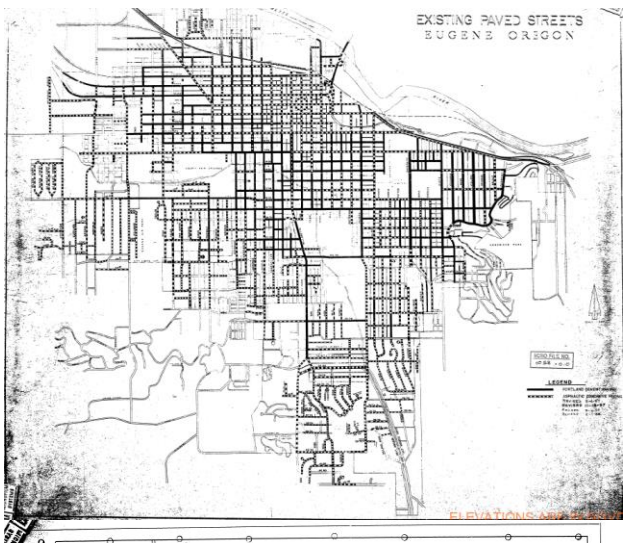
2019 PAVEMENT MANAGEMENT REPORT

An Update on Asphalt Pavement Conditions and Programs
(2018 Rating & Inventory Data)



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Cover Photos (top left – clockwise): GO BONDS, Maintenance Surface Operations Staff, Map of City of Eugene Paved Streets circa 1957, Concrete Panel Replacement.

EXECUTIVE SUMMARY

The annual Pavement Management Report is generated to provide updated information and data regarding the City of Eugene's transportation system including improved streets, unimproved streets and off-street shared-use paths. This report provides surface descriptions and associated mileage, reviews current treatment programs and costs, and projects future treatment needs based on several funding scenarios.

The transportation system is a significant public asset which requires continued maintenance and management. The asset is described in lane miles and/or centerline miles. Currently, Public Works manages 1371 lane miles (553 centerline miles) of streets and approximately 46 centerline miles of off-street shared-use paths within the City limits. This report includes a breakdown of the street transportation system in terms of pavement type, level of improvement, and functional classification.

Street, improved alley, and off-street shared-use path condition data is collected by Public Works Maintenance staff through on-site inspections. Utilizing this data, a Pavement Condition Index (PCI) score is generated. Formulas and methodology within the software help establish resourceful treatment recommendations and identify the financial implications of various response strategies. The Pavement Management System (PMS) also provides a detailed street inventory and condition trends using street condition data collected since 1987.

A local gas tax was established in 2003 for a Pavement Preservation Program (PPP) because street repair funding was not adequate to keep pace with rehabilitation needs. Even with the local gas tax in place, it was reported in 2007, the anticipated backlog for rehabilitation needs would reach more than $282 million by 2016 (2007 Pavement Management Report). In 2008, a $35.9 million five-year bond measure was approved by voters, and an additional five-year bond for $43 million was approved by voters in 2012. The 2017 Bond measure ($51.2 M) addresses 91 street projects with 5 million going toward pedestrian and bicycle infrastructure improvements. With these funding sources, more than 204 streets in Eugene have been or are identified to be repaired by 2023. The revenues from the local gas tax and the bond measures have helped reduce the backlog of street repair projects over the last 16 years. The current calculated backlog for repairs on improved asphalt streets at the end of 2018 is $68.4 million, in 2017 the reported backlog was $79.8 million.

In addition to funding from the current street repair bond ending in 2023 and rising constructions costs, other factors contribute to current and future backlogs:

- Since the beginning of the Pavement Preservation Program (PPP) in 2002 the primary focus for preservation has been arterial and collector streets. These formerly rehabilitated streets are now showing signs of deterioration beyond what can be addressed using standard maintenance practices.

- It is anticipated that costs will continue to increase at a steady rate. Changes in costs for construction materials and labor will affect long-term backlog estimates.

EXECUTIVE SUMMARY – (*continued*)

- New construction techniques such as in-place recycling (also known as in-place cement treated base, ICTB) which strengthens existing roadbed materials for reuse and lowers impacts to the environment have been successfully used in place of conventional reconstruction techniques and resulted in additional cost savings.

- In 2018, Public Works hired a third party consultant to review pavement data, confirming accuracy.

The backlog estimate does not take into account the repair needs for concrete streets, unimproved streets, sidewalks, off-street shared-used paths, or other elements of the transportation system.

The report utilizes three funding scenarios to project treatment needs and costs over a 10-year period. The analyses uses bi-annually updated costs provided by Public Works Engineering, which are adjusted to include a 2 percent inflation factor. Following is a summary of the analyses:

- Based on the projected funding (Table 3, pg. 14), a $192 million backlog is projected in 10 years. Last year the projected backlog was $182 million. In 2023 bond funding will end, decreasing pavement preservation from an average of $11.9 million to $3.2 million.

- Based on current and projected funding of $3.2 million, an additional $6.4 million is needed annually to prevent arterial and collector streets from falling into the reconstruct range and to eliminate the reconstruct backlog for arterial and collector streets in 10 years.

- In addition to the above mentioned need, $4.6 million annually is also needed to prevent residential streets from falling into the reconstruct category, and to eliminate the residential reconstruct backlog in10 years.

SCOPE OF REPORT

This report is comprised of four primary sections:

Street Inventory: The street inventory is discussed, including improvement status and functional classification definitions.

*Pavement Management System (PMS)***:** A brief history and description of the Pavement Management System used by the City, the selection process and conversion to Paver system is discussed. Included in this section are: the rating methodology, pavement inspection frequency, pavement conditions described by the Pavement Condition Index (PCI), and specific distress definitions and the resulting reports.

Pavement Preservation Program (PPP): The Pavement Preservation Program is highlighted in this report, including Maintenance and Engineering division roles, treatment types and estimated unit costs, project prioritization, sustainable construction, current treatment costs, projected funding, historical and projected funding graphs, unimproved streets, and off-street shared-use paths.

*Project*s: This section includes completed and future project lists and maps, including a map of the projects identified in the 2017 bond measure.

EUGENE'S STREET INVENTORY

The City of Eugene has jurisdictional responsibility for many types and classifications of transportation facilities. Many factors such as age, development type, traffic loads, use, and future transportation needs affect the maintenance and rehabilitation planning for the system. The section inventory component of the PMS allows a reporting of both centerline miles (intersection to intersection) and lane miles of each section of the system. While commonly used in reporting distance, centerline miles do not relate equally across streets of different widths or number of lanes. For this report, comparisons typically are shown both in centerline and 12 foot-wide lane miles unless otherwise noted.

Improvement Status

For purposes of establishing budget allocations and rehabilitation priorities, and performing maintenance activities based on established maintenance policies, the City of Eugene divides the street inventory into two distinct categories:

Improved Streets are streets which are engineered for structural adequacy, have storm drainage facilities which include curbs and gutters, and have either an asphalt concrete (AC) or a Portland cement concrete (PCC) surface. Improved streets are either fully improved at the time of development, at the developer's expense or were improved through a local improvement district (LID) and paid for in part by the abutting property owners. In some cases, a street may have been fully improved while under state or county jurisdiction and then surrendered to the City. Improved streets receive the highest level of ongoing maintenance and are eligible for rehabilitation funding through Eugene's Capital Improvement Program (CIP) and (PPP).

Unimproved Streets are streets with soil, gravel, or asphalt mat surfaces, have not been structurally designed, and no curbs or gutters. Typically, an unimproved street must be fully improved through a LID, and funded in part by the abutting property owners before a higher level of service will be provided (see "City of Eugene Street Maintenance Policy and Procedure Manual" for levels of maintenance service). These streets receive a low level of ongoing maintenance, limited primarily to emergency pothole patching (three inches or greater in depth), and minimal roadside ditch maintenance. To address the deterioration of these streets, Public Works is currently allocating $375,000 annually from the Road Fund for the Enhanced Street Repair Program. Since 2008, 119 unimproved streets, totaling 48 lane miles, have been resurfaced as a temporary treatment. In addition, several unimproved streets have been upgraded to engineered street standards through assessment projects.

The following table (Table 1) categorizes Eugene's Improved and Unimproved Street System in centerline miles and 12-foot lane-miles by pavement type and by functional class.

IMPROVED SYSTEM	Asphalt (ACP)		Asphalt over Concrete (APC)		Concrete (PCC)		Gravel		Undeveloped		Total	
	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles
Major Arterial	13.87	63.79	0.03	0.18	6.48	8.64	0	0	0	0	20.38	72.61
Minor Arterial	63.12	213.39	2.27	7.51	3.6	12.35	0	0	0	0	68.99	233.25
Major Collector	30.08	92.56	1.15	2.72	3.25	8.96	0	0	0	0	34.48	104.24
Neighborhood Collector	24.96	62.88	0.45	1.23	1.66	4.7	0	0	0	0	27.07	68.81
Residential	314.04	725.33	2.06	5.32	21.15	53.89	0	0	0	0	337.25	784.54
Total	446.07	1157.95	5.96	16.96	36.14	88.54	0	0	0	0	488.17	1263.45

UNIMPROVED SYSTEM	Asphalt (ACP)		Bituminous Surface-Oil Mats (BST)		Concrete (PCC)		Gravel		Undeveloped		Total	
	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles	Miles	12' Lane Miles
Major Arterial	0	0	0	0	0	0	0	0	0	0	0	0
Minor Arterial	1.69	3.15	0	0	0	0	0	0	0	0	1.69	3.15
Major Collector	2.47	5.40	0	0	0	0	0	0	0	0	2.47	5.40
Neighborhood Collector	3.86	7.71	0.27	0.62	0	0	0	0	0	0	4.13	8.33
Residential	40.27	66.29	3.69	6.05	0.03	0.03	8.64	12.59	4.46	5.96	57.09	90.92
Total	48.29	82.55	3.96	6.67	0.03	0.03	8.64	12.59	4.46	5.96	65.38	107.8

Table 1 *Miles and Lane Miles of Street System by Classification and Pavement Type*
*Note: 2018 ODOT Right-of-Way transfers not included.

Functional Classifications

The quantity and associated vehicle weight of traffic using streets is a critical factor affecting the rate at which pavement and roadbeds deteriorate. Eugene divides streets into five categories called functional classifications (FC), each representing a different volume and type of vehicular usage. The Paver terminology for functional classification/section rank is identified as follows:

Major Arterial (FC-1) - (A): Major Arterials are usually four or more lanes and generally connect various parts of the region with one another within the city and with the "outside world". They serve as major access routes to regional destinations such as downtowns, universities, airports, and similar major focal points within the urban area. Major Arterials typically carry an average of more than 20,000 vehicles per day. Major Arterials receive high priority maintenance.

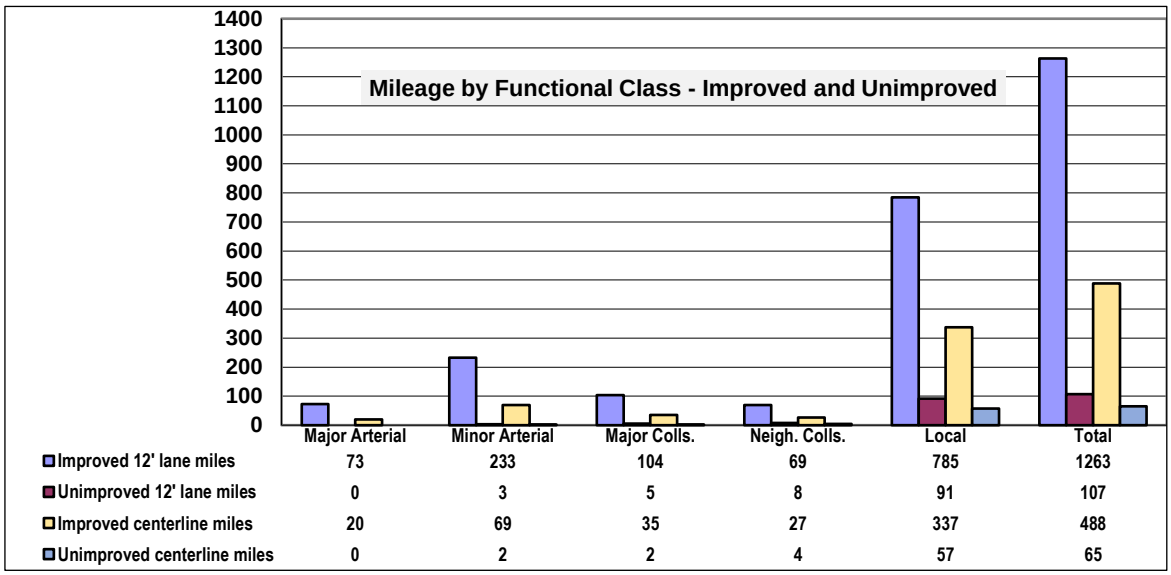
Minor Arterial (FC 2) - (B): Minor Arterials are typically two or three lanes. These streets provide the next level of urban connectivity below major arterials. In most cases, their main role tends to be serving intra-city mobility. Minor Arterials carry between 7,500 and 20,000 vehicles per day. Minor Arterials receive priority maintenance.

Major Collector (FC-3) - (C): Major Collectors can be found in residential, commercial, and industrial areas. They typically carry between 2,500 and 7,500 vehicles per day. Major Collectors have a higher priority for maintenance than local streets.

Neighborhood Collector (FC-4) - (D): Neighborhood Collectors are found only in residential neighborhoods and provide a high degree of access to individual properties in a neighborhood. They typically carry between 1,500 and 2,500 vehicles per day.

Local (FC-5 - (E): Local streets provide access to individual properties along the roadway. They are narrow, slow-speed, and low-volume service facilities. They typically carry fewer than 1,500 vehicles per day and receive low priority maintenance. Local streets are also referred to as Residential streets.

The following graph (Fig.1) illustrates both centerline miles and lane miles by improvement type and functional classes.



