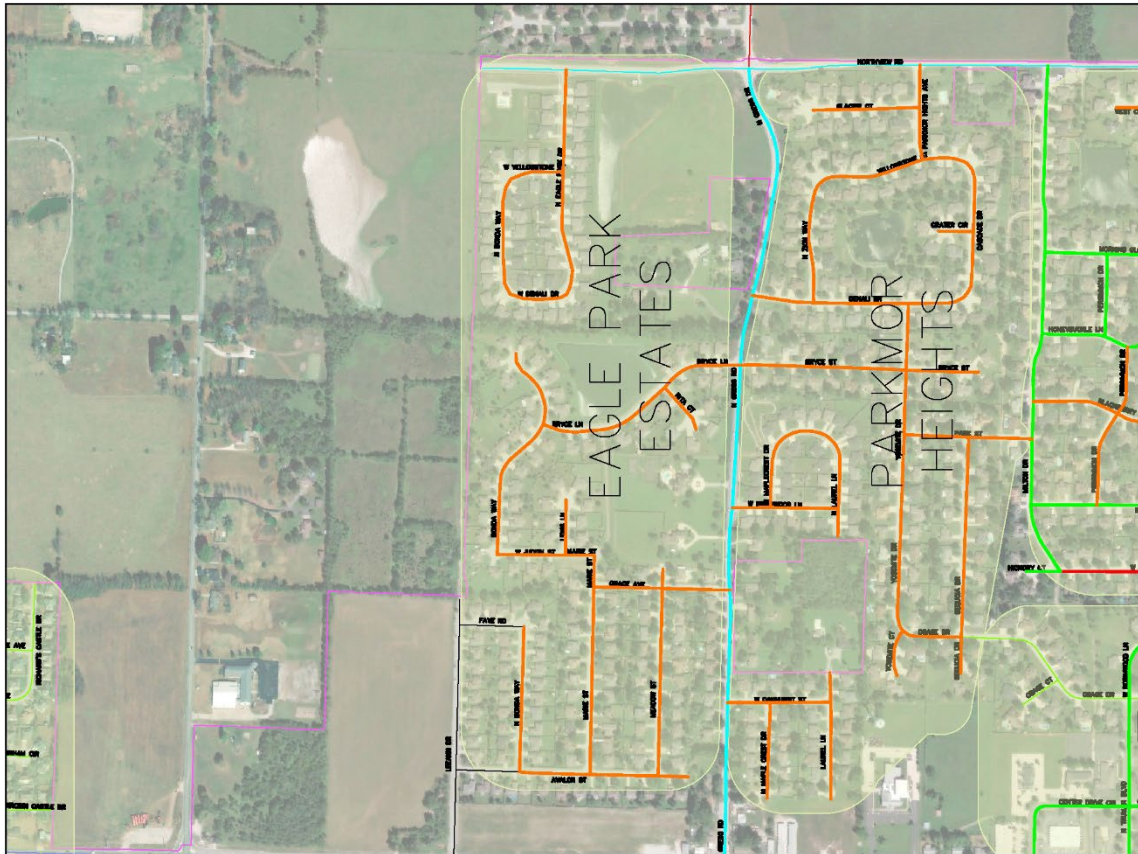
Detroit Theatre Group

- E. Allen Ct.
- N. Bill Ring Ct.
- Chet Atkins Ct.
- N. Clayton St.
- E. Deanne Ln
- E. Dyann Dr.
- N. Gretchen St.
- N. Haworth Ct.
- N. Jones Ct.
- E. Ozark Jubilee Dr.
- E. Red Foley Ct.
- E. Scott Wayne Dr.
- E. Slim Wilson Blvd.
- N. Zed Tennis St.



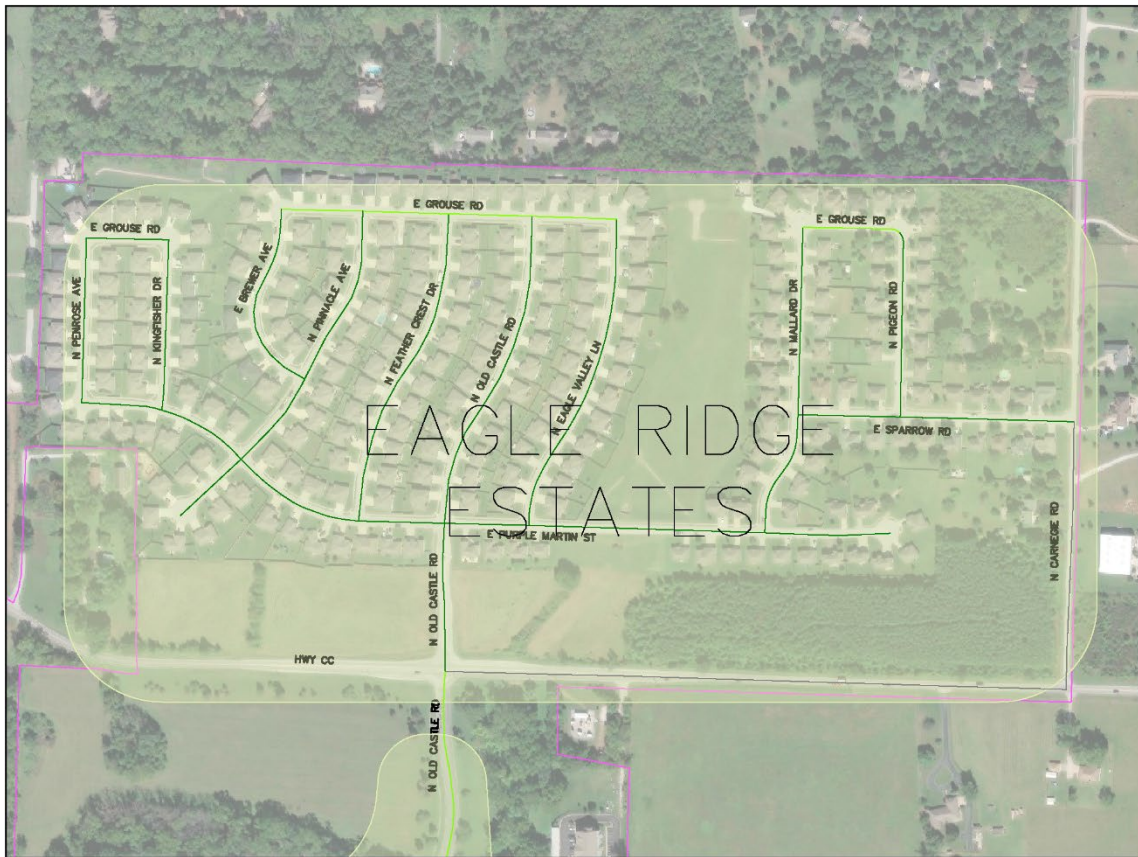
Eagle Park Estates Group

- Avalon St.
- Bonda Way
- N. Bonda Way
- W. Bryce
- W. Denali
- Eagle Park
- Faye
- Grace
- N. Gregg Rd.
- Judith
- Laurel
- Lewis
- Marie
- Maplecrest
- Meadow St.
- Oakhurst
- Rita
- W. Yellowstone



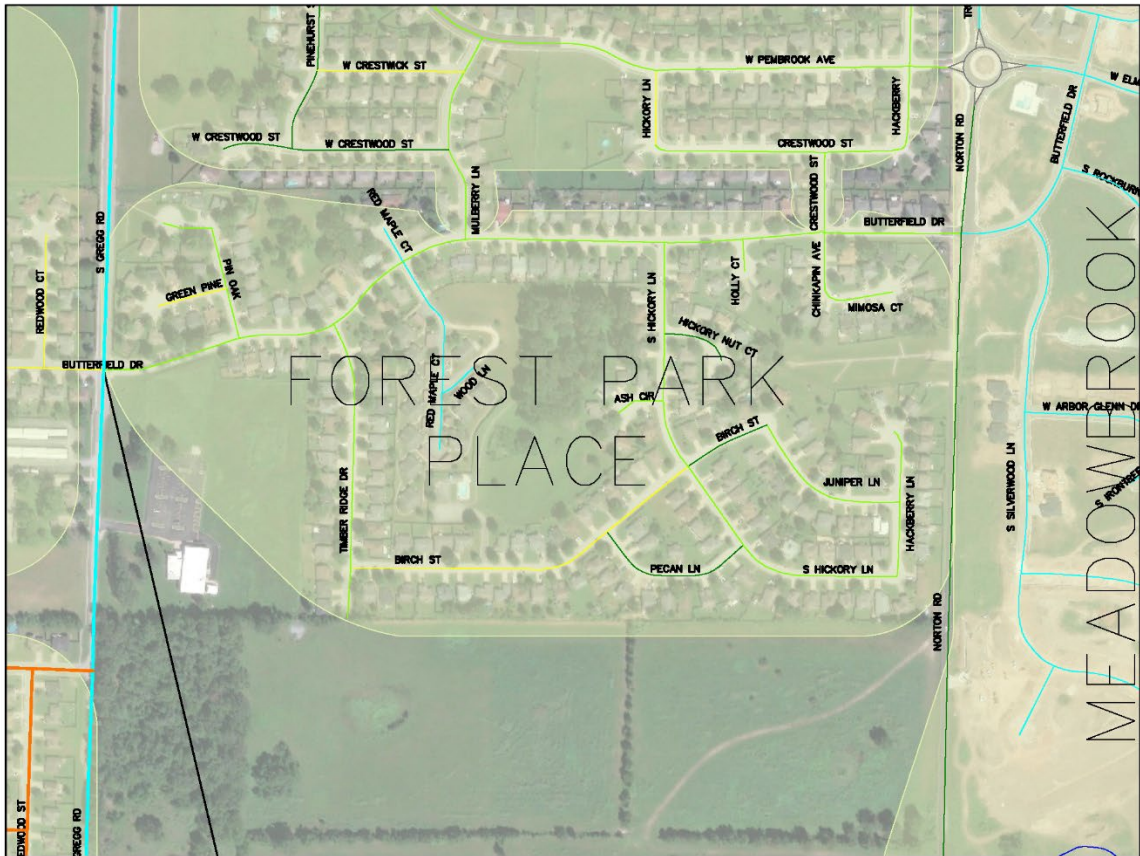
Eagle Ridge Estates Group

- E. Brewer Ave
- E. Eagle Valley Ln
- N. Feather Crest Dr.
- E. Grouse Rd.
- E Grouse Dr.
- N. King Fischer Dr.
- N. Mallard Dr.
- N. Old Castle Rd.
- N. Penrose Ave
- N. Pigeon Rd
- N. Pinnacle Ave
- E. Purple Martin St.
- E. Sparrow Rd



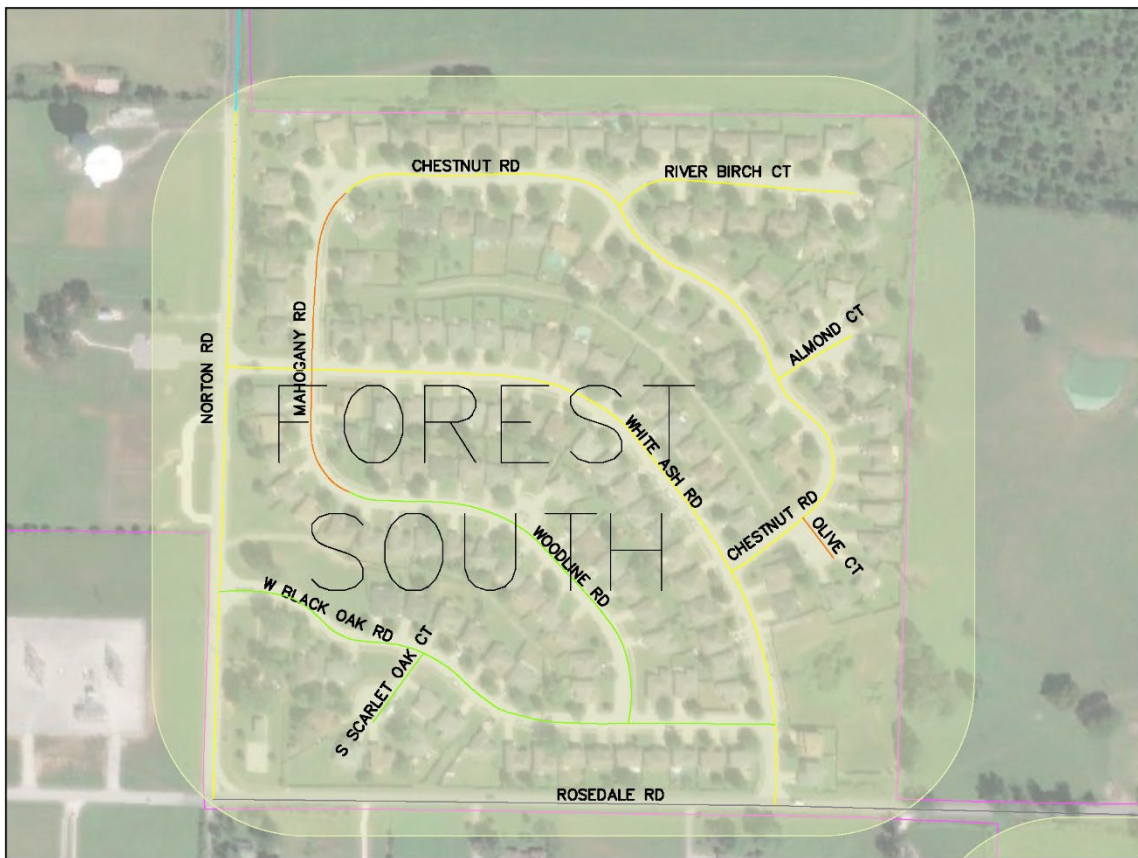
Forest Park Place Group

- Ash Cir.
- E. Birch St.
- W. Birch St.
- Butterfield Rd
- Chinkapin Ave.
- Green Pine
- Hackberry Ln
- Hickory Ln
- Hickory Nut Ct.
- Juniper
- Holly Ct
- Mimosa
- Pin Oak
- Red Maple
- S. Timber Ridge
- Wood Ln



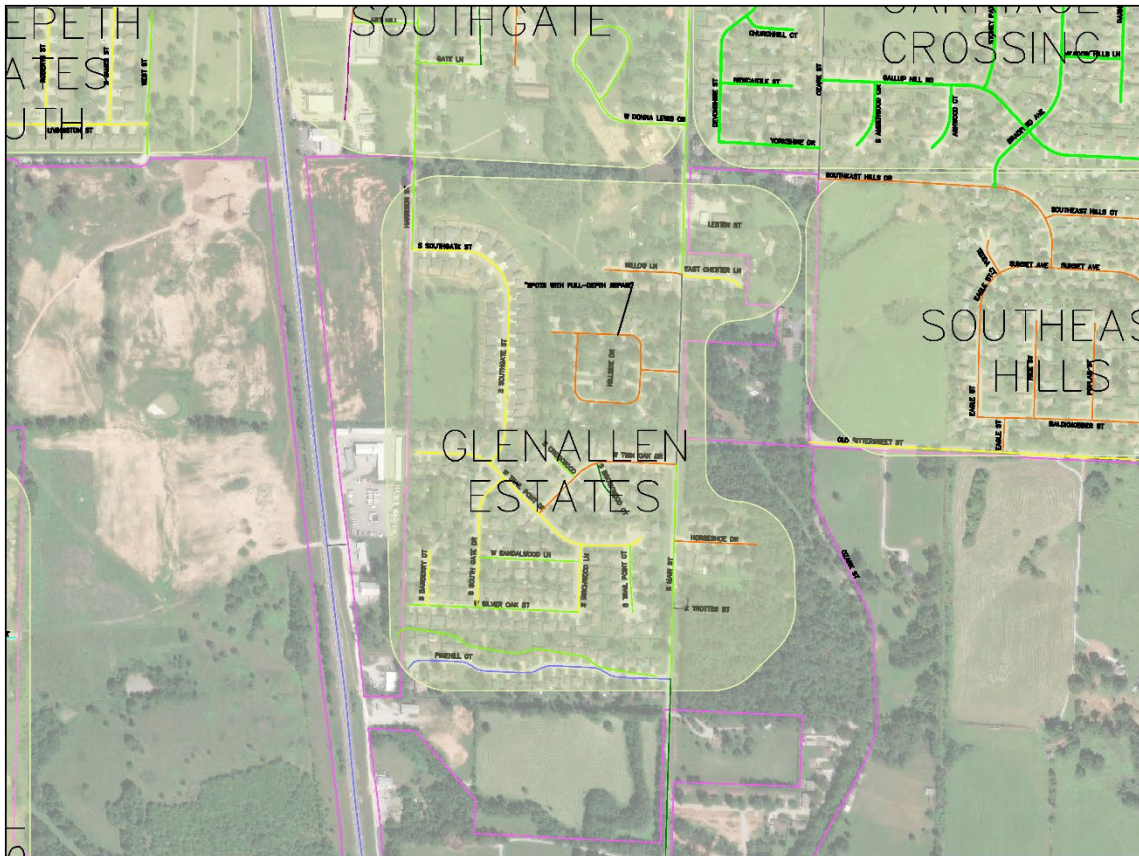
Forest South Group

- Almond Ct.
- W. Black Oak Rd
- W. Chestnut
- S. Mahogany
- N. Norton
- S. Norton
- Olive Ct.
- River Birch
- Rosedale
- S. Scarlet Oak Ct.
- White Ash Rd
- Woodline Rd.



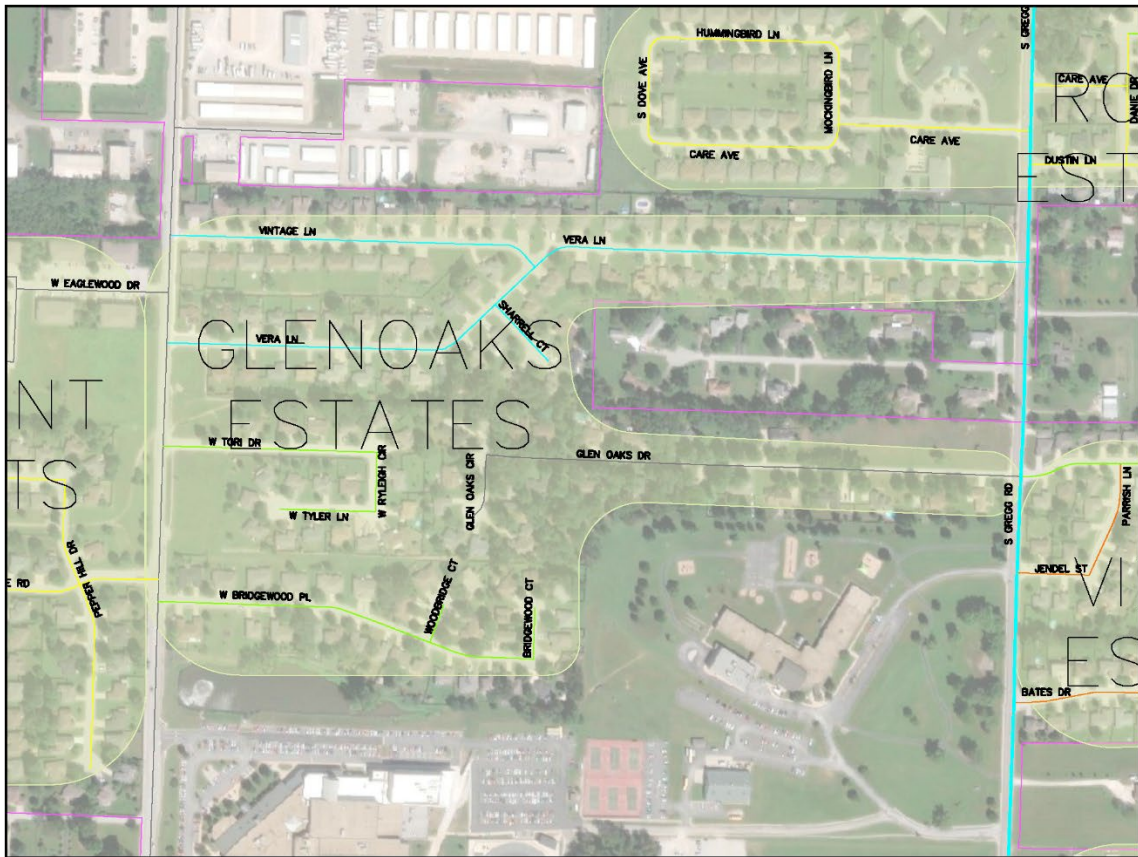
Glenallen Estates Group

- S. Barberry
- S. Birchwood
- S. Brookwood Ct.
- E. Chester Ln
- S. Creekwood Ct.
- Hillside Dr.
- S. Main
- Pinehill Ct.
- W. Sandalwood Ln
- W. Silver Oak St.
- S. Southgate Dr.
- S Southgate St.
- W. Trail Point Dr.
- S. Trail Point Dr.
- E. Trotter Dr.
- W. Twin Oak
- Willow Ln.



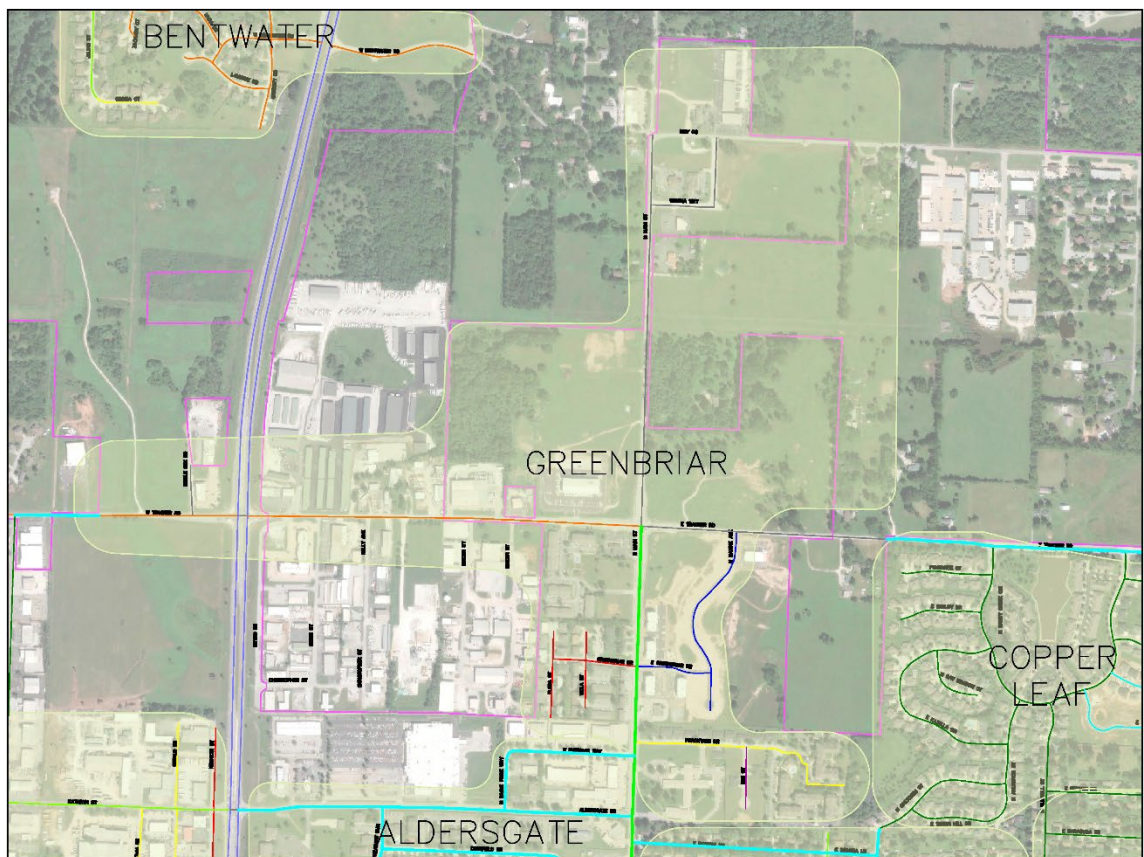
Glenoak Estates Group

- W. Bridgewood Pl
- Bridgewood Ct.
- Glen Oaks Dr.
- Glen Oaks Cir.
- W. Ryleigh Cir.
- Sharrel Ct.
- W. Tori Dr.
- W. Tyler Ln
- W. Verna
- Vineyard
- Vintage
- Woodbridge Ct.



