2014
PAVEMENT MANAGEMENT PLAN

Maintenance and Rehabilitation Planning

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THE GOAL OF PAVEMENT MANAGEMENT IS...

To improve the overall condition of our community’s paved transportation system, with the limited amount of funding available, by utilizing the most effective street treatments and applying them at the right place and the right time.
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A picture is worth a thousand words. Please take time to review the photos included in this year's addition of the Pavement Management Plan.

That being said, I'll not drone on in this memo about the need for additional funding to maintain the streets we have. The Street Fund revenue comes primarily from the State Gas Tax and from a portion of the Baker City property tax revenue. Neither the gas tax or property tax revenue stream is increasing at the same pace as the cost of street maintenance.

A couple of highlights from 2013 include the reconstruction of Resort Street. This project has been in the works for over a decade, and it finally came together last summer. A portion of the street between Auburn and Campbell had been in the “Poor” category in our street rating system. It is now in the “Very Good” category. The crews also completed an excellent chip seal project, covering 53,500 square yards. In addition, the overlay of E Street from College to 8th Street was completed. The new asphalt and ADA compliant sidewalks and crossings are a huge improvement in the community.

The 2014 projects include a larger chip seal project and a fog seal project to seal the newly reconstructed Resort Street and recent overlay streets – E Street and L Street. The ability to complete an overlay every year is becoming more difficult with the high cost of the required ADA improvements. Money will be set aside this year and put towards an overlay next year.

We will continue to utilize every tool in our street maintenance toolbox to work towards meeting the Pavement Management Plan goals. Thank you for taking the time to be part of the Committee and assist the Public Works Department in maintaining our transportation network.

Sincerely,

Michelle Owen
Director of Public Works
mowen@bakercity.com
541-524-2031
The graph below illustrates the approximate cost to treat every street with the recommended treatment for its condition category for each of the last 10 years. The graph further demonstrates the level of maintenance needed but not funded for each of those years. As you can see, until 2013 these deferred maintenance costs continue to rise. Future years will determine if reduced costs will continue beyond 2013.
Illustrated below is a major contributor to the escalating cost of overlays – the ever increasing cost of asphalt application. Although not demonstrated by this graph, the costs of fog seal and chip seal oils also continue to increase. These combined factors are directly related to our dwindling purchasing power.

**Contract Cost of Asphalt Per Ton Applied**

![Graph showing the cost of asphalt per ton applied from 2004 to 2013.]

Note: Baker City did not overlay streets in 2009, 2010 or 2012. The costs for these years were derived by using the average costs from surrounding years. The 2013 figure shows a significant downward turn in the cost of asphalt. Future projects will determine if this is the trend.
Extending the surface life and improving the condition of our community’s paved streets.
Maintaining Baker City’s existing transportation system at the highest level possible with the funding available.

Program Objectives

1. Keep most of Baker City’s paved streets in the “Very Good” or “Good” categories.
2. Do not allow any street to remain in the “Poor” category for more than 2 years.
3. Do not allow any paved street to deteriorate below the “Poor” category.
4. Increase the percentage of paved streets in the “Very Good” category.
5. Monitor deterioration patterns. Recognize future needs and plan to minimize their impact.

Review of Achievements Toward Objectives

1. The program continues to meet objective number one. Currently 64% of Baker City’s paved streets are in the “Very Good” and “Good” categories. Our ongoing analysis continues to demonstrate that band-aid treatments, like the single chip seal, temporarily elevate or maintain ratings on streets that are otherwise showing a steady decline.

2. There are currently five street sections in the “Poor” category, totaling 54 mile. Last year there was one mile of paved streets within this category. The reconstruction of Resort Street elevated it out of this category, reflecting the bulk of the mileage reduction.

3. Pavement conditions continue to decline, with the overall deterioration continuing to overwhelm our the available resources needed to address the appropriate maintenance. This is the third year Clifford Street is in the “Very Poor” category.

4. Maintaining 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 higher rating “Good” streets. Raising the percentage by adding new streets is more indicative of current community growth than success of the “Pavement Management Plan”. New streets incorporated into the system add increased pavement maintenance responsibilities to the program. Within the last decade, approximately 2.78 miles of paved public streets have been added to the system.