	Major Arterial	Minor Arterial	Major Colls.	Neigh. Colls.	Local	Total
Improved 12' lane miles	73	233	104	69	785	1263
Unimproved 12' lane miles	0	3	5	8	91	107
Improved centerline miles	20	69	35	27	337	488
Unimproved centerline miles	0	2	2	4	57	65

Figure 1 *Mileage by Functional Class – Improved and Unimproved*

PAVEMENT MANAGEMENT SYSTEM

Public Works has used Paver since 2013 as its pavement management system. Pavement Management System (PMS) programs analyze collected rating data and process the data to provide reports on the current and projected conditions of the street system. In addition, the program is used to evaluate the effectiveness of planning and funding priorities and provides guidance in the decision-making process. A primary goal, through judicious maintenance, is to prevent pavement failures in the most efficient means based on selected parameters.

Pavement Inspection Frequency

Two predominant work efforts required to maintain the PMS are; updating the street inventory, and performing the annual inspection of surface conditions.

City streets are divided into sections based on their Functional Classification (FC), pavement type, and geometric design. Sections are the basic unit for evaluating streets and surface conditions. A sections is defined as a portion of a street with a beginning and ending description. Changes in geometric features are used as a guide for determining sections. Examples of geometric differences are the surface type, section width, surface age, and extent of past rehabilitations. Public Works currently manages over 6100 street sections.

Field inspections are conducted by pavement raters who walk each street section evaluating the pavement surface for signs of distress. Arterial and collector streets are inspected annually, residential streets are inspected on a three-year cycle, and off-street shared-use path and improved alley inspections are completed on a two-year cycle.

This year, staff inspected 171 miles of arterial and collector streets, 117 miles of local streets in the West Eugene and Downtown areas, plus 14 miles of improved alleys throughout the city.

Pavement Condition Index (PCI), Deduct Values, and Distresses

Pavement distresses are dependent on pavement type and are rated by severity and extent. Paver provides a numerical value (PCI) calculated internally based on deduct values for the distresses rated per street section.

A street with a PCI of 100 represents a new or recently rehabilitated street. This PCI value is the basis used to analyze the surface treatment needs. Distress data are collected using Tablets and then uploaded to the pavement management software. Paver method rates severities and all their extents for up to 20 different distresses. As the condition of a streets' surface begins to deteriorate, the PCI decreases. Asphalt distresses typically observed are alligatoring, longitudinal and transverse cracks, rutting, and raveling. Distresses in concrete streets typically observed and rated include cracks per panel, raveling, joint spalling, faulting, and crack sealing. Descriptions of some common distresses are shown below:

Alligator Cracking: When the asphalt begins to crack in all direction it is called alligator cracking.

Longitudinal Cracking/Transverse Cracking: These are cracks that run parallel to the roadway centerline (longitudinal) and perpendicular to the roadway center line (transverse). These distresses usually divide the piece into different sections and which are caused by repeated traffic loading. The low-severity cracks are not considered serious to the overall function and safety of the road. Medium to high-severity cracks are usually caused by heavy traffic loads and environmental factors and can become very serious distresses. The picture below shows longitudinal cracking.

Rutting: When the traffic of the street becomes heavy for long periods of times the asphalt begins to sink into the wheel path of the vehicles causing a rut. When there is a rut it is usually along the length of the road and is one to two feet wide and there are almost always two ruts, one for each wheel path of the vehicle. The severity of the rut is rated on the average rut depth from ¼” to more than ¾” in depth.

Joint Spalling: Spalling is the deterioration of the edges of a concrete slab within two feet (0.6m) of the joint. The edges get chipped off concrete slabs causing spalling. Spalling is caused by heavy traffic loads and environmental factors.

Raveling: The roads, mainly asphalt, over time become worn out and rough not smooth as when they were first put in, often due to age and the effects of UV rays. Raveling measures the severity of the roughness and coarseness of the top layer of the street.

Faulting: Faulting is the difference in elevation across the slab. One side may be leaning up more over the other side. Causes are soft foundations, heavy traffic, poor construction, and environmental damage.

How Pavement Management System Information is Used

The primary purpose of maintaining a PMS is to collect and analyze information relating to street system condition and deterioration trends. With this vital information, public works managers ensure the most cost-effective maintenance or rehabilitation strategies are identified and performed at the optimum time.

Each year the PMS is used to generate several reports requested by other agencies as well as statistical data requested within our own agency. The following is a sample of reports produced with PMS data:

- Pavement Preservation Project List
- Crack Seal Program
- Five-Year Surface List – five-year moratorium for street cutting
- ODOT Oregon Mileage Report
- City of Eugene Public Infrastructure Table
- Annual Insurance Marketing Report
- Transportation Service Profile
- HB2017 - Keep Oregon Moving

PAVEMENT PRESERVATION PROGRAM

Street preservation and rehabilitation, capital improvements, off-street shared-use path projects, and maintenance efforts make up Eugene's Pavement Preservation Program (PPP). Additionally, Public Works budgets funding for Maintenance Operations to repair portions of the unimproved street system through the Enhanced Street Repair Program. Both PW Maintenance and PW Engineering divisions have important roles within the PPP.

PW Maintenance Roles

Public Works Maintenance Surface Technical team conducts the pavement rating, budget and street life analysis, resulting in a list of proposed projects provided to Engineering for field testing and final grouping. Operations staff provides preventative maintenance of all City streets (including concrete streets) and off-street shared-use paths. Preventative maintenance extends the life of the transportation asset and is of highest priority. Improved asphalt streets receive the highest level of maintenance. Preventative maintenance helps prevent a street's PCI from dropping into a more costly treatment category.

PW Engineering Roles
Public Works Engineering receives projects proposed for preservation from the Maintenance Division three years in advance of planned construction. Engineering performs field investigations to confirm treatment needs and reviews historic data on construction and maintenance of streets. Streets are then prioritized for detailed pavement testing and design recommendations based on the available funding and the assessed condition of the streets. Pavement testing and design reports identify whether a street needs to be reconstructed or rehabilitated (overlaid) and the range of treatment options available. If a street requires a full reconstruct, it is typically deferred until funding is identified.

Public Works Engineering is responsible for capital project management including design, stakeholder coordination and communication, contract administration, and construction management. Public Works Maintenance receives updated construction costs from Engineering and utilizes this data for analysis and reporting of projected backlogs. Reports are based on a system-wide approach, not at the project level performed by Engineering.

Treatment Types

Treatments reflected in the backlog analysis are limited to three types: slurry seal, overlay, and reconstruct.

Slurry Seal: The slurry seal option allows for a cost-effective treatment to seal the surface and restore the skid resistance of local streets, which do not carry high traffic loads. This treatment is not used on streets which require strengthening or reconstruction. Typical slurry seal costs include street cleaning, removal of vegetation, minor base repairs (dig-outs), sealing of cracks, and application of an emulsified asphalt-aggregate mixture to the entire paved surface. Associated costs include replacement of striping and pavement markings, and other work needed to return the street to normal operation.

Overlay: Typical overlay rehabilitation costs include milling of existing pavement to a moderate depth to remove existing cracking and increase the strength of the structural section. Isolated areas of severely distressed pavement are removed and replaced including a new aggregate base. Associated costs include replacement of striping and pavement markings, adjustment of manholes, and other work needed to return the street to normal operation.

Reconstruct: Typical street reconstruction costs include removal of the existing pavement and base structural section and replacement with a new structural section which will meet a 20-year design life. Isolated areas of curb and gutter are replaced where they would not be suitable to contain new paving or have severe drainage problems.

The following table (Table 2) identifies the estimated costs for the various treatment types including costs to upgrade curb ramps to comply with The American with Disabilities Act (ADA). The slurry seal treatment is exempt from ADA requirements. Construction costs are updated on a bi-annual basis.

Treatment – Functional Class Improved System	12' Lane Mile Cost			
	Updated Eng. 2006 cost	Updated Eng. 2011 cost	Updated Eng. 2016 cost	Updated Eng. 2018 Cost
Overlay - FC 1 & 2	$215,000.00	$243,000.00	$336,000.00	$409,000.00
Overlay - FC 3 & 4	$184,000.00	$214,000.00	$311,000.00	$312,000.00
Overlay - FC 5	$169,000.00	$195,000.00	$255,000.00	$269,000.00
Re-Const - FC 1 & 2	$765,000.00	$724,000.00	$892,000.00	$959,000.00
Re-Const - FC 3 & 4	$677,000.00	$679,000.00	$884,000.00	$902,000.00
Re-Const - FC 5	$505,000.00	$505,000.00	$649,000.00	$681,000.00
Slurry Seal - FC 5	$19,000.00	$25,000.00	$44,000.00	$49,000.00

Table 2 *12' Lane Mile Cost by Treatment and Functional Class*

The following graph (Fig.2) identifies the trigger points (PCI) for each treatment based on Functional Class.

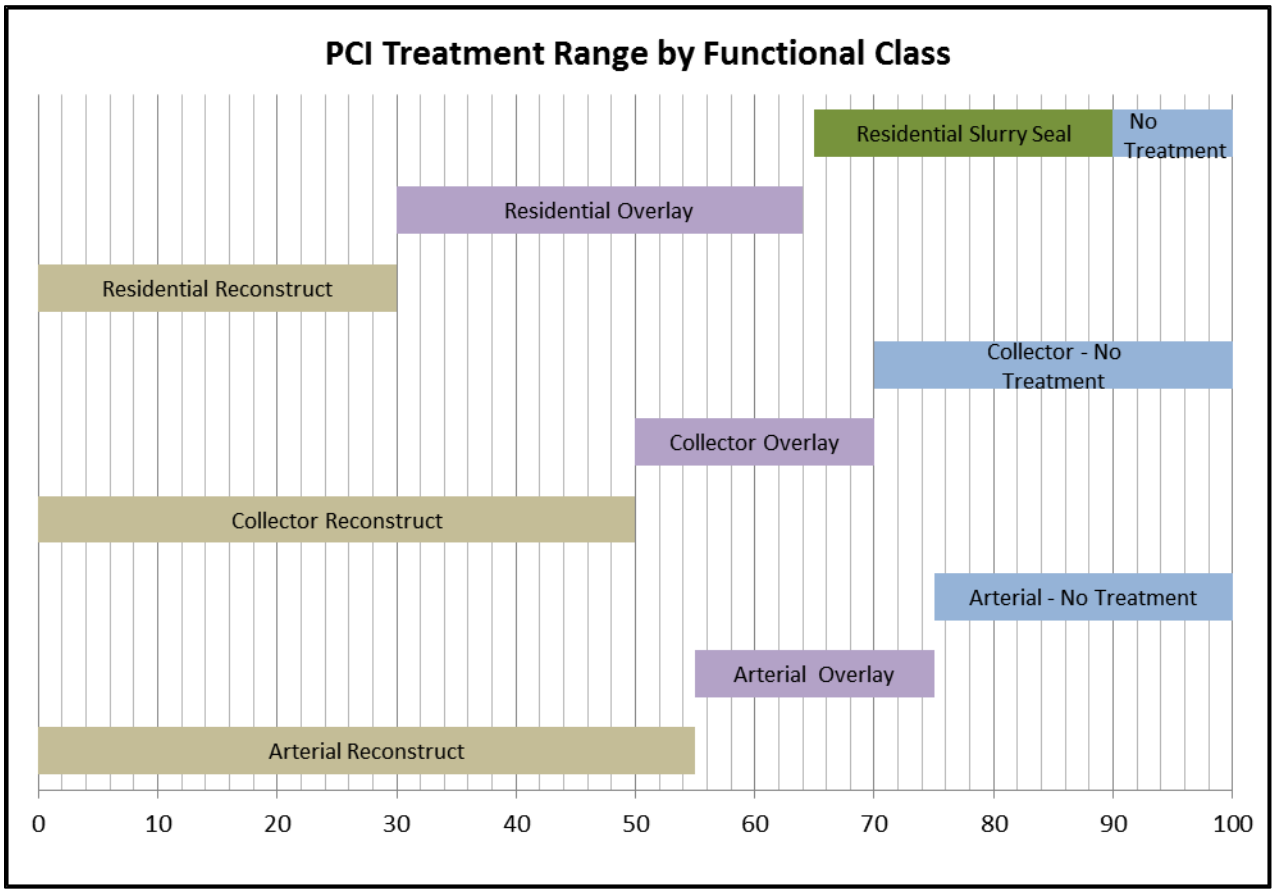


Figure 2 *PCI Treatment Range by Functional Class*

Project Prioritization Methodology

Selecting streets or street sections for treatment is done through a process involving analysis, testing, and staff experience. Using the data produced by Paver, and combining this information with estimated revenues allows staff to approximate backlogs and group potential street sections for consideration for treatment under the Pavement Preservation Program.

As a means of optimizing funding, streets are not prioritized on a "worst first" basis. Rather, Public Works' main objective is to keep street sections from slipping into reconstruct, a more costly category, see 12' Lane Mile chart above. By overlaying a street before it significantly deteriorates, 15 to 20 years of useful life can be added, resulting in substantial cost savings. Once a street has deteriorated to the point that it must be reconstructed, the opportunity for an overlay is lost. As a result, streets that are categorized as overlay projects receive the highest priority for corrective treatment. Street Bond Measures have been the exception, additional criteria such as citizen input and equitable geographic distribution of projects throughout the community are also considered.

Sustainable Construction

Since 2008, Eugene has been in the forefront of sustainable construction and paving practices, some of which include paving with warm mix asphalt (WMA), using reclaimed asphalt pavement (RAP), and full depth reclamation (FDR). Production of warm mix asphalt is a "green" solution for the environment with noticeably reduced energy consumption and greenhouse gas emissions. Exposure to fuel emissions, fumes, and odors are reduced for asphalt producers, construction workers, and the public. Benefits of paving with WMA are the ability to extend the paving season in colder weather, longer haul distances, and better road performance. Warm mix asphalt is identical to conventional hot mix asphalt, except that through a special mixing process it is produced at a temperature approximately 50 to 100 degrees cooler than conventional hot mix asphalt. This mixing process for asphalt has many benefits, it aids in compaction during paving, helps prevent premature aging, and slows the aging process of asphalt. In Eugene, all asphalt producers have retrofitted their plants to produce warm mix asphalt.