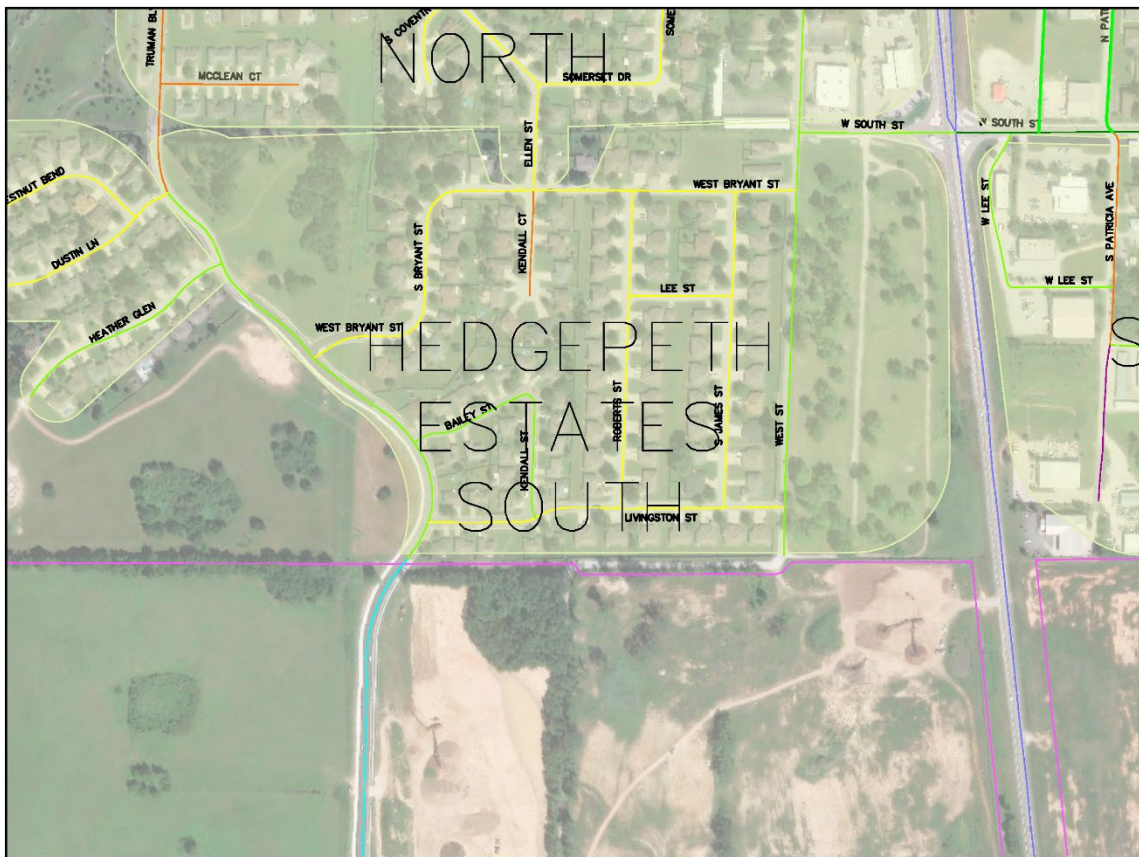
Greenbriar Group

- Flora St.
- Greenbriar Dr W
- Greenbriar Dr E
- Kiwi Ct.
- Peachtree Dr.
- Tracker
- Viola St.
- N. Maxine Ave
- Middle Sex Rd.



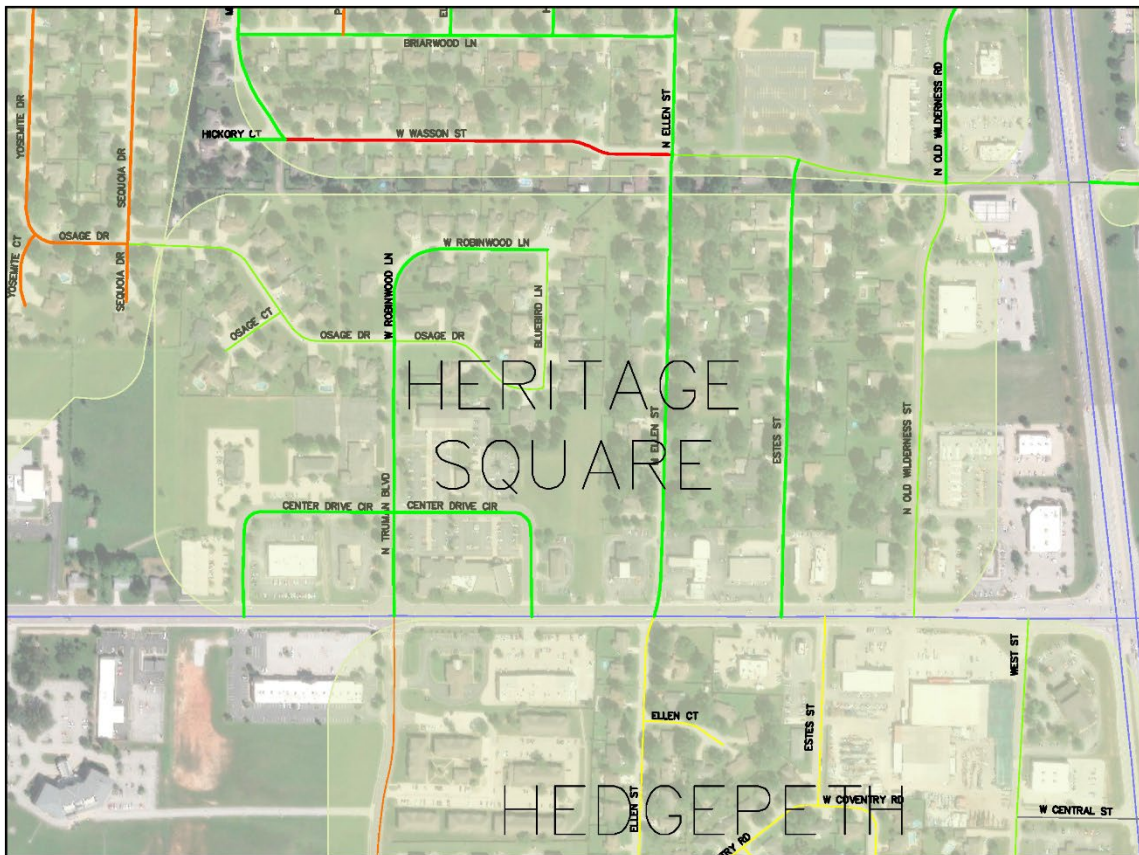
Hedgepeth Estates South Group

- Bailey St.
- S. Bryant
- W. Bryant
- S. James
- Kendall St.
- Kendall Ct.
- Lee St.
- Livingston
- Roberts St.
- West St.
- Truman Blvd.



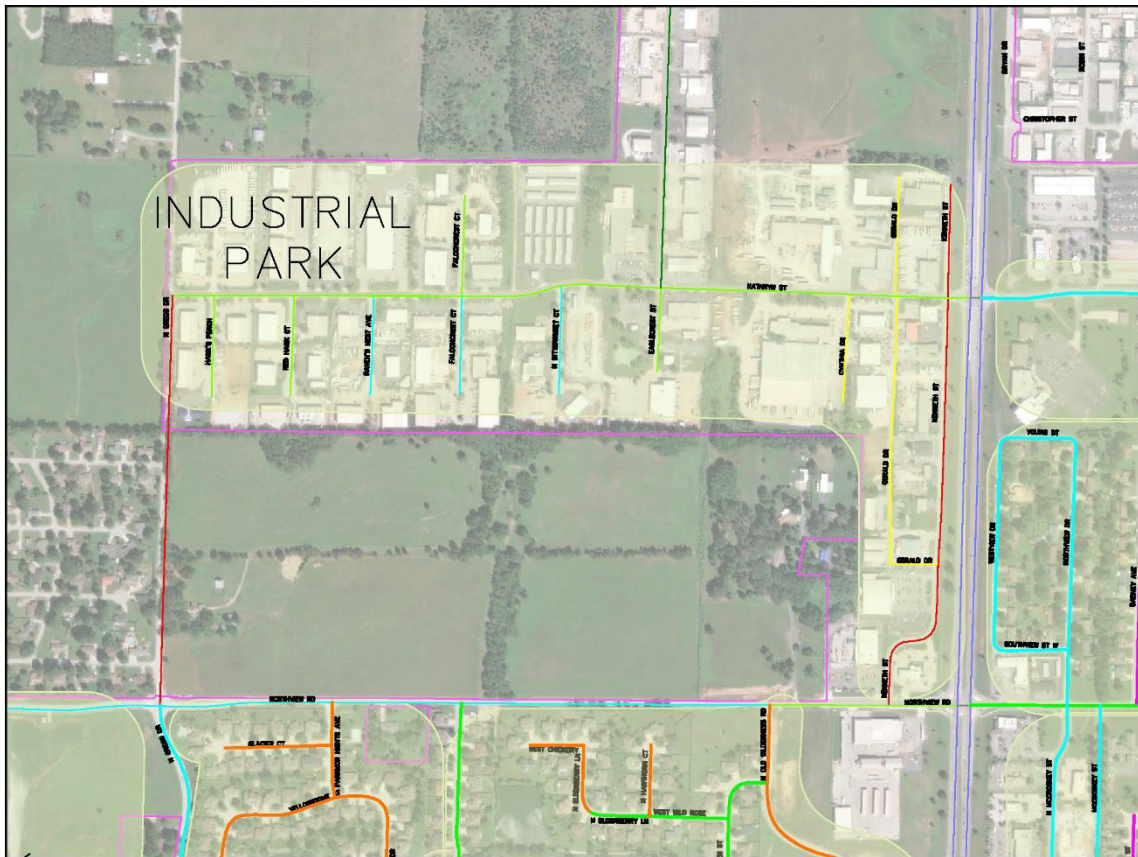
Heritage Square Group

- Bluebird Ln
- W. Center
- N. Center
- N. Ellen St.
- Estes St.
- N. Old Wilderness St.
- Osage Dr.
- Osage Ct.
- W. Robinwood
- N. Truman Blvd.
- Elm



Industrial Park Group

- N. Kenneth St.
- S. Kenneth St.
- N. Gerald St.
- S. Gerald St
- Kathryn St.
- Hawk Perch Ct.
- Red Hawk Ct.
- Ravens Nest Ct.
- N. Falconcrest Ct.
- S. Falconcrest Ct.
- N. Bittersweet Ct.
- Eagle Crest St.
- Cynthia Dr.



Irish Hills Group

- E. Ailesbury Rd.
- N. Ashford Ave
- E. Blarney Ct.
- N. Dublin Dr.
- N. Glengary Dr.
- Kilkenny



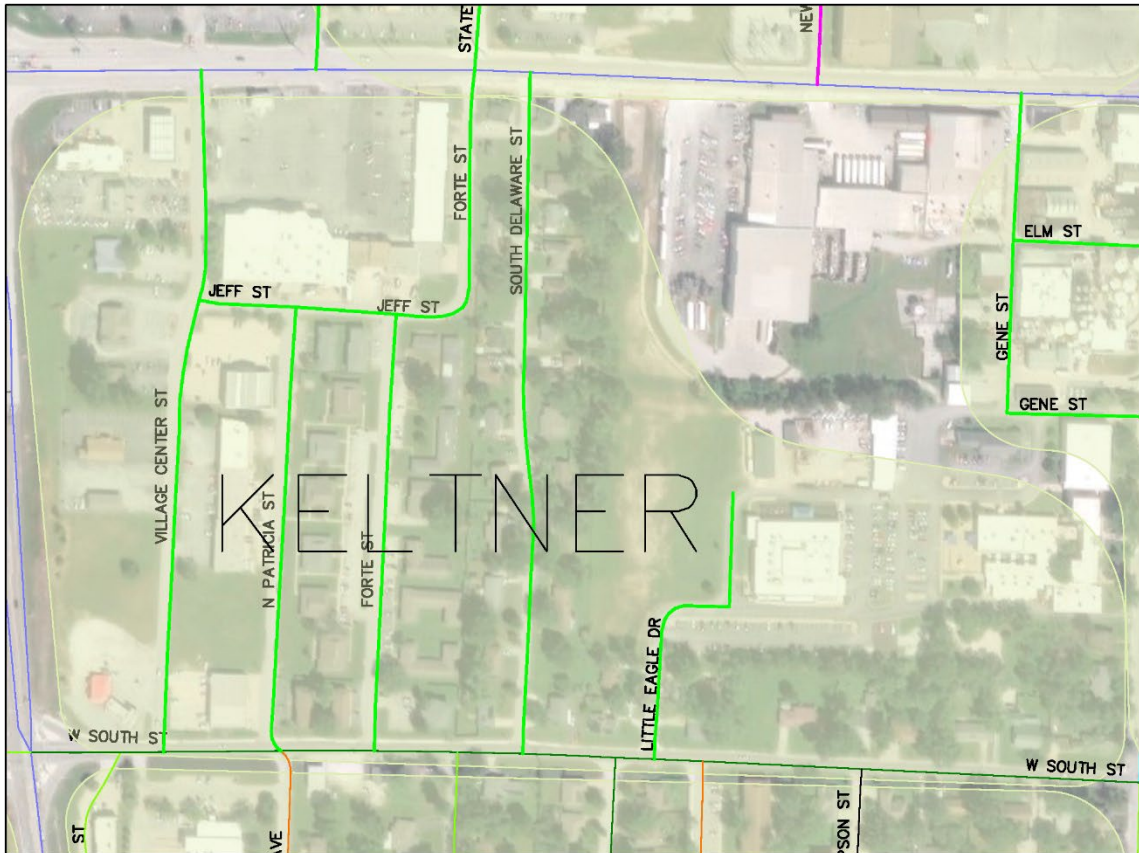
Kelby Creek Group

- S. Amber Ridge Dr
- W. Declan Ct
- W. Everwood Way
- S. Kelby Pkwy
- S. Kelby
- S. Kingscliffe
- S. Marketplace Crossing
- W. Monarchwood
- Rosedale Rd
- S. Rosemoor Dr.
- S. Waterstone Bend



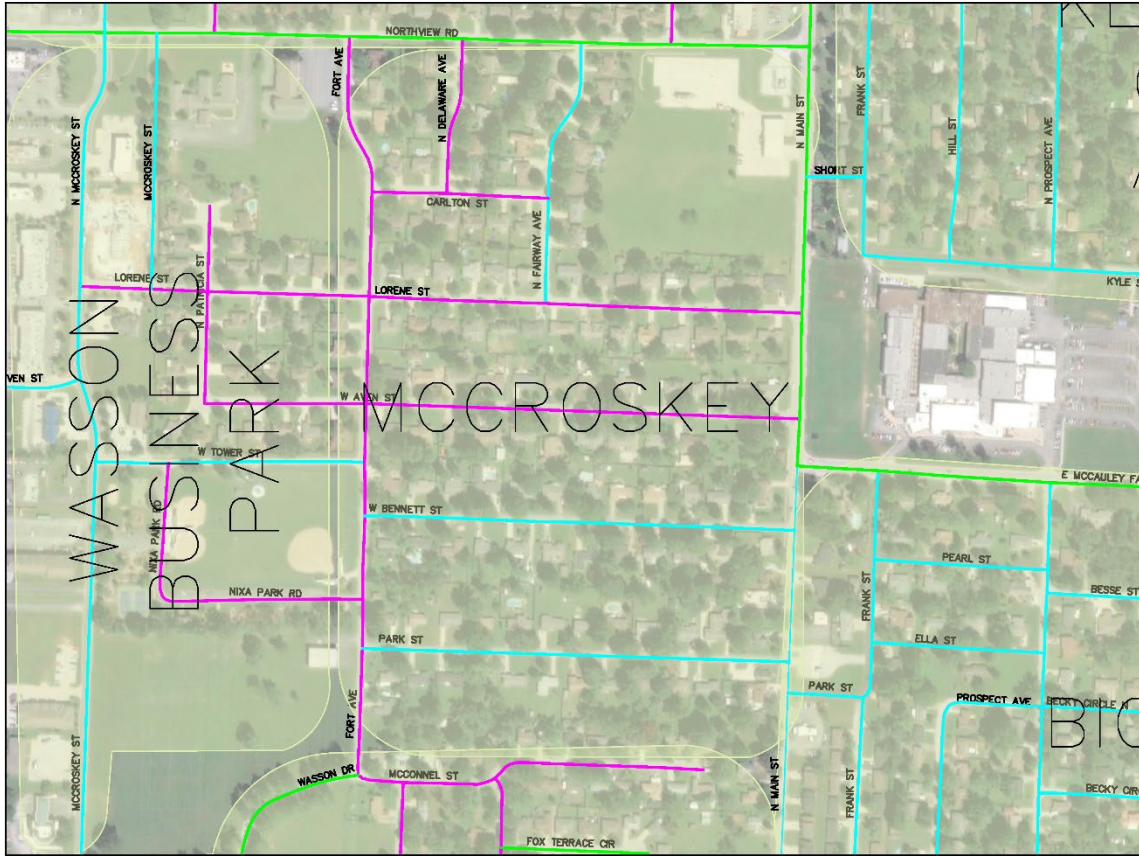
Keltner Group

- S. Delaware St
- S. Fort St
- Jeff St
- S. Patricia St
- W. South
- Little Eagle
- Village Center



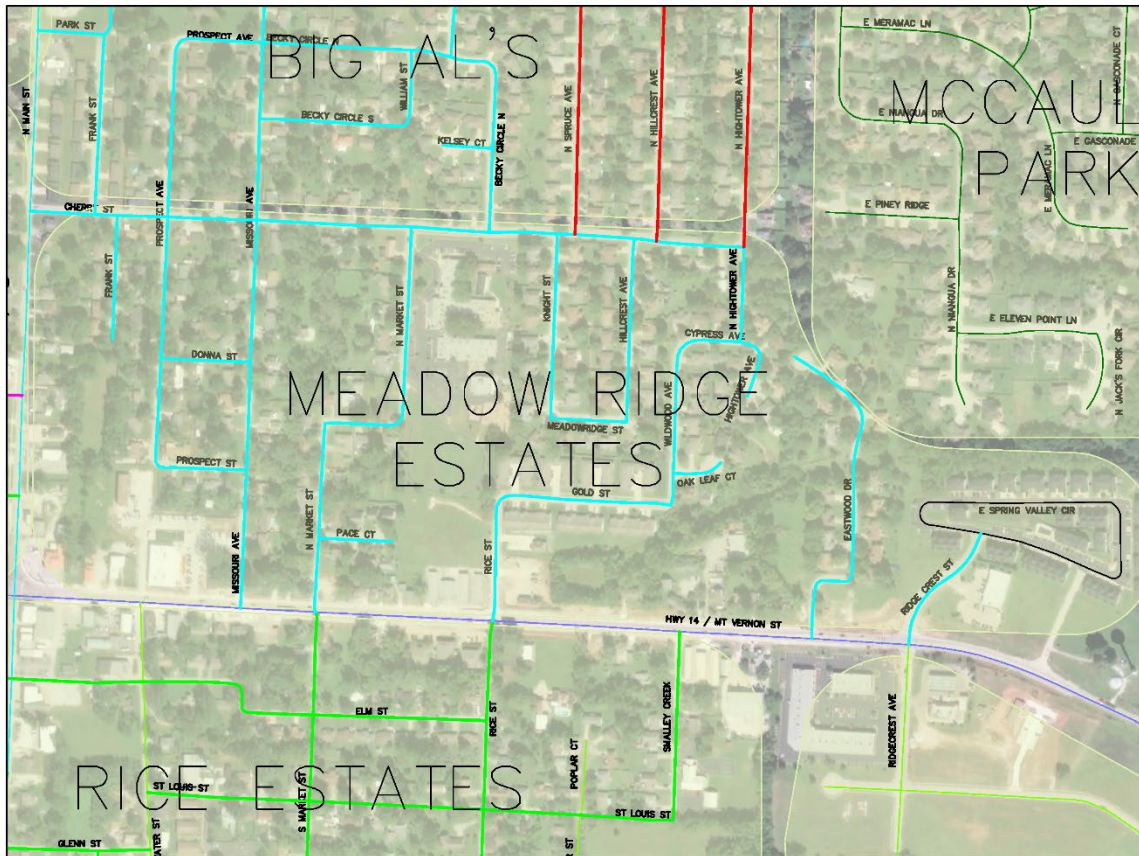
Mccroskey Group

- W. Aven St
- W. Bennett
- Carlton St.
- N. Delaware
- N. Fairway Ave
- Fort Ave
- Lorene St
- Park St