5. 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.

*For those unfamiliar with the program, a detailed explanation of the pavement rating system is provided beginning on page 15*
2014 Maintenance Tasks

Focusing on Program Objectives 1 – 4, street maintenance this year will involve chip sealing almost 5 miles (76,170 yd\(^2\)) and fog sealing .4 miles (8,569 yd\(^3\)) of city streets.

Factors considered when selecting streets for chip seal:

- The street has not been chip sealed since 2007; and
- The street is rated in the lower range of the “Good” category. The “Good” category consists of ratings in the 89 - 97 range; or
- The street is rated in the mid-“Fair” category. The “Fair” category includes ratings in the 70 - 88 range.

\(^2\) See page 18 for a detailed explanation of maintenance procedures
This graph represents the very foundation upon which the Pavement Management Plan was developed. Maintaining streets in the “Fair”, “Good”, and “Very Good” categories provides the citizens of Baker City with the most cost-effective transportation system.

The added cost for required ADA Compliance is not included in these estimated amounts.
# Street Preventative Maintenance

## Estimated Costs - 2014

### 2014 Estimated Project Costs

#### Chip Seal

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Application to City Streets</td>
<td>$255,931.20</td>
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<tr>
<td>(76,170 sq. yd. @ $3.36 sq. yd.)</td>
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<tr>
<td>Preparing Streets Prior to Application</td>
<td>$86,833.80</td>
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<tr>
<td>(76,170 sq. yd. @ $1.14 sq. yd.)</td>
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</tr>
<tr>
<td><strong>Subtotal of Chip Seal Application and Prep</strong></td>
<td><strong>$342,765.00</strong></td>
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#### Fog Seal

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application to City Streets</td>
<td>$2,570.70</td>
</tr>
<tr>
<td>(8,569 sq. yd. @ $.30 sq. yd.)</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal of Fog Seal Application</strong></td>
<td><strong>$2,570.70</strong></td>
</tr>
</tbody>
</table>

### Total for Chip and Fog Seal Applications

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering (10%)</td>
<td>$34,533.57</td>
</tr>
<tr>
<td>Administration (8.3%)</td>
<td>$31,529.15</td>
</tr>
<tr>
<td>Contingency (10%)</td>
<td>$41,139.84</td>
</tr>
<tr>
<td><strong>Subtotal of Engineering, Administration &amp; Contingency</strong></td>
<td><strong>$107,202.56</strong></td>
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</table>

**2014 Preventative Maintenance Estimated Cost**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total for Chip and Fog Seal Applications</strong></td>
<td><strong>$452,538.26</strong></td>
</tr>
</tbody>
</table>

Revenue for pavement maintenance work comes from the Surface Transportation Program (STP) and the Sertal Maintenance Levy (now a portion of the tax base).

The crack filling and asphalt crack 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.
STREETS SELECTED FOR TREATMENT - 2014

STREETS TARGETED FOR TREATMENT

CHIP SEAL

FOG SEAL

The proposed pavement maintenance work for 2014 consists of approximately 100,000 square yards of chip seal and base layer. Some of the fog seal improvements apply to city streets.

2011 PAVEMENT MANAGEMENT PLAN

Page 10
Due to weather conditions in 2001, the annual street inspection was not completed. Partial inspection showed some degradation. In order to conform to the 1996 Transportation Plan, some gravel streets were reclassified.

*The variation in total mileage is due to a correction made to M Street's dimensions as well as the new dimensions of Resort Street.

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4 See page 17 for a detailed explanation of the ratings categories.
This chart illustrates how many feet of new asphalt (original construction or thin overlay) were applied in each calendar year for the last 62 years. The absence of a year or years indicates that new asphalt was not applied that year. The bar labeled 1957 has 15,545 feet (2.94 miles) of streets that were newly paved that year. Those streets represented in those 15,545 feet have not received any substantial asphalt treatment in over 55 years. The average life expectancy for an asphalt street is 20-25 years depending on the time of construction, type of base, etc.