Council set goals in 2011 for waste reduction by requiring that the volume of material placed in landfills be reduced. In addition to using WMA, Public Works conducted two pilot projects specifying that reclaimed asphalt shingles (RAS) be used as a binder in the asphalt mix, thereby keeping this material from entering the waste stream. The City continues to use warm mix asphalt and in-place recycling techniques to improve the quality, environmental footprint, and cost efficiency of the street bond projects. Key terms in sustainable construction practices:

> *In-Place Recycling:* A process in which a large piece of equipment called a reclaimer pulverizes and mixes the existing base rock and a portion of subgrade soils with dry cement and water to create a cement-treated base. This process greatly reduces the use of virgin materials and trucking that are needed using conventional remove-and-replace construction techniques.

Full Depth Reclamation: When applicable, partial or full-depth reclamation (FDR) is used as a cost and time-saving alternative to traditional reconstruction. Associated costs include replacement of striping and pavement markings, adjustment of manholes, and other work needed to return the street to normal operation.

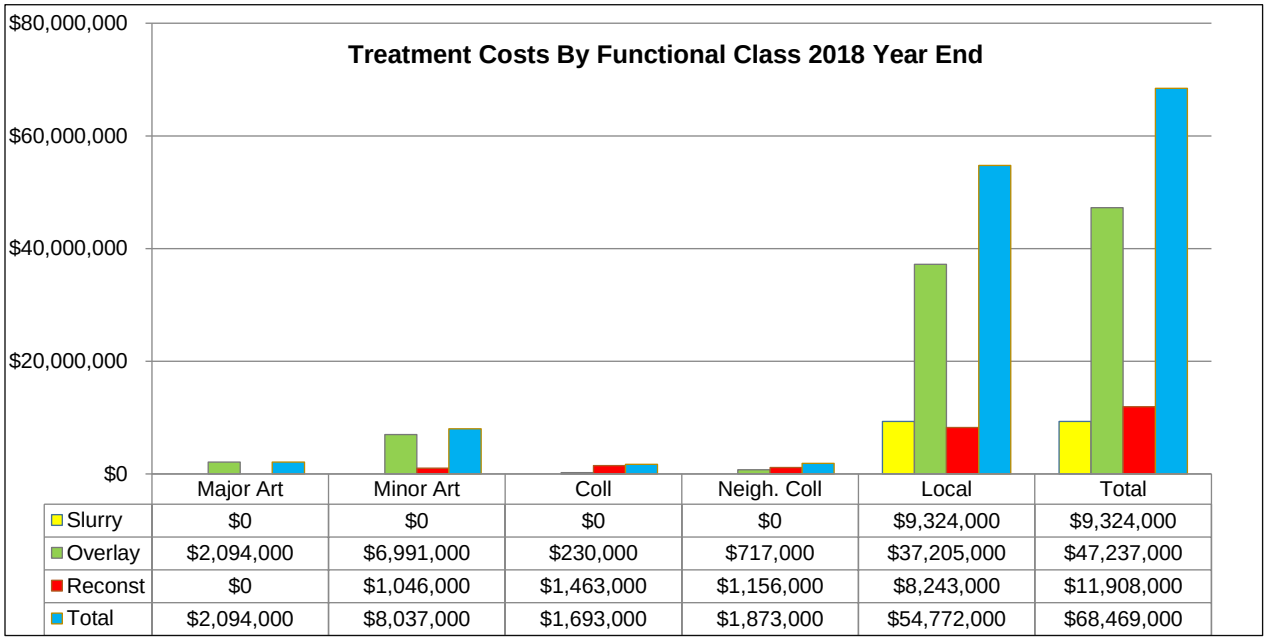
Crack Seal: Placing specialized materials into cracks in unique configurations to keep water and other matter out of the crack and the underlying pavement layers. Crack sealing can be used for two different reasons in pavement maintenance. One is a treatment to seal the cracks in order to prevent moisture intrusion into the pavement. The other is preparatory work for other treatments, such as overlays, and slurry seals.

Reclaimed Asphalt Pavement (RAP): The term given to removed and/or reprocessed pavement materials containing asphalt and aggregates. These materials are generated when asphalt pavements are removed for reconstruction, resurfacing, or to obtain access to buried utilities. When properly crushed and screened, RAP consists of high-quality, well-graded aggregates coated by asphalt cement that can be reused as a substitute for a portion of virgin materials in asphalt and aggregate base.

Recycled Asphalt Shingles (RAS): A primary reason for the high potential value of recycled shingles is that they contain ingredients that hot mix asphalt (HMA) producers purchase to enhance their paving mixtures including asphalt cement (or AC "binder") and mineral aggregate. Asphalt shingles also contain a fibrous mat made from organic felt (cellulose) or fiberglass that can also be valuable as fiber in some asphalt paving mixes.

Current Treatment Costs

This chart (Fig.3) provides detail of the current cost for treatment of the entire improved system excluding concrete streets at the end of the 2018 rating period. The total estimated treatment cost backlog at the end of 2018 is $68.4 million down from $79.8 million reported in 2017.



	Major Art	Minor Art	Coll	Neigh. Coll	Local	Total
Slurry	$0	$0	$0	$0	$9,324,000	$9,324,000
Overlay	$2,094,000	$6,991,000	$230,000	$717,000	$37,205,000	$47,237,000
Reconst	$0	$1,046,000	$1,463,000	$1,156,000	$8,243,000	$11,908,000
Total	$2,094,000	$8,037,000	$1,693,000	$1,873,000	$54,772,000	$68,469,000

Figure 3 *Treatment Costs By Functional Class*

Projected Funding for Pavement Preservation Program FY17 through FY24

From the inception of the Pavement Preservation Program (PPP), Eugene has been faced with the challenge of securing adequate, sustainable funding for this program. There are several sources that contribute funding for pavement rehabilitation and reconstruction projects. The primary source of ongoing revenue is the City's local motor vehicle fuel tax ("gas tax"), which is currently levied at 5 cents per gallon. The reimbursement component of Transportation System Development Charges (SDCs) have historically generated close to $800,000 per year for PPP projects, but have dropped significantly. The cumulative effect of these factors is that PPP annual revenues, which were once projected at $4.2 million annually, are now projected to level out at approximately $3.2 million.

Projected Funding Sources Pavement Preservation Projects
FY17 through FY24

Fiscal Year	Local Gas Tax Note 1	SDC Note 2	Bond Note 3	Other Note 4	Total Funding
FY17 (actual)	$3,081,192	$600,251	$8,600,000	$44,962	$12,326,405
FY18 (actual)	$3,135,901	$636,858	$8,900,000	$48,671	$12,721,430
FY19 (est)	$3,300,000	$562,000	$6,220,000	$60,000	$10,142,000
FY20 (est)	$3,100,000	$98,000	$9,755,000	$49,000	$13,002,000
FY21 (est)	$3,100,000	$80,500	$9,430,000	$49,000	$12,659,500
FY22 (est)	$3,100,000	$80,500	$9,720,000	$49,000	$12,949,500
FY23 (est)	$3,100,000	$80,500	$9,620,000	$49,000	$12,849,500
FY24 (est)	$3,100,000	$80,500	$9,990,000	$49,000	$13,219,500

Notes:

1) Local Motor Vehicle Fuel Tax (gas tax) revenues are assumed at the 5-cent level throughout the forecast period.
2) SDC reimbursement revenue is projected to maintain low level of activity through the forecasted period.
3) November 2017 voters passed a 3rd 5 year bond. November 2012 voters passed a second five year bond measure starting FY15.
4) "Other" revenue generally includes investment interest, permit fees and other miscellaneous resources.

The estimate year's does not include reimbursements from other agency. This does not include the Jurisdictional transfer funds for Hwy 99.

Table 3 *Projected Funduing Sources PPP FY17-FY24*

Historical and Projected Funding Outcomes

Based on current funding, a ten year analysis (2018-2028) has been performed using a PMS software program. The program evaluates the deterioration of each section based on individual PCI ratings. It then projects when to apply the necessary treatment at the appropriate time. When possible, the program recommends a less expensive treatment earlier in the degradation curve to prevent the street from falling into an overlay or reconstruct range. In the following four graphs (Figs. 4,5,6,7) this projected evaluation includes historical data to present a more comprehensive view of the street system. The graphs show the impact of past and current funding over a 20-year period (2008 to 2028). Each graph indicates the percentage of streets that fall within a specific treatment range (reconstruct, overlay and no treatment). Plotting the percentages of streets within a treatment range over time visually demonstrates the overall condition of streets within that class. This is useful when deciding how to allocate funds in future years.

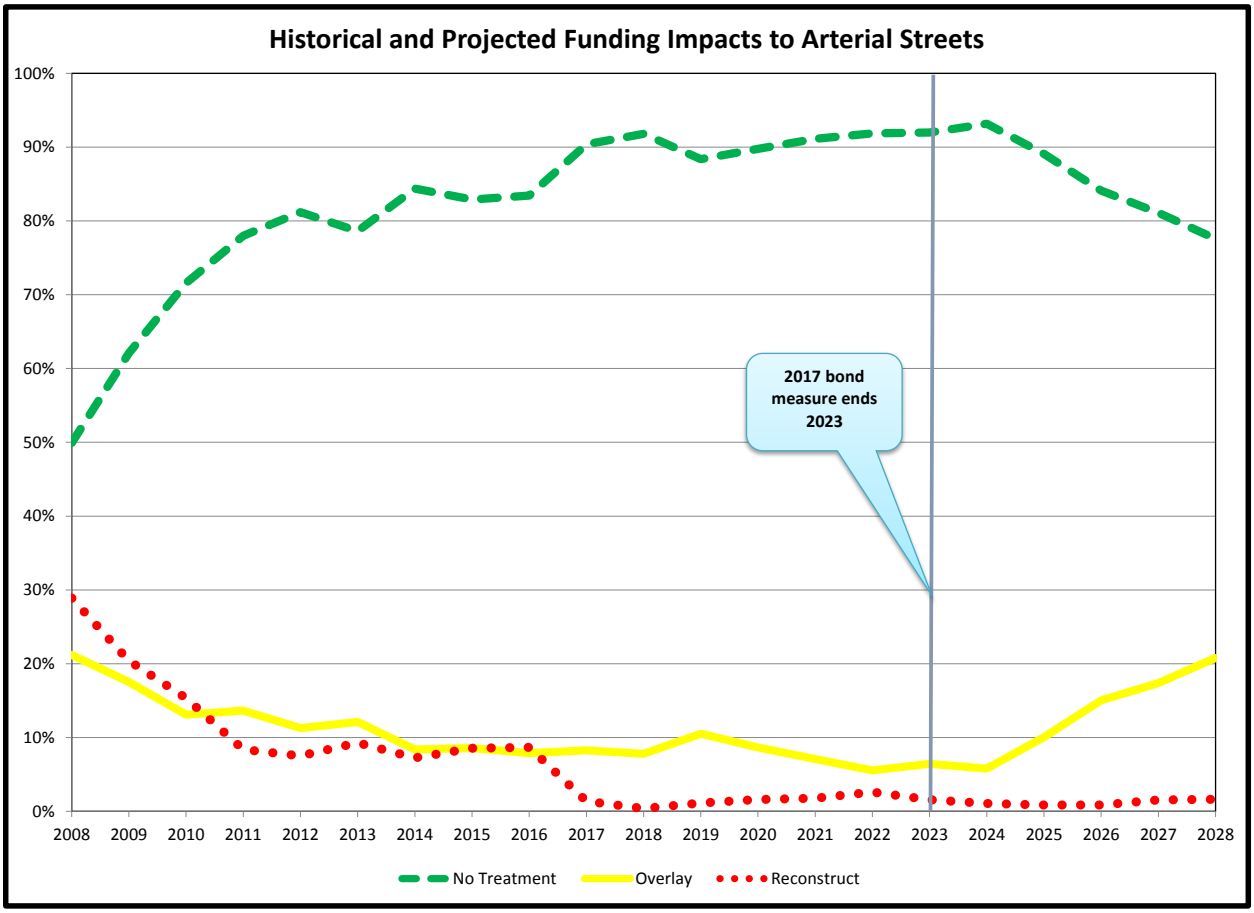


Figure 4 *Historical and Projected Funding Impacts to Arterial Streets*

Arterial streets have been a major focus of the PPP since 2002; as a result, the percentage of arterial streets within the reconstruct treatment range has steadily declined. Roughly 39 lane-miles are planned for treatment through the 2017 Bond Measure. When the Bond Measure ends in 2023, we see an increase in the overlay range due to streets beginning to deteriorate beyond regular maintenance activities. The projected funding of $3.2 million is inadequate to prevent overlays at the bottom end of the range from falling into the reconstruct category. The increased cost for reconstruct treatments as well as a decrease in projected funding furthers the potential for overlays falling into the reconstruct category.