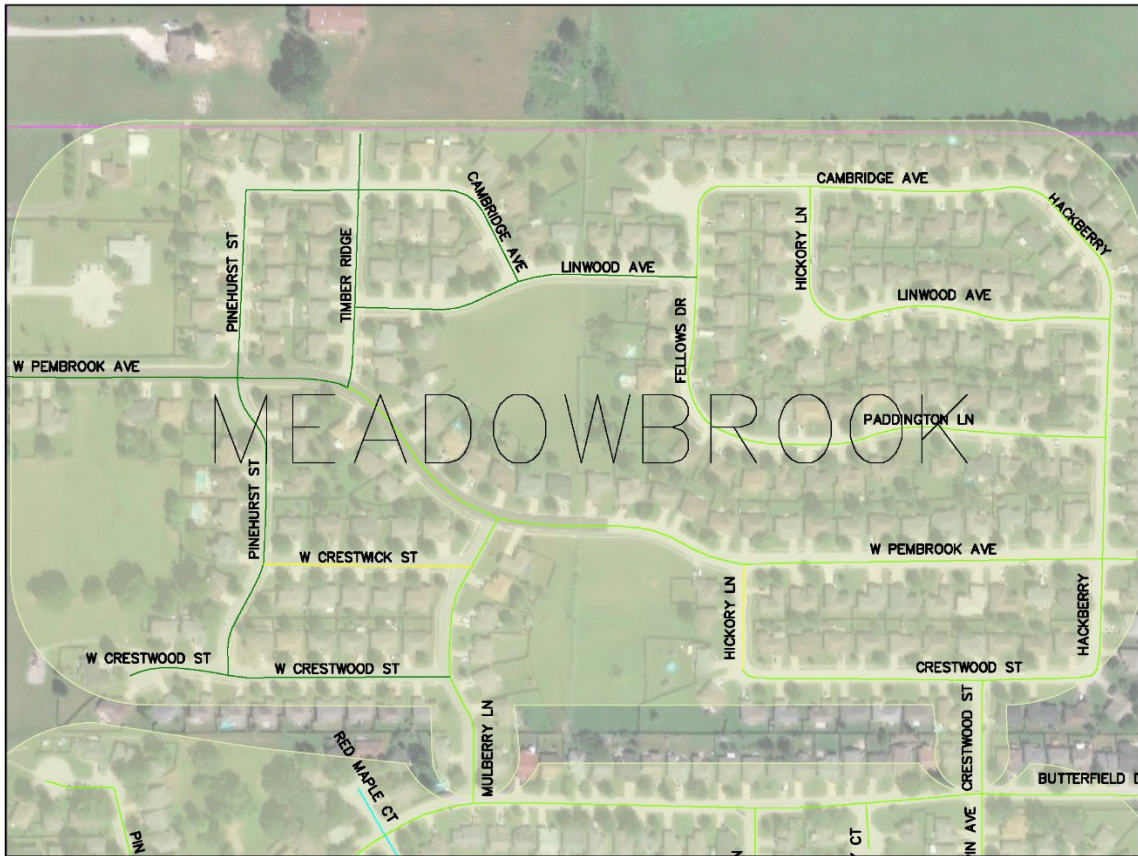
Meadow Ridge Estates Group

- Cherry
- Donna
- Eastwood
- Frank
- Gold
- Hillcrest
- Knight Dr
- Main
- Market
- Meadowridge St.
- Missouri Blvd
- Oak Leaf
- Prospect Ave
- Prospect St.
- Pace Ct.
- Ridge Crest St.
- E. Spring Valley Cir.
- Wildwood



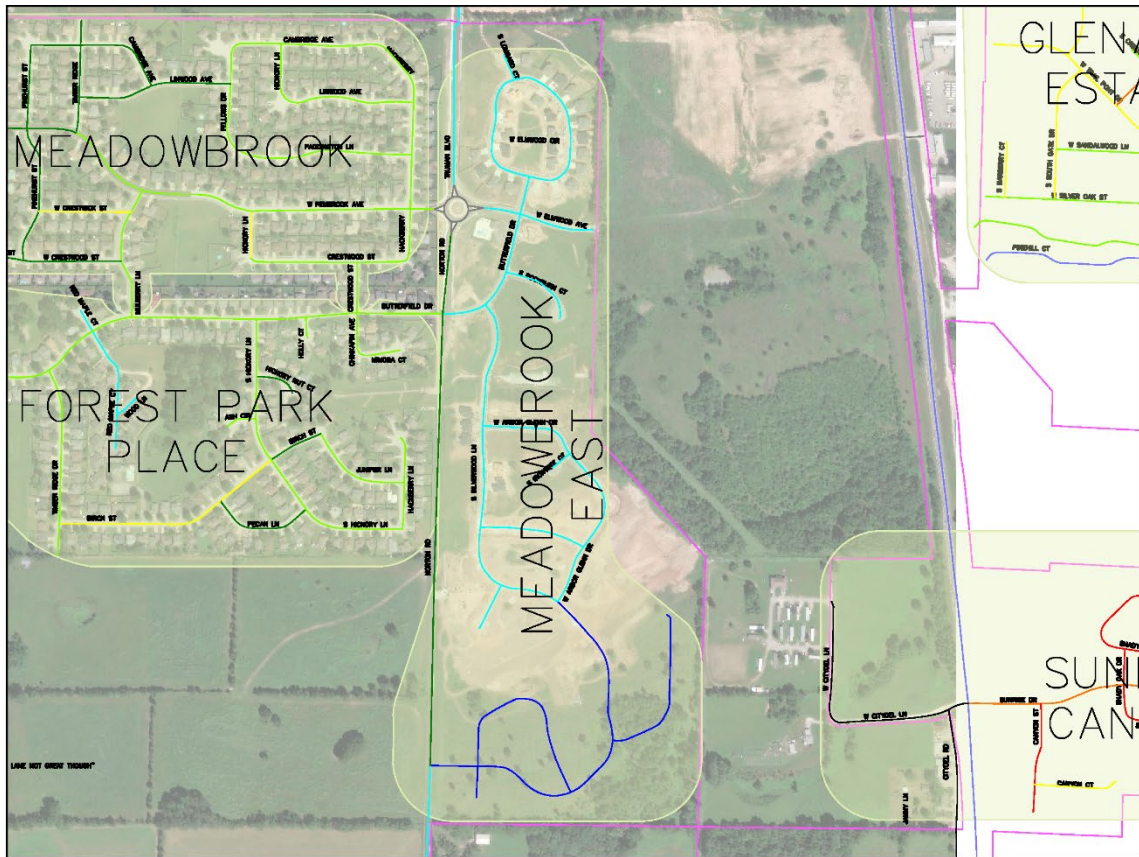
Meadowbrook Group

- W. Cambridge Ave
- E. Cambridge Ave
- W. Crestwick St.
- W. Crestwood St.
- E. Crestwood St.
- Fellow Ave
- Hackberry
- N. Hickory Ln.
- S. Hickory Ln.
- Linwood Ave
- Mulberry
- Paddington
- W. Pembroke
- E. Pembroke
- Pinchurst
- N. Timber Ridge



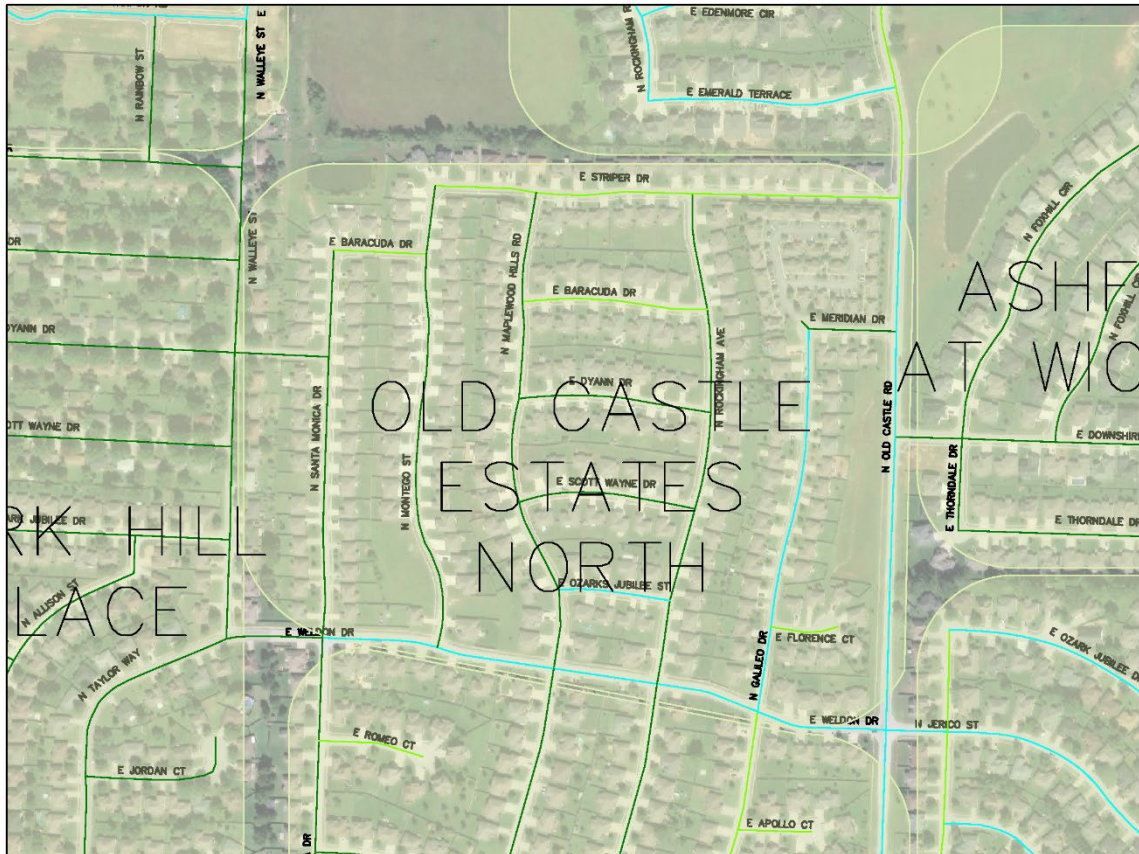
Meadowbrook East Group

- W. Arbor Glenn Dr.
- Brookhaven
- Butterfield Dr
- Deerfield
- W. Elmwood Ave
- W. Elmwood Ct.
- Iron Tree
- S. Ironwood Ct.
- S. Lombard Ct.
- Pembroke
- Pinewood
- S. Rockburn Ct.
- S. Silverwood Ct.



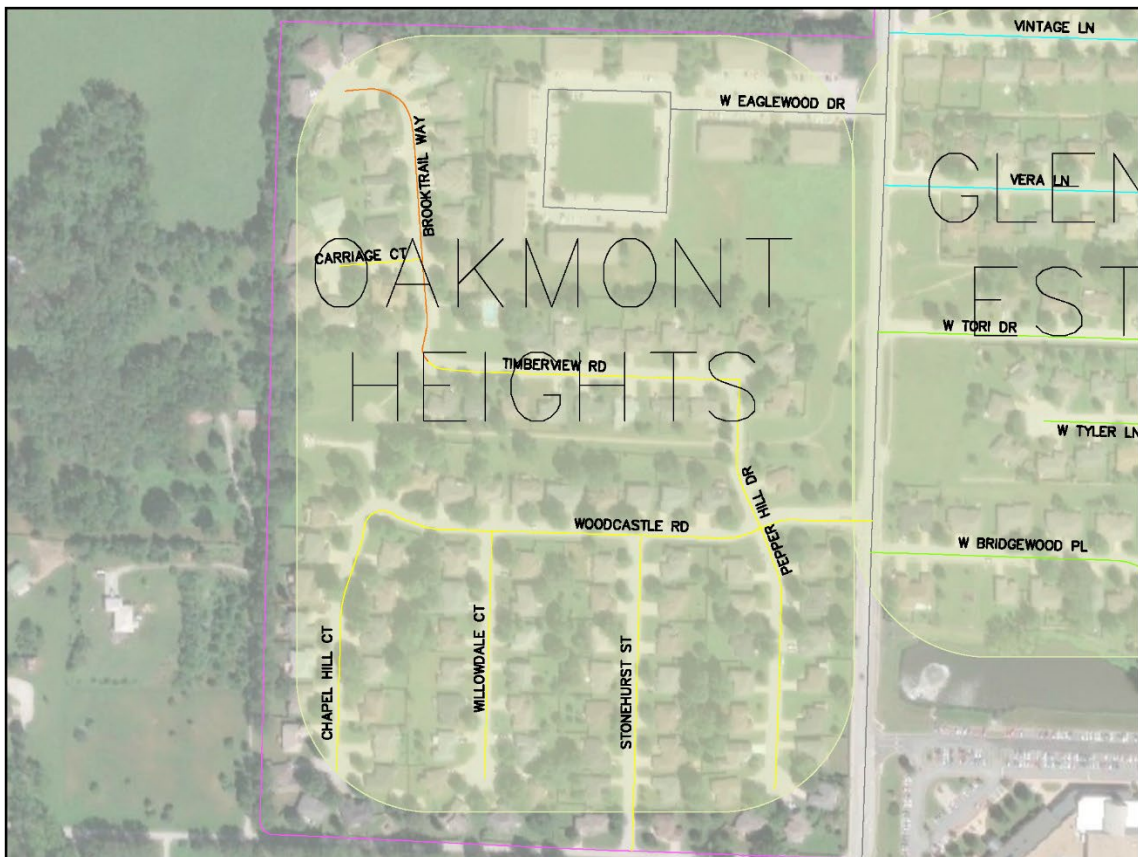
Old Castle Estates North Group

- E. Baracuda Dr
- E. Dyann
- Florence Ct.
- N. Galileo Dr.
- N. Maplewood Hills
- E. Meridian Ave
- N. Montego St.
- Old Castle Rd
- Ozark Jubilee W.
- N. Rockingham
- N. Santa Monica
- E. Scott Wayne
- E. Striper Dr.
- E. Weldon Dr.



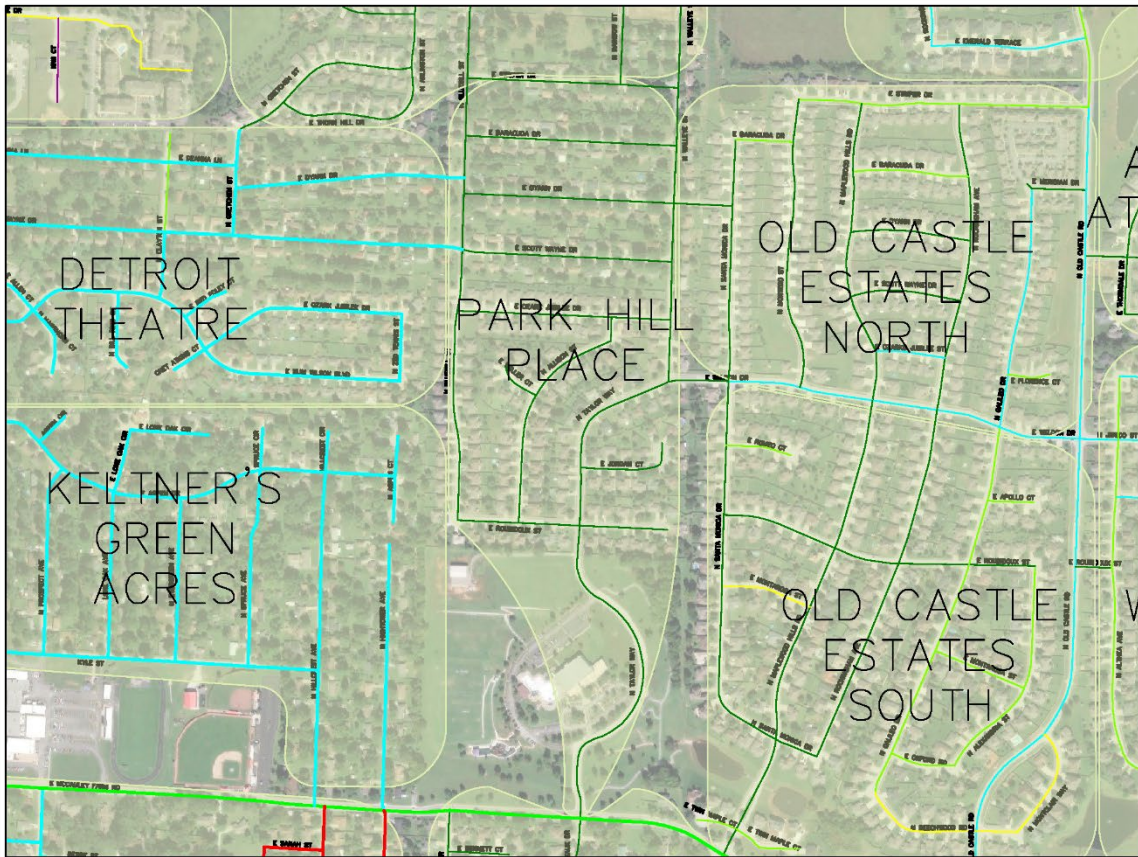
Oakmont Heights Group

- Brooktrail Way
- Carriage Ct
- Chapel Hill
- W. Eaglewood Dr
- Moppin Hollow
- W. Old Bittersweet
- Pepper Hill
- Stonehurst
- Timberview Rd
- Willowdale Ct.
- Woodcastle Rd



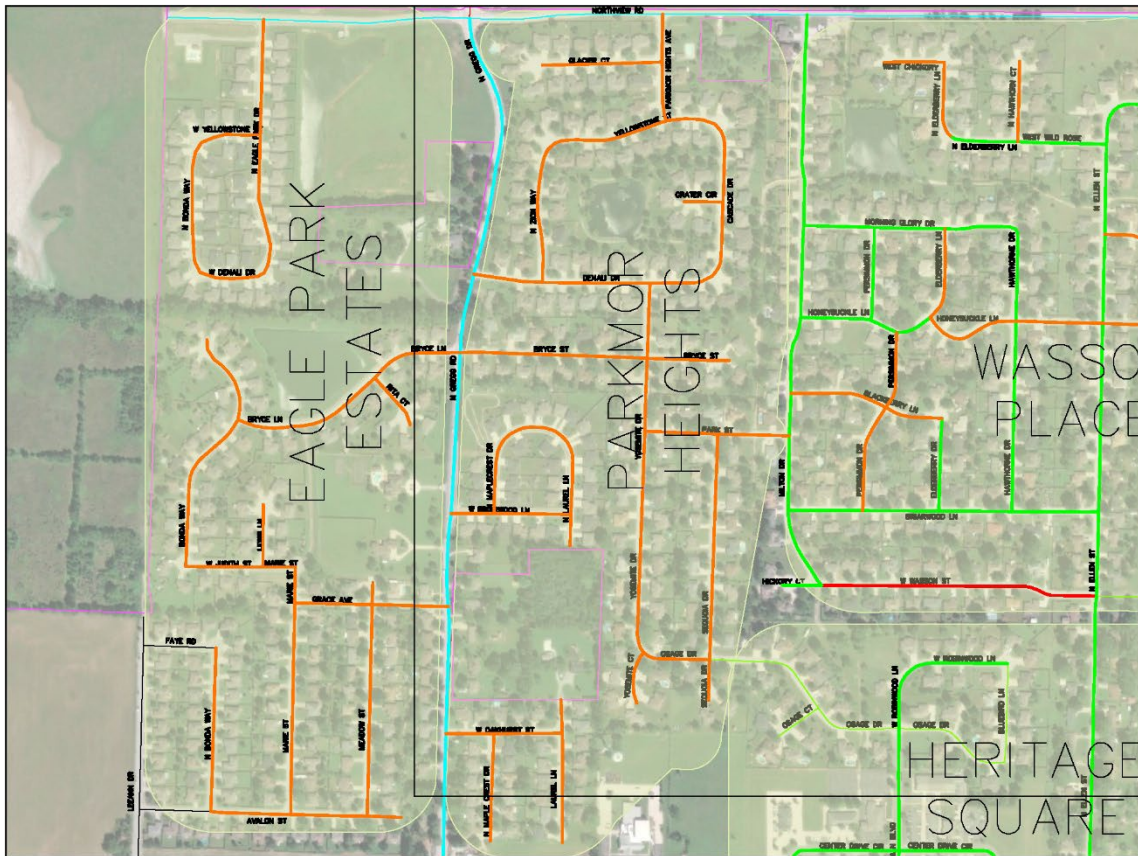
Parkhill Place Group

- N. Alison
- E. Baracuda Dr
- Bluegill St.
- E. Dyann Dr.
- Jordan Ct
- E. Ozark Jubilee Dr
- E. Roubidoux St.
- E. Scott Wayne Dr
- E. Striper Dr
- N. Taylor Way
- N. Walleye
- Weller Ct.



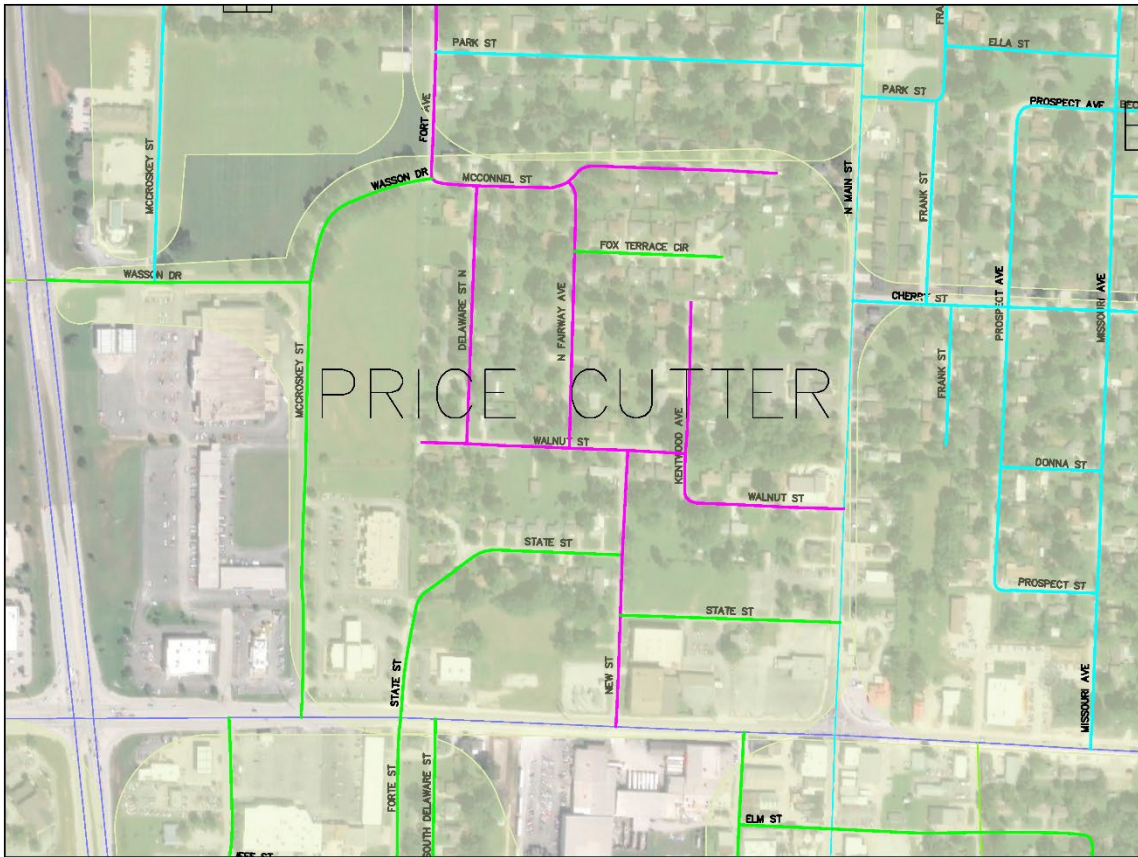
Parkmor Heights Group

- W. Briarwood Ln
- Bryce
- Cascade Dr
- Crater Cir.
- Denali
- Glacier Ct.
- Laurel Ln.
- N. Maplecrest Dr
- W. Oakhurst St.
- Osage Dr
- Park St
- Parkmoor
- Sequoia Dr
- Yellowstone
- Yosemite
- Yosemite Ct.
- N. Zion



