

2023

City of Baker City

Pavement Management Plan

Public Works Department

1655 1st Street
P.O. Box 650
Baker City, OR 97814
Phone: (541) 524-2047

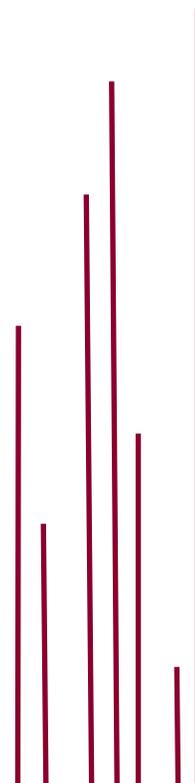


2023

Pavement Management Plan

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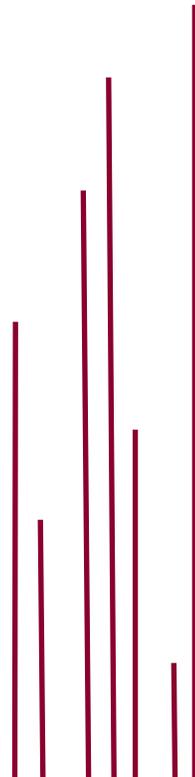
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Hillcrest Place Chip Seal

Introduction





Auburn Ave. Mastic Patching

Program Background

1111 211

ASPHALT PAVEMENT RATING FORM DATE 10/31/22

STREET Spring Garden - Elm to E. side Clark ZONE NE ROUTE 310 LENGTH 920

Defects - Cracks			
TYPE	RATING INSTRUCTIONS	RATING	COMMENTS
Transverse	Rate 0 - 10 (10= Major Crack at 25' Intervals)	10	
Longitudinal	Rate 0 - 5 (5= Joint Cracks Full Length of Block)	5	
Alligator	Rate 0 - 60 (60= 100% of Road Surface)	9	Block Cracking
Shrinkage	Rate 0 - 60 (60= 100% of Road Surface)	6	
Subtotal crack defects ratings (cannot exceed 60)			30
Other Defects			
TYPE	RATING INSTRUCTIONS	RATING	COMMENTS
Trench Settlement or Bad Patching	Rate 0 - 10	1	MH @ Crack
Pot Holes	Rate 0 - 5 (5 = Five per Block)	1	y-block @ crack
Deficient Drainage	Rate 0 - 5	1	
Base Failure	Rate 0 - 5	-	
Other Defects	Rate 0 - 10 Corrugations: <input type="checkbox"/> Ravelling: <input checked="" type="checkbox"/> Rutting: <input checked="" type="checkbox"/>	2	
Subtotal other defects ratings (cannot exceed 40)			5
Overall Ride Quality			
TYPE	INSTRUCTIONS	QUANTITY	RATING
Transverse Crack	1 Noticeable/50'=15	4	3
Patch or Settlement	1 Noticeable/100'=10	1	3
Subtotal Ride Quality Ratings (Maximum 20)			
Overall ride quality converted rating (use subtotal above)			36
Total defects ratings (cracks+other-overall r.q.)			36
Suggested Maintenance			
Overlay	DCH	Crackfill 1st Priority	Crackfill 2nd Priority
		<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
Condition Rating		2021 Rating	
Possible Points	Defects	Rating	
100	36	64	69
Categories			
Very Good	Good	Fair	Poor
100 - 98	97 - 89	88 - 70	69 - 45
			Very Poor
			44 - 0
Other Comments:		Ride Quality Conversion Chart	
		Ride Quality	Defect Rating
		1 - 6	1
		7 - 12	2
		13 - 17	3
		18 - 20	4

Last Maintenance: 2007 ch

Last Year's Comments:
Settling at MH @ Clark; PH @ Xdrain @ Clark

In the fall of each year an engineering technician drives each paved city street to conduct a street inspection.

The following characteristics are analyzed and rated:

- The ride quality;*
- Surface cracking;*
- Trench settlement;*
- Drainage issues; and*
- Miscellaneous items affecting the street's structural integrity.*

The illustration to the left is an example of the rating form used by staff when conducting the inspection. It is through this inspection that each paved street is rated. This rating system assists staff in determining what maintenance techniques, if any, will be recommended.

Each street is placed into a category by rating the defects found in each section of pavement. A street starts with a rating value of 100. The number of defects found, based on the inspection, are subtracted from 100 to arrive at the rating value for that street section.

After the street is rated, it is placed into the appropriate condition category based upon the rating value. There are five street condition categories: Very Good, Good, Fair, Poor, and Very Poor.



Brian Johnson & Blain LeaMaster
Skid Steer w/Asphalt Zipper



Riley Carter
Rolling Asphalt Patch



Blain LeaMaster & Nate Miller
Asphalt Zipper Creating Trench



Logan Brashler et al
Mastic Patching

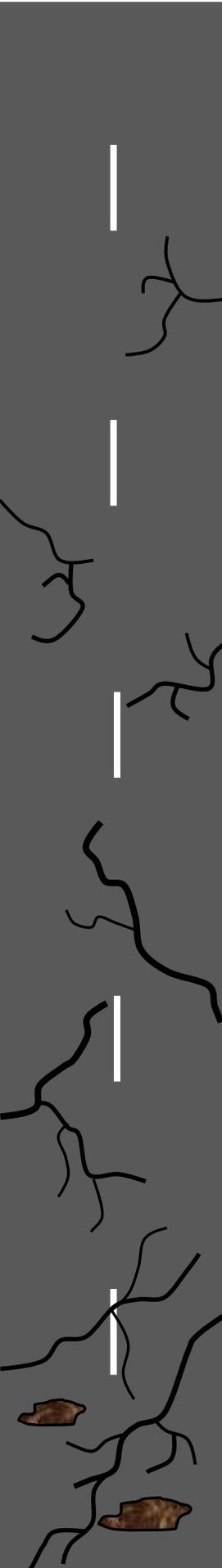


Blain LeaMaster & Riley Carter
Maneuvering Trench Shoring



Nate Miller, Brian Johnson & Caden Long
Asphalt Patching

Street Rating Categories



“Very Good” Condition

→ Do Nothing

These streets generally are only those that have been recently overlaid or constructed. There are only occasional cracks and a stable, excellent ride quality.