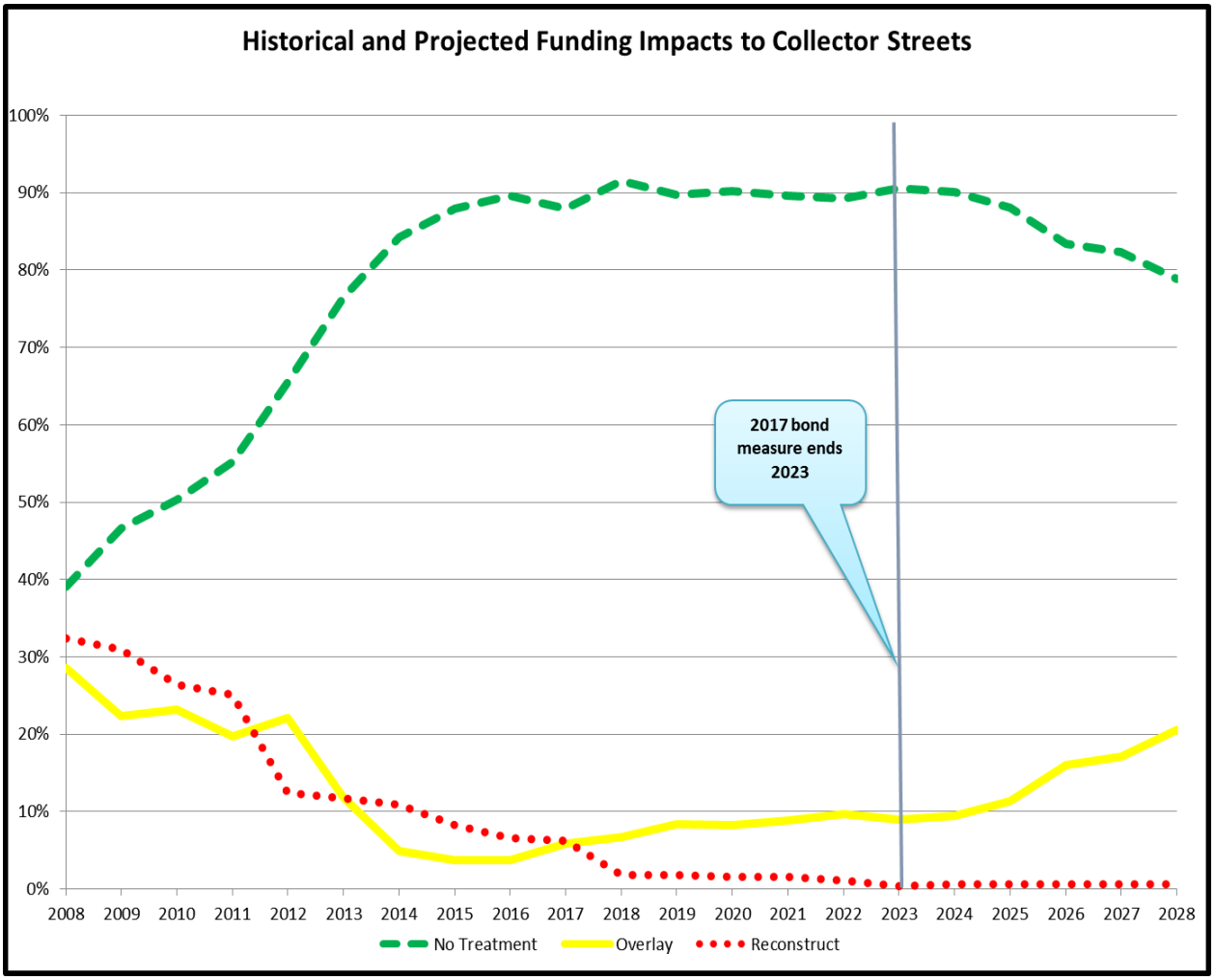


Figure 5 *Historical and Projected Funding Impacts to Collector Streets*

As a result of completed projects, reconstruction and overlay treatment needs have also decreased since 2008. However, analysis indicates overlay treatment needs are increasing such that by 2028 we will be approaching the overlay treatment needs that were required in 2008. Analysis also indicates a slight increase in reconstruct needs of approximately 11 lane miles after four centerline miles are treated with funds from 2017 bond funding. The previously treated streets in the arterial system will begin to show deterioration beyond regular maintenance activites.

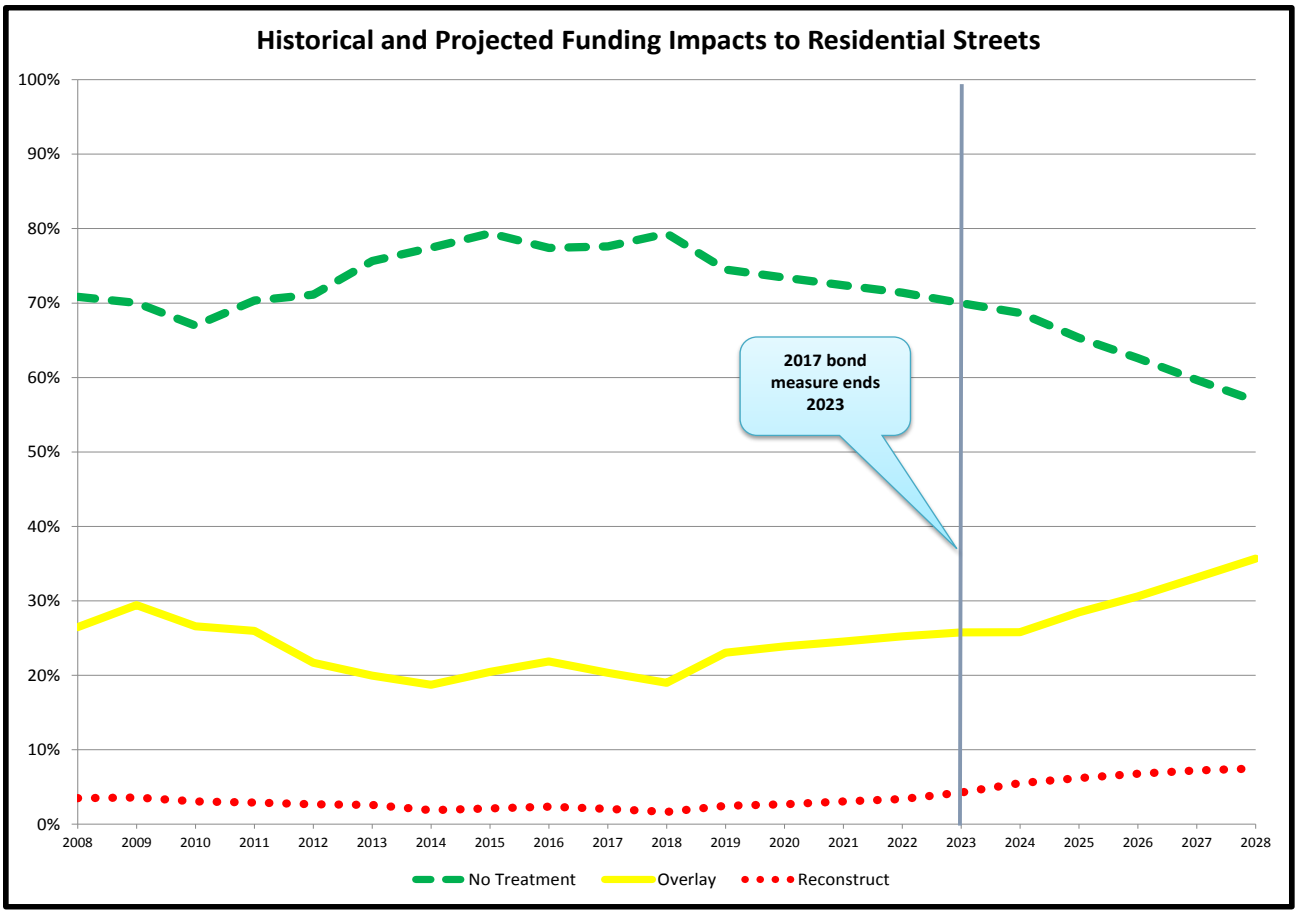


Figure 6 *Historical and Projected Funding Impacts to Residential Streets*

To date, the primary treatment for residential streets has been slurry seals, which are included in the no treatment category, 207 lane miles (89 centerline miles). Slurry seal treatment may increase the life by five to seven years, and increase the PCI, typically elevating it out of an overlay range Following this time period, these same streets will typically fall into the mid to low end overlay treatment category.

Residential (Local) streets make up 75 percent of the total street system backlog in 10 years. To date, residential streets have not been adequately funded for preservation. Between the three bond measures, approximately 31 centerline miles have or will receive repair other than a slurry seal treatment, less than 10 percent of the residential street system. The percentage of streets within the overlay treatment range continues to increase along with an increase of reconstruct treatments. Looking back, the percentage of residential streets within the no-treatment range has been dropping and is projected to continue so that by 2028, over 45 percent of residential streets will require treatment which is 57 percent of the $191 million dollar backlog cost in ten years.

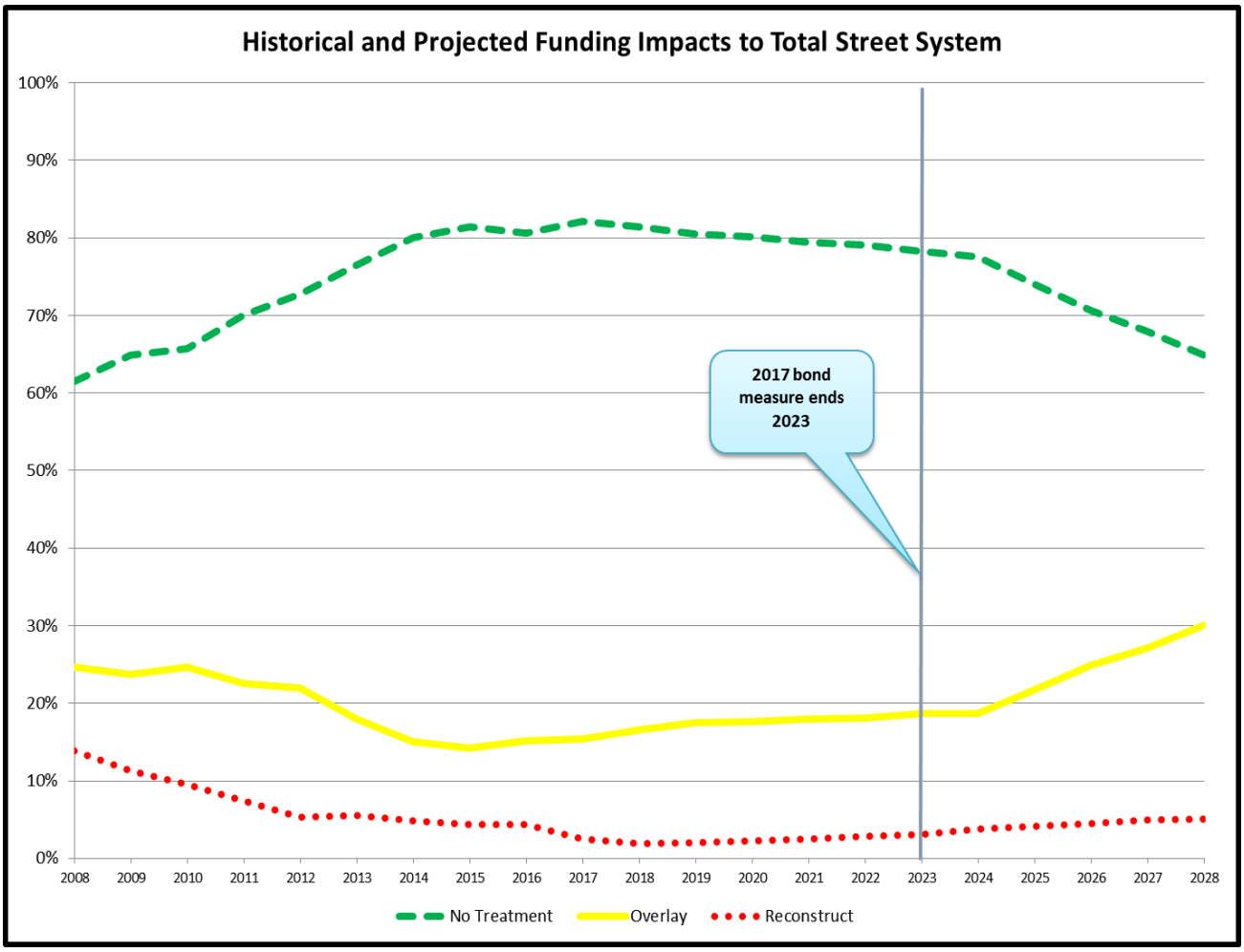


Figure 7 *Historical and Projected Funding Inpacts to Total Street System*

The graph (Fig.7) of the combined arterial, collector and residential streets reflects the recommended treatment needs for the overall street system and indicates the insufficient funding for residential streets. The percentage of streets needing "no treatment" declines, while streets requiring both reconstruction and overlay treatments increase.

The projected $191 million backlog in 10 years represents a majority of streets in the high-end overlay ranges. Arterial, collector, and residential streets benefitting from past rehabilitations often only require minimal work such as a thin-lift overlay. This treatment is much lower cost than overlay costs used for the current analyses.

Concrete Improved Street System

Of the 555 centerline miles of streets 36 centerline miles (89 lane miles) are concrete. In 2015 staff were able to refine concrete street inventory data so condition inspections could be completed. Unlike asphalt streets, concrete streets require panel counts plus an average width and length of the panel for the calculation of PCIs. Concrete sections are best evaluated when defined as a city block. Historical concrete designs for typical city blocks contained 66 panels, three columns of panels within a block length, or 33 panels with two columns.

Concrete streets, like bike paths, are built for a life of 50 or more years before requiring complete reconstruction. Deterioration of concrete streets occurs within individual panels with many panels not requiring repair. Due to these unique factors for concrete streets, analyses which predict future needs of this system tend to be less accurate than asphalt surfaces. However, like unimproved streets and bike paths, we can provide a current condition of this system.

Past repair of these streets was provided primarily by City maintenance crews which consisted of panel replacements for the most deteriorated panels. Historical construction data indicates that 60 percent of concrete streets in Eugene are over 70 years in age. Based on past maintenance repairs these streets over time may have had a majority of panels replaced.

By the end of the 2017 Bond Measure (2023), approximately 17 lane miles (six centerline miles) of concrete streets will have been rehabilitated from past and current funding sources. Through the new bond measure, an estimated $5 million will be spent on approximately seven lane miles of concrete streets.