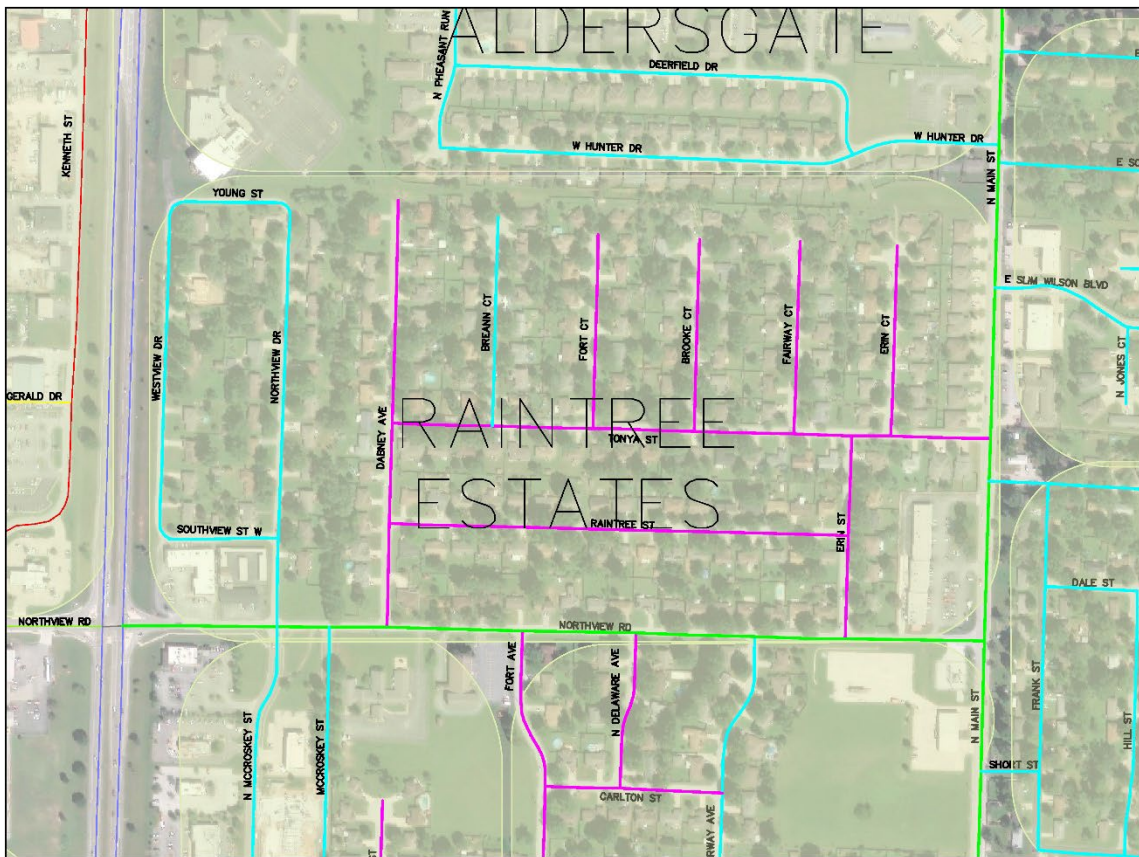
Price Cutter Group

- Delaware St. N.
- N. Fairway Ave
- Fox Terrace Cir.
- Kentwood Ave
- W. McConnell
- N. McCroskey St
- New St
- State St
- Walnut St
- E. Wasson



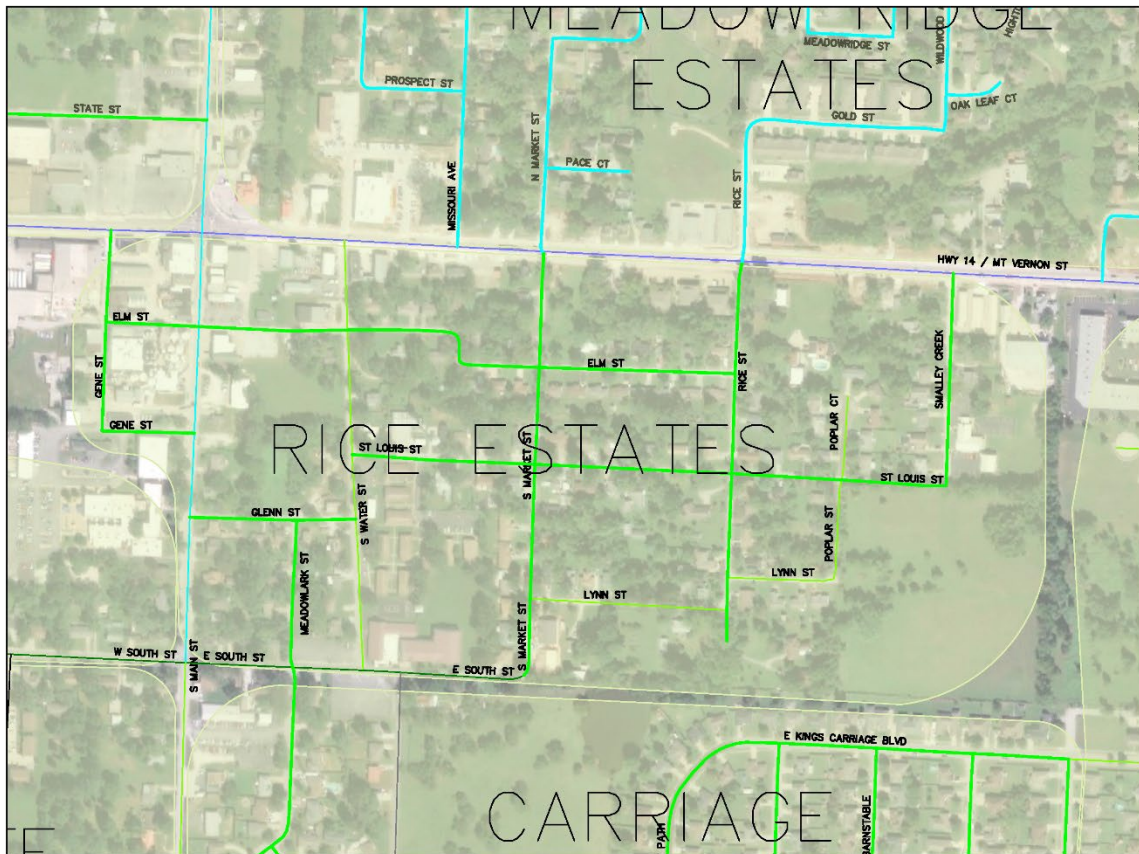
Raintree Estates Group

- Breann Ct
- Brooke Ct
- N. Dabney Ave
- Erin Ct.
- Erin St.
- Fairway Ct.
- Fort Ct
- N. Main
- Northview
- Raintree
- Tonya



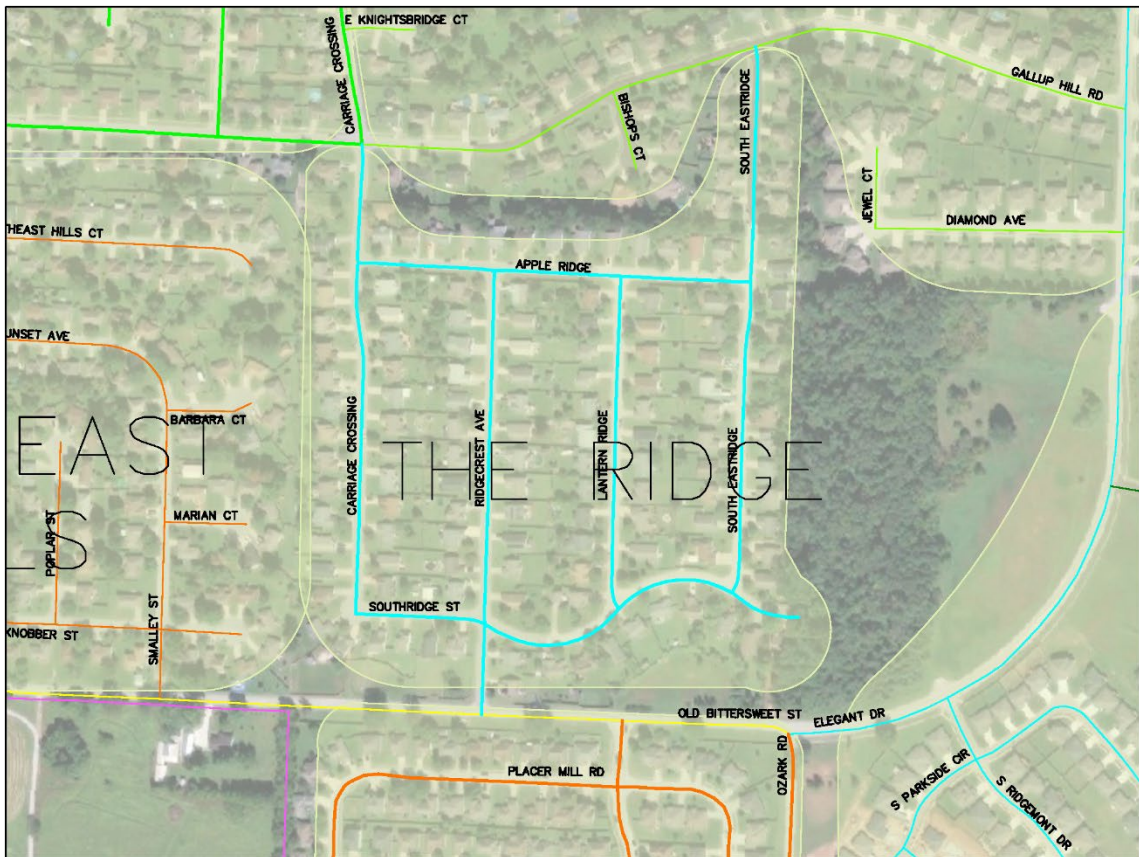
Rice Estates Group

- Elm St
- Gene St
- Glenn St
- Lynn St
- Meadowlark St
- E. Mt. Vernon/HWY 14
- S. Market St
- Poplar St
- Poplar Ct.
- Rice St.
- Smalleye Creek
- E. South St.
- E. St. Louis St
- Water



The Ridge Group

- E. Apple Ridge
- Bishops Ct.
- Carriage Crossing
- S. Eastridge
- E. Gallup Hill
- S. Lantern Ridge
- E. Old Bittersweet
- S. Ridgecrest
- S. South Ridge



Riverton Group

- N. Baywood
- E. Command
- Hayston
- N. Street
- N. Quantum Dr
- E. Riverton Rd



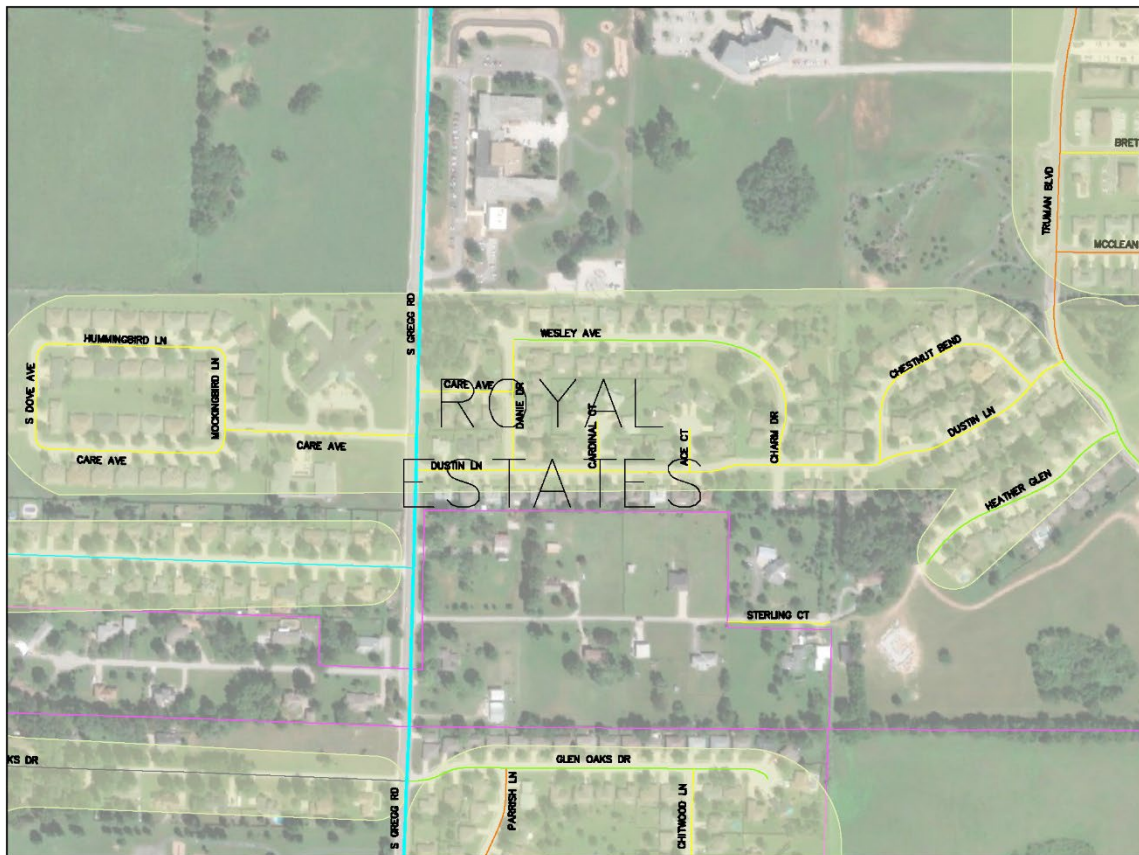
Rolling Hills Group

- S. Ballard St
- Cedar Chase
- Eagle Lake
- Grassy Ct
- Great River Dr
- S. Gregg
- Hedge
- W. Inman Rd
- Nicholas Inman
- McCafferty
- S. Pasture Cir.
- Pinewood Ct.
- Redwood
- Scenic Hills
- Westwood Ct.



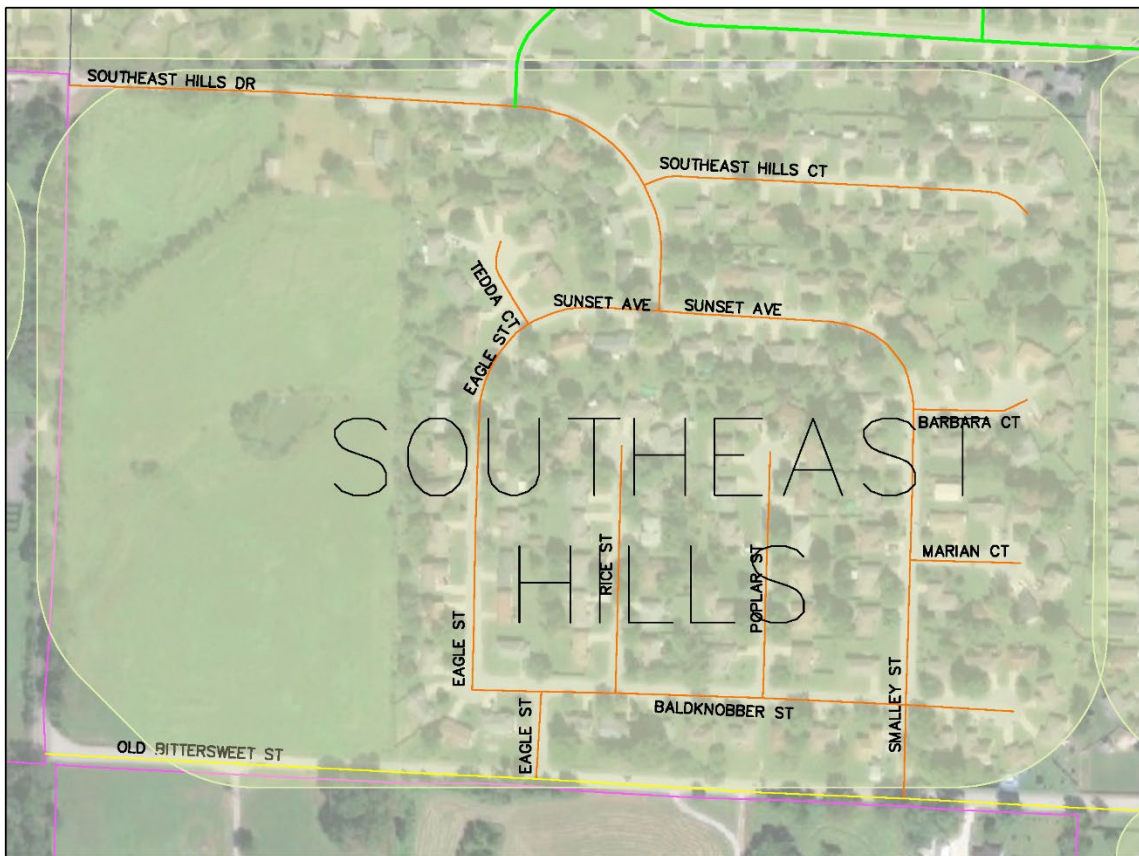
Royal Estates Group

- Ace Ct
- Cardinal Ct
- Care Ave
- W. Care Ave
- Charm
- W. Chestnut Bent
- Danine Ln.
- Dove
- W. Dustin
- Gregg
- W. Heather Glen
- Hummingbird Ln.
- Mockingbird Ln.
- W. Sterling Ct
- Truman
- Wesley Ave



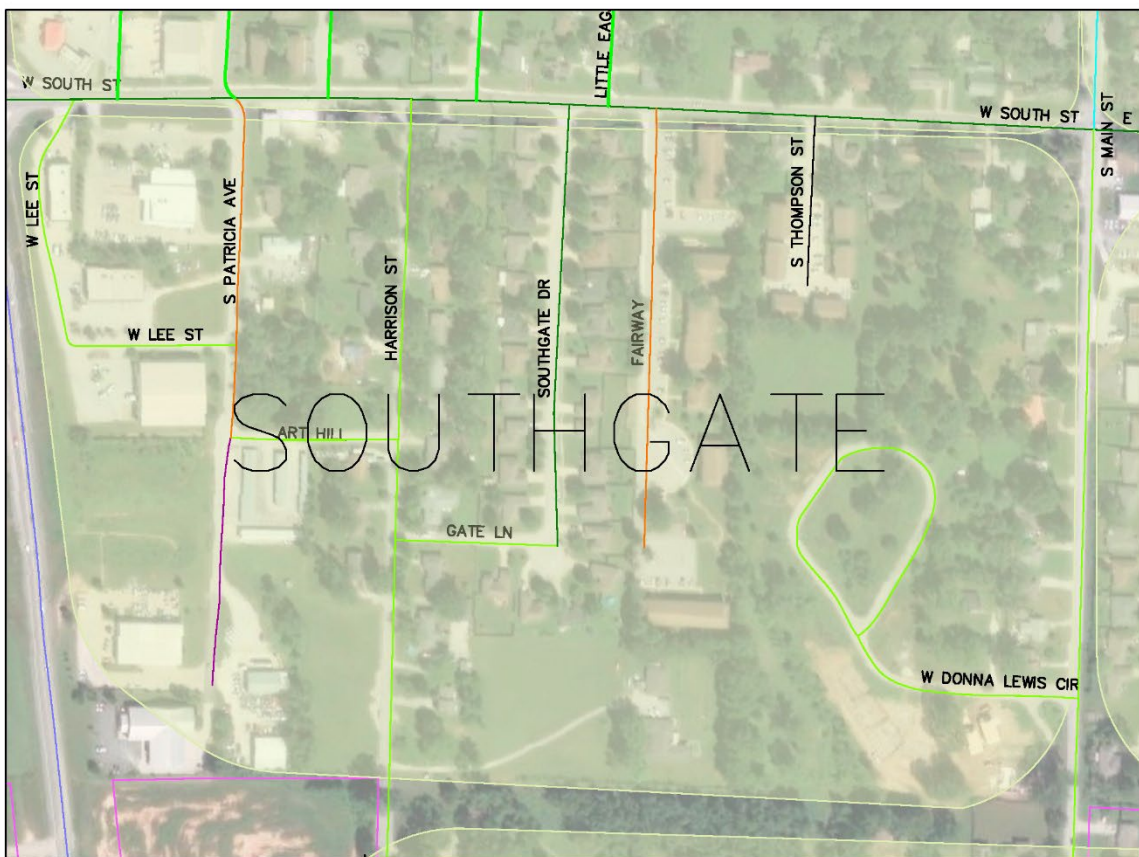
Southeast Hills Group

- Bald Knobber
- Barbara Ct
- Eagle St
- E. Old Bittersweet
- Poplar St
- Marian Ct
- Rice St
- Smalley
- Southeast Hills Ct.
- Southeast Hills Dr.
- Sunset Ave
- Tedda Ct.