“Good” Condition

→ Routine Maintenance: *crack filling, chip seal, fog seal & possible thin overlay*

Stable ride qualities. These streets generally have a light-gray appearance due to oxidation, some transverse and longitudinal cracks and possible trench settlement.

“Fair” Condition

→ Preventative Maintenance: *extensive patching, chip seal, thin overlay*

Minor areas of structural weakness may be evident but generally these streets are stable. Ride qualities are good to fair. There may be some transverse, longitudinal and alligator cracking. Some trench settlement or drainage deficiencies.

“Poor” Condition

→ Structural Improvement: *overlay or reconstruction*

Areas of instability with evidence of structural deficiency. Ride qualities are fair to poor. Characteristics may include transverse, longitudinal, alligator and shrinkage cracking. Trench settlement and drainage deficiencies are evident. To alleviate settlement and drainage issues, extensive crack filling and patching would be necessary.

“Very Poor” Condition

→ Base Reconstruction: *emergency maintenance only, reconstruction necessary*

Obvious structural deficiencies and areas of instability. Poor ride qualities. Generally includes alligator and shrinkage cracking with potholes, extensive trench settlement and drainage deficiencies.

“Very Good” Street Condition

Rating Range: 98-100

7.04%

of Baker City’s Paved Streets

4.3 Miles in 2022

6 Miles (9.85%) in 2021

5.11 Miles (8.4%) in 2020

4.79 Miles (7.87%) in 2019

Best Frontage Road (E Campbell to H St.)

Constructed: 2014

Last Maintenance: Chip & Fog Seal 2020

Suggested Maintenance for 2022: None

Ratings: 2019=100 2020=99 2021=100 **2022=99**

Best Frontage is currently surrounded by mostly vacant commercial property and was designed to sustain a heavier volume and weight of vehicle traffic.



Mitchell Ave. (Hwy. 7 to 4th St.)

