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## MEMORANDUM

TO: Town Of Foxfield  
FROM: Erica Olsen, PE  
DATE: May 10, 2018  
RE: Foxfield Roadway 2018 Update  
SEH No. 145229 14.00

This memo summarizes the Town of Foxfield's pavement maintenance program since 2012, provides recommendations for 2018 pavement maintenance program and initial planning for future years.

### **Background**

From 2003 when the Town streets were paved, until 2012 the Town of Foxfield maintained streets through an annual crack sealing and patching program. In 2012 the Town contracted with Terracon to conduct a field investigation and develop a pavement condition index of your ten miles of streets. A Pavement Condition Index (PCI) is a numerical scale from 1-100 by which pavement condition is rated either very poor, poor, good, very good or excellent. At that time all streets were rated fair or better, which is to be expected for properly constructed pavement less than 10 years old. At that time the Town decided to develop a more formal pavement management program for treatments to maintain your pavement condition at fair (PCI of 55) or better.

In the summer of 2012 SEH conducted an evaluation of the roadways and ranking based on the PCI, traffic level and field observations. We provided a multi-year program to chip seal all streets. Chip seal provides a first line of defense for an on-going program improving the wearing ability of roadways, extending the pavement life and reducing cracking. It is about 15% of the cost of an overlay and is appropriate for roadways in fair condition. The initial program was three years, however the Town chose to chip seal all streets over two summers in 2013 and 2014. Prior to chip seal placement failing areas were patched, larger cracks (over ¼ inch wide) were milled and patched, and crack seal material was placed. Two different sizes of chip (1/4" or 3/8") were then placed, depending on the level of traffic on the street.

Since the initial chip seal program of 2013/14, patching of failing areas, crack patching and crack sealing have continued over the past four years as part of the Town's annual maintenance program.

### **Recommended 2018 Pavement Maintenance Program**

As requested, and periodically when SEH is on site for Town development inspections, we have observed and noted locations where pavement is failing or excessive cracking is occurring. Needed repairs are identified, inventoried and included as part of the work performed annually by your pavement maintenance contractor, Straight Line Sawcutting, Inc. They also provide the annual hot tar crack sealing for the Town. To establish recommendations for the 2018 maintenance program, a visual inspection was completed by SEH. As expected, the number and severity of cracking has increased with the age of the pavement. This finding reflects typical wear and tear and general aging of the pavement surface. The visual inspection of the roadways does also include the Town's concrete

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drainage cross pans. During the 2018 inspection no cross pans were identified as needing maintenance or replacement at this time, and SEH did not witness any critical pavement areas warranting emergency repairs.

At the Town's request, SEH identified, inventoried and provided a list of recommended pavement crack patch and crack seal locations on Town streets to Straight Line Sawcutting. The Town additionally requested pricing to install three (3) asphalt speed humps for traffic calming purposes on Town streets. SEH solicited a cost estimate proposal. Straight Line anticipates completing the work this summer and fall, pending Town approval. Please see the attached Straight Line proposal estimate (**Exhibit A**) for your consideration. Please refer to the attached map (**Exhibit B**) identifying locations for proposed repairs, while **Exhibit C** provides specific estimates of crack length by location and a tabulation of total work. The estimated total 2018 maintenance and speed hump estimate is \$69,374.30.

### **Roadway Surfacing: Chip Seal Program and Mill and Overlay – 2019 and Beyond**

Typically chip seal treatment has a useful life of 5-10 years. Since the Town is near the end of the typical useful life for the chip seal treatment that occurred in 2013 and 2014, SEH recommends the Board consider including a pavement improvements and a chip seal program in the 2019 (and/or beyond) budget. The provided mapping (**Exhibit B**) indicates three general levels of noted roadway condition – areas exhibiting advanced, moderate and minor or no structural defects. Structural defect areas should be repaired prior to the reapplication of chip seal.

Streets wear differently depending on the traffic volumes and type of vehicles using the streets. For this reason field observation and assessment provides value instead of just assuming all streets wear the same and the program should match the initial program from 2013 and 2014. Also, unless at least one quarter (2.5 miles) of your streets require a new chip seal it may not be cost effective for a contractor to bid the work because of staging and mobilization costs (this could also depend on other work in the area).