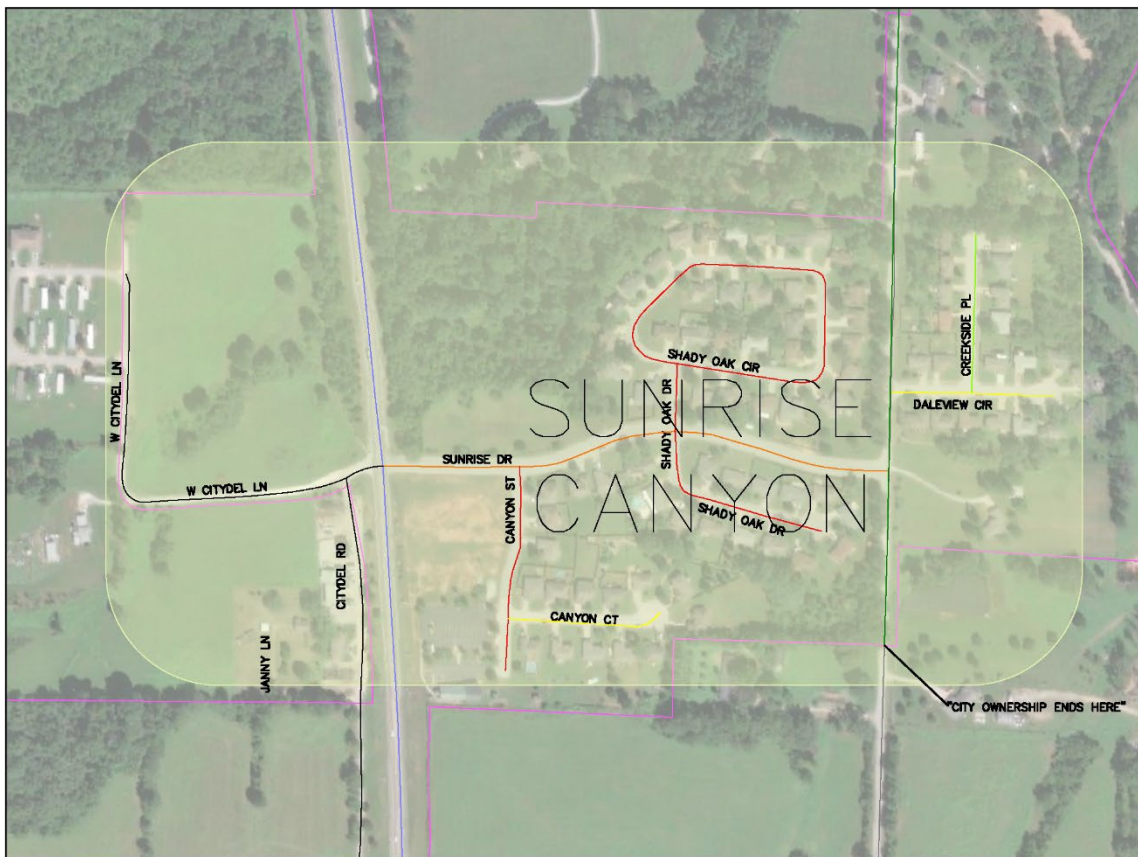
Southgate Group

- Art Hill
- Donna Lewis Cir.
- S. Fairway
- Gate Ln
- Harrison
- W. Lee
- S. Main
- S. Patricia
- W. South
- Southgate
- S. Thompson St



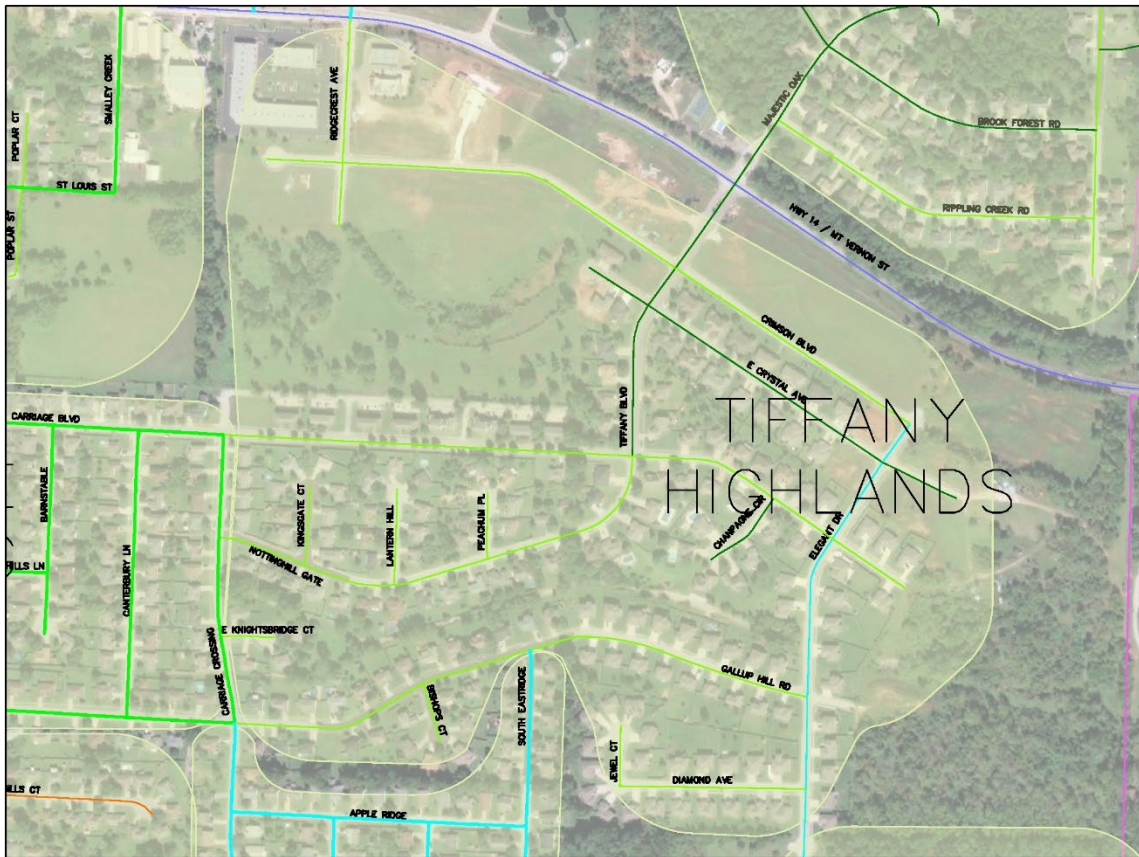
Sunrise Canyon Group

- Canyon St.
- Canyon Ct.
- Creekside Pl.
- W. Citydel Ln.
- Daleview
- Janny
- S. Main
- Pine Hill
- Shady Oak Cir.
- Shady Oak Dr.
- Sunrise Dr.



Tiffany Highlands Group

- Champagne Cir.
- Crimson Blvd.
- E. Crystal
- Diamond Ave
- Elegant Dr
- E. Gallup Hill
- Jewel Ct
- Kingsgate Ct
- E. Knightsbridge Ct.
- Nottinghill Gate
- Peachum Pl.
- Tiffany Blvd.
- Ridgecrest Ave



Villages at Wicklow Group

- E. Abbey Ct.
- E. Beaufort St.
- E. Clare Ct.
- E. Cork Ct.
- E. Donegal Cir.
- E. Edenmore Cir.
- E. Emerald Terrace
- E. Grafton Rd
- N. Kempton Ct.
- E. Kings Mead Cir.
- N. Old Castle Rd
- N. Rich Hill Cir
- N. Rockingham Ave.
- N. Roundwood Rd
- E. Rush Ct
- E. Tracker Rd
- N. Wicklow Rd



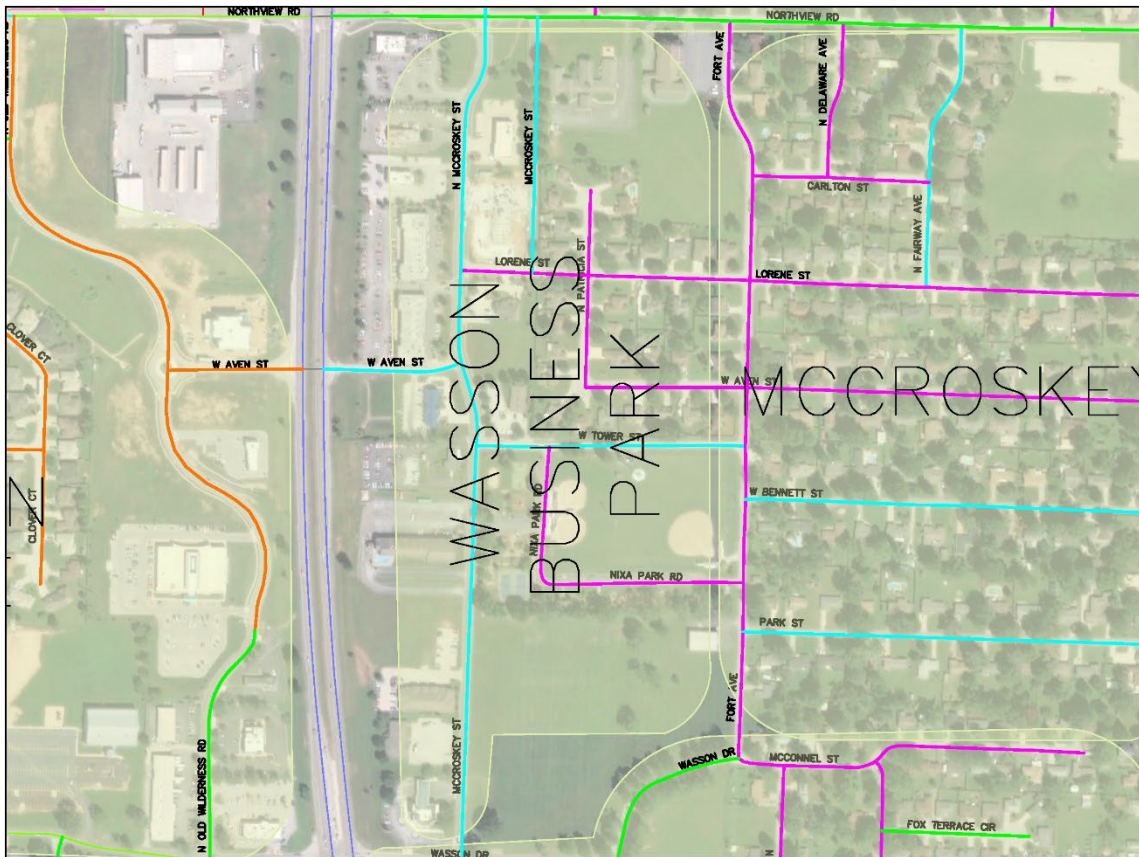
Vintage Estates Group

- Bates Dr
- Chitwood Ln.
- Glen Oaks Dr
- Jake Flood Cir
- Jendel St
- Parrish Ln



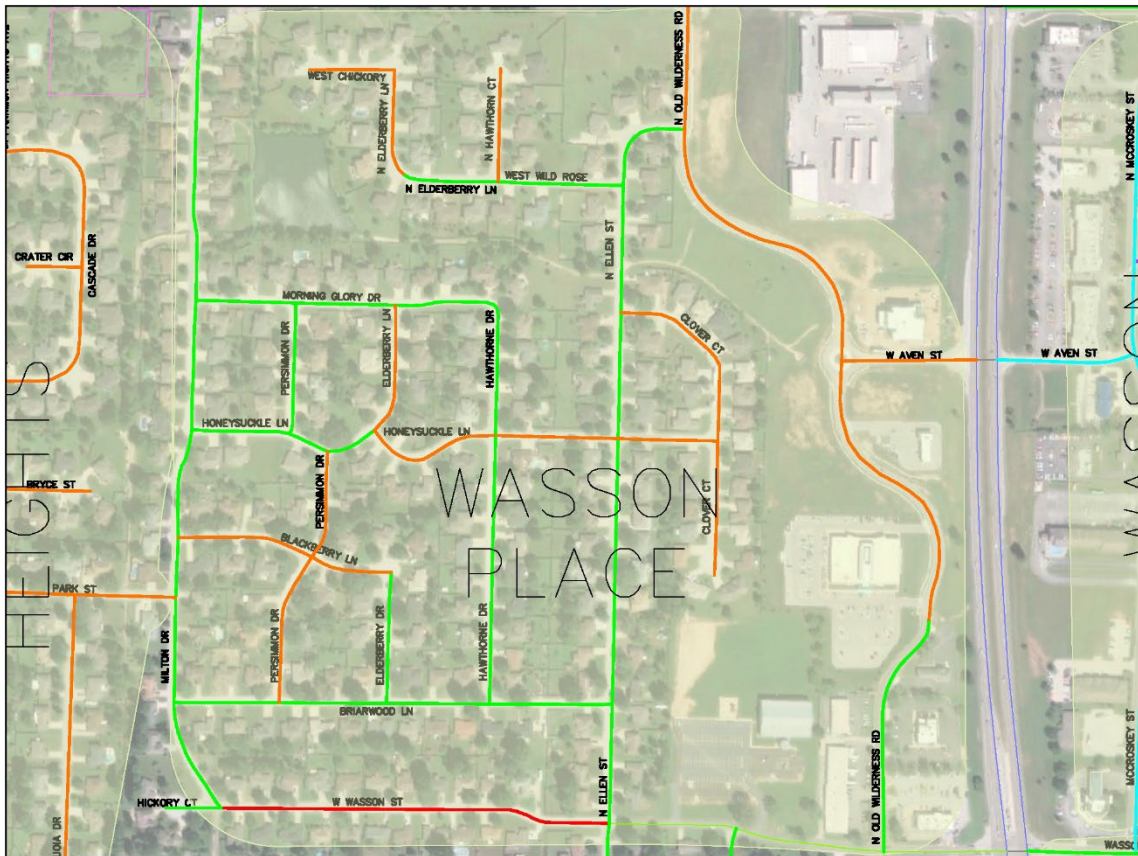
Wasson Business Park Group

- W. Aven St
- Lorene St
- N. Main
- McCroskey St
- Northview Dr
- Northview Rd
- Nixa Park Rd
- N. Patricia St
- W. Tower St



Wasson Place Group

- Blackberry
- W. Briarwood Ln
- W. Chickory
- Clover Ct
- N. Elderberry Ln
- N. Elderberry Dr
- N. Ellen St
- N. Hawthorne Ct
- N. Hawthorne Dr
- Hickory Ct
- Honeysuck;e
- N. Milton Dr
- Morning Glory Dr
- N. Old Wilderness Rd
- Persimmon Dr
- W. Wasson St
- W. Wild Rose



Wellington Park Group

- Amy Ln
- W. Berkshire
- N Carlisle Dr
- S. Carlisle Dr
- Cedar Heights Dr
- Dunrobin Castle Dr
- Durham Cir.
- Hi-Mac Rd.
- Kent Cir.
- W. MT. Vernon
- Norfolk Ave.
- N. Richards Castle Dr.
- Westminister
- W. Eagle Ct.



Willows Group

- N. Althea Ave
- N. Athena
- Greer
- Hodgson St
- N. Jerico
- E. Ozark Jubilee
- Pulltide Ct
- N. Ritter Ave
- Spout Spring
- Tucker Bay Cir
- E. Welch St
- E. Weldon Dr.



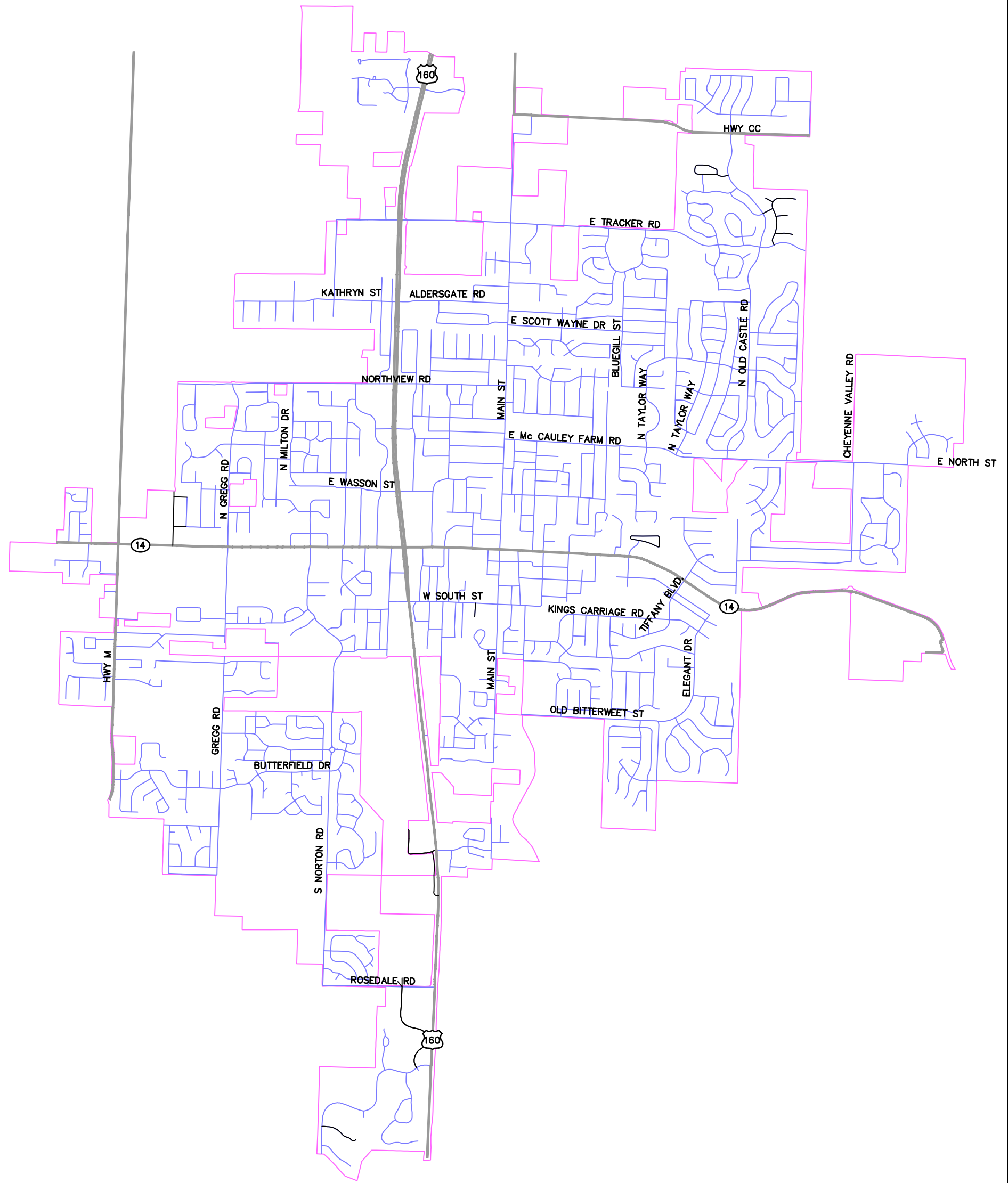
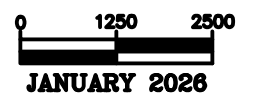
Appendix “A” Pavement Resurfacing Schedule – Assuming 3% Inflation

Project Description	PCI	Treatment	Length	Width	2026		2027		2028		2029		2030		2031		2032		2033		
					Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost		Cost
Arterials/Major Collectors:																					
E. Tracker Rd (W. of Hwy 160)	5		1,200	30			CF	City Crew			CF	City Crew			A	\$102,016			CF	City Crew	
E. Tracker Rd (160 to Main) (County)	5		2,700	25																	
E. Tracker Rd (East of Main)	7		6,200	25	CF	City Crew			CF	City Crew			CF	City Crew	A	\$439,236	CF	City Crew			
Northview Rd (W. of Hwy 160)	7		5,295	24			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Northview Rd (E. of Hwy 160)	5		2,710	25	CF	City Crew			CF	City Crew			CF	City Crew	U	\$130,901					
Gregg Rd (North of Hwy 14)	5		8,075	24			CF	City Crew			CF	City Crew			CF	City Crew	A	\$565,662	CF	City Crew	
Gregg Rd (S. of 14 to Butterfield)	5		5,905	40			CF	City Crew			CF	City Crew			CF	City Crew	A	\$689,419	CF	City Crew	
Gregg Rd (S. of Butterfield)	6		4,770	20			CF	City Crew			CF	City Crew			CF	City Crew	A	\$278,453	CF	City Crew	
S. Norton Rd	9		8,070	22			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Main St (North of McCauley to Tracker)	6		5,290	42	CF	City Crew			CF	City Crew			CF	City Crew	U	\$429,279	CF	City Crew			
Main St (South of McCauley)	9		4,040	24	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Main St (South of South St)	7		6,490	21	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
E. McCauley Farm Rd (W. of Century Elem)	6		4,223	41	CF	City Crew			CF	City Crew			CF	City Crew	U	\$490,649	CF	City Crew			
E. McCauley Farm Rd (E. of Century Elem)	6		4,360	25	CF	City Crew			CF	City Crew			CF	City Crew	U	\$210,601	CF	City Crew			
Cheyenne Rd (S. of Middle School)	7		7,950	25	CF	City Crew			CF	City Crew			CF	City Crew	A	\$580,110					
North St	4		5,365	25	CF	City Crew			CF	City Crew			CF	City Crew			A	\$391,483			
SUBTOTAL																					
Residential Streets:																					
Meadow Ridge Estates	4.9				A	\$712,602			CF	City Crew			CF	City Crew			CF	City Crew			
McCroskey	5.6						A	\$440,264	CF	City Crew			CF	City Crew			CF	City Crew			
Price Cutter	5.8						A	\$283,118	CF	City Crew			CF	City Crew			CF	City Crew			
Raintree Estates	5.4						A	\$545,798	CF	City Crew			CF	City Crew			CF	City Crew			
Wasson Bus. Park	5.5						A	\$327,998	CF	City Crew			CF	City Crew			CF	City Crew			
Wasson Place Wasson Street	4		1,219	30			FD	\$711,083													
Aldersgate Microsurface	7				CF	City Crew			M	\$81,025			CF	City Crew			CF	City Crew			
Detroit Theatre	6.8				CF	City Crew			M	\$249,282			CF	City Crew			CF	City Crew			
Keltner	6.9						CF	City Crew	PP	\$184,809											
Keltner's Green Acres	6.9				CF	City Crew			M	\$268,760			CF	City Crew			CF	City Crew			
McCroskey Micro Surface	7				CF	City Crew			M	\$42,457			CF	City Crew			CF	City Crew			
Meadow Ridge Estates Micro Surface	8				CF	City Crew			M	\$30,242			CF	City Crew			CF	City Crew			
Price Cutter Pressure Pave	7				CF	City Crew			PP	\$109,222			CF	City Crew			CF	City Crew			
Rice Estates	6.3						CF	City Crew	PP	\$179,844	CF	City Crew			CF	City Crew			CF	City Crew	
Wasson Bus. Park Micro Surface	7				CF	City Crew			M	\$94,902			CF	City Crew			CF	City Crew			
Carriage Crossing Pressure Pave	6.6						CF	City Crew	M	\$476,938	CF	City Crew			CF	City Crew			CF	City Crew	
The Ridge Micro Surface	6.9						CF	City Crew	M	\$72,992	CF	City Crew			CF	City Crew			CF	City Crew	
Aldersgate	5.2				CF	City Crew			CF	City Crew	A	\$306,005	CF	City Crew			CF	City Crew			
Big A's	5.5				CF	City Crew			CF	City Crew	A	\$320,838	CF	City Crew			CF	City Crew			
Big A's Hilcrest	5		1,306	28	CF	City Crew			FD	\$776,977	CF	City Crew			CF	City Crew			CF	City Crew	
Big A's Sarah & Spruce	5		1,372	28	CF	City Crew			CF	City Crew	FD	\$816,243	CF	City Crew			CF	City Crew			
Big A's Hightower	5		1,306	28	CF	City Crew			CF	City Crew	FD	\$776,977					CF	City Crew			
Industrial Park	6.3						CF	City Crew			A	\$362,643									
Cobble Creek	7.1						CF	City Crew			M	\$242,140			CF	City Crew			CF	City Crew	
Eagle Park Estates Micro Surface	7.1						CF	City Crew			M	\$128,446			CF	City Crew			CF	City Crew	
Parkmour Heights Micro Surface	7.3						CF	City Crew			M	\$130,708			CF	City Crew			CF	City Crew	
Rolling Hills	7.2						CF	City Crew			M	\$166,348			CF	City Crew			CF	City Crew	
Wasson Place Micro Surface	7						CF	City Crew			M	\$182,968			CF	City Crew			CF	City Crew	
Heritage Square	6						CF	City Crew			CF	City Crew	A	\$953,628	CF	City Crew			CF	City Crew	
Wasson Place	6.5						CF	City Crew			CF	City Crew	A	\$691,011	CF	City Crew			CF	City Crew	
Southeast Hills	5.3						CF	City Crew			CF	City Crew			CF	City Crew			A	\$798,838	
Sunrise Canyon	5.4						CF	City Crew			CF	City Crew			CF	City Crew			A	\$630,542	
The Ridge	5.9						CF	City Crew			CF	City Crew			CF	City Crew			A	\$310,265	
Forest Park Place	7.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Wellington Park	7.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Glenoaks Estates	8.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Meadowbrook	7.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Eagle Ridge Estates	7.6				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Park Place	7.4				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Park Hill Place	7.8				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Kelby Creek	7.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Industrial Park Pressure Pave	6.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Hedgepeth Estates North	6.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Hedgepeth Estates South	6.9						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Bentwater	5.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Eagle Park Estates	6.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Parkmour Heights	6.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Oakmont Heights	6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Royal Estates	6.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Vintage Estates	6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Forest South	6.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Glenallen Estates	6.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Butterfield Place	7.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Southgate	6.6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Greenbriar Full Depth	4				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Price Cutter W. State St.	3		673	20	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Tiffany Highlands	7.6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Old Castle Estates North	8.2				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Old Castle Estates South	7.4				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Copper Leaf	8				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Willows	8.5				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Wicklow Ashford	8.4				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Wicklow Villages	8.1				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Irish Hills	8.4				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Cheyenne Valley	8.8				CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew			
Forest Heights	8.8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew	
Greenbriar	8.2																				