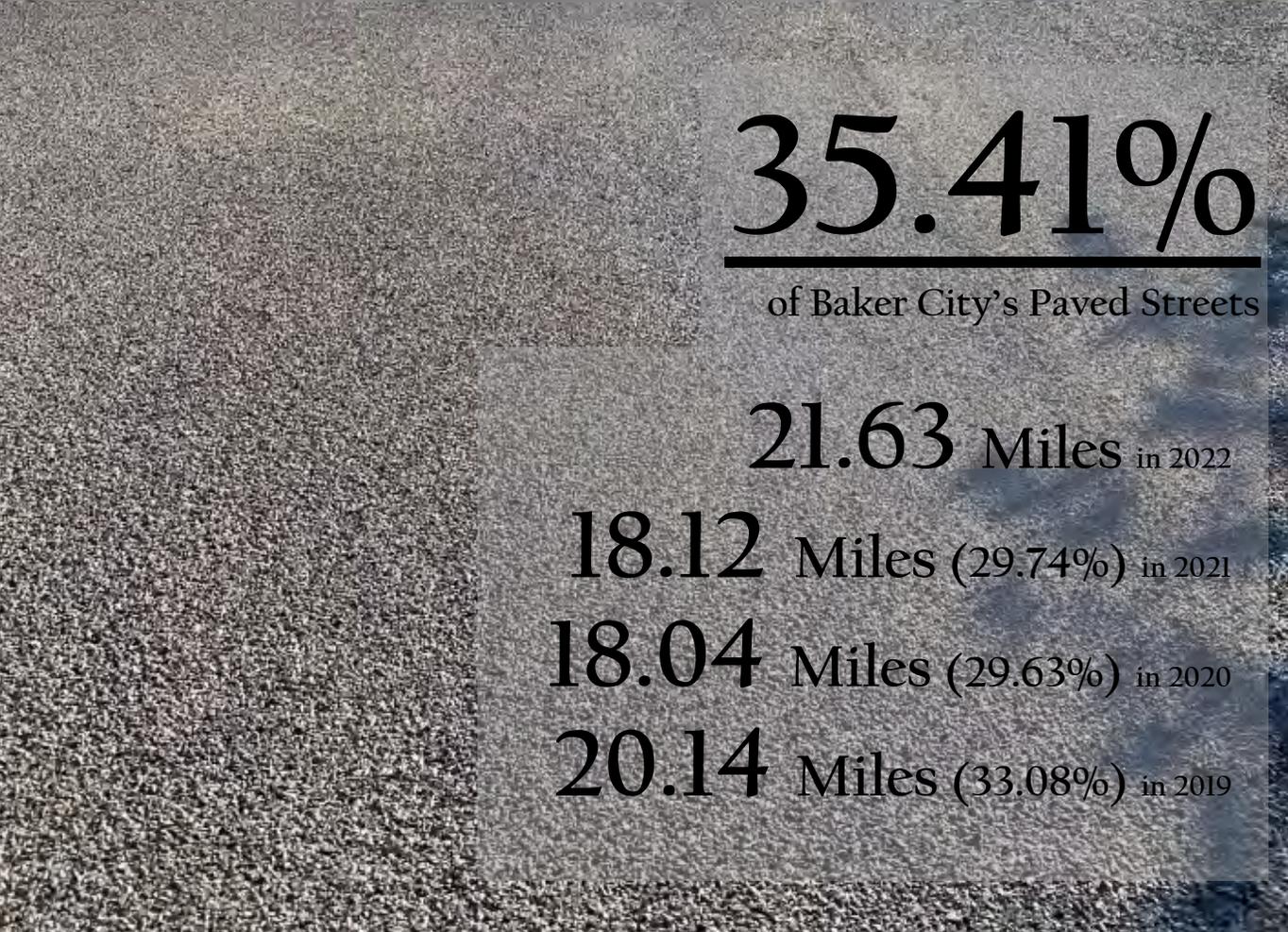
Constructed: 1982

Last Maintenance: Chip Seal 2022

Suggested Maintenance for 2022: None

Ratings: 2019=53 2020=45 2021=44 **2022=92**

Mitchell Ave. had a significant boost in its annual street rating this year. Crews spent a significant amount of time rehabbing this street by utilizing glass grid mesh to cover alligator cracks and stabilize those areas before applying C Mix & D Mix.



35.41%

of Baker City's Paved Streets

21.63 Miles in 2022

18.12 Miles (29.74%) in 2021

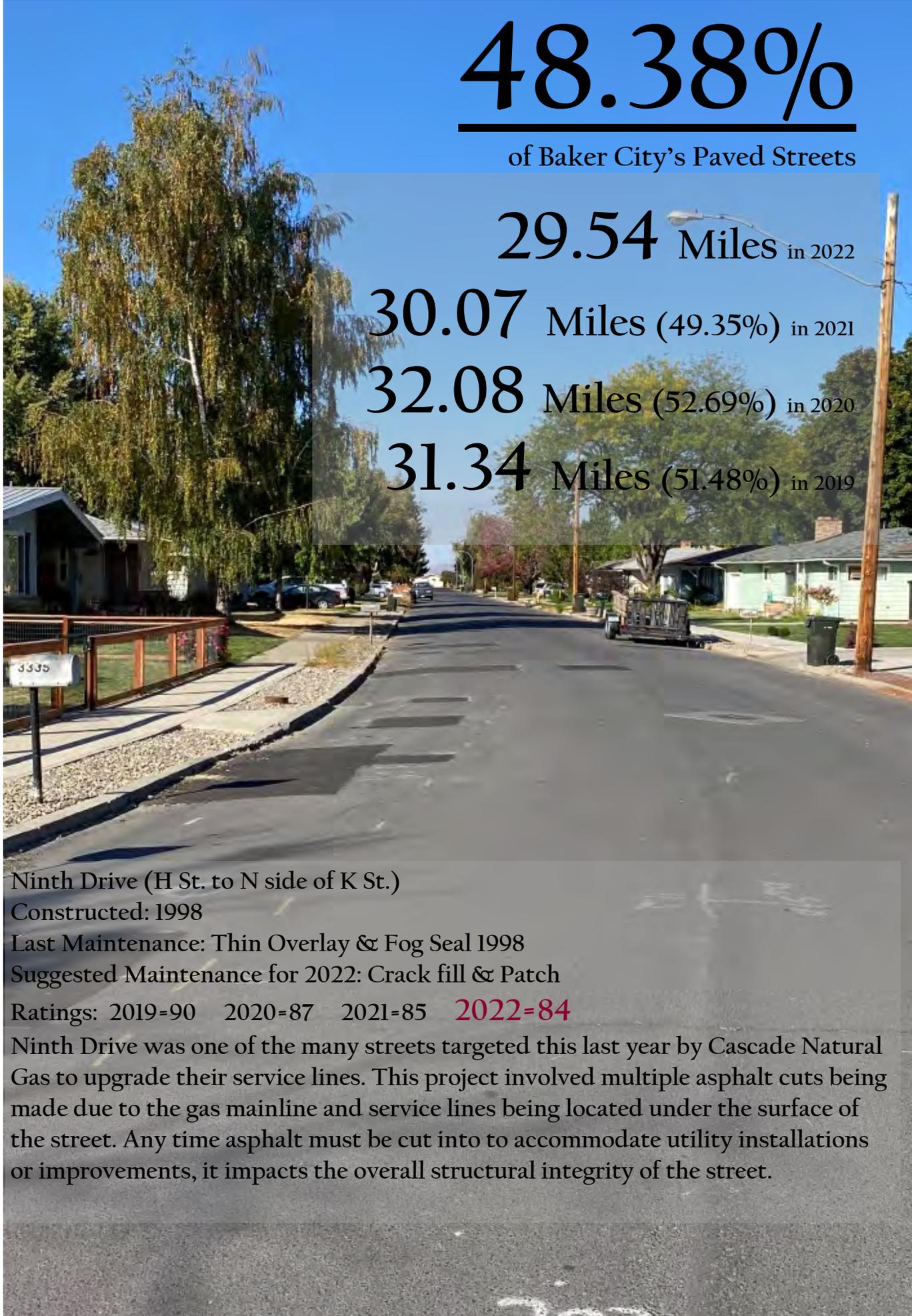
18.04 Miles (29.63%) in 2020

20.14 Miles (33.08%) in 2019

“Good” Street Condition
Rating Range: 89-97

“Fair” Street Condition

Rating Range: 70-88



48.38%

of Baker City's Paved Streets

29.54 Miles in 2022

30.07 Miles (49.35%) in 2021

32.08 Miles (52.69%) in 2020

31.34 Miles (51.48%) in 2019

Ninth Drive (H St. to N side of K St.)