During SEH's field review of the Town's streets for the 2018 maintenance program, we also noted the condition of the existing chip seal, as well as locations showing visible signs of distress and aging. As noted above, wear is not uniform. Vehicle speed, stopping distance, turn movements and weight impact chip seal and the underlying pavement. Visible signs of wear to the chip seal include raveling (aggregate chip no longer binds to the mat and loosely sits on the surface), and the more severe road surface polishing (aggregate chip has become dislodged and is no longer on the surface providing protection). Pavement deterioration, such as rutting, pumping and linear and "alligator" cracking can signify excessive vehicle loading or subsurface issues, or simply the natural breakdown of the pavement due to aging. There are a few areas where the roadway is experiencing "alligator cracking". This is not uncommon, but may be an indication of damage to the asphalt or subbase. In these areas SEH recommends removal of the asphalt, replacement and/or recompaction of the subgrade, and replacement with an asphalt patch.

A few areas are experiencing higher crack counts which cannot be corrected with the chip seal. In these areas we recommend the top 1" of asphalt be milled, potholes and cracks patched, then placement of asphalt overlay. This is more expensive but also longer lasting than chip seal. On the map these areas are referred to as Advanced Structural Defects Detected.

SEH recommends phasing the work based on the roadway condition level, with further refinement based on Town annual program budgets. After Town input, chip seal programming areas can be divided into locations requiring 1/4" or 3/8" chip, depending on anticipated wear factors for a final program, along with further refinement for limits of work. The chip seal program can occur over two years or be spread over a longer period depending on the Town budget. The estimated total for all Town roadways

to be chip sealed is approximately \$650,000. The estimated total for the recommended mill & overlay areas is \$150,000.

A pavement program of this size is a sizeable expense and investment that requires planning and financial forecasting. For initial discussion, we have assumed an aggressive programming schedule that addresses both underlying pavement condition first, and chip seal to follow in 2019. Programming for 2020, then assumes a phased chip seal program. Areas of concern will also need to be addressed as they arise. We realize this program is likely to be spread out, and will work with the Town to provide a thoughtful schedule that meets your needs. **Exhibit C** provides a more detailed breakdown of your areas of need, including small patching repairs, areas needing larger mill and overlay efforts, and recommended chip seal for general planning purposes only. With input, direction, and approval of the Town we will develop the 2019 Pavement Surfacing Program so that bidding can occur in mid-winter of 2018 for 2019 work to get the best prices, since that's when most communities bid their pavement management work.

CC: Rick Coldsnow, Scott Jardine.

Attachments:

Exhibit A: 2018 Crack Seal, Crack Patch, and Speed Hump Bid from Straight Line Sawcutting

Exhibit B: 2018 Roadway Assessment Map

Exhibit C: Pavement Maintenance Program Forecast

**STRAIGHT LINE**  
**INC.**

**Estimate**

**SAWCUTTING**  
*A Complete Concrete and Asphalt Company*

|           |            |
|-----------|------------|
| Date      | Estimate # |
| 5/10/2018 | 14436      |

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TOWN OF FOXFIELD  
ERICA OLSEN  
2000 S. COLORADO, BLVD., SUITE 6000  
DENVER, CO. 80222

|       |                    |
|-------|--------------------|
| Rep   | Project            |
| Bruce | STREET MAINTENANCE |

| Item           | Description   | Qty    | Cost   | Total     |
|----------------|---|--------|--------|-----------|
|                | STREET MAINTENANCE  |        |        |           |
| ASPHALT        | PREP AND INSTALL 3 SPEED HUMPS AS DIRECTED.   | 3      | 450.00 | 1,350.00  |
| CRACK FILLI... | CLEAN AND CRACK FILL 51,880 L.F. OF CRACKS IN THE ASPHALT WITH HOT RUBBERIZED CRACK FILLER.   | 51,880 | 0.62   | 32,165.60 |
| ASPHALT        | MILL 810 L.F. OF LARGE CRACKS, 18" WIDE X 2" DEPTH, FILL THE CRACKS WITH ASPHALT, APPLY 12" WIDE GEOTAC AND PATCH BACK WITH HOT MIX ASPHALT | 810    | 44.27  | 35,858.70 |
|                | THANKS.<br>BRUCE  |        |        |           |

THANK YOU FOR THE OPPORTUNITY. This estimate does not include testing, permits, bonding, traffic control, certified wages. No warranty on drainage under 1.5%.

|              |                    |
|--------------|--------------------|
| <b>Total</b> | <b>\$69,374.30</b> |
|--------------|--------------------|