Project Description	PCI	Treatment	Length	Width	2034		2035		2036		2037		2038		2039		2040		2041	
					Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost
Arterials/Major Collectors:																				
E. Tracker Rd (W. of Hwy 160)	5		1,200	30			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
E. Tracker Rd (160 to Main) (County)	5		2,700	25																
E. Tracker Rd (East of Main)	7		6,200	25	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Northview Rd (W. of Hwy 160)	7		5,295	24			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Northview Rd (E. of Hwy 160)	5		2,710	25	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Gregg Rd (North of Hwy 14)	5		8,075	24			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Gregg Rd (S. of 14 to Butterfield)	5		5,905	40			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Gregg Rd (S. of Butterfield)	6		4,770	20			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
S. Norton Rd	9		8,070	22			CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Main St (North of McCauley to Tracker)	6		5,290	42	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Main St (South of McCauley)	9		4,040	24	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Main St (South of South St)	7		6,490	21	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
E. McCauley Farm Rd (W. of Century Elem)	6		4,223	41	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
E. McCauley Farm Rd (E. of Century Elem)	6		4,360	25	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Cheyenne Rd (S. of Middle School)	7		7,950	25	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
North St	4		5,365	25	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
SUBTOTAL																				
Residential Streets:																				
Meadow Ridge Estates	4.9						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
McCroskey	5.6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Price Cutter	5.8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Raintree Estates	5.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wasson Bus. Park	5.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wasson Place Wasson Street	4		1,219	30																
Aldersgate Microsurface	7						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Detroit Theatre	6.8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Keltner	6.9																			
Keltner's Green Acres	6.9						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
McCroskey Micro Surface	7						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Meadow Ridge Estates Micro Surface	8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Price Cutter Pressure Pave	7						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Rice Estates	6.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wasson Bus. Park Micro Surface	7						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Carriage Crossing Pressure Pave	6.6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
The Ridge Micro Surface	6.9						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Aldersgate	5.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Big Afs	5.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Big Afs Hilcrest	5		1,306	28	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Big Afs Sarah & Spruce	5		1,372	28	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Big Afs Hightower	5		1,306	28	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew		
Industrial Park	6.3																			
Cobble Creek	7.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Eagle Park Estates Micro Surface	7.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Parkmour Heights Micro Surface	7.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Rolling Hills	7.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wasson Place Micro Surface	7						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Heritage Square	6						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wasson Place	6.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Southeast Hills	5.3						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Sunrise Canyon	5.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
The Ridge	5.9						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Forest Park Place	7.3				M	\$245,751	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wellington Park	7.5				M	\$159,195	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Glenoaks Estates	8.1				M	\$184,505	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Meadowbrook	7.4				M	\$298,134	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Eagle Ridge Estates	7.6				M	\$325,861			CF	City Crew			CF	City Crew			CF	City Crew		
Park Place	7.4				M	\$306,533			CF	City Crew			CF	City Crew			CF	City Crew		
Park Hill Place	7.8				M	\$346,003			CF	City Crew			CF	City Crew			CF	City Crew		
Kelby Creek	7.5				M	\$325,018	CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Industrial Park Pressure Pave	6.3						PP	\$208,221			CF	City Crew			CF	City Crew			CF	City Crew
Hedgepeth Estates North	6.2						A	\$721,874			CF	City Crew			CF	City Crew			CF	City Crew
Hedgepeth Estates South	6.9						A	\$858,165			CF	City Crew			CF	City Crew			CF	City Crew
Bentwater	5.2						CF	City Crew	A	\$607,762	CF	City Crew			CF	City Crew			CF	City Crew
Eagle Park Estates	6.1						CF	City Crew	A	\$579,231	CF	City Crew			CF	City Crew			CF	City Crew
Parkmour Heights	6.3						CF	City Crew	A	\$589,431	CF	City Crew			CF	City Crew			CF	City Crew
Oakmont Heights	6						CF	City Crew			A	\$515,511			CF	City Crew			CF	City Crew
Royal Estates	6.1						CF	City Crew			A	\$833,107			CF	City Crew			CF	City Crew
Vintage Estates	6						CF	City Crew			A	\$336,203			CF	City Crew			CF	City Crew
Forest South	6.5						CF	City Crew			CF	City Crew	A	\$842,699	CF	City Crew			CF	City Crew
Glenallen Estates	6.1						CF	City Crew			CF	City Crew	A	\$1,074,719	CF	City Crew			CF	City Crew
Butterfield Place	7.2						CF	City Crew			CF	City Crew			A	\$1,215,902			CF	City Crew
Southgate	6.6						CF	City Crew			CF	City Crew			A	\$826,820			CF	City Crew
Greenbriar Full Depth	4						CF	City Crew			CF	City Crew					FD	\$1,680,865		
Price Cutter W. State St.	3		673	20	CF	City Crew			CF	City Crew			CF	City Crew			FD	\$395,878		
Tiffany Highlands	7.6						CF	City Crew			CF	City Crew			CF	City Crew			A	\$1,547,186
Old Castle Estates North	8.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Old Castle Estates South	7.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Copper Leaf	8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Willows	8.5						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wicklow Ashford	8.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Wicklow Villages	8.1						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Irish Hills	8.4						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Cheyenne Valley	8.8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Forest Heights	8.8						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Greenbriar	8.2						CF	City Crew			CF	City Crew			CF	City Crew			CF	City Crew
Riverton	10																			

Appendix “B” Report Maps

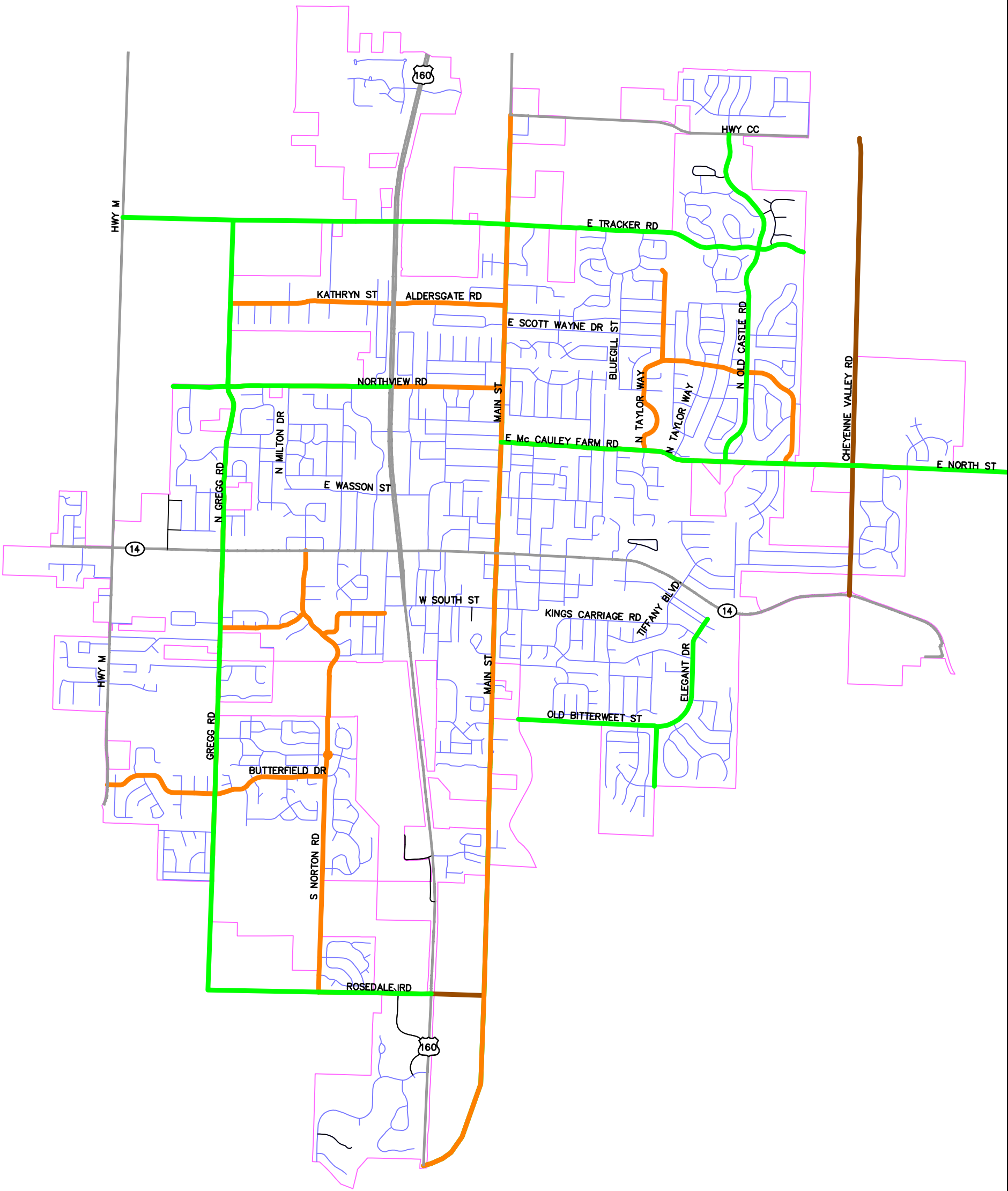
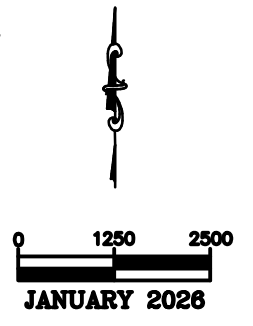
CITY OF NIXA – ROADWAY MAINTENANCE



CITY OF NIXA – ARTERIALS AND COLLECTORS

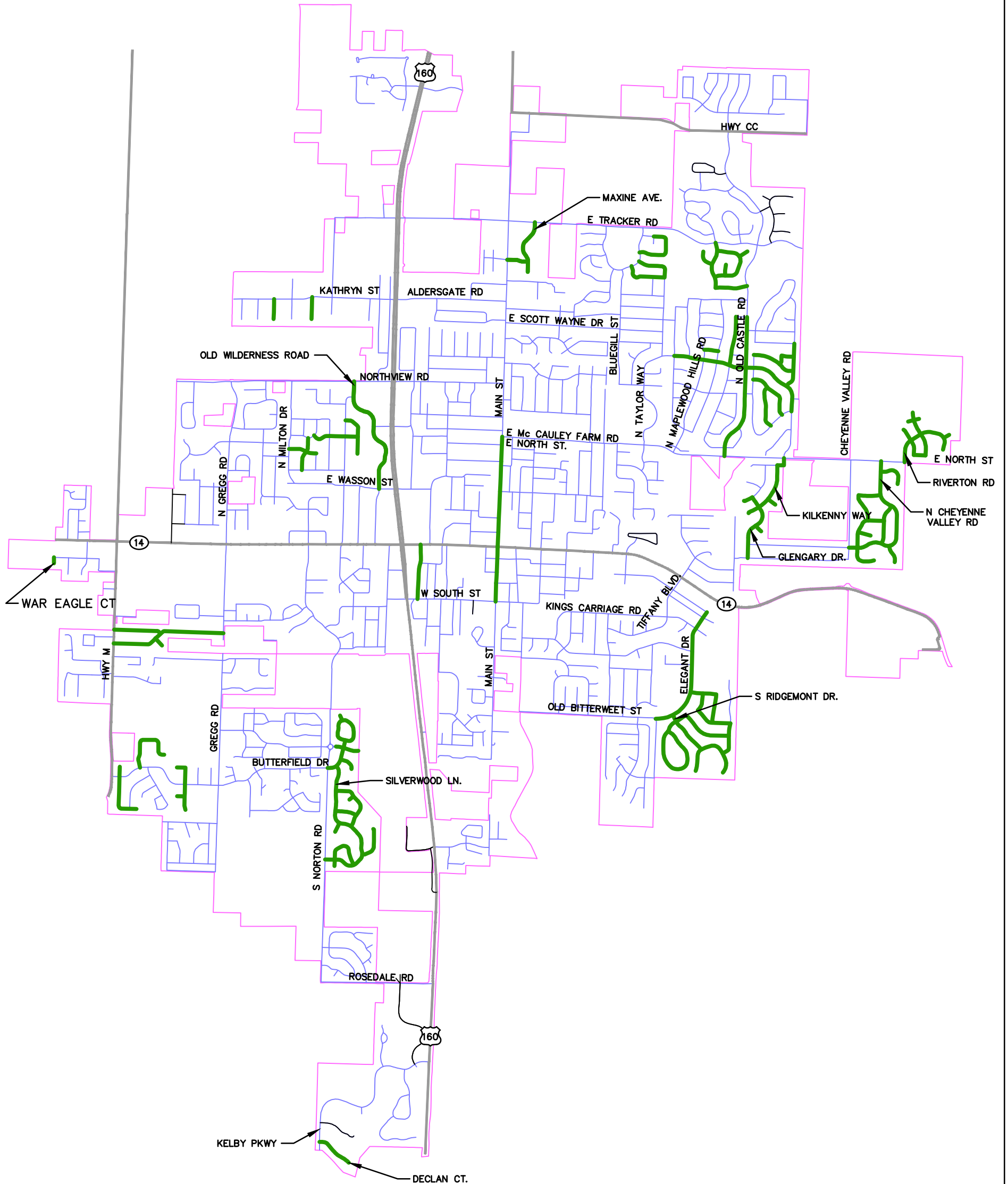
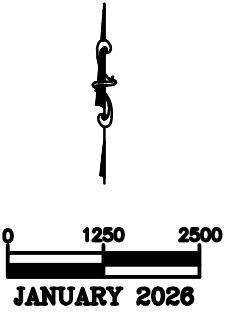
LEGEND

- NIXA CITY STREETS
- MAJOR COLLECTOR
- PRIMARY ARTERIAL
- SECONDARY ARTERIAL

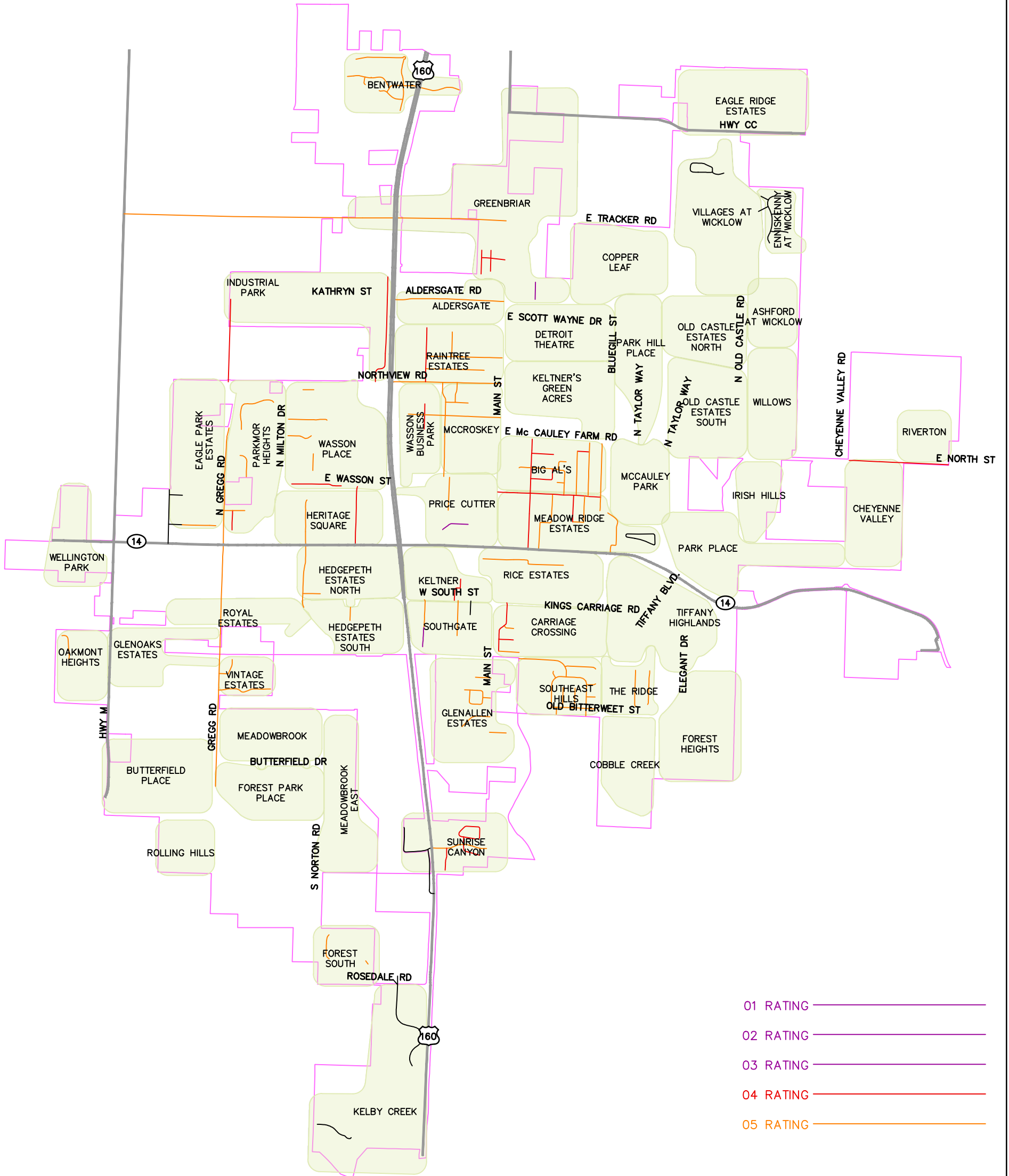
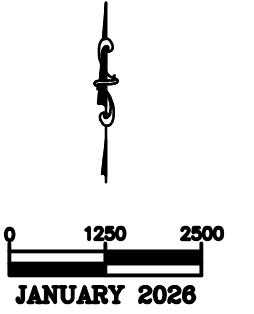