Constructed: 1998

Last Maintenance: Thin Overlay & Fog Seal 1998

Suggested Maintenance for 2022: Crack fill & Patch

Ratings: 2019=90 2020=87 2021=85 **2022=84**

Ninth Drive was one of the many streets targeted this last year by Cascade Natural Gas to upgrade their service lines. This project involved multiple asphalt cuts being made due to the gas mainline and service lines being located under the surface of the street. Any time asphalt must be cut into to accommodate utility installations or improvements, it impacts the overall structural integrity of the street.

Balm St. (S Side of Madison St. to Campbell St.)

Constructed: 1980

Last Maintenance: Chip Seal 2008

Suggested Maintenance for 2022: Crack fill, AC Crack fill & Patch

Ratings: 2019=71 2020=62 2021=62 **2022=57**

This section of Balm Street receives a higher volume of vehicle traffic because of its proximity to Campbell Street- as well as being surrounded by commercial, industrial, and residential uses. This street's rating reflects the perpetual trend seen in aging streets that are beginning to have more significant structural deficiencies. Once the temporary buffer of the chip seal surface begins to wear down, the street's underlying structural deficiencies will again become apparent.



9.04%

of Baker City's Paved Streets

5.52 Miles in 2022

6.57 Miles (10.78%) in 2021

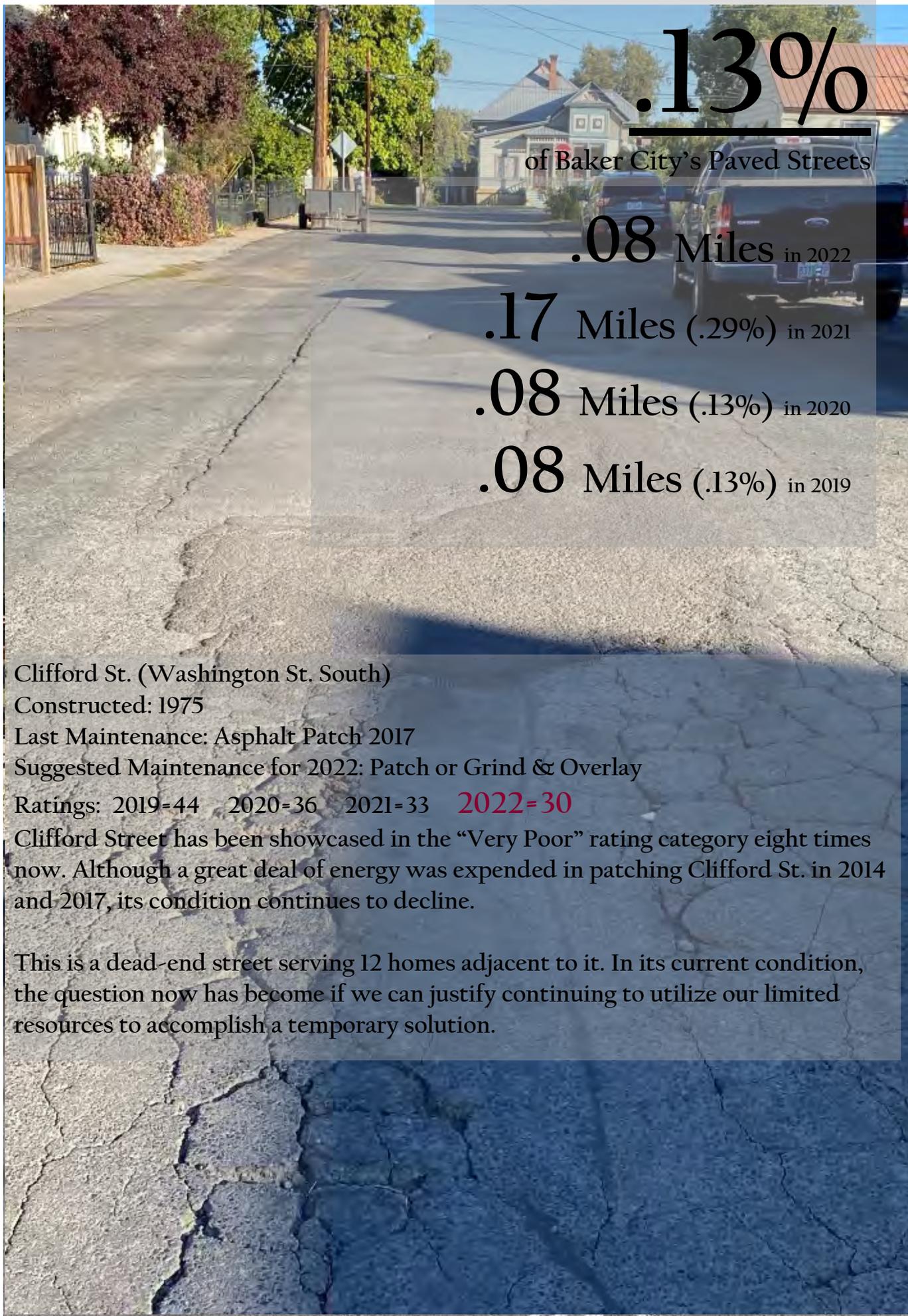
5.58 Miles (9.16%) in 2020

4.53 Miles (7.44%) in 2019

“Poor” Street Condition
Rating Range: 45-69

“Very Poor” Street Condition

Rating Range: 0-44



.13%

of Baker City's Paved Streets

.08 Miles in 2022

.17 Miles (.29%) in 2021

.08 Miles (.13%) in 2020

.08 Miles (.13%) in 2019

Clifford St. (Washington St. South)