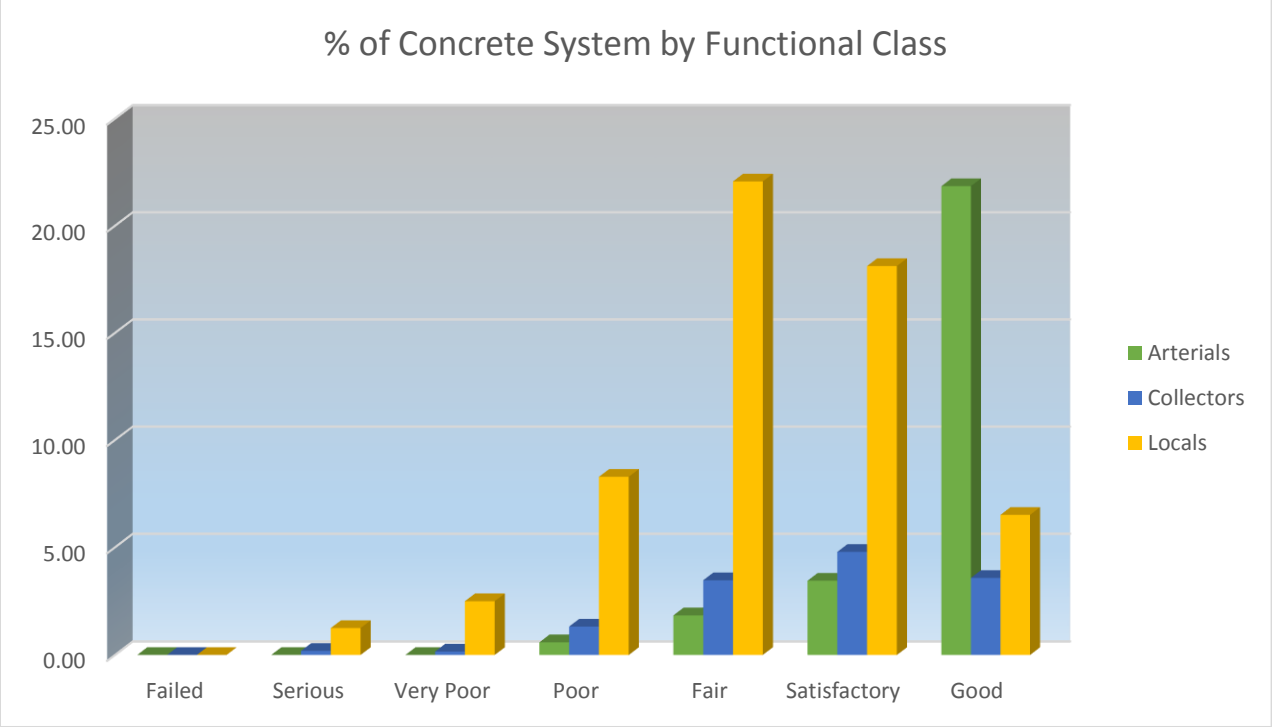


Figure 8 *Percentage of Concrete System by Functional Class*

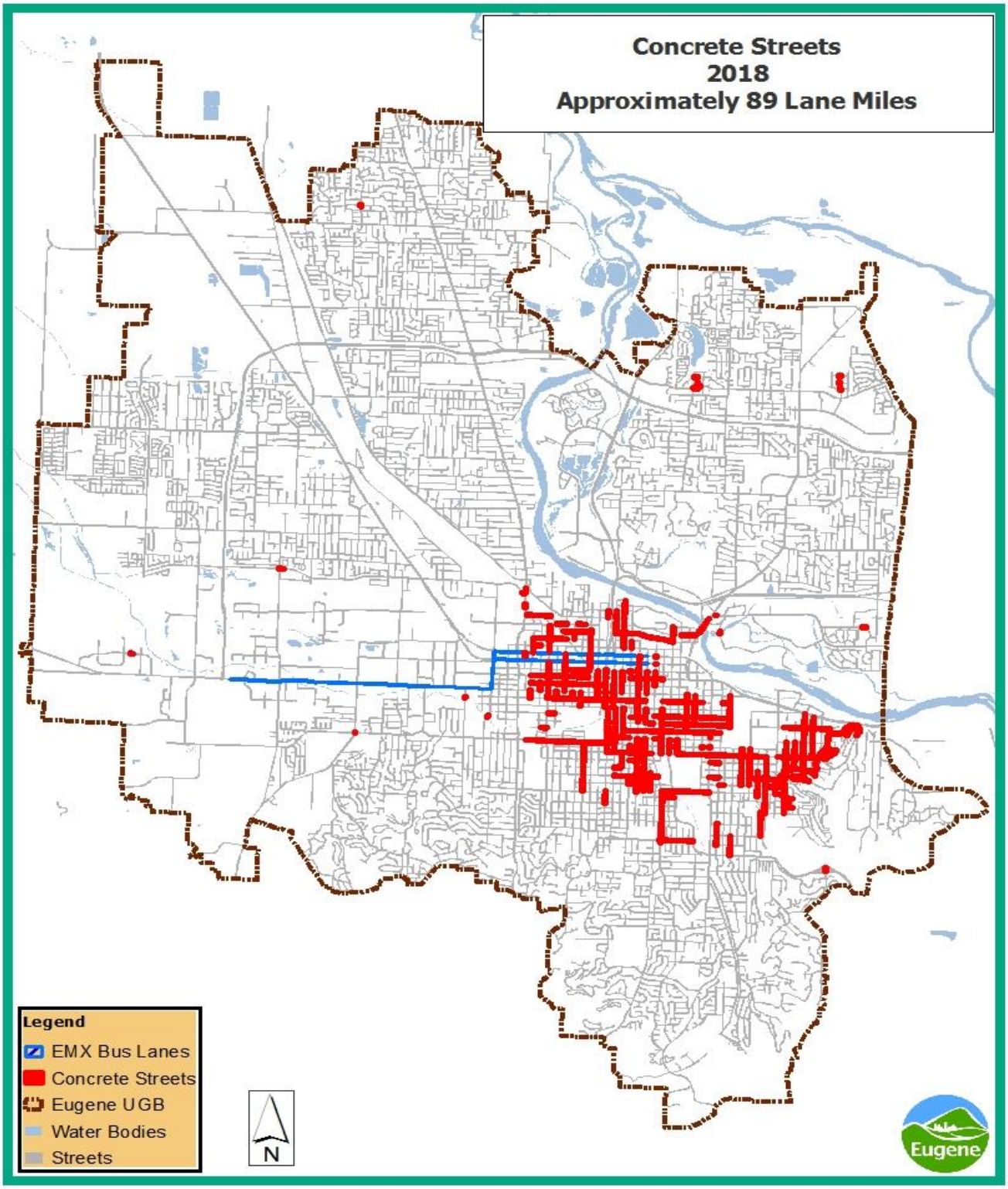


Figure 9 *Map of Concrete Streets*

Unimproved Street System

The City's transportation system consists of 555 centerline miles of improved and unimproved streets. The unimproved portion of this total includes 53 centerline miles (91 lane miles) of asphalt and bituminous surface streets. The intent of this section is to describe the overall condition of unimproved asphalt streets, highlight potential treatment needs, display associated rehabilitation costs, and indicate the projected backlog repair cost for addressing the street classification. It is important to note that any treatment short of being brought up to full urban street standards should be considered temporary. The estimated cost to improve this classification to meet the urban street standards is approximately $60 million. In addition, the following backlog figure is separate from the improved street backlog figure.

Based on 2018 rating data of the unimproved street system, there is a backlog of temporary repair projects, totaling an estimated $3.2 million, up from $3.10 million reported in 2017. The following charts and graphs indicate that 70 percent of the system falls into a no treatment category, up from 68 percent reported in 2017. Approximately 124 unimproved streets have benefited from full or partial treatment since 2008, though eleven percent of the system falls into the "poor" category. Public Works Maintenance plans to spend $375,000 annually to address a portion of these streets when funding allows.

2018 Unimproved Asphalt Street Condition and Rehabilitation Report (2018 Rating Data)						
PCI	Lane Miles	% of System	Condition	Rehabilitation Cost	Unit Cost/SQFT *	Treatment **
0-10	0.3	0.3%	Poor	$63,490	$3.50	FDR
11-20	3.5	3.9%	Poor	$610,913	$2.75	FDR or 2"AC
21-30	6.5	7.3%	Poor	$724,600	$1.75	1.5"-2" AC
31-40	6.5	7.3%	Fair	$720,237	$1.75	1.5"-2" AC
41-50	5.2	5.9%	Fair	$580,263	$1.75	1.5"-2" AC
51-60	1.7	1.9%	Fair	$184,396	$1.75	1.5"-2" AC
61-65	2.8	3.2%	Fair	$314,496	$1.75	1.5"-2" AC
66-70	3.0	3.4%	Good	$0	$0.00	No Treatment
71-80	5.4	6.1%	Good	$0	$0.00	No Treatment
81-85	8.6	9.7%	Good	$0	$0.00	No Treatment
86-90	11.1	12.5%	Excellent	$0	$0.00	No Treatment
91-100	34.5	38.7%	Excellent	$0	$0.00	No Treatment
			Total Rehabilitation	**$3,198,395**	* Unit cost based on recent project costs	** Example treatments. Actual treatment would need further analysis.
	89.2	100.00%				

Table 4 *Unimproved Asphalt Street Condition and Rehabilitation*

The following graphs (Fig.10, 11) are a visual representation of the information provided in (Table 4), above.

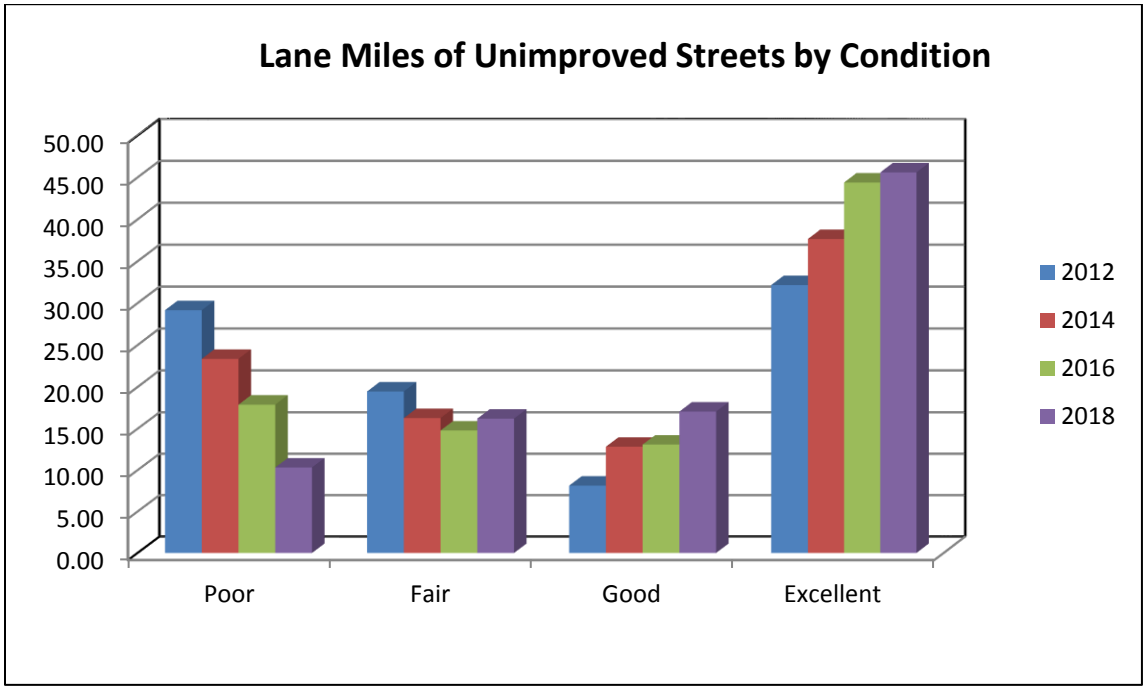


Figure 10 *Lane Miles of Unimproved Streets by Condition*

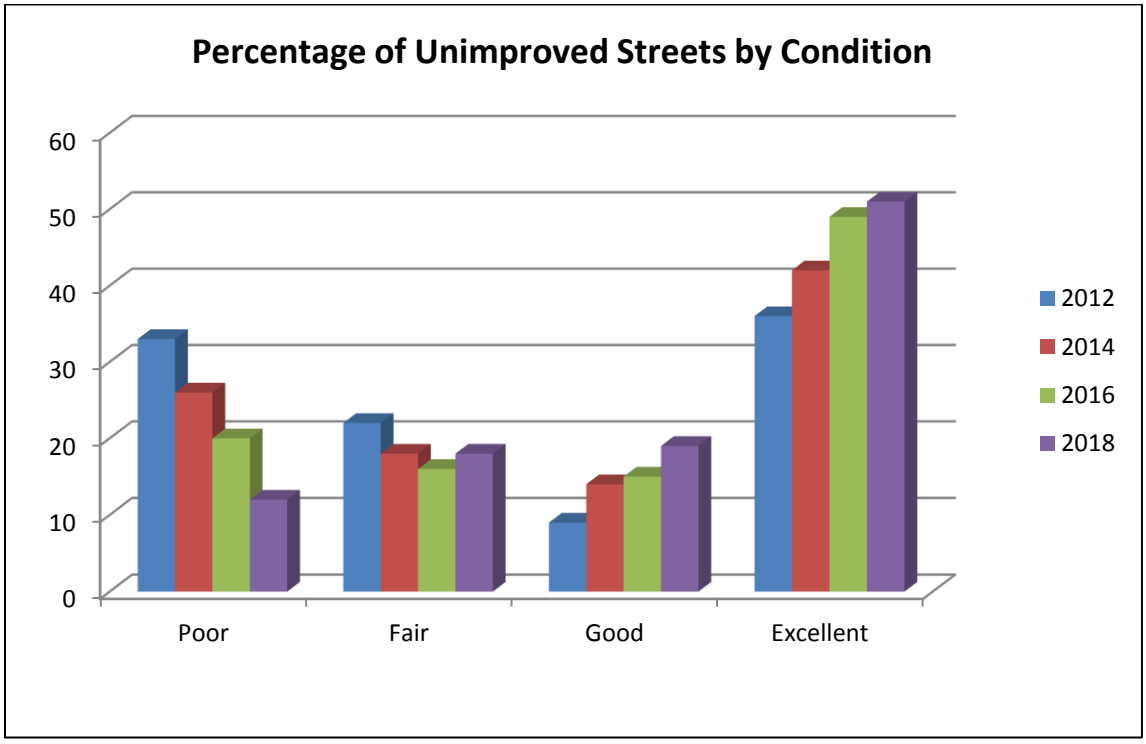


Figure 11 *Percentage of Unimproved Streets by Condition*

Off-Street Shared-Use Paths

Shared-use paths are utilized by a variety of non-motorized users including; pedestrians, cyclists, skaters, and runners. Shared-use paths are typically wider than an average sidewalk and paved with asphalt or concrete.