CITY OF NIXA – RECENTLY PAVED ROADWAYS

RECENT PAVING & REHABILITATED DEPICTED IN GREEN

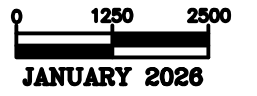


CITY OF NIXA – FAILING STREET RATINGS

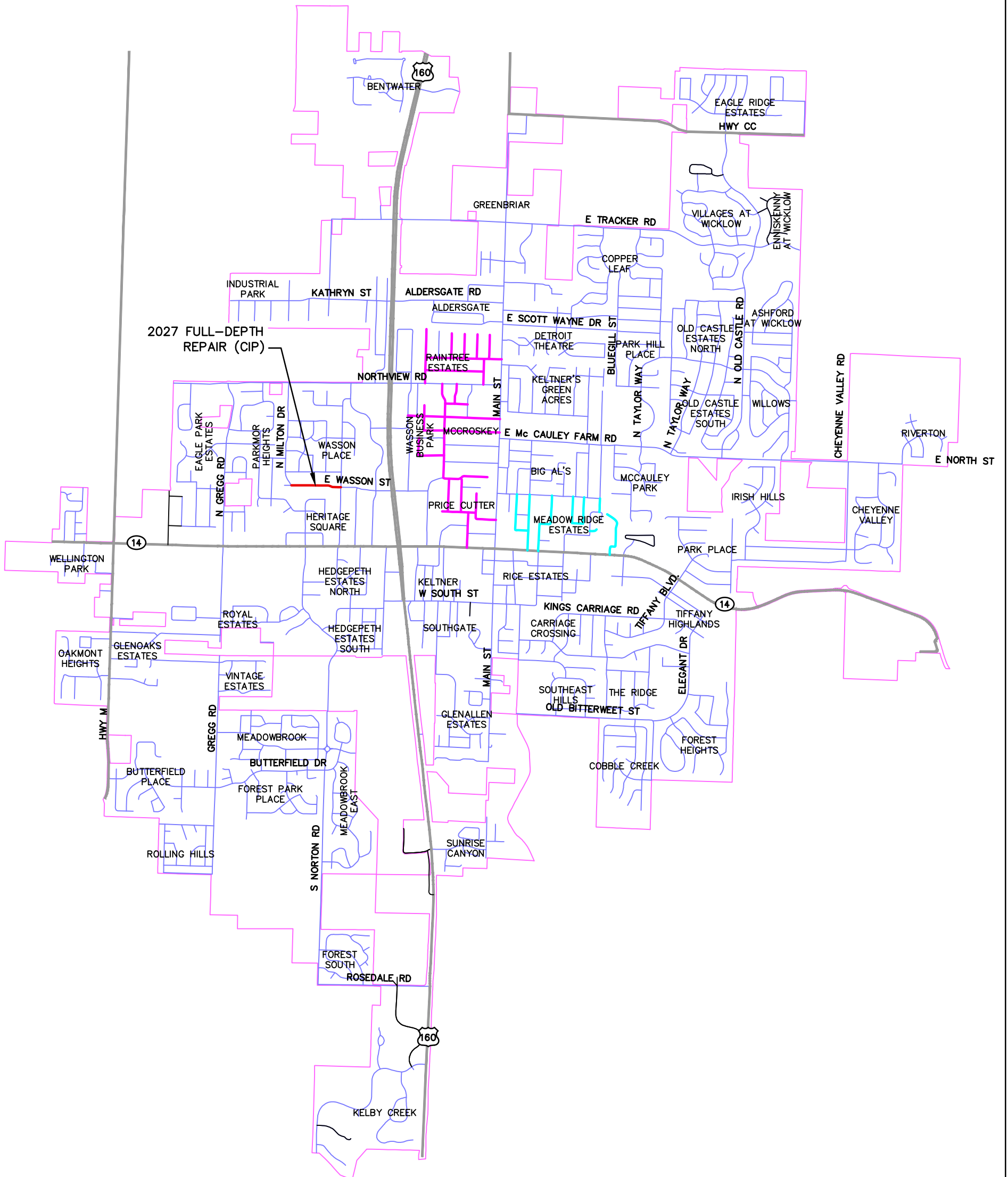


Appendix “C” Paving Schedule Maps

CITY OF NIXA 2026-2027 MILL AND OVERLAY



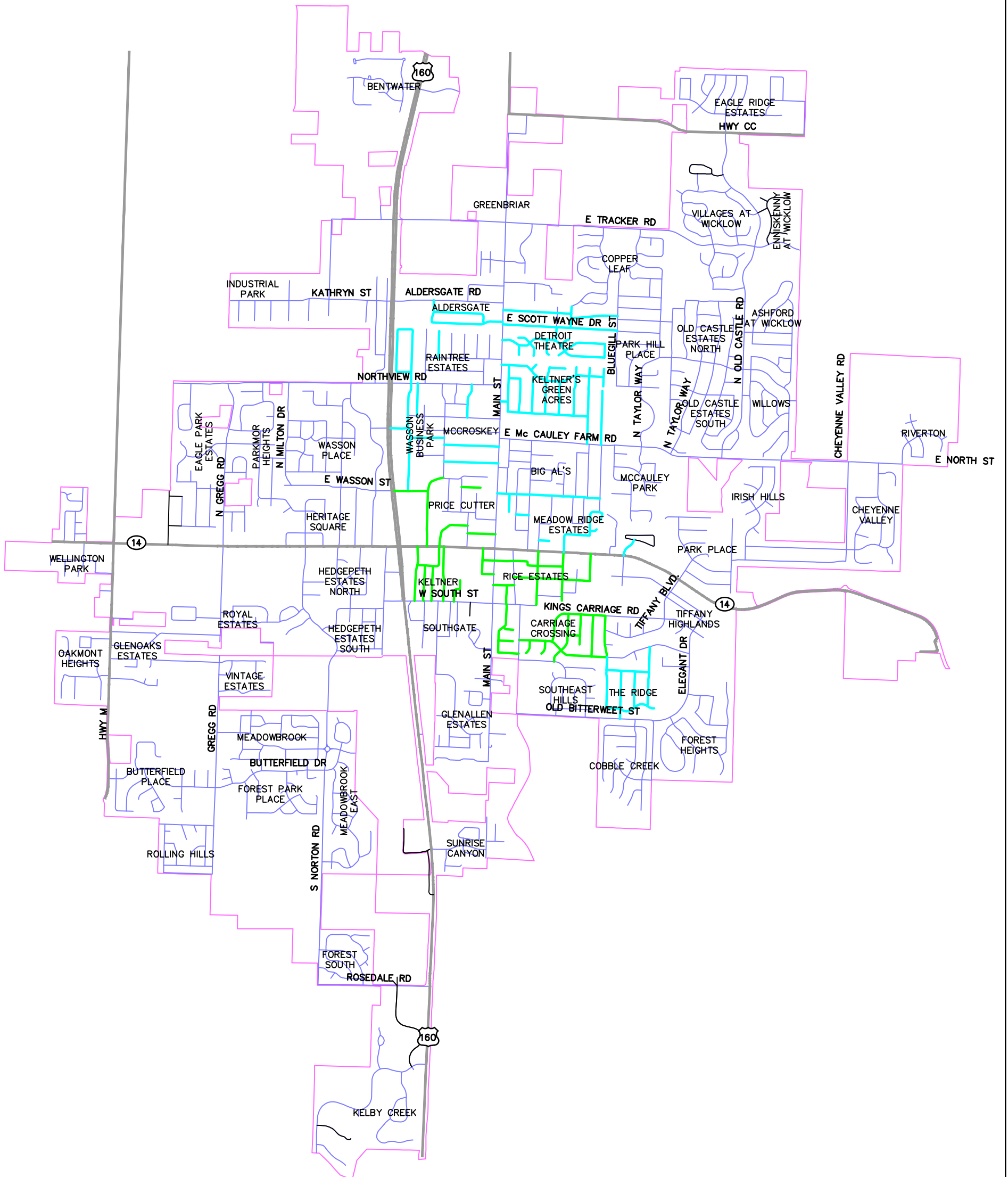
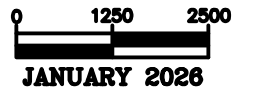
- 2026 PAVING
- 2027 PAVING
- 2027 FULL-DEPTH REPAIR



CITY OF NIXA 2028 IMPROVEMENTS



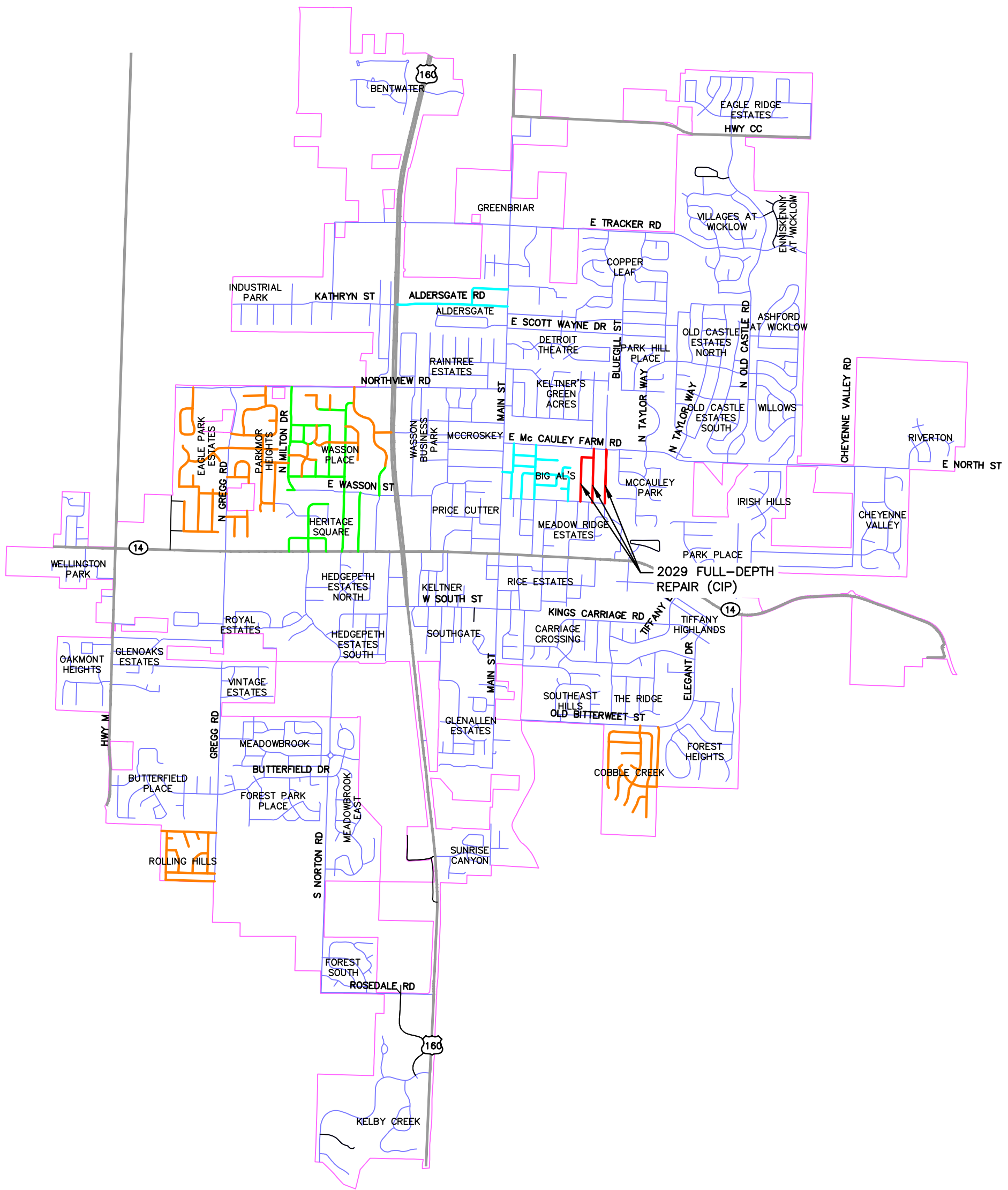
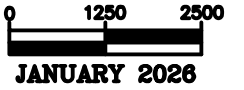
- 2028 MICRO-SURFACE
- 2028 PRESSURE PAVE
- 2028 FULL-DEPTH REPAIR



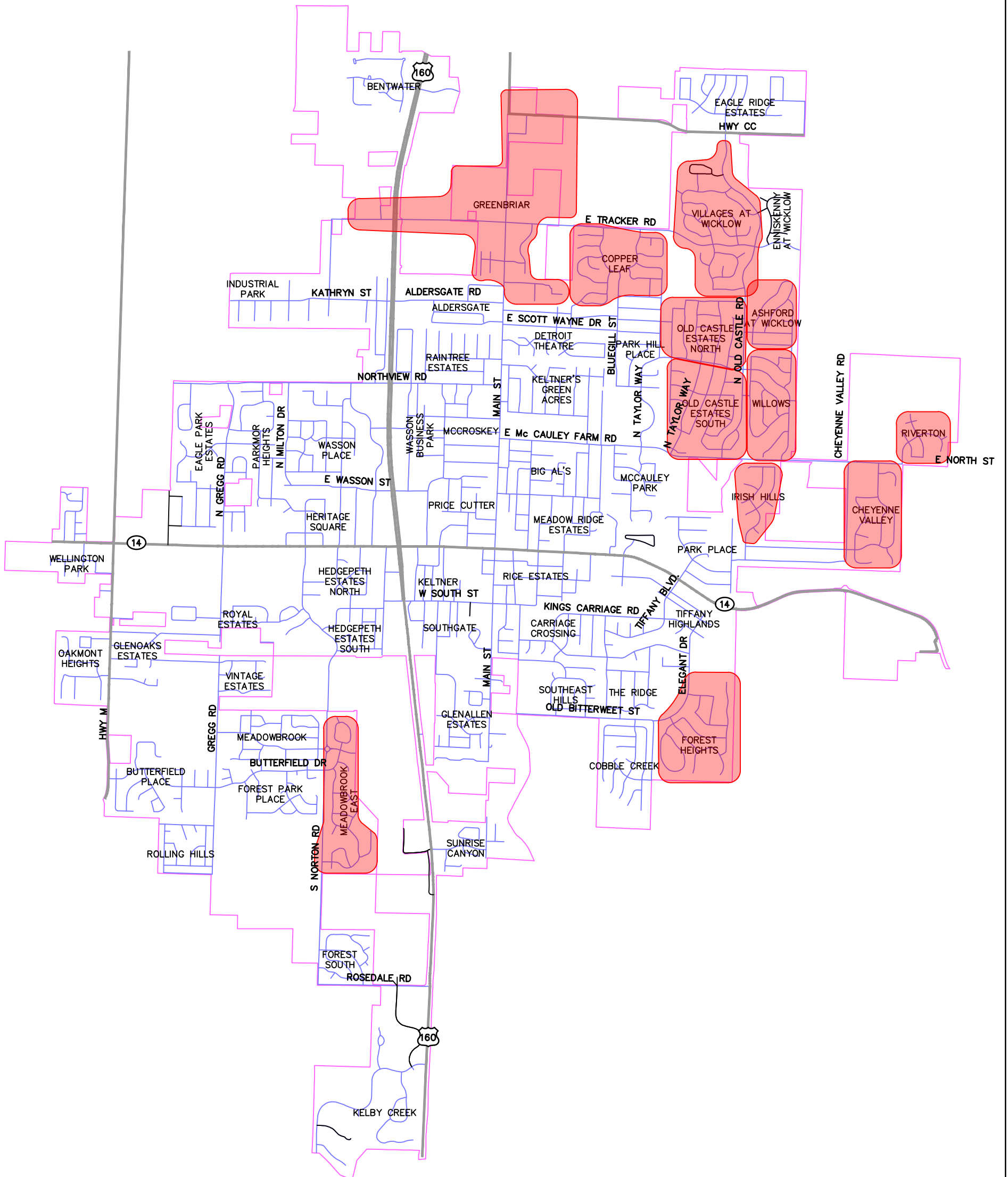
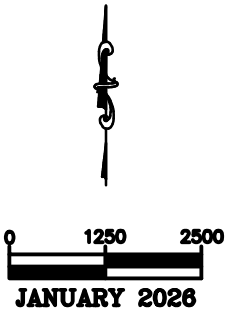
CITY OF NIXA 2029-2030 IMPROVEMENTS



- 2029 MICRO-SURFACE
- 2029 MILL AND OVERLAY
- 2029 FULL-DEPTH REPAIR
- 2030 MILL AND OVERLAY



CITY OF NIXA IMPROVEMENTS AFTER 2041

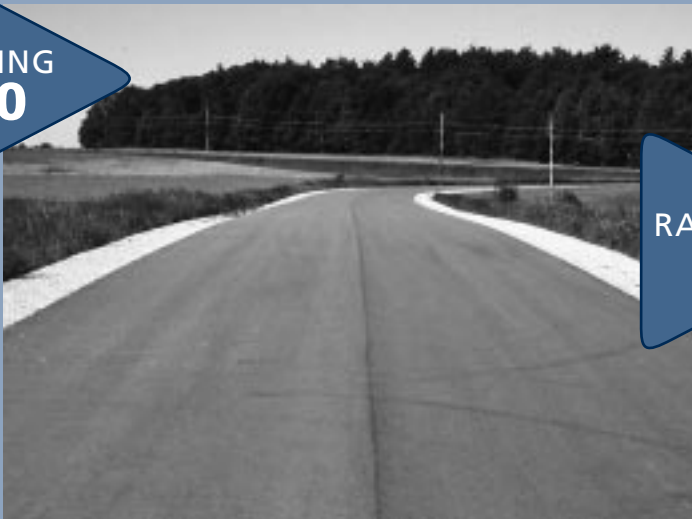


Appendix “D” PASER Manual

Pavement Surface Evaluation and Rating

PASER Asphalt Roads Manual

RATING
10



RATING
7



RATING
4



RATING
1



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Practical advice on rating roads	26

This manual is intended to assist local officials in understanding and rating the surface condition of asphalt pavement. It describes types of defects and provides a simple system to visually rate pavement condition. The rating procedure can be used as condition data for the Wisconsin DOT local road inventory and as part of a computerized pavement management system like PASERWARE.

The PASER system described here and in other T.I.C. publications is based in part on a roadway management system originally developed by Phil Scherer, transportation planner, Northwest Wisconsin Regional Planning Commission.

Produced by the T.I.C. with support from the Federal Highway Administration, the Wisconsin Department of Transportation, and the University of Wisconsin-Extension. The T.I.C., part of the nationwide Local Technical Assistance Program (LTAP), is a Center of the College of Engineering, Department of Engineering Professional Development, University of Wisconsin–Madison.

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Printed on recycled paper.

Pavement Surface Evaluation and Rating

PASER Manual

Asphalt Roads

Donald Walker, T.I.C. Director, *author*
Lynn Entine, Entine & Associates, *editor*
Susan Kummer, Artifax, *designer*

Pavement Surface Evaluation and Rating

Asphalt PASER Manual

A local highway agency's major goal is to use public funds to provide a comfortable, safe and economical road surface—no simple task. It requires balancing priorities and making difficult decisions in order to manage pavements. Local rural and small city pavements are often managed informally, based on the staff's judgment and experience. While this process is both important and functional, using a slightly more formalized technique can make it easier to manage pavements effectively.

Experience has shown that there are three especially useful steps in managing local roads:

1. Inventory all local roads and streets.
2. Periodically evaluate the condition of all pavements.
3. Use the condition evaluations to set priorities for projects and select alternative treatments.

A comprehensive pavement management system involves collecting data and assessing several road characteristics: roughness (ride), surface distress (condition), surface skid characteristics, and structure (pavement strength and deflection). Planners can combine this condition data with economic analysis to develop short-range and long-range plans for a variety of budget levels. However, many local agencies lack the resources for such a full-scale system.

Since surface condition is the most vital element in any pavement management system, local agencies can use the simplified rating system presented in this *Asphalt PASER Manual* to evaluate their roads. The PASER ratings combined with other inventory data (width, length, shoulder, pavement type, etc.) from the WisDOT local roads inventory (WISLR) can be very helpful in planning future budgets and priorities.

WISLR inventory information and PASER ratings can be used in a computerized pavement management system, PASERWARE, developed by the T.I.C and WisDOT. Local officials can use PASERWARE to evaluate whether their annual road budgets are adequate to maintain or improve current road conditions and to select the most cost-effective strategies and priorities for annual projects.

PASER Manuals for gravel, concrete, and other road surfaces, with compatible rating systems are also available (page 29). Together they make a comprehensive condition rating method for all road types. PASER ratings are accepted for WISLR condition data.

Asphalt pavement distress

PASER uses visual inspection to evaluate pavement surface conditions. The key to a useful evaluation is identifying different types of pavement distress and linking them to a cause. Understanding the cause for current conditions is extremely important in selecting an appropriate maintenance or rehabilitation technique.

There are four major categories of common asphalt pavement surface distress:

Surface defects

Raveling, flushing, polishing.

Surface deformation

Rutting, distortion—rippling and shoving, settling, frost heave.

Cracks

Transverse, reflection, slippage, longitudinal, block, and alligator cracks.

Patches and potholes

Deterioration has two general causes: environmental due to weathering and aging, and structural caused by repeated traffic loadings.

Obviously, most pavement deterioration results from both environmental and structural causes. However, it is important to try to distinguish between the two in order to select the most effective rehabilitation techniques.

The rate at which pavement deteriorates depends on its environment, traffic loading conditions, original construction quality, and interim maintenance procedures. Poor quality materials or poor construction procedures can significantly reduce the life of a pavement. As a result, two pavements constructed at the same time may have significantly different lives, or certain portions of a pavement may deteriorate more rapidly than others. On the other hand, timely and effective maintenance can extend a pavement's life. Crack sealing and seal coating can reduce the effect of moisture in aging of asphalt pavement.

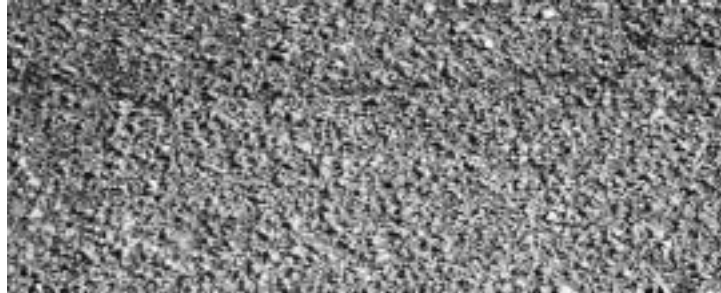
With all of these variables, it is easy to see why pavements deteriorate at various rates and why we find them in various stages of disrepair. Recognizing defects and understanding their causes helps us rate pavement condition and select cost-effective repairs. The pavement defects shown on the following pages provide a background for this process.

Periodic inspection is necessary to provide current and useful evaluation data. It is recommended that PASER ratings be updated every two years, and an annual update is even better.

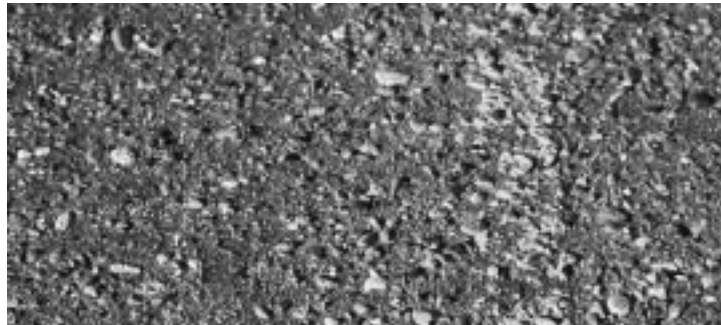
SURFACE DEFECTS

Raveling

Raveling is progressive loss of pavement material from the surface downward, caused by: stripping of the bituminous film from the aggregate, asphalt hardening due to aging, poor compaction especially in cold weather construction, or insufficient asphalt content. Slight to moderate raveling has loss of fines. Severe raveling has loss of coarse aggregate. Raveling in the wheelpaths can be accelerated by traffic. Protect pavement surfaces from the environment with a sealcoat or a thin overlay if additional strength is required.



◀ Slight raveling. Small aggregate particles have worn away exposing tops of large aggregate.



◀ Moderate to severe raveling. Erosion further exposes large aggregate.

Flushing

Flushing is excess asphalt on the surface caused by a poor initial asphalt mix design or by paving or sealcoating over a flushed surface. Repair by blotting with sand or by overlaying with properly designed asphalt mix.



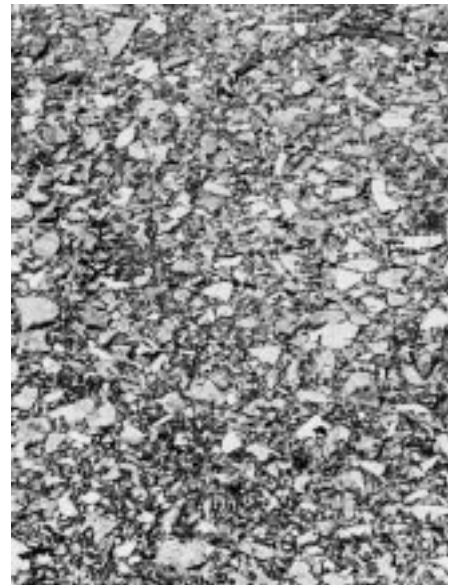
◀ Severe raveling and loss of surface material.

Polishing

Polishing is a smooth slippery surface caused by traffic wearing off sharp edges of aggregates. Repair with sealcoat or thin bituminous overlay using skid-resistant aggregate.

Polished, worn aggregate needs repair. ▼

▶ Flushing. Dark patches show where asphalt has worked to surface.



SURFACE DEFORMATION

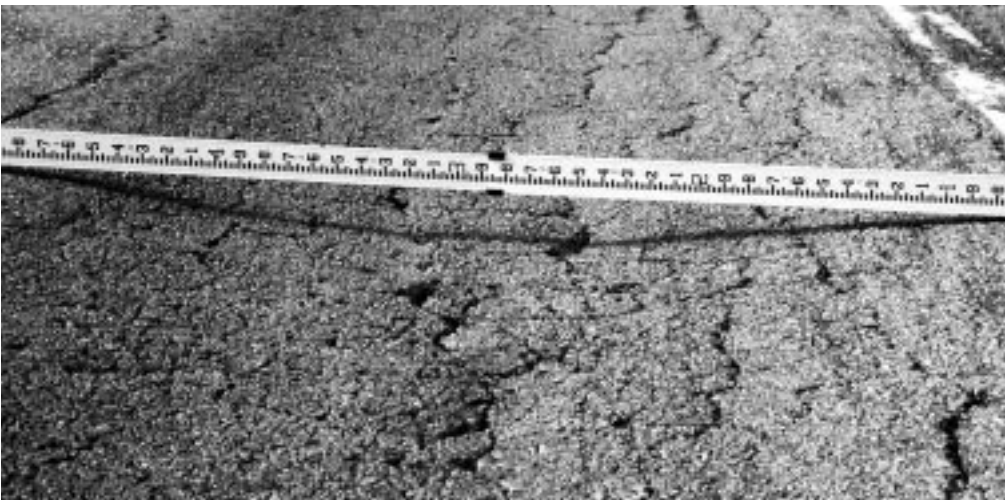
Rutting

Rutting is displacement of material, creating channels in wheelpaths. It is caused by traffic compaction or displacement of unstable material. Severe rutting (over 2") may be caused by base or subgrade consolidation. Repair minor rutting with overlays. Severe rutting requires milling the old surface or reconstructing the roadbed before resurfacing.