Constructed: 1975

Last Maintenance: Asphalt Patch 2017

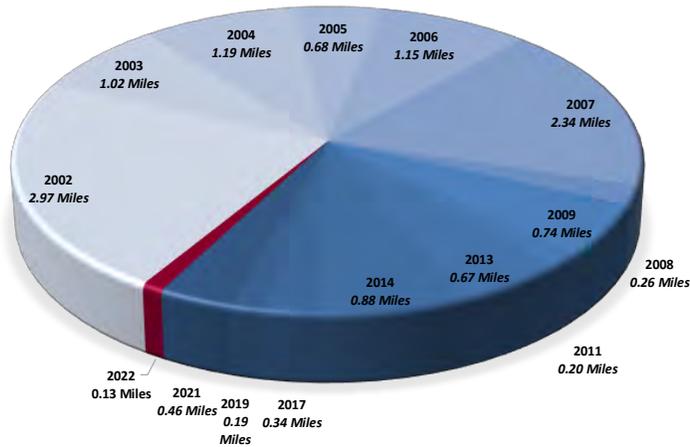
Suggested Maintenance for 2022: Patch or Grind & Overlay

Ratings: 2019=44 2020=36 2021=33 **2022=30**

Clifford Street has been showcased in the “Very Poor” rating category eight times now. Although a great deal of energy was expended in patching Clifford St. in 2014 and 2017, its condition continues to decline.

This is a dead-end street serving 12 homes adjacent to it. In its current condition, the question now has become if we can justify continuing to utilize our limited resources to accomplish a temporary solution.

A Look in Review



The mileage reflected for 2004 has been modified based upon the distances reflected in the street inventory database.

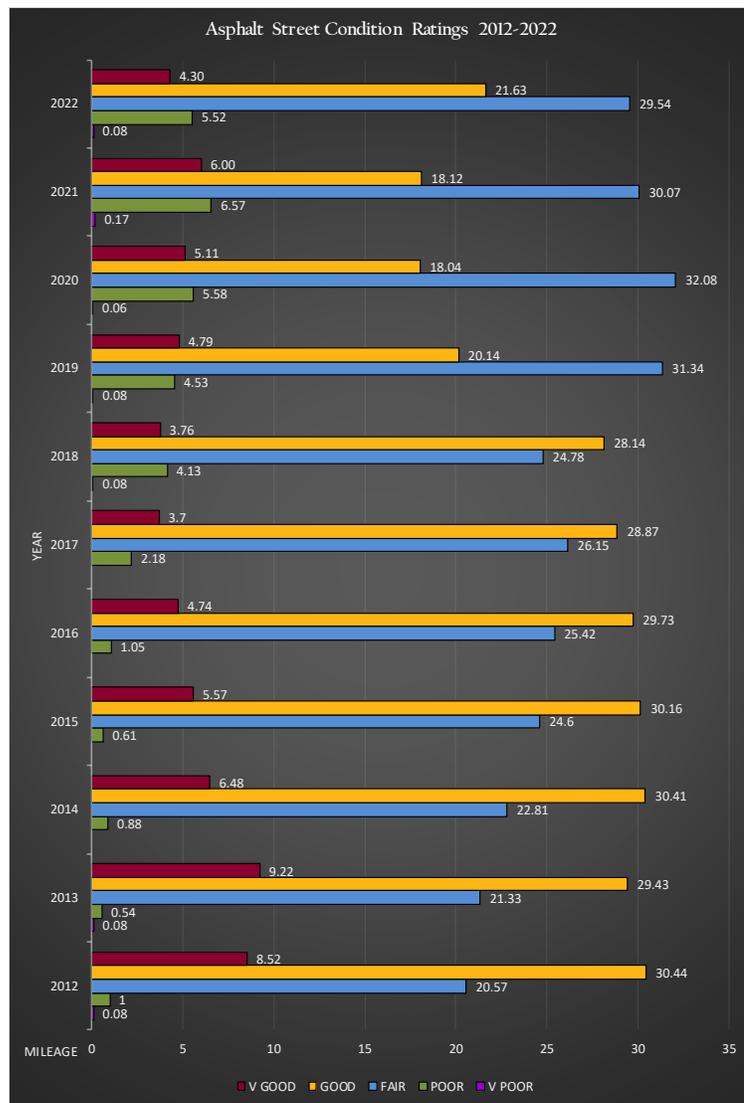
The chart to the left reflects the mileage of new asphalt applied each applicable year for the previous 20 calendar years. “New asphalt” includes streets that have received an overlay, a full-depth reclamation or those that were newly constructed.

In the last 20 years, 13.22 miles of new asphalt has been applied. Approximately 27% (3.54 miles) of that 13.22 miles includes streets that were not overlaid but instead were newly developed either as part of a private subdivision or by the City via various means of public funding to provide better street connectivity.

The new development of E Street (east of Birch St.) has added an additional .13 miles of new asphalt to our transportation infrastructure.

Looking at the diagram to the right you can more clearly see the trend we have been discussing for a number of years - the shift of the “Good” and “Fair” street rating categories. As you can see, the shift began in 2019. The shift was inevitable. Our streets continue to age, maintenance costs continue to escalate, while available funding for maintenance or reconstruction dwindles. As you might guess, this trend will also eventually influence an increase in the total mileage within the “Poor” rating category.