There are approximately 46 miles of shared-use paths within UGB, all of which are scheduled to be rated in 2019. In 2017, staff rated 45 miles of shared-use paths. In 2015 approximately 30 miles of shared-use paths were in a PCI condition of 90 or above, however, this number dropped to 23 miles in 2017.

The City standards for shared-use paths require a concrete structure no less than six inches deep and 12 feet wide. Paths designed, constructed or reconstructed to current standards are expected to have a 50-year life. Of the $51.2 million 2017 bond, $5 million will go toward safety improvements for pedestrian and bicycle infrastructure.

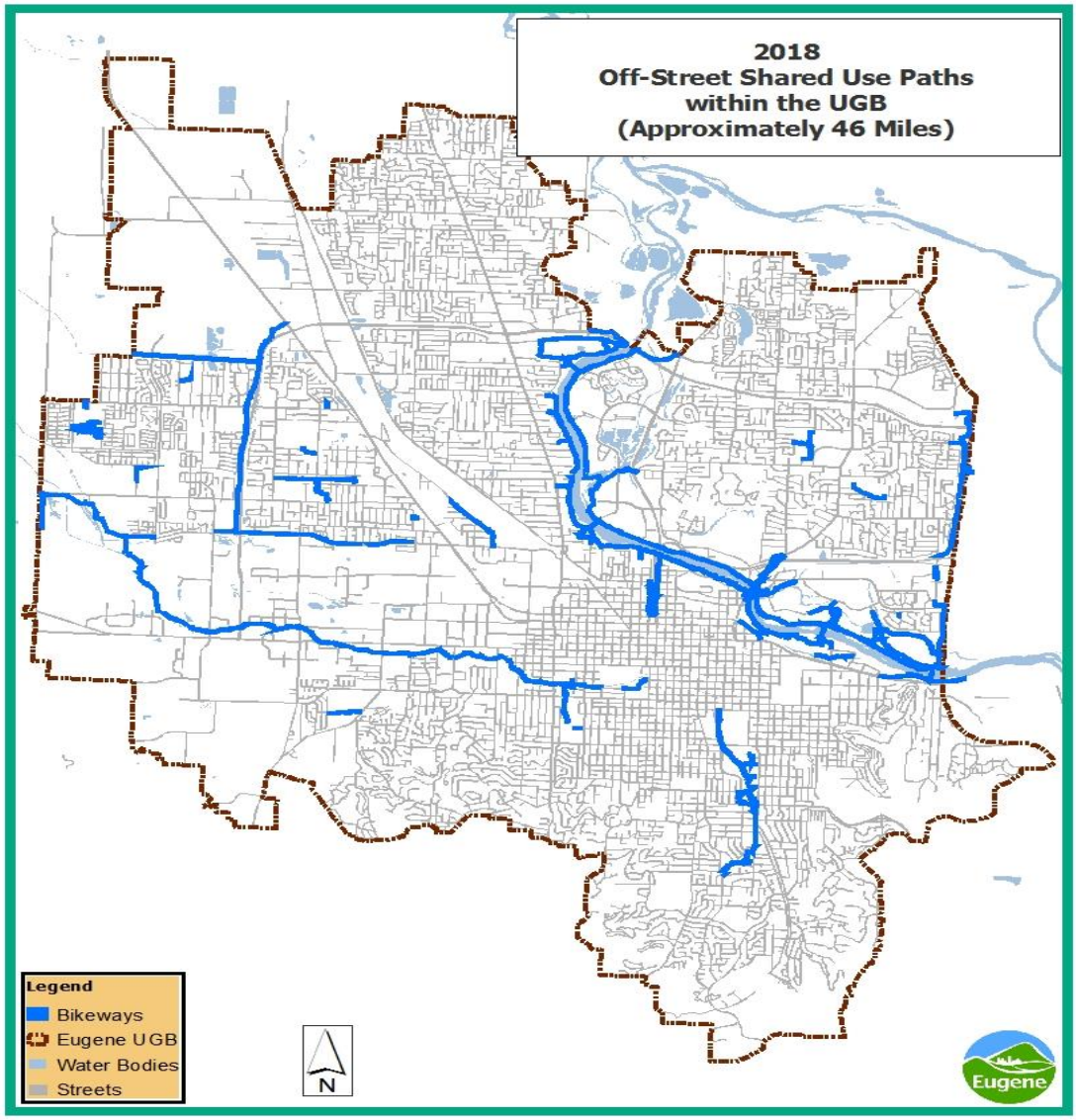


Figure 12 *Map of Off-Street Shared Use Paths*

The following graphs (Fig 13,14) show the division of surface types and widths within the system as of 2018.

Off-Street Shared-Use Path Surface Type:

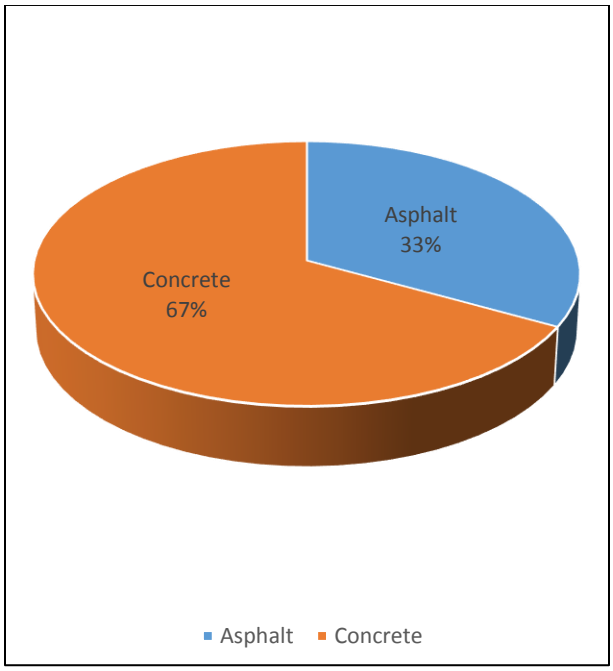


Figure 13 *Path Type Percentage*

Off-Street Shared-Use Path Existing Widths:

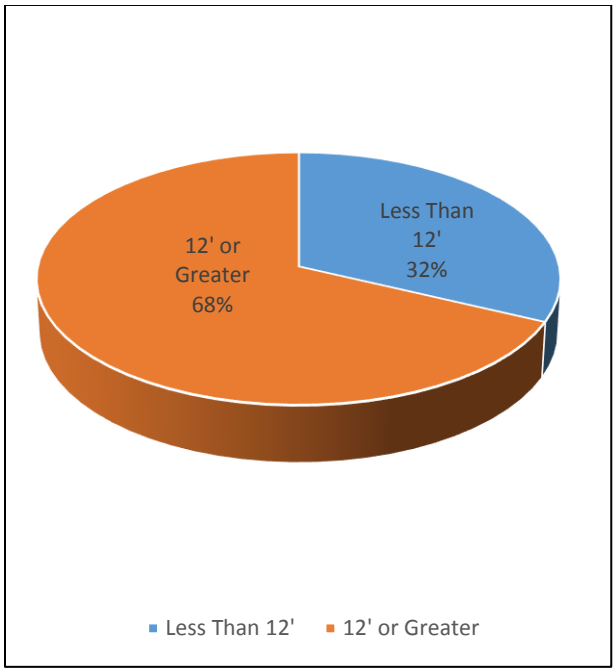


Figure 14 *Path Widths Percentage*

The following graph (Fig.15) shows the path condition in 2018 for the system.

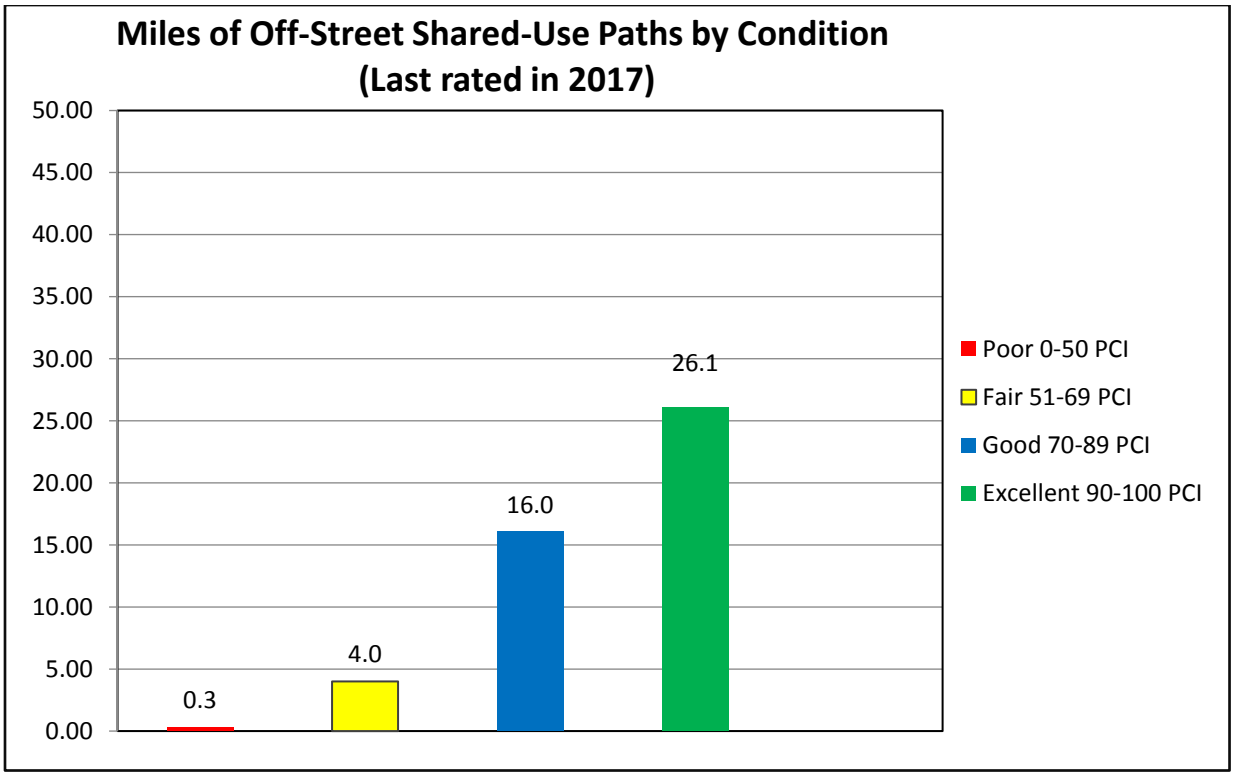


Figure 15 *Miles of Paths by Condition*

Shared-use path projects have been historically funded by state and federal grants and more recently by voter-approved bond measures. There is currently no long-term funding identified specifically for shared-use paths. The following is a list of completed and current projects, including shared-use paths funded by the bond measures.

Name	Fiscal Year	Funding
Fern Ridge Chambers - City View	2004	STP-U
Garden Way Bike Path	2005	STP-U
Monroe Bikeway	2006	STP-U
N Bank Path Club Rd 3000'W	2006	STP-U
West Bank Trail	2007	Transportation Enhancement (TE) Funds
Delta Ponds Bridge	2007	Various Federal and Local Funds
Amazon: SEHS - 31st Bike Path	2009	PBM
Fern Ridge Path Rehab/Westmoreland Connector	2010	PBM
South Bank Path Rehab	2011	PBM
West Bank Trail Extension	2011	STP-U/TE
Fern Ridge: Chambers - Arthur	2012	ODOT Rapid Readiness Funds
W Bank: Greenway - Copping	2012	PBM
Amazon/Willamette River Path Connectors	2012	State Urban Trail Funds
North Bank Path: DeFazio Bridge to Leisure Ln.	2012	STP-U
Fern Ridge: Terry - Greenhill	2013	STP-U/TE
South Bank Path - Riverplay to DeFazio Bridge	2013	PBM
South Bank Path - Knickerbocker Bridge to Franklin Blvd	2015	N/A
Fern Ridge Path - Commerce to Connector Path	2016	LGT
Jessen Multi-Use Path – BeltLine Hwy to Ohio St.	2018	TE
I-5 @ Beltline Interchange	2015	Other
West Bank Path – Maurie Jacobs to Copping	2019	POS/PBM

Table 5 *List of Shared-Use Path Projects*

<u>Project Funding Abbreviations</u>
PBM – Paving Bond Measure
LGT – Local Gas Tax/SDC/Other
STP-U – Surface Transportation Funds-Urban (Federal)
TE – Transportation Enhancement (Federal)
POS – Parks Bond Measure

Scheduled Street Projects for 2019

2019 Project Name and Limits	Lane Miles	Funding
3rd AVE (High to Pearl)	0.19	PBM
5th AVE (Chambers to Grant)	0.14	PBM
11th AVE (Tyinn to Bailey Hill)	3.02	PBM
19th AVE (Hilyard to Agate)	1.73	PBM
19th AVE (Jefferson to Tyler)	1.29	PBM
Alder ST (24th Ave to 27th Ave)	0.85	PBM
Balfour ST (North End to Terresa)	0.15	PBM
Barger DR (100' E Of Altimon to Primrose)	3.26	PBM
Bedford WAY (Oakway to Fairoaks Dr)	0.33	PBM
Brookside DR (Brae Burn (North) to SS 999)	0.85	PBM
Brookside DR (Brae Burn (South) to NS Montara Wy)	0.51	PBM
Coburg RD (County Farm Rd to N Game Farm Rd)	3.60	LGT
Elanco + 1 CDS AVE (Norkenzie Rd to North CDS)	0.27	PBM
Fair Oaks DR (Oakway Rd to Fairway Lp)	0.80	PBM
Jerry ST (Richard to Royal)	0.12	PBM
Lariat DR (Oakway Rd to Lariat Dr)	1.24	PBM
Lariat Meadows DR (Lariat to East End)	0.40	PBM
Lariat Mesa (Lariat to East End)	0.16	PBM
Lawrence ST (Drwy 36 to 6th Ave)	1.13	PBM
Louis ST (Hawthorne to Drwy 715)	0.50	PBM
Mill ST (2nd Ave to 4th Ave)	0.40	PBM
Montreal AVE (Balfour to Calgary)	0.25	PBM
Olive ST (5th Ave to 6th Ave)	0.23	PBM
Quebec ST (Calgary to Elanco)	0.35	PBM
Richard AVE (Hwy 99N to Fairfield)	0.48	PBM
Sundance + 1 CDS ST (Sundial to East End)	0.32	PBM
Terresa AVE (Gilham to Montreal)	0.37	PBM
Villard ST (Franklin to Drwy 1460)	0.49	PBM
Willamette ST (23rd Ave to 29th Ave)	0.67	PBM

Table 6 *2019 Street Projects*

Project Funding Abbreviations
PBM – Paving Bond Measure
LGT – Local Gas Tax

The following map (Fig.16) illustrates the Pavement Projects scheduled for 2019.