◀
Even slight rutting is evident after a rain.



◀
Severe rutting over 2" caused by poor mix design.



◀
Severe rutting caused by poor base or subgrade.

Distortion

Shoving or rippling is surfacing material displaced crossways to the direction of traffic. It can develop into washboarding when the asphalt mixture is unstable because of poor quality aggregate or improper mix design. Repair by milling smooth and overlaying with stable asphalt mix.

Other pavement distortions may be caused by settling, frost heave, etc. Patching may provide temporary repair. Permanent correction usually involves removal of unsuitable subgrade material and reconstruction.

▼ Heavy traffic has shoved pavement into washboard ripples and bumps.



► Severe settling from utility trench.



► Frost heave damage from spring break-up.

▼ Widely spaced, well-sealed cracks.



CRACKS

Transverse cracks

A crack at approximately right angles to the center line is a transverse crack. They are often regularly spaced. The cause is movement due to temperature changes and hardening of the asphalt with aging.

Transverse cracks will initially be widely spaced (over 50'). Additional cracking will occur with aging until they are closely spaced (within several feet). These usually begin as hairline or very narrow cracks; with aging they widen. If not properly sealed and maintained, secondary or multiple cracks develop parallel to the initial crack. The crack edges can further deteriorate by raveling and eroding the adjacent pavement.

Prevent water intrusion and damage by sealing cracks which are more than 1/4" wide.

◀ Sealed cracks, a few feet apart.



▲ Tight cracks less than 1/4" in width.



▲ Open crack – 1/2" or more in width.



▲ Water enters unsealed cracks softening pavement and causing secondary cracks.



▲ Pavement ravels and erodes along open cracks causing deterioration.

Reflection cracks

Cracks in overlays reflect the crack pattern in the pavement underneath. They are difficult to prevent and correct. Thick overlays or reconstruction is usually required.

►
Concrete joints reflected through bituminous overlay.



Slippage cracks

Crescent or rounded cracks in the direction of traffic, caused by slippage between an overlay and an underlying pavement. Slippage is most likely to occur at intersections where traffic is stopping and starting. Repair by removing the top surface and resurfacing using a tack coat.

►
Crescent-shaped cracks characteristic of slippage.



►
Loss of bond between pavement layers allows traffic to break loose pieces of surface.



Centerline crack (still tight). ▶



Edge cracking from weakened subbase and traffic loads. ▼



Longitudinal cracks

Cracks running in the direction of traffic are longitudinal cracks. Center line or lane cracks are caused by inadequate bonding during construction or reflect cracks in underlying pavement. Longitudinal cracks in the wheel path indicate fatigue failure from heavy vehicle loads. Cracks within one foot of the edge are caused by insufficient shoulder support, poor drainage, or frost action. Cracks usually start as hairline or vary narrow and widen and erode with age. Without crack filling, they can ravel, develop multiple cracks, and become wide enough to require patching.

Filling and sealing cracks will reduce moisture penetration and prevent further subgrade weakening. Multiple longitudinal cracks in the wheel path or pavement edge indicate a need for strengthening with an overlay or reconstruction.

▶
First stage of wheelpath cracking caused by heavy traffic loads.



Load-related cracks in wheel path plus centerline cracking. ▼



Multiple open cracks at center line, wheelpaths and lane center. ▼



Block cracks

Block cracking is interconnected cracks forming large blocks. Cracks usually intersect at nearly right angles. Blocks may range from one foot to approximately 10' or more across. The closer spacing indicates more advanced aging caused by shrinking and hardening of the asphalt over time. Repair with sealcoating during early stages to reduce weathering of the asphalt. Overlay or reconstruction required in the advanced stages.

▶
Large blocks, approximately 10' across.



▶
Intermediate-size block cracking, 1'-5' across with open cracks.



▲ **Extensive block cracking in an irregular pattern.**

▶
Severe block cracking – 1' or smaller blocks. Tight cracks with no raveling.



Alligator cracks

Interconnected cracks forming small pieces ranging in size from about 1" to 6". This is caused by failure of the surfacing due to traffic loading (fatigue) and very often also due to inadequate base or subgrade support. Repair by excavating localized areas and replacing base and surface. Large areas require reconstruction. Improvements in drainage may often be required.

◀
Alligator crack pattern. Tight cracks and one patch.

◀
Characteristic "chicken wire" crack pattern shows smaller pavement pieces and patching.

◀
Open raveled alligator cracking with settlement along lane edge most likely due to very soft subgrade.



PATCHES AND POTHOLES

Patches

Original surface repaired with new asphalt patch material. This indicates a pavement defect or utility excavation which has been repaired. Patches with cracking, settlement or distortions indicate underlying causes still remain. Recycling or reconstruction are required when extensive patching shows distress.

►
Typical repair of utility excavation. Patch in fair to good condition.



►
Edge wedging. Pavement edges strengthened with wedges of asphalt. Patch is in very good condition.



►
Extensive patching in very poor condition.



Potholes

Holes and loss of pavement material caused by traffic loading, fatigue and inadequate strength. Often combined with poor drainage. Repair by excavating or rebuilding localized potholes. Reconstruction required for extensive defects.



Small pothole where top course has broken away.



Multiple potholes show pavement failure, probably due to poor subgrade soils, frost heave, and bad drainage.



Large, isolated pothole, extends through base. Note adjacent alligator cracks which commonly deteriorate into potholes.



Rating pavement surface condition

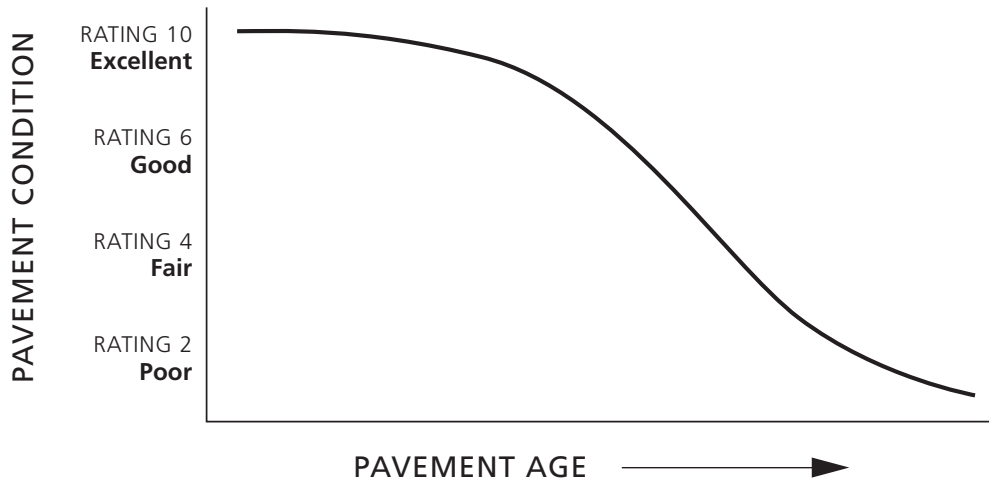
With an understanding of surface distress, you can evaluate and rate asphalt pavement surfaces. The rating scale ranges from **10—excellent** condition to **1—failed**. Most pavements will deteriorate through the phases listed in the rating scale. The time it takes to go from excellent condition (10) to complete failure (1) depends largely on the quality of the original construction and the amount of heavy traffic loading.

Once significant deterioration begins, it is common to see pavement decline rapidly. This is usually due to a combination of loading and the effects of additional moisture. As a pavement ages and additional cracking develops, more moisture can enter the pavement and accelerate the rate of deterioration.

Look at the photographs in this section to become familiar with the descriptions of the individual rating categories. To evaluate an individual pavement segment, first determine its general condition. Is it relatively new,

toward the top end of the scale? In very poor condition and at the bottom of the scale? Or somewhere in between? Next, think generally about the appropriate maintenance method. Use the rating categories outlined below.

Finally, review the individual pavement distress and select the appropriate surface rating. Individual pavements will **not** have all of the types of distress listed for any particular rating. They may have only one or two types.



In addition to indicating the surface condition of a road, a given rating also includes a recommendation for needed maintenance or repair. This feature of the rating system facilitates its use and enhances its value as a tool in ongoing road maintenance.

RATINGS ARE RELATED TO NEEDED MAINTENANCE OR REPAIR

Rating 9 & 10	No maintenance required
Rating 8	Little or no maintenance
Rating 7	Routine maintenance, cracksealing and minor patching
Rating 5 & 6	Preservative treatments (sealcoating)
Rating 3 & 4	Structural improvement and leveling (overlay or recycling)
Rating 1 & 2	Reconstruction

Rating system

Surface rating	Visible distress*	General condition/ treatment measures
10 Excellent	None.	New construction.
9 Excellent	None.	Recent overlay. Like new.
8 Very Good	No longitudinal cracks except reflection of paving joints. Occasional transverse cracks, widely spaced (40' or greater). All cracks sealed or tight (open less than 1/4").	Recent sealcoat or new cold mix. Little or no maintenance required.
7 Good	Very slight or no raveling, surface shows some traffic wear. Longitudinal cracks (open 1/4") due to reflection or paving joints. Transverse cracks (open 1/4") spaced 10' or more apart, little or slight crack raveling. No patching or very few patches in excellent condition.	First signs of aging. Maintain with routine crack filling.
6 Good	Slight raveling (loss of fines) and traffic wear. Longitudinal cracks (open 1/4"–1/2"), some spaced less than 10'. First sign of block cracking. Slight to moderate flushing or polishing. Occasional patching in good condition.	Shows signs of aging. Sound structural condition. Could extend life with sealcoat.
5 Fair	Moderate to severe raveling (loss of fine and coarse aggregate). Longitudinal and transverse cracks (open 1/2") show first signs of slight raveling and secondary cracks. First signs of longitudinal cracks near pavement edge. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Some patching or edge wedging in good condition.	Surface aging. Sound structural condition. Needs sealcoat or thin non-structural overlay (less than 2")
4 Fair	Severe surface raveling. Multiple longitudinal and transverse cracking with slight raveling. Longitudinal cracking in wheel path. Block cracking (over 50% of surface). Patching in fair condition. Slight rutting or distortions (1/2" deep or less).	Significant aging and first signs of need for strengthening. Would benefit from a structural overlay (2" or more).
3 Poor	Closely spaced longitudinal and transverse cracks often showing raveling and crack erosion. Severe block cracking. Some alligator cracking (less than 25% of surface). Patches in fair to poor condition. Moderate rutting or distortion (1" or 2" deep). Occasional potholes.	Needs patching and repair prior to major overlay. Milling and removal of deterioration extends the life of overlay.
2 Very Poor	Alligator cracking (over 25% of surface). Severe distortions (over 2" deep) Extensive patching in poor condition. Potholes.	Severe deterioration. Needs reconstruction with extensive base repair. Pulverization of old pavement is effective.
1 Failed	Severe distress with extensive loss of surface integrity.	Failed. Needs total reconstruction.

* Individual pavements will not have all of the types of distress listed for any particular rating. They may have only one or two types.

RATING 10 & 9

**EXCELLENT —
No maintenance required**

Newly constructed or recently overlaid roads are in excellent condition and require no maintenance.



▶
RATING 10
New construction.



▶
RATING 9
Recent overlay,
rural.



▶
RATING 9
Recent overlay,
urban.



RATING 8

**VERY GOOD —
Little or no maintenance required**

This category includes roads which have been recently sealcoated or overlaid with new cold mix. It also includes recently constructed or overlaid roads which may show longitudinal or transverse cracks. All cracks are tight or sealed.

◀
**Recent
chip seal.**



◀
**Recent
slurry seal.**

▼ **Widely spaced,
sealed cracks.**



▲ **New cold mix surface.**



RATING 7

GOOD —

Routine sealing recommended

Roads show first signs of aging, and they may have very slight raveling. Any longitudinal cracks are along paving joint. Transverse cracks may be approximately 10' or more apart. All cracks are 1/4" or less, with little or no crack erosion. Few if any patches, all in very good condition. Maintain a crack sealing program.

►
**Tight and sealed
transverse and
longitudinal cracks.
Maintain crack
sealing program.**



►
**Tight and sealed
transverse and
longitudinal cracks.**



►
**Transverse cracks
about 10' or more
apart. Maintain crack
sealing program.**





RATING 6

GOOD —
Consider preservative treatment

Roads are in sound structural condition but show definite signs of aging. Seal-coating could extend their useful life. There may be slight surface raveling. Transverse cracks can be frequent, less than 10' apart. Cracks may be 1/4–1/2" and sealed or open. Pavement is generally sound adjacent to cracks. First signs of block cracking may be evident. May have slight or moderate bleeding or polishing. Patches are in good condition.

◀ **Slight surface raveling with tight cracks, less than 10' apart.**

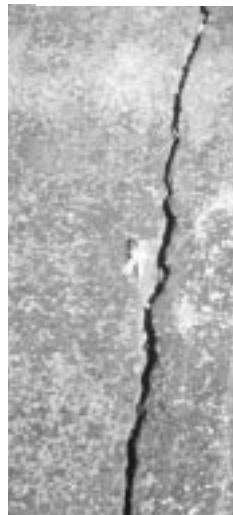
◀ **Transverse cracking less than 10' apart; cracks well-sealed.**



▼ **Large blocks, early signs of raveling and block cracking.**

▼ **Open crack, 1/2" wide; adjoining pavement sound.**

▼ **Moderate flushing.**



RATING 5

FAIR —

Preservative maintenance treatment required

Roads are still in good structural condition but clearly need sealcoating or overlay. They may have moderate to severe surface raveling with significant loss of aggregate. First signs of longitudinal cracks near the edge. First signs of raveling along cracks. Block cracking up to 50% of surface. Extensive to severe flushing or polishing. Any patches or edge wedges are in good condition.

▼ Block cracking with open cracks.



► Moderate to severe raveling in wheel paths.



▼ Severe flushing.



▲ Wedges and patches extensive but in good condition.

Severe raveling with
▼ extreme loss of aggregate.



Load cracking and slight
▼ rutting in wheel path.



RATING 4

FAIR —
Structural improvement required

Roads show first signs of needing strengthening by overlay. They have very severe surface raveling which should no longer be sealed. First longitudinal cracking in wheel path. Many transverse cracks and some may be raveling slightly. Over 50% of the surface may have block cracking. Patches are in fair condition. They may have rutting less than 1/2" deep or slight distortion.



◀ **Longitudinal cracking; early load-related distress in wheel path. Strengthening needed.**

▼ **Slight rutting; patch in good condition.**



▼ **Extensive block cracking. Blocks tight and sound.**
◀ **Slight rutting in wheel path.**

RATING 3

POOR—

Structural improvement required

Roads must be strengthened with a structural overlay (2" or more). Will benefit from milling and very likely will require pavement patching and repair beforehand. Cracking will likely be extensive. Raveling and erosion in cracks may be common. Surface may have severe block cracking and show first signs of alligator cracking. Patches are in fair to poor condition. There is moderate distortion or rutting (1-2") and occasional potholes.

►
Many wide and raveled cracks indicate need for milling and overlay.



►
2" ruts need mill and overlay.



►
Open and raveled block cracks.



**RATING 3**

POOR — (continued)

Structural improvement required

◀ **Alligator cracking.**
Edge needs repair
and drainage needs
improvement prior
to rehabilitation.

▼ **Distortion with patches**
in poor condition. Repair
and overlay.



RATING 2

**VERY POOR—
Reconstruction required**

Roads are severely deteriorated and need reconstruction. Surface pulverization and additional base may be cost-effective. These roads have more than 25% alligator cracking, severe distortion or rutting, as well as potholes or extensive patches in poor condition.



▶
Extensive alligator cracking. Pulverize and rebuild.



▲ **Severe rutting. Strengthen base and reconstruct.**

▲ **Patches in poor condition, wheelpath rutting. Pulverize, strengthen and reconstruct.**



▶
Severe frost damage. Reconstruct.



RATING 1

**FAILED —
Reconstruction required**

Roads have failed, showing severe distress and extensive loss of surface integrity.



Potholes from frost damage. Reconstruct.



Potholes and severe alligator cracking. Failed pavement. Reconstruct.



Extensive loss of surface. Rebuild.

Practical advice on rating roads

Inventory and field inspection

Most agencies routinely observe roadway conditions as a part of their normal work and travel. However, an actual inspection means looking at the entire roadway system as a whole and preparing a written summary of conditions. This inspection has many benefits over casual observations. It can be helpful to compare segments, and ratings decisions are likely to be more consistent because the roadway system is considered as a whole within a relatively short time.

An inspection also encourages a review of specific conditions important in roadway maintenance, such as drainage, adequate strength, and safety.

A simple written inventory is useful in making decisions where other people are involved. You do not have to trust your memory, and you can usually answer questions in more detail. Having a written record and objective information also improves your credibility with the public.

Finally, a written inventory is very useful in documenting changing roadway conditions. Without records over several years it is impossible to know if road conditions are improving, holding their own, or declining.

Annual budgets and long range planning are best done when based on actual needs as documented with a written inventory.

The Wisconsin DOT local road inventory (WISLR) is a valuable resource for managing your local roads. Adding PASER surface condition ratings is an important improvement.

Averaging and comparing sections

For evaluation, divide the local road system into individual segments which are similar in construction and condition. Rural segments may vary from

1/2 mile to a mile long, while sections in urban areas will likely be 1-4 blocks long or more. If you are starting with the WISLR Inventory, the segments have already been established. You may want to review them for consistent road conditions.

Obviously, no roadway segment is entirely consistent. Also, surfaces in one section will not have all of the types of distress listed for any particular rating. They may have only one or two types. Therefore, some averaging is necessary.

The objective is to rate the condition that represents the majority of the roadway. Small or isolated conditions should not influence the rating. It is useful to note these special conditions on the inventory form so this information can be used in planning specific improvement projects. For example, some spot repairs may be required.

Occasionally surface conditions vary significantly within a segment. For example, short sections of good condition may be followed by sections of poor surface conditions. In these cases, it is best to rate the segment according to the worst conditions and note the variation on the form.

The overall purpose of condition rating is to be able to compare each

segment relative to all the other segments in your roadway system. On completion you should be able to look at any two pavement segments and find that the better surface has a higher rating.

Within a given rating, say 6, not all pavements will be exactly the same. However, they should all be considered to be in better condition than those with lower ratings, say 5. Sometimes it is helpful in rating a difficult segment to compare it to other previously rated segments. For example, if it is better than one you rated 5 and worse than a typical 7, then a rating of 6 is appropriate. Having all pavement segments rated in the proper relative order is most important and useful.

Assessing drainage conditions

Moisture and poor pavement drainage are significant factors in pavement deterioration. Some assessment of drainage conditions during pavement rating is highly recommended. While you should review drainage in detail at the project level, at this stage simply include an overview drainage evaluation at the same time as you evaluate surface condition.



Urban drainage.
RATING:
Excellent

Good rural ditch and driveway culvert. Culvert end needs cleaning.

RATING: Good



Consider both pavement surface drainage and lateral drainage (ditches or storm sewers). Pavement should be able to quickly shed water off the surface into the lateral ditches. Ditches should be large and deep enough to drain the pavement and remove the surface water efficiently into adjacent waterways.

Look at the roadway crown and check for low surface areas that permit ponding. Paved surfaces should have approximately a 2% cross slope or crown across the roadway. This will provide approximately 3" of fall on a 12' traffic lane. Shoulders should have a greater slope to improve surface drainage.

A pavement's ability to carry heavy traffic loads depends on both the pavement materials (asphalt surfacing and granular base) and the strength of the underlying soils. Most soils lose strength when they are very wet. Therefore, it is important to provide drainage to the top layer of the subgrade supporting the pavement structure.

In rural areas, drainage is provided most economically by open ditches that allow soil moisture to drain laterally. As a rule of thumb, the bottom of the ditch ought to be at least one foot below the base course of the pavement in order to drain the soils. This means that minimum ditch depth should be about 2' below the center of the pavement. Deeper ditches, of course, are required to accommodate roadway culverts and maintain the flow line to adjacent drainage channels or streams.

You should also check culverts and storm drain systems. Storm drainage systems that are silted in, have a large accumulation of debris, or are in poor structural condition will also degrade pavement performance.

The T.I.C. publication, *Drainage Manual: Local Road Assessment and Improvement*, describes the elements of drainage systems, depicts them in detailed photographs, and explains how to rate their condition. Copies are available from the Transportation Information Center.

High shoulder and no ditch lead to pavement damage. Needs major ditch improvement for a short distance.

RATING: Fair



No drainage leads to failed pavement.

RATING: Poor



Planning annual maintenance and repair budgets

We have found that relating a normal maintenance or rehabilitation procedure to the surface rating scheme helps local officials use the rating system. However, an individual surface rating should not automatically dictate the final maintenance or rehabilitation technique.

You should consider future traffic projections, original construction, and

pavement strength since these may dictate a more comprehensive rehabilitation than the rating suggests. On the other hand, it may be appropriate under special conditions to do nothing and let the pavement fully deteriorate, then rebuild when funds are available.

Summary

Using local road funds most efficiently requires good planning and accurate identification of appropriate rehabili-

tation projects. Assessing roadway conditions is an essential first step in this process. This asphalt pavement surface condition rating procedure has proved effective in improving decision making and using highway funds more efficiently. It can be used directly by local officials and staff. It may be combined with additional testing and data collection in a more comprehensive pavement management system.

**Transportation
Information
Center
Publications**

Pavement Surface Evaluation and Rating (PASER) Manuals

Asphalt PASER Manual, 2002, 28 pp.

Brick and Block PASER Manual, 2001, 8 pp.

Concrete PASER Manual, 2002, 28 pp.

Gravel PASER Manual, 2002, 20 pp.

Sealcoat PASER Manual, 2000, 16 pp.

Unimproved Roads PASER Manual, 2001, 12 pp.

Drainage Manual

Local Road Assessment and Improvement, 2000, 16 pp.

SAFER Manual

Safety Evaluation for Roadways, 1996, 40 pp.

Flagger's Handbook (pocket-sized guide), 1998, 22 pp.

Work Zone Safety, Guidelines for Construction, Maintenance, and Utility Operations, (pocket-sized guide), 1999, 55 pp.

Wisconsin Transportation Bulletins

- #1 Understanding and Using Asphalt
- #2 How Vehicle Loads Affect Pavement Performance
- #3 LCC—Life Cycle Cost Analysis
- #4 Road Drainage
- #5 Gravel Roads
- #6 Using Salt and Sand for Winter Road Maintenance
- #7 Signing for Local Roads
- #8 Using Weight Limits to Protect Local Roads
- #9 Pavement Markings
- #10 Seal Coating and Other Asphalt Surface Treatments
- #11 Compaction Improves Pavement Performance
- #12 Roadway Safety and Guardrail
- #13 Dust Control on Unpaved Roads
- #14 Mailbox Safety
- #15 Culverts-Proper Use and Installation
- #16 Geotextiles in Road Construction/Maintenance and Erosion Control
- #17 Managing Utility Cuts
- #18 Roadway Management and Tort Liability in Wisconsin
- #19 The Basics of a Good Road
- #20 Using Recovered Materials in Highway Construction
- #21 Setting Speed Limits on Local Roads

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