The mileage within the “Very Good” category has a steady ebb and flow. This is generally contributed to street ratings being temporarily boosted after chip seal is applied.



2021 to Now

- VERY GOOD: ↓ -28.33%
- GOOD: ↑ 19.37%
- FAIR: ↓ -1.76%
- POOR: ↓ -15.98%
- VERY POOR: ↓ -52.94%



Karl Ritch & Riley Carter
Wastewater Specialist II & Utility Worker



Blain LeaMaster
Equipment Operator II



Hank Laeger, Draven Pearce & Caden Long
Glass Grid Applied Prior to Asphalt Patch

Deferred Maintenance

As we continue to see the trend of paved streets within the “Fair” category escalate and the number of paved streets within the “Good” category begin to dwindle, we will soon be faced with the reality that we need to re-evaluate how we will manage our street infrastructure. With that in mind, the reality is that our street improvement projects will also continue to dwindle in size because the costs associated with improvements continue to increase.

When streets are re-constructed or overlaid, those projects involve:

- Relocating utilities;
- Curb and gutter improvements;
- Reconstruction of driveway approaches, ADA ramps, and sidewalks.

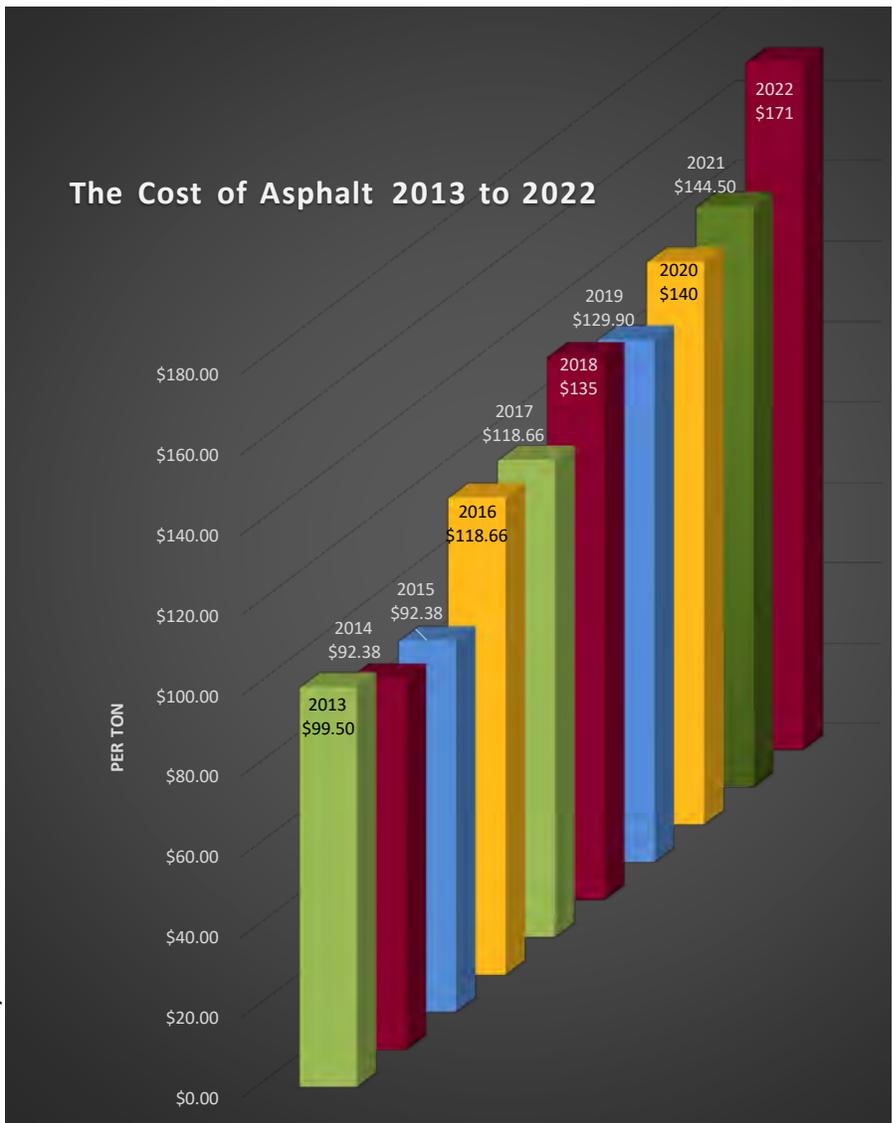
The costs of the tasks listed above also go hand in hand with the fluctuating cost of asphalt, as is illustrated in the graph below. Streets were not overlaid in 2015 & 2018. Asphalt costs for these years were derived by using the average of costs of adjacent years. In 2014 overlays of Best Frontage Rd. and Pocahontas Rd. were completed simultaneously allowing us to purchase asphalt at a lower per-ton rate. The 2020 figure is based on a bid awarded for a wastewater improvement project done that year.

Asphalt costs increased almost 26% between 2021 and 2022. That increase coupled with an estimated increase of 10% in the cost of application of the product is where this year’s rate is derived from.

This year our maintenance focus will entail chip sealing approximately 2.69 miles of paved city streets. Streets recommended for this treatment are those rating within the lower range of the “Good” category as well as streets within the mid “Fair” category.

In years past our focus was to add a chip seal layer to streets that had an annual rating of “93” or less which received a higher volume of vehicle traffic and that had not received a chip seal treatment within the last decade.