NOTE: Chip seals and fog seals are not considered substantial asphalt surface treatments for the purpose of this illustration.
The street treatment budget in 2004 was $337,000. Treatment tasks accomplished that year included 50 days of crack fill application, asphalt thin overlay application of .91 miles and fog seal application to 4.45 miles of city streets. This year we are proposing to apply chip seal to approximately 76,170 square yards of asphalt surface to an estimated cost of $449,169.54. We are also proposing to apply fog seal to approximately 8,569 square yards of asphalt surface at an estimated cost of $2,370.70.
In the fall of each year, usually around the first of October, a City of Baker City engineering technician drives along each paved city street and conducts an inspection.

During this inspection the following items are analyzed:

- The street’s ride quality;
- Surface cracking;
- Trench settlement; and
- Drainage issues.

Additionally, any other items that affect the street’s structural integrity are noted.

It is through this inspection that each street is rated. The rating assists in determining what maintenance techniques, if any, will be recommended for that street.

Each street is placed into a category by visually 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 visual inspection, are subtracted from 100 to arrive at the rating value for that section. Each category has a range of values. The rated street is placed in the appropriate category based upon the rating value. There are five categories, ranging from “Very Good” to “Very Poor”, used to report the street section’s condition.
# Annual Pavement Rating Form

## Asphalt Pavement Rating Form

<table>
<thead>
<tr>
<th>Street</th>
<th>Zone</th>
<th>Route</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Ave to 2nd Ave</td>
<td>SE</td>
<td>234</td>
<td>288</td>
</tr>
</tbody>
</table>

### Defects

<table>
<thead>
<tr>
<th>Type</th>
<th>Rating/Instructions</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transverse Cracks</td>
<td>Rate 0 - 10 (10= Major Crack at 25' intervals)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Cracks</td>
<td>Rate 0 - 5 (5= Joint Cracks Full Length of Block)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Alligator Cracks</td>
<td>Rate 0 - 60 (60= 100% of Road Surface)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Shrinkage</td>
<td>Rate 0 - 60 (60= 100% of Road Surface)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Subtotal Crack defect ratings (cannot exceed 60)

### Other Defects

<table>
<thead>
<tr>
<th>Type</th>
<th>Rating/Instructions</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trench Settlement or Bad Patching</td>
<td>Rate 0 - 10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Pot Holes</td>
<td>Rate 0 - 5 (5= Five per Block)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deficient Drainage</td>
<td>Rate 0 - 5</td>
<td>3</td>
<td>curb failure</td>
</tr>
<tr>
<td>Base Failure</td>
<td>Rate 0 - 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Defects</td>
<td>Rate 0 - 10 (corrugated, Raveling, Rutting)</td>
<td>2</td>
<td>Hoarding</td>
</tr>
</tbody>
</table>

Subtotal Other Defects Ratings (cannot exceed 60) 15

### Overall Ride Quality

<table>
<thead>
<tr>
<th>Type</th>
<th>Instructions</th>
<th>Quantity</th>
<th>Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transverse Crack 1 Noticed/50'</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patch or Settlement 1 Noticed/100'</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subtotal Ride Quality Ratings (Add to overall 20) 20

Overall Ride Quality Corrected Rating (Use subtotal above) 18

### Suggested Maintenance

<table>
<thead>
<tr>
<th>Overlay</th>
<th>DCH</th>
<th>Crackfill 1st Priority</th>
<th>Crackfill 2nd Priority</th>
<th>Asphalt Crackfill</th>
<th>Grind and Overlay</th>
<th>Fog Seal</th>
<th>Patching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Condition Rating

<table>
<thead>
<tr>
<th>Possible Points</th>
<th>100</th>
<th>Defects</th>
<th>Rating</th>
<th>2012 Rating</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td>65</td>
</tr>
</tbody>
</table>

Categories:

- Very Good
- Good
- Fair
- Poor
- Very Poor

<table>
<thead>
<tr>
<th>100 - 93</th>
<th>97 - 89</th>
<th>88 - 70</th>
<th>69 - 45</th>
<th>44 - 0</th>
</tr>
</thead>
</table>

Other Comments:

- Adequate

Ride Quality Conversion Chart

<table>
<thead>
<tr>
<th>Ride Quality</th>
<th>Defect Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>1</td>
</tr>
<tr>
<td>7 - 12</td>
<td>2</td>
</tr>
<tr>
<td>13 - 17</td>
<td>3</td>
</tr>
<tr>
<td>18 - 25</td>
<td>4</td>
</tr>
</tbody>
</table>
Very Good

Definition: Stable, no more than an occasional crack, excellent ride qualities. These streets usually have been constructed or overlaid recently. Recommended treatments are fog seal or ¼"-#10 chip seal to prevent oxidation and possibly minor crack filling. Currently 15.21% of Baker City’s asphalt streets are in this category.