Customer Signature \_\_\_\_\_



| Town of Foxfield<br>Pavement Maintenance Program Forecast |                 |            |                                 |                |                |      |    |                      |                            |                       |                      |                     |                            |                                       |                                     |                                 |
|---|-----------------|------------|---------------------------------|----------------|----------------|------|----|----------------------|----------------------------|-----------------------|----------------------|---------------------|----------------------------|---------------------------------------|-------------------------------------|---------------------------------|
| District  | Number of Lanes | Lane Miles | Street                          | From           | To             | L    | W  | Additional Area (SF) | Total Pavement Area (S.Y.) | Crack Patch 2018 (LF) | Crack Seal 2018 (LF) | Crack Seal 2018 Ton | Small Patch 2018/2019 (SY) | Proposed Mill and Overlay 2019 (S.Y.) | Proposed Chip Seal 2019/2020 (S.Y.) | Proposed Chip Seal 2020+ (S.Y.) |
| 1   | 2               | 0.116      | E Fremont Ave                   | S Buckley Rd   | E end CDS      | 305  | 24 | 426                  | 861                        |                       | 80.69                | 0.004               |                            |                                       |                                     | 861                             |
| 1   | 2               | 0.074      | S Pitkin St (South End of Site) | E Hinsdale Ave | S end CDS      | 195  | 16 | 324                  | 383                        |                       | 53.81                | 0.003               |                            |                                       |                                     | 383                             |
| 1   | 2               | 0.475      | S Buckley Rd                    | E Arapahoe Rd  | E Costilla Ave | 1255 | 25 | -                    | 3,486                      |                       | 1,568.75             | 0.084               |                            |                                       | 3,486                               |                                 |
| 1   | 2               | 0.509      | S Buckley Rd                    | E Costilla Ave | E Easter Ave   | 1345 | 25 | -                    | 3,736                      | 75.00                 | 1,681.25             | 0.090               |                            |                                       | 3,736                               |                                 |
| 1   | 2               | 0.511      | S Buckley Rd                    | E Easter Ave   | E Hinsdale Way | 1350 | 25 | -                    | 3,750                      | 25.00                 | 1,687.50             | 0.090               |                            |                                       | 3,750                               |                                 |
| 1   | 2               | 0.364      | E Davies Ave (East End of Site) | S Waco St      | S Yampa Ct     | 960  | 25 | 391                  | 2,710                      |                       | 1,219.55             | 0.065               | 46.00                      | 2,710                                 |                                     |                                 |
| 1   | 2               | 0.362      | S Yampa Ct                      | E Davies Ave   | E Easter Ave   | 955  | 25 | 750                  | 2,736                      |                       | 1,231.25             | 0.066               | 15.00                      | 2,736                                 |                                     |                                 |
| 1   | 2               | 0.227      | Norfolk Ct                      | N end CDS      | E Costilla Ave | 600  | 24 | 4,657                | 2,117                      | 24.00                 | 992.53               | 0.053               |                            |                                       | 2,117                               |                                 |
| 1   | 2               | 0.701      | S Richfield St                  | E Arapahoe Ave | E Davies Ave   | 1850 | 25 | -                    | 5,139                      |                       | 2,312.50             | 0.123               |                            |                                       | 5,139                               |                                 |
| 1   | 2               | 0.309      | S Richfield St                  | E Davies Ave   | E Easter Ave   | 815  | 25 | -                    | 2,264                      |                       |                      |                     |                            |                                       |                                     |                                 |
| 1   | 2               | 0.877      | S Richfield St                  | E Easter Ave   | E Hinsdale Pl  | 2315 | 25 | -                    | 6,431                      |                       | 2,893.75             | 0.154               |                            |                                       | 6,431                               |                                 |
| 1   | 2               | 0.134      | S Richfield St                  | E Hinsdale Ave | City Limits    | 355  | 25 | 160                  | 1,004                      |                       | 451.75               | 0.024               |                            |                                       | 1,004                               |                                 |
| 1   | 2               | 0.108      | S Salida St Cul-de-sac          | S Salida St    | E end CDS      | 285  | 24 | 3,958                | 1,200                      |                       | 562.38               | 0.030               |                            |                                       | 1,200                               |                                 |
| 1   | 2               | 0.108      | E Fremont Ave Cul-de-sac        | S Buckley Rd   | E End CDS      | 285  | 25 | 5,070                | 1,355                      | 25.00                 | 121.95               | 0.007               |                            |                                       |                                     | 1,355                           |
| 1   | 2               | 0.150      | S Quintero Cir                  | N end CDS      | E Hinsdale Ave | 395  | 24 | 4,778                | 1,584                      |                       | 742.62               | 0.040               |                            |                                       | 1,584                               |                                 |