Additionally, this year we are planning to move forward on paving the gravel section of Indiana Ave. west of Reservoir Road. In 2021 the Baker City Council deemed this pavement project a priority. Generally, paving projects such as this would be covered within the scope of private development of the surrounding area - at the time subdivisions are created or after a number of homes are constructed within a concentrated area.



Additional Funding Options

City Property Tax and State Gas Tax: The maintenance of our street infrastructure is currently funded by Baker City’s property tax revenue as well as the State of Oregon’s gas tax funds. As you might guess, the current revenue collected is not able to sustain the current or future maintenance needs of our aging transportation system. As the condition of our existing infrastructure continues to decline, the maintenance needs and costs associated with those needs will continue to escalate. Over 57% of our paved streets are currently within the “Fair” and “Poor” street rating categories. A decade ago approximately 36% of our paved streets were within those two categories combined. Fifteen years ago there were no streets within the “Poor” or “Very Poor” street rating categories. At that time approximately 26% of our paved streets were within the “Fair” rating category.

Local Improvement District (LID): An area of public improvement which is created under State of Oregon statutes. These statutes allow for public financing of public improvement projects that benefit private property. An LID is typically used for street and/or sidewalk improvements; however, it can also be used to install wastewater, water, and storm lines. To be included within an LID, the property must receive some benefit from the project. For example, a street improvement project would benefit properties abutting the street. In order to form an LID, a specified minimum percentage (33.34%) of the property owners fronting on, or benefiting from, the proposed improvement must be in favor of the improvement petition.

State Transportation Fund: In the 2021-2023 biennium the Oregon Department of Transportation will collect approximately \$5.1 billion in revenue. Twenty-three percent of that revenue is from the federal government. The remaining funding comes from the following state sources: state fuels tax, taxes on heavy trucks, driver and motor vehicle fees, and Certificates of Participation.

Street User Fee: A fee that is assessed on the utility bills of water/sewer customers. Generally there are two methods of calculating this transportation-related fee, either a flat fee or a more complicated trip generation methodology. Cities using the trip generation methodology establish different rates for different categories of use. Below is an example of the methodology used by the City of Eagle Point.

Utility Rates by Land Use

			Monthly Residential Rate per ADT:				\$0.732
			Monthly Nonresidential Rate per ADT:				\$0.534
ITE Code	Customer Type	Land Use Description	Average Daily Trips	Pass-By Trip Factor	Adjusted ADTs	Units	Monthly Rate Per Unit
30	Truck Terminal	Truck terminals are facilities where goods are transferred between trucks, trucks and railroads or trucks and ports.	9.85	1	9.85	KSF	\$5.26
110	General Light Industrial	Typically less than 500 employees, freestanding and single use. Examples: Printing plants, material testing laboratories, data processing equipment assembly, power stations.	6.97	1	6.97	KSF	\$3.72
130	Industrial Park	Industrial park areas that contain a number of industrial and/or related facilities (mix of manufacturing, service, and warehouse).	6.96	1	6.96	KSF	\$3.72
140	Manufacturing	Facilities that convert raw materials into finished products. Typically have related office, warehouse, research, and associated functions.	3.82	1	3.82	KSF	\$2.04

League of Oregon Cities www.orcities.org

Goals of this Plan

1. Keep most of Baker City's paved streets in the "Very Good" or "Good" categories.

Currently a total of 42.45% of paved streets are within these rating categories. Last year there were 39.59% of streets within these same categories. And in 2021 38.03% of streets were within this bracket. Although this percentage has increased in a positive direction, the reality remains that our aging streets and increasing maintenance needs/costs will continue to challenge this objective from being met.

2. Do not allow any street to remain in the "Poor" category for more than two years.

There are 39 street sections within the "Poor" category this year. Of those 39 sections, ten sections have been within the category for three years; five sections have been placed in this category for four years; three sections have been within this category for five years. Grove Street (S of Washington) has found its home within the "Poor" category for 14 consecutive years.

3. Do not allow any paved street to deteriorate below the "Poor" category.

This is the fifth year Clifford Street has been within the "Very Poor" category. When we look at the overall street maintenance priorities, Clifford Street's current condition would require a great deal of resources to boost it out of this category. As stated on page 8 of this report, this is a dead-end street which serves 12 homes. The number of dwellings it serves and the fact that it is a dead-end street will greatly influence this street section being reconstructed versus other street sections serving a higher volume of vehicle traffic.

4. Increase the percentage of paved streets in the "Very Good" category.

Last year 6 miles of paved streets were within this category. This year there are 4.3 miles of streets within this category. This objective is largely influenced by community growth and streets being constructed through new development or with the assistance of grant program funding. Without new construction, additions to the "Very Good" category are the result of overlay projects or chip sealing of high-rated "Good" streets. Raising the percentage by adding new streets is more indicative of current community growth than the success of the Pavement Management Plan.

Although there is a decline of the total street mileage within this category this year, a new street section was constructed and added into this category in 2022—E Street (east of Birch St.)

5. Monitor deterioration patterns. Recognize future needs and plan to minimize their impact.

We continue to monitor and analyze deterioration patterns in our pavement system. Current and future needs have been identified in past reports. We continue to systematically set priorities and utilize available resources to provide the best use of the taxpayer dollar.