Rating Range 98 - 100

Good

Definition: Stable, good ride qualities. Distress characteristics may include: grey or light-colored appearance (due to oxidation), some transverse and longitudinal cracking, and possibly isolated trench settlement. Recommended treatments are crack filling, fog seal, chip seal, and possibly thin overlay. Currently 48.56% of Baker City’s asphalt streets are in this category. In 2012 50.22% of asphalt streets were in this category, and that percentage in 2011 was 53.01%.

Rating Range 89 - 97

Fair

Definition: Generally stable, though minor areas of structural weakness may be evident. Ride qualities are good to fair. Distress characteristics may include: transverse, longitudinal, and occasional alligator cracking, trench settlement, or drainage deficiencies. Recommended treatment is extensive patching and chip seal application or thin overlay. Streets within this category currently comprise 35.2% of the total paved street inventory.

Rating Range 70 - 88

Poor

Definition: Areas of instability with evidence of structural deficiency. Ride qualities range from fair to poor. Distress characteristics may include transverse, longitudinal, alligator, and shrinkage cracking. Trench settlement and drainage deficiencies will also be evident. If the street base is in such condition that rehabilitation is possible, an overlay is recommended; otherwise street reconstruction is necessary. The first two treatments would require extensive crack filling and patching. With the reconstruction of Resort Street, the percentage of streets within this category is down from last year - now at .89% compared to 1.65% in 2012.

Rating Range 45 - 69

Very Poor

Definition: Many areas of instability with obvious structural deficiencies. Ride qualities are very poor. Distress characteristics will mostly be alligator and shrinkage cracking with potholes, extensive trench settlement, and drainage deficiencies. Cost of continually maintaining the pavement in acceptable condition exceeds available maintenance funds. Although the recommended treatment is to perform emergency maintenance only, and to schedule reconstruction as soon as possible, with current funding constraints we now have to look at other factors such as traffic flow, and balance the need vs. utilizing funds to perform preventative maintenance work on an arterial or collector street. One public street is currently in this category, comprising of .13% of the total paved street system. This is the third year Clifford Street has been in this category.

Rating Range 0 - 45
Crack Fill
This work consists of filling existing narrow cracks with a hot liquid asphalt compound or emulsified asphalt sealer (CRF). 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, then sealant is applied to the surface to effectively fill the crack.

Thin Overlay
This work consists of placing a thin asphalt mat, generally one and one-half inches 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. Patching, crack filling, and other rehabilitation work are completed in preparation for this procedure. A fog seal or 1/4"-#10 chip seal is applied within two years of the overlay work in order to seal the new asphalt. “Fair” or “Good” category streets with solid bases are generally targeted for thin overlays.

1/4’’-10’’ Single Chip Seal
This work consists of an application of emulsified asphalt and a single layer of graded aggregate. Aggregate is usually 1/4’’-#10. Patching and crack filling are not generally necessary for this work. Streets in the “Very Good” and “Good” categories are targeted for this treatment.

3/8”-1/4” Single Chip Seal
This work consists of an application of emulsified asphalt and a single layer of graded aggregate. Aggregate is usually 3/4”-1/4” in size. Patching and crack filling are done in preparation for this work. Streets in the “Fair” and “Good” categories are traditionally single chip sealed using this procedure.

Double Chip Seal
This work is similar to the single chip seal. Usually a 3/4”-1/4” chip aggregate is applied, loose rock swept up, then a 1/4”-#10 chip aggregate is applied over the 3/4”-1/4” layer. Extensive patching is completed prior to any chip seal application. This procedure is generally used on streets in the “Fair” to “Good” categories.