| 1   | 2               | 0.765      | S Waco St                       | E Arapahoe Rd  | E Easter Ave   | 2020 | 25 | 19,445               | 7,772                      |                       | 3,497.23             | 0.187               |                            |                                       | 7,772                               |                                 |
| 1   | 2               | 0.170      | S Norfolk St                    | N end CDS      | E Costilla Ave | 450  | 24 | 2,376                | 1,464                      |                       | 137.25               | 0.007               |                            |                                       |                                     | 1,464                           |
| 1   | 2               | 0.886      | S Norfolk St                    | E Costilla Ave | E Easter Ave   | 2340 | 24 | -                    | 6,240                      | 96.00                 | 585.00               | 0.031               |                            |                                       | 6,240                               |                                 |
| 1   | 2               | 0.473      | S Pitkin St (North End of Site) | E Arapahoe Rd  | E Costilla Ave | 1250 | 24 | -                    | 3,333                      |                       | 1,562.50             | 0.083               |                            |                                       | 3,333                               |                                 |
| 1   | 2               | 0.121      | E Costilla Ave                  | W end CDS      | S Norfolk St   | 320  | 24 | 300                  | 887                        |                       | 83.13                | 0.004               |                            |                                       |                                     | 887                             |
| 1   | 2               | 0.489      | E Costilla Ave                  | S Norfolk St   | S Buckley Rd   | 1290 | 25 | -                    | 3,583                      | 25.00                 | 1,612.50             | 0.086               |                            |                                       | 3,583                               |                                 |
| 1   | 2               | 0.258      | E Costilla Ave                  | S Buckley Rd   | S Pitkin St    | 680  | 24 | 132                  | 1,828                      |                       | 856.88               | 0.046               | 1,828                      |                                       |                                     |                                 |
|   | 2               | 0.285      | S Hinsdale Ave                  | S Buckley Rd   | S Pitkin St    | 1502 | 24 | -                    | 4,005                      | 24.00                 |                      |                     |                            |                                       |                                     |                                 |
| 1   | 2               | 0.928      | E Hinsdale Ave                  | S Pitkin St    | S Richfield St | 2450 | 24 | 792                  | 6,621                      |                       | 3,103.75             | 0.166               |                            |                                       | 6,621                               |                                 |
| 1   | 2               | 1.110      | E Hinsdale Ave                  | S Richfield St | S Yampa St     | 2930 | 25 | 192                  | 8,160                      |                       | 734.42               | 0.039               |                            |                                       |                                     | 8,160                           |
| 1   | 2               | 0.267      | E Hinsdale Ave                  | S Yampa St     | City Limits    | 705  | 26 | 245                  | 2,064                      |                       | 178.60               | 0.010               |                            |                                       |                                     | 2,064                           |
| 1   | 2               | 0.502      | S Salida St                     | N end CDS      | E Davies Ave   | 1325 | 24 | 4,072                | 3,986                      |                       | 1,868.31             | 0.100               |                            |                                       | 3,986                               |                                 |
| 1   | 2               | 0.492      | E Davies Ave                    | S Norfolk St   | S Buckley Rd   | 1300 | 25 | 864                  | 3,707                      | 50.00                 | 333.64               | 0.018               |                            |                                       |                                     | 3,707                           |
| 1   | 2               | 0.566      | E Davies Ave                    | S Buckley Rd   | S Richfield St | 1495 | 25 | 988                  | 4,263                      | 50.00                 | 1,918.15             | 0.102               |                            |                                       | 4,263                               |                                 |
| 1   | 2               | 0.966      | E Davies Ave                    | S Richfield St | S end CDS      | 2550 | 25 | 4,657                | 7,601                      | 25.00                 | 3,420.33             | 0.182               | 53.00                      | 7,601                                 |                                     |                                 |
| 1   | 2               | 0.489      | E Easter Ave                    | S Norfolk St   | S Buckley Rd   | 1290 | 25 | -                    | 3,583                      | 25.00                 | 1,612.50             | 0.086               |                            |                                       | 3,583                               |                                 |
| 1   | 2               | 0.627      | E Easter Ave                    | S Buckley Rd   | S Richfield St | 1655 | 25 | -                    | 4,597                      |                       | 2,068.75             | 0.110               |                            |                                       | 4,597                               |                                 |
| 1   | 2               | 0.879      | E Easter Ave                    | S Richfield St | S Waco St      | 2320 | 24 | -                    | 6,187                      | 48.00                 | 2,900.00             | 0.155               |                            |                                       | 6,187                               |                                 |
| 1   | 2               | 0.498      | E Easter Ave                    | S Waco St      | City Limits    | 1315 | 24 | 160                  | 3,524                      | 24.00                 | 1,652.08             | 0.088               |                            |                                       | 3,524                               |                                 |