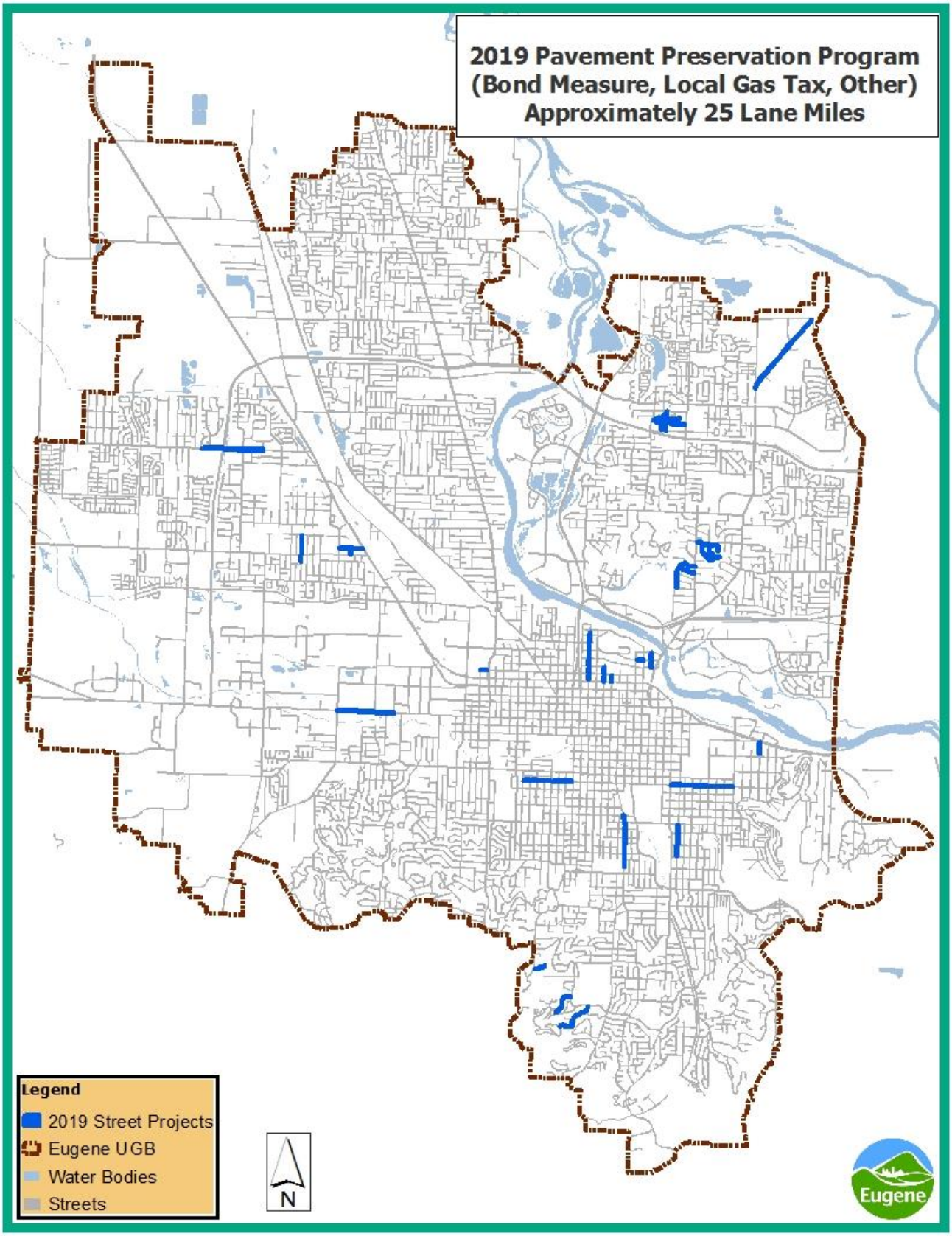


Figure 16 *Map of 2019 Street Projects*

The following map (Fig.18) illustrates Pavement Preservation Projects since inception of the program 2002 - 2018.

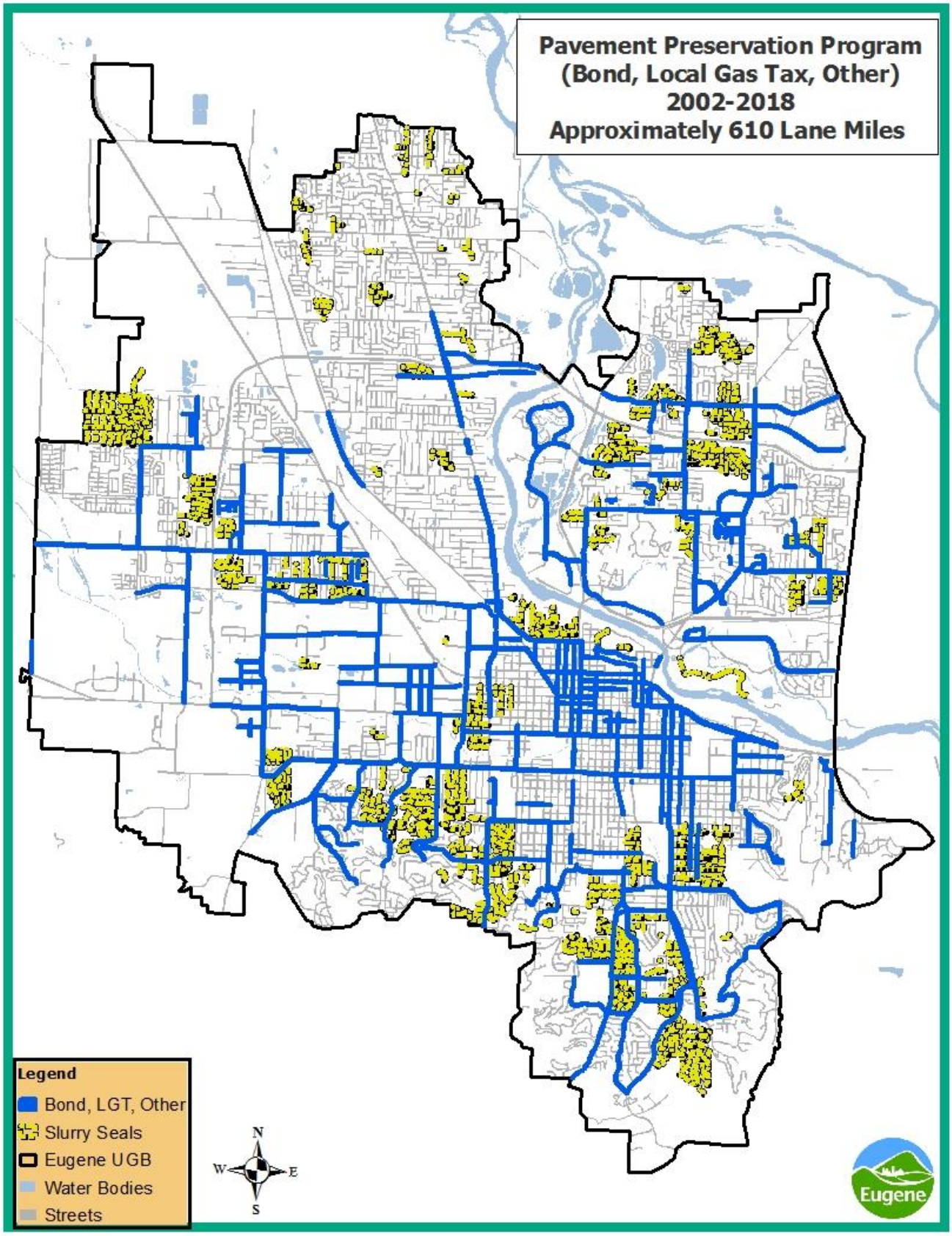


Figure 18 *Projects Since PPP Inception*

The following map (Fig.19) illustrates the Enhanced Street Repair Program 2008-2018.

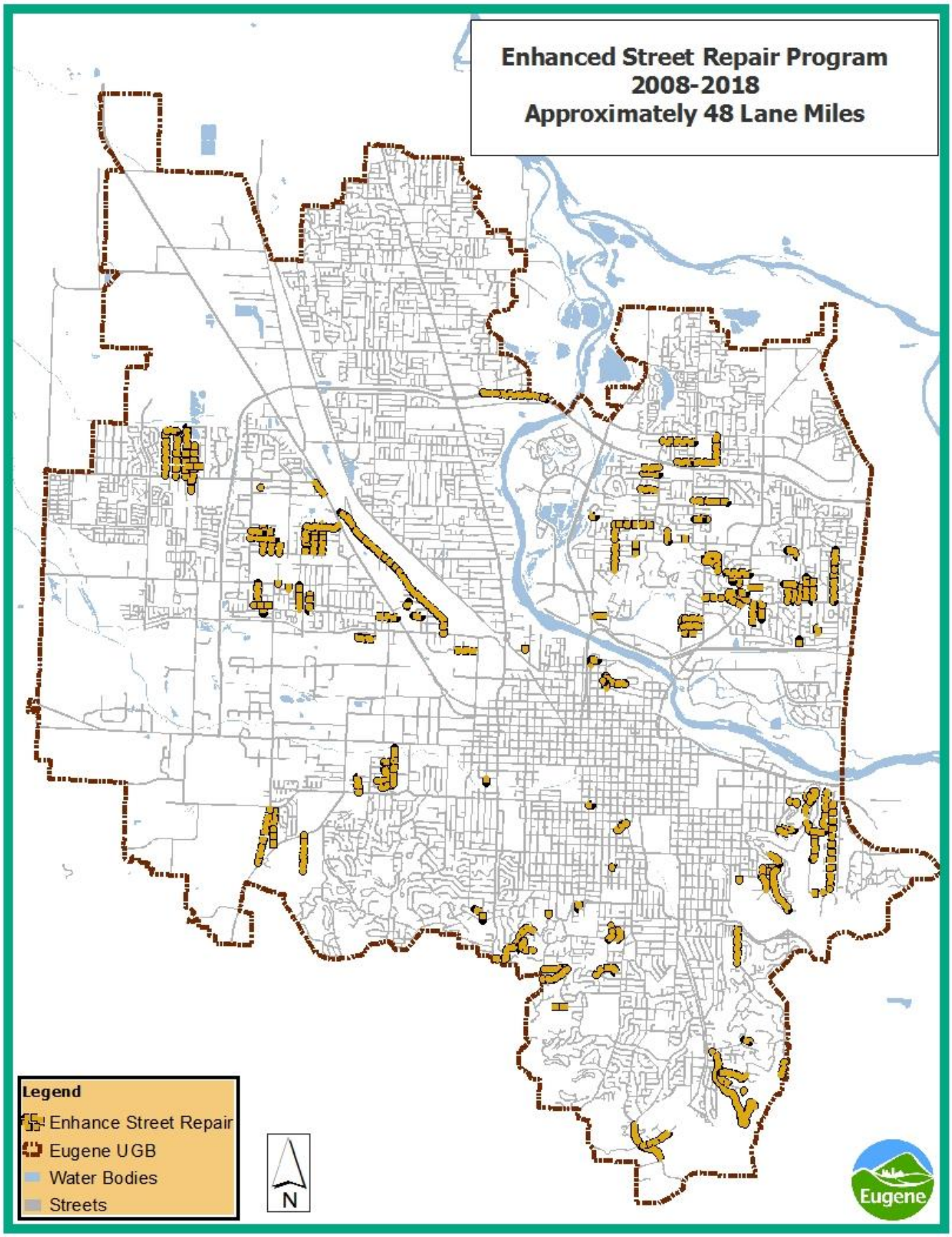


Figure 19 *Enhanced Street Repair Program*

The following map (Fig.20) illustrates Pavement Preservation Projects and Enhanced Street Repair Program since inception of the programs 2002 – 2018.