Fog Seal
This work consists of an emulsified asphalt coating applied to the existing asphalt surface. The coating seals and rejuvenates the existing asphalt. This process is a preventative maintenance procedure which extends the operational life of the street. “Good” and “Very Good” streets are fog sealed, as well as any newly constructed or overlaid streets. Products used in the past have included CRF with a sand blotter, and GSB-88.
Resort Street (Auburn Ave. - Washington St.)

"Very Good" - Rated 100  Constructed in 2013

Reconstructed in 2013, Resort Street is making its debut in this category! Resort Street is classified as a collector street in the Transportation System Plan, as it receives a high volume of vehicle traffic in the downtown area.

Resort Street was originally constructed in 1953. Prior to 2013, it shared its place of being the widest street in Baker City (60' wide) with Main Street (Campbell St. to B St.). It is now 52' wide.

Previous Ratings:
2010: 57  2011: 57  2012: 56

Fifth Street (Grace St. - Carter St.)

"Very Good" - Rated 99  Constructed in 1982

Having recently received a chip seal facelift, Fifth Street’s ratings recently skyrocketed from “82” in 2012 to “99” this year. Previously it held its rating in the “Fair” category for five years.

This is one route available to those dropping off students at South Baker Elementary, although it generally serves the surrounding residences.

Previous Ratings:
**Street Condition “good”**

**Church Street (9th St. - 4th St.)**

"Good" - Rated 96    Constructed in 1970

This section of Church Street received a chip seal application in 2012, which significantly boosted its previous rating of “86” to “98” in 2012.

As is to be expected, as time goes on and the street continues to be utilized, we will once again begin seeing the standard surface wear. The majority of traffic found on this portion of Church Street is produced from vehicles accessing the surrounding commercial area.

Previous Ratings:

**8th Drive (H St. - N. side K St.)**

"Good" - Rated 89    Constructed in 1957

8th Drive is targeted to be chip sealed this year. Constructed in 1957, 8th Drive has previously received two fog seal treatments in 1998 & 1994, a thin overlay in 1995, chip sealed in 1988 and double chip sealed in 1982.

This is a local residential street, with the majority of its usage stemming from the surrounding homes.

Previous Ratings:
Oak Street (Campbell St. - Cedar St.)

“Fair” - Rated 83  Constructed in 1985

Although Oak Street is a local street, it connects Cedar and Campbell Streets and is frequently used by drivers when traveling to or from the adjacent commercial area.

This section of Oak Street has only been in the “Fair” category for the last 2 years. It received a fog seal surface treatment in 2003 and is scheduled to be chip sealed this year.

Previous Ratings:
2010: 89  2011: 82  2012: 82

Balm Street (Auburn Ave. - Washington St.)

“Fair” - Rated 86  Constructed in 1973

This is Balm Street’s first appearance in the “Fair” category. Its rating has held steady in the “Good” category (rating range 89-97) since 1999. Balm Street serves the surrounding residential neighborhoods.

Some of its previous surface treatments have included fog sealing in 1996 and 2004. It was also chip sealed in 1992.

Previous Ratings:
2010: 89  2011: 90  2012: 91
Street Condition “Poor” & “Very Poor”

B Street (10th St. - 9th St.)

“Poor” - Rated 69    Constructed in 1969

Because of its proximity to 10th Street (State Highway 30), this section of B Street provides both access to the surrounding residential and commercial areas. It may also receive slightly higher volumes of traffic due to its proximity to North Baker Elementary School.

This section of B Street has been in the “Poor” category for the last 2 years.

Previous Ratings:

2010: 73  
2011: 70  
2012: 68

Clifford Street (Washington St. - South)

“Very Poor” - Rated 40    Constructed in 1975

Clifford Street provides local access to 13 residences and terminates at a cul-de-sac approximately 402 feet south of Washington Avenue.

This is Clifford Street’s third consecutive year of being in the “Very Poor” category. Previous maintenance includes fog sealing in 1991 & 1996, crack filling in 1990 and chip seal in 1986.

Ratings:

2010: 47  
2011: 43  
2012: 42