| 1   | 2               | 0.686      | E Easter Way                    | E Easter Ave   | S Buckley Rd   | 1810 | 24 | 756                  | 4,911                      |                       | 460.38               | 0.025               |                            |                                       |                                     | 4,911                           |
| 1   | 2               | 0.076      | E Easter Ct                     | E Easter Way   | E end CDS      | 200  | 24 | 3,978                | 975                        |                       | 91.44                | 0.005               |                            |                                       |                                     | 975                             |
| 1   | 2               | 0.233      | E Hinsdale Pl                   | S Richfield St | E end CDS      | 615  | 24 | 4,634                | 2,155                      | 48.00                 | 1,010.10             | 0.054               |                            |                                       | 2,155                               |                                 |
| 1   | 2               | 0.242      | S Telluride Ct                  | N end CDS      | E Hinsdale Ave | 640  | 24 | 4,951                | 2,257                      | 24.00                 | 211.57               | 0.011               |                            |                                       |                                     | 2,257                           |
| 1   | 2               | 0.125      | E Glasgow Pl                    | S Yampa St     | E end CDS      | 330  | 25 | 3,551                | 1,311                      |                       | 118.01               | 0.006               |                            |                                       |                                     | 1,311                           |
| 1   | 2               | 0.367      | S Sedalia St                    | E Davies Ave   | E Easter Ave   | 970  | 25 | 864                  | 2,790                      |                       | 1,255.70             | 0.067               |                            |                                       | 2,790                               |                                 |
| 1   | 2               | 0.722      | S Sedalia St                    | E Easter Ave   | S Richfield St | 1905 | 25 | 864                  | 5,388                      | 50.00                 | 484.89               | 0.026               |                            |                                       |                                     | 5,388                           |
| 1   | 2               | 0.468      | S Uravan Ct                     | E Easter Ave   | S end CDS      | 1235 | 25 | 4,517                | 3,932                      | 25.00                 | 353.92               | 0.019               |                            |                                       |                                     | 3,932                           |
| 1   | 2               | 0.367      | S Telluride St                  | E Davies Ave   | E Easter Ave   | 970  | 25 | 864                  | 2,790                      | 25.00                 | 251.14               | 0.013               |                            |                                       |                                     | 2,790                           |
| 1   | 2               | 0.619      | S Quintero St                   | E Easter Ave   | S Richfield St | 1635 | 25 | 576                  | 4,606                      | 50.00                 | 414.51               | 0.022               |                            |                                       |                                     | 4,606                           |
| 1   | 2               | 1.019      | S Yampa St                      | E Easter Ave   | E Hinsdale Ave | 2690 | 24 | -                    | 7,173                      | 48.00                 | 672.50               | 0.036               |                            |                                       |                                     | 7,173                           |
| 1   | 2               | 0.110      | E Geddes Pl                     | W end CDS      | S Yampa St     | 290  | 24 | 3,521                | 1,165                      |                       | 545.90               | 0.029               |                            |                                       | 1,165                               |                                 |
| 1   | 2               | 0.103      | E Geddes Pl                     | S Yampa St     | E end CDS      | 272  | 24 | 4,518                | 1,227                      |                       | 115.06               | 0.006               |                            |                                       |                                     | 1,227                           |
| 1   | 2               | 0.106      | E Fremont Pl                    | W end CDS      | S Yampa St     | 280  | 24 | 4,401                | 1,236                      |                       | 115.84               | 0.006               |                            |                                       |                                     | 1,236                           |
| 1   | 2               | 0.108      | E Fremont Pl                    | S Yampa St     | E end CDS      | 285  | 24 | 3,626                | 1,163                      | 24.00                 | 109.02               | 0.006               |                            |                                       |                                     | 1,163                           |
| 1   | 2               | 0.123      | E Briarwood Pl                  | S Waco St      | E end CDS      | 325  | 25 | 4,522                | 1,405                      |                       | 126.47               | 0.007               |                            |                                       |                                     | 1,405                           |
| 1   | 2               | 0.108      | E Easter Pl                     | W end CDS      | S Uravan Ct    | 285  | 25 | 3,897                | 1,225                      |                       | 110.22               | 0.006               |                            |                                       |                                     | 1,225                           |
| TOTALS  |                 |            |                                 |                |                |      |    |                      | 177,870.01                 | 810.00                | 50,171.95            | 2.68                | 114.00                     | 14,874.96                             | 82,006.41                           | 64,719.42                       |

\*Early estimate had this higher at 51880