Maintaining Our Infrastructure

Full-Depth Reclamation with Cement (FDR-C)

Full-Depth Reclamation is a rehabilitation strategy that involves in-place recycling of the existing roadway materials. The existing street surface and a portion of the granular base layer is pulverized and then stabilized by introducing Portland cement and water into the recycled mixture. The pulverized layer that has been stabilized with cement becomes the base for the new pavement structure. Two to three inches of new asphalt are then placed on the prepared base to create the finished driving surface. Cold milling of two to three inches of existing asphalt can precede the FDR-C work so that the completed street section matches the original grade, reducing the amount of curbs, driveways, and sidewalks that need to be replaced.



Because FDR-C replaces the asphalt surface and re-stabilizes the base, this treatment is appropriate for use on “Very Poor” to “Good” category streets.

Thin Overlay

Placing a thin asphalt mat, generally 2” - 2 1/2” thick, on an existing asphalt street. An asphalt pre-level mat may be applied prior to the top mat with a motor grader or paving machine. Geosynthetic fabric is often used beneath the overlay to prevent cracks from projecting into the new overlay.



Various combinations of patching, crack filling, grinding, and other rehab work is completed prior to the application. A fog seal or 1/4” -#10 chip seal is applied within two years of the overlay to seal the new asphalt. The degree of surface preparation for an overlay is dependent on the condition and type of the existing pavement. Generally, the existing pavement should be structurally sound, level, clean and capable of bonding to the overlay.

Milling (also called grinding) can be used to smooth pavement prior to overlays. Rather than filling in low spots, milling removes the high points in existing pavement to produce a relatively smooth surface. Milling can help eliminate varying compaction problems. After milling, new asphalt is inlaid at the original asphalt grade, eliminating the need to raise adjacent curbs, sidewalks, and driveways.

“Fair” or “Good” category streets with solid bases are generally targeted for thin overlays.

Maintaining Our Infrastructure



Crack Fill

Filling existing narrow cracks with hot liquid asphalt compound or emulsified asphalt sealer. This seals the crack and keeps moisture from penetrating the asphalt and street base. Wide cracks are filled with a 1/4" mix of hot asphalt compacted into and overlapping the cracks. Sealant is then applied to the surface to effectively fill the crack.



1/4"-#10 Single Chip Seal

An application of emulsified asphalt and a single layer of graded aggregate. The aggregate is usually 1/4" -#10 in size. Patching and crack filling are generally not necessary prior to the chip seal application.

Streets in the "Very Good" and "Good" categories are targeted for this treatment.



3/8"-1/4" Single Chip Seal

An application of emulsified asphalt and a single layer of graded aggregate. The aggregate is usually 3/8"-1/4" in size. Patching and crack filling are completed in preparation of the application.

Streets in the "Good" and "Fair" categories traditionally receive this treatment.



Double Chip Seal

Similar to a single chip seal application, emulsified asphalt is applied, a 3/8"-1/4" chip aggregate is applied, loose rock is swept up, then another coat of emulsified asphalt and 1/4" -#10 chip aggregate is applied over the 3/8"-1/4" layer. Extensive patching is completed prior to the chip seal application.

Streets in the "Good" and "Fair" categories are generally selected to receive this treatment.



Fog Seal

An emulsified asphalt coating is applied to existing asphalt surfaces. The coating seals and rejuvenates the existing asphalt. It is used as preventative maintenance to extend the operational life of a street.

"Good" and "Very Good" rated streets and newly-constructed or overlaid streets are fog sealed. Products used in the past: HFE-901-S, CRF with a sand blotter as well as GSB-88.

2023 Estimated Costs

Revenue for pavement maintenance work comes from the Surface Transportation Program (STP) and Serial Maintenance Levy (now a portion of the property tax base). The crack filling and asphalt patching necessary to prep streets for treatment are funded in the Street Maintenance Department of the State Tax Street Fund and not the Preventative Maintenance Department.

Priority A: This year's proposed street maintenance budget includes doing the necessary preparations of and application of chip seal to approximately 2.69 miles of paved city streets.

Priority B: On May 25, 2021 the City Council reviewed a request from property owners of Boulder Drive, a private drive adjacent to Indiana Ave. The group requested that the City pave Indiana Ave. west of Reservoir Road. Council deferred the matter to the Public Works Advisory Committee for their review.

On June 10th the PWAC reviewed the request. At the conclusion of that meeting, a majority of the PWAC members recommended that the street be fully constructed through a Local Improvement District. PWAC members further recommended that if an LID could not be formed, that the street section remain as it currently is - a gravel street - with annual dust abatement performed. The matter was then brought again before the City Council in June of 2021. The council did not vote on the matter at that time and instead requested staff to poll the impacted property owners regarding the formation of an LID. On July 27, 2021 the matter once again went before the council. At this meeting the majority of the council voted in favor of moving forward with the City solely funding up to \$50,000 towards the Indiana Ave. road improvements. That project is included within this year's improvement costs.

A breakdown of the costs associated with the proposed improvement projects outlined above can be found below.

Priority A: Chip Seal		
Application to Selected City Streets	49,528.1 yd ² @\$	\$ -
Preparing Streets Prior to Application	49,528.1 yd ² @\$	\$ -
Subtotal of Chip Seal Application and Prep:		\$ -
Subtotal for Chip Seal Application:		\$ -
Engineering (10%)		\$ -
Administration (7%)		\$ -
Contingency (10%)		\$ -
2023 Total of Chip Seal Estimated Cost:		\$ -
Priority B: Construction of Indiana Ave. (Reservoir Rd. to Scenic Vista)		
Preparation of Road Surface & Application of Material		Not to Exceed \$50,000
Subtotal of Construction Project:		Not to Exceed \$50,000
2023 Total Estimated Cost of Construction of Section of Indiana Ave.:		\$ 50,000.00



Baker City Public Works Crew 2022

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