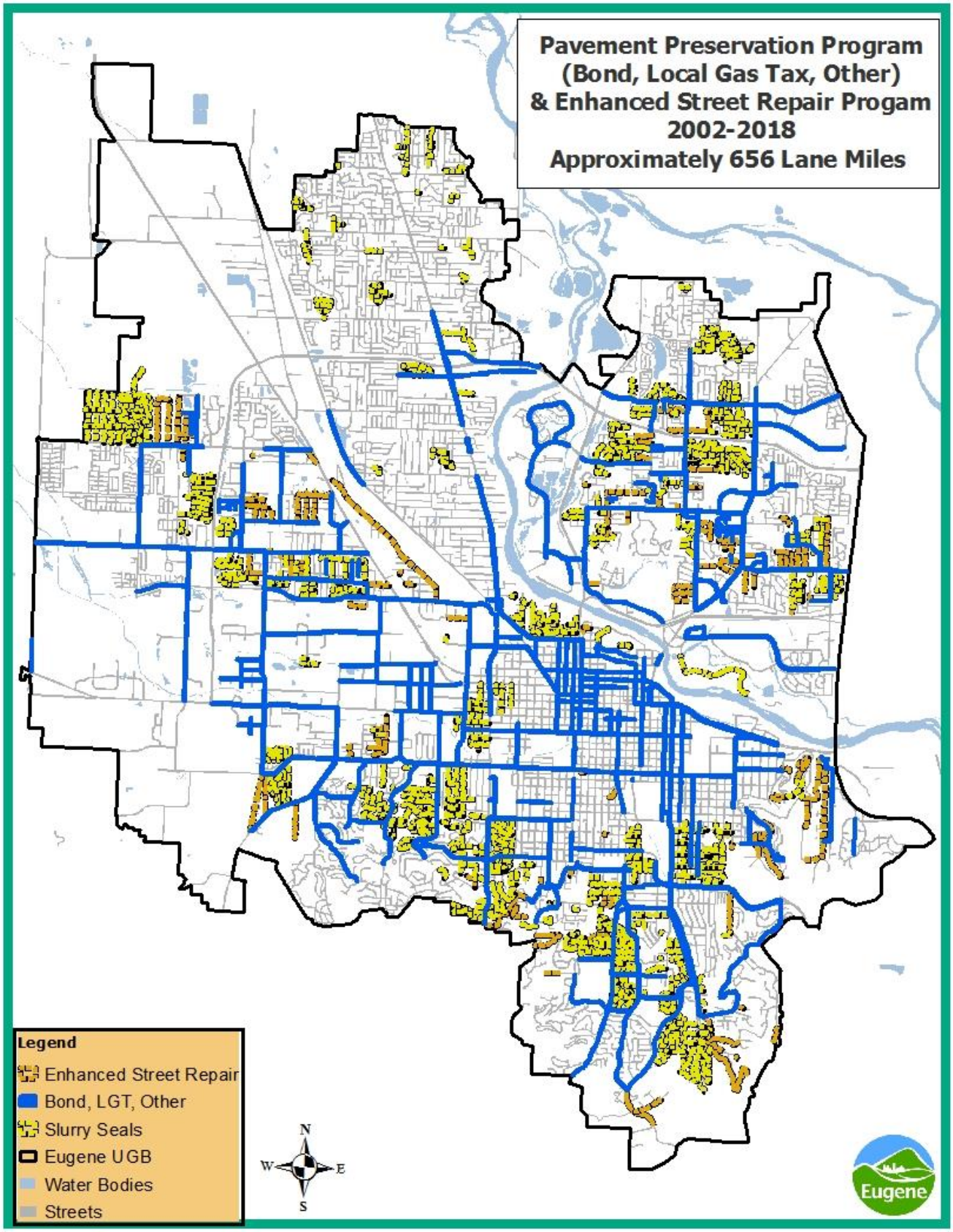


Figure 20 *All Projects Since Inception*

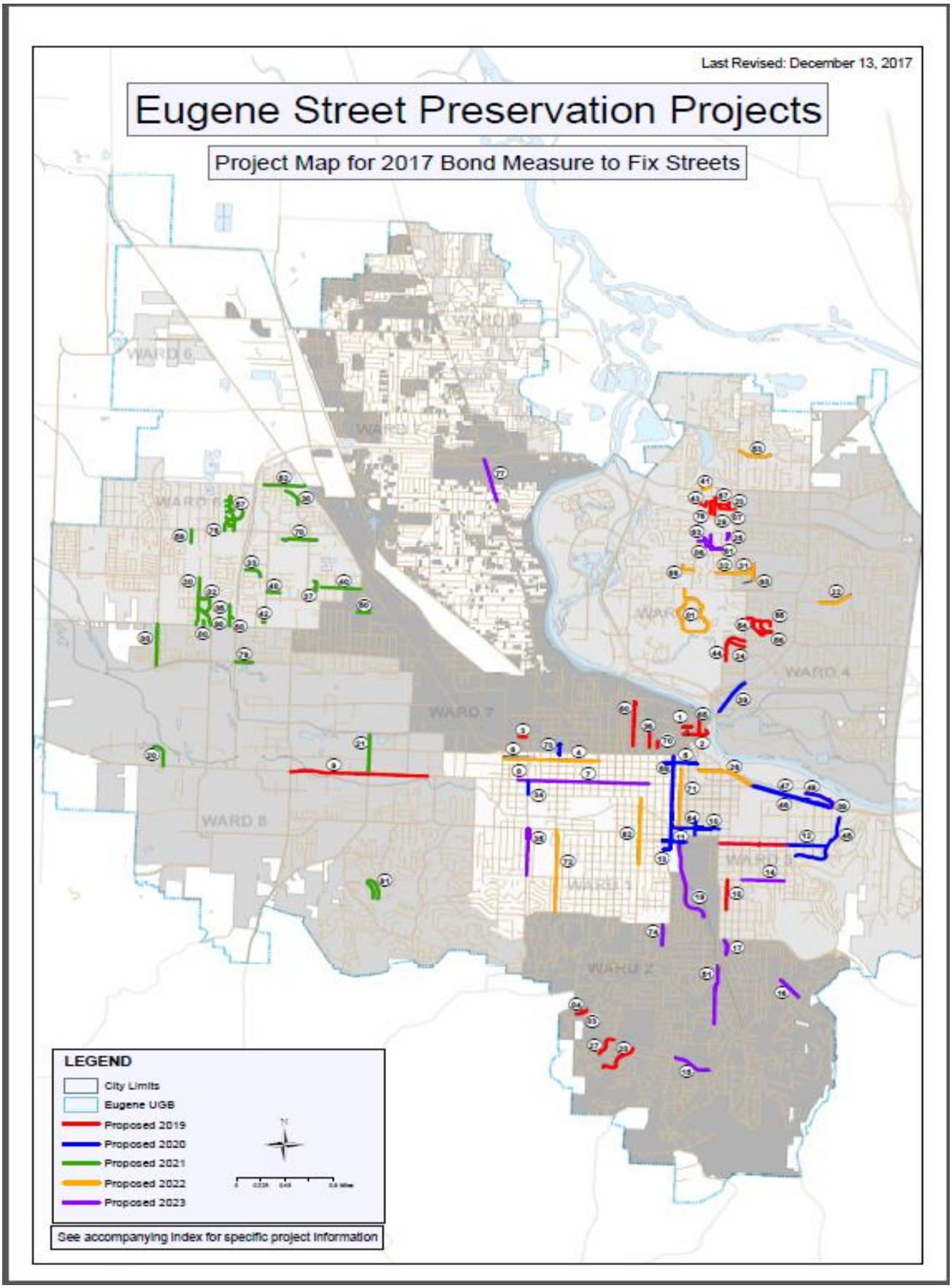


Figure 21 *2017 Bond Projects*

Project List (Table 7)for 2017 Bond Measure to Fix Streets

MAP #	Street Name	From	To
1	03RD AVENUE	HIGH ST	PEARL ST
2	04TH AVENUE	COBURG RD	PEARL ST
3	05TH AVENUE	CHAMBERS ST	GRANT ST
4	08TH AVENUE	CHAMBERS ST	MONROE ST
5	08TH AVENUE	WILLAMETTE ST	MILL ST
6	08TH AVENUE	GARFIELD ST	CHAMBERS ST
7	11TH AVENUE	CHARNELTON ST	CHAMBERS ST
8	11TH AVENUE	CHAMBERS ST	GRANT ST
9	11TH AVENUE	TYINN ST	BERTELSEN RD
10	17TH AVENUE	HILYARD ST	OAK ST
11	19TH AVENUE	WILLAMETTE ST	HIGH ST
12	19TH AVENUE	HILYARD ST	FAIRMOUNT BLVD
13	20TH AVENUE	WILLAMETTE ST	OAK ST
14	24TH AVENUE	HARRIS ST	AGATE ST
15	46TH AVENUE	FOX HOLLOW RD	DONALD ST
16	AGATE STREET	N 163 BLACK OAK RD	FIRLAND ST
17	ALDER STREET	30TH AVE	32ND AVE
18	ALDER STREET	24TH AVE	27TH AVE
19	AMAZON PARKWAY	19TH AVE	2693 S OF E 24TH
20	ARROWSMITH STREET	TERRY ST	11TH AVE
21	BAILEY HILL ROAD	5TH AVE	11TH AVE
22	BAILEY LANE	BOGART LN	LUELLA ST
23	BALFOUR STREET	TERRA AVE	NORTH END
24	BEDFORD WAY	OAKWAY RD	FAIR OAKS DR
25	BREWER AVENUE	BREWER AVENUE	SOUTH END
26	BROADWAY	MILL ST	11TH AVE
27	BROOKSIDE DRIVE	BRAE BURN DR (NORTH)	ADDR 999
28	BROOKSIDE DRIVE	BRAE BURN DR (SOUTH)	MONTARA WAY
29	CALGARY STREET	HOLLY AVE	ELANCO AVE
30	CANDLELIGHT DRIVE	AVALON	ROYAL
31	CARMEL AVENUE	GILHAM RD	NORWOOD ST
32	CARMEL AVENUE	DIANE ST	GILHAM RD
33	CATALINA STREET	JUHL ST	WILLHI ST
34	CHAMBERS STREET	11TH AVE	13TH AVE
35	CHAMBERS STREET	18TH AVE	24TH AVE
36	CHARNELTON STREET	4TH AVE	6TH AVE
37	CHASE STREET + CDS	500' NORTH OF MARSHALL	NORTH END
38	CLAREY STREET	BEAN ST	1071' S OF BEAN ST
39	COBURG ROAD	FERRY STREET BRIDGE	OAKWAY RD
40	CONCORD STREET	BERNTZEN RD	JACOBS DR
41	CRCENT AVENUE	NORKENZIE RD	ADDRS 1670
42	ECHO HOLLOW CDS	WEST END (CDS) (880-960)	ECHO HOLLOW RD
43	ELANCO AVENUE + 1 CDS (NORTH)	NORKENZIE RD	END OF NORTHERLY CDS
44	FAIR OAKS DRIVE	OAKWAY RD	FAIRWAY LP

MAP #	Street Name	From	To
45	FAIRMOUNT BOULEVARD	15TH AVE	COLUMBIA ST
46	FRANKLIN BOULEVARD EB	WALNUT ST	11TH AVE
47	FRANKLIN BOULEVARD WB	WALNUT ST	11TH AVE
48	FULLER AVENUE	ECHO HOLLOW RD	JAY ST
49	GARDEN AVENUE	MOSS ST	WALNUT ST
50	HAWTHORNE AVENUE	WEST END	FAIRFIELD AVE
51	HILYARD STREET	W AMAZON DR	40TH AVE
52	JESSEN DRIVE	ELIZABETH ST	HWY 99
53	LAKEVIEW DRIVE	207' E OF SARAH LN	GILHAM RD
54	LARIAT DRIVE	OAKWAY RD	LARIAT DR
55	LARIAT MEADOWS DRIVE	LARIAT DR	EAST END
56	LARIAT MESA	LARIAT DR	EAST END
57	LAURELHURST DRIVE + 5 CDS	MELROSE LP	BARGER DR
58	LAURELHURST DRIVE + SHEFFIELD CT CDS	HARRIET AVE	ROYAL AVE
59	LAVETA LANE	BARGER DR	SOUTH END
60	LAWRENCE STREET	DRWY 36	6TH AVE
61	LEMMING AVENUE	TARPON ST	SHILO ST
62	LINCOLN STREET	13TH AVE	22ND AVE
63	LINNEA AVENUE + 1 CDS	NORKENZIE RD	TARPON ST
64	MILL STREET	16TH AVE	18TH AVE
65	MILL STREET	2ND AVE	4TH AVE
66	MONTEREY AVENUE	NORKENZIE RD	LARKSPUR AVE
67	MONTREAL AVENUE	CALGARY ST	BALFOUR ST
68	NORWOOD STREET	MONTEREY ST	MARLOW ST
69	OAK STREET	7TH AVE	20TH AVE
70	OLIVE STREET	5TH AVE	6TH AVE
71	PEARL STREET	BROADWAY	17TH AVE (AMAZON BRIDGE)
72	POLK STREET	18TH AVE	28TH AVE
73	POLK STREET	67' N OF 6TH AVE	72' S OF 7TH AVE
74	PORTLAND ST	29TH AVE	31ST AVE
75	PRIMROSE STREET + 1 CDS	BARGER RD	100' N OF PARKER PL (S)
76	QUEBEC STREET	CALGARY ST	ELANCO ST
77	RIVER ROAD	MAXWELL RD	BELTLINE RD
78	ROBIN AVENUE	200' EAST OF RUSKIN ST	396' EAST OF TANEY ST
79	ROOSEVELT BLVD	BELTLINE	APPROX 800' EAST OF BELTLINE
80	ROYAL AVENUE CUL DE SAC	ROYAL AVE	N END CDS
81	SPYGLASS DRIVE	CAL YOUNG RD	LOOP AROUND BACK TO SPYGLASS DR
82	STAGECOACH ROAD	CANDLELIGHT DR	SURREY LN
83	SUNDANCE STREET	SUNDIAL RD	EAST END
84	SUNDANCE STREET CDS	NORTH END	SUNDANCE ST
85	SURRY LANE	STAGECOACH	WELCOME WY
86	TARPON STREET + CUL-DE-SAC	BREWER AVE	LEMMING AVE
87	TERRA AVENUE	MONTREAL AVE	GILHAM RD
88	TERRY STREET	ROYAL AVE	ROOSEVELT BLVD
89	WALNUT STREET	FRANKLIN BLVD	GARDEN AVE
90	WELCOME WAY	CANDLELIGHT DR	ROYAL AVE
91	WINDSOR CIRCLE EAST/WT	WILSHIRE LN	WILSHIRE LN

Table 7 *List of 2017 Bond Projects*