



*"Our mission is to provide outstanding service, safety and support for transportation infrastructure and maintenance."*



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**TO:** Dave Corliss, Town Manager

**FROM:** Dan Sailer, Public Works Director and Brian Kelley, Engineering Manager

**DATE:** February 16, 2021

**SUBJECT:** Pavement Maintenance Program Overview and 2021 Pavement Maintenance Program Summary

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The Department has developed a Strategic Asset Management Plan, which guides our efforts toward maximizing the value the community receives from our transportation assets. Low total lifecycle cost is part of this value, which drives our overall Pavement Maintenance Program (PMP) analysis and recommendations. The purpose of this item is to provide a general overview of our PMP and plans for 2021.

#### PMP vs Capital Improvement Program (CIP)

The Town's PMP focuses on maintaining the existing pavement assets in a manner that utilizes our finite resources to keep the total lifecycle cost low. Lifecycle cost involves the total amount spent on a pavement beginning with construction (or reconstruction), and all maintenance costs over its life before needing to be reconstructed. Only one reconstruction cost is included. To illustrate this: If a single lane-mile (one lane of travel that is one mile long) is reconstructed at a hypothetical cost of \$500,000, and we spend another hypothetical amount of \$200,000 on maintenance over the course of 30 years, the total lifecycle cost is \$700,000 (or an equivalent unit cost of \$23,333 per lane-mile per year).

The Town's CIP focuses on adding additional assets to a transportation asset class. This may be a new roadway, a roadway widening, bridge, traffic signal, etc. Once a new pavement asset is constructed, it moves into our PMP for all maintenance.

#### Funding

The Public Works Department manages two separate funds associated with our transportation CIP and PMP:

- Transportation Capital Fund (135): The primary revenue source for this fund comes from Transportation Impact Fees associated with new development. As a new house, or building, is constructed a fee for transportation improvements is assessed. These funds must be utilized for new construction only.
- Transportation Fund (120): The primary revenue source for this fund comes from sales tax. This fund is nicknamed our operations and maintenance fund as all day to day operational and maintenance expenditures associated with existing

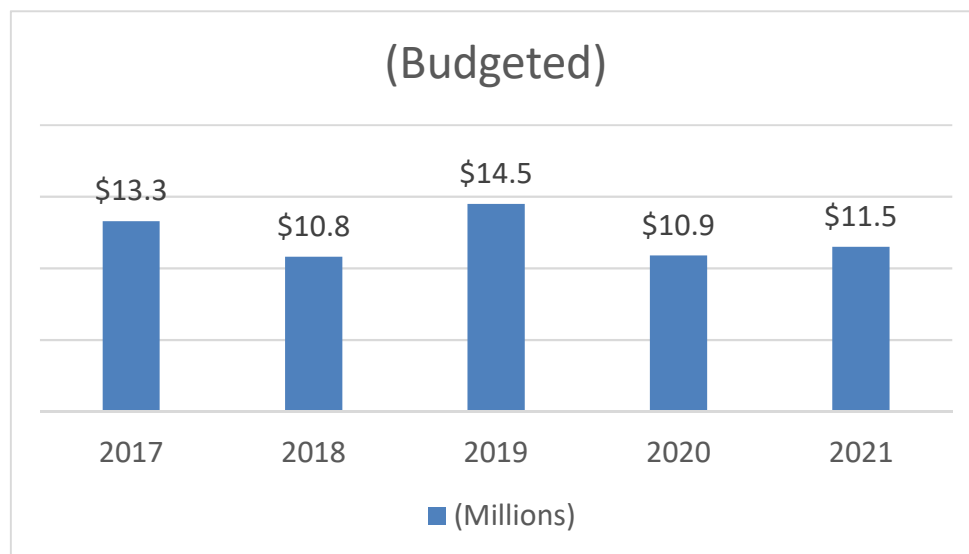
transportation assets are charged to this fund. Unlike the Transportation Capital Fund, revenue from this fund can be transferred into the Transportation Capital Fund to support funding of new projects.

Each fund is constrained by the amount of sales tax received each year and the number of building permits that are pulled each year. As a result, there is tendency to have more project and maintenance desires than the ability to fund. This leads to a need to prioritize spending between operations and maintenance, and new capital projects. Each year as part of the budget approval cycle, Town staff will assess a variety of variables to make recommendations in both funds that are fiscally constrained by revenue projections. Town Council can make any modifications to these recommendations as part of their final approval of the budget. The annual budget also includes a five-year CIP that is developed based on five year revenue forecasts.

### PMP Level of Service

As with any fiscally constrained program, there is opportunity to expand, maintain, or decrease the level of service that is provided to the community. As mentioned earlier, Town staff's primary goal is to maximize the life of a pavement at the lowest total cost with the allocated revenue dedicated to the PMP. To assess where our current level of service falls on this lowest total lifecycle spectrum, we have assessed a variety of maintenance schedules that could be implemented to find the one that provides the lowest theoretical cost. It's important to note the theoretical aspect as pavements are like any "thing" with a limited lifespan: there are a variety of variables that affect their actual lifespan.

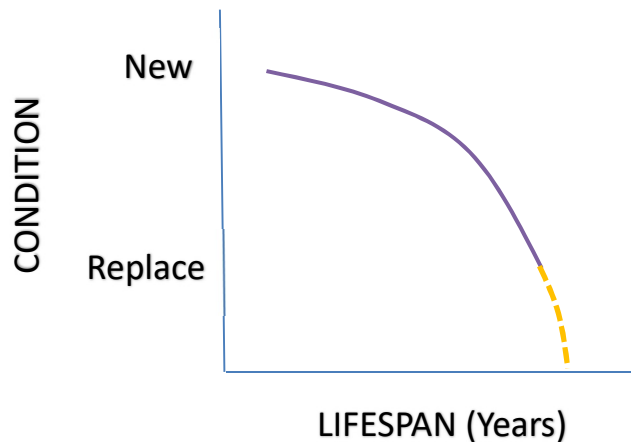
The theoretical lifecycle is useful however because it is fairly easy to calculate, and is a good representation of the average life that can be expected. The current lowest lifecycle cost that we have calculated is \$22,500 per lane-mile per year. Theoretically if we budgeted this amount each year once a pavement is new we would have the needed funds to complete recommended maintenance treatments at the recommended intervals, and the funding to reconstruct the pavement at the recommended timeframe. Knowing this number is helpful, because we can compare it to our historical budget:



By knowing the amount of pavement inventory we have in each of these years, we are able to calculate the average budget to be under \$17,000 per lane-mile per year over the last five year period (our current inventory totals 710 lane-miles). This is 74% of the theoretical optimum funding amount to obtain the lowest lifecycle cost.

By funding less than the theoretical optimum amount, one of two things can occur:

- The life-span is shortened, and the cost per lane-mile is higher than the \$22,500/lane-mile/year **IF** the pavement is reconstructed at the recommended condition (60 on a scale of 0-100 with 100 being new) of the shortened lifespan, or
- The pavement continues to degrade below the recommended reconstruction condition (60). There is still life left in the pavement, but the remaining amount of life is less predictable and susceptible to a more rapid deterioration. This is shown conceptually with the dashed line in the following life-cycle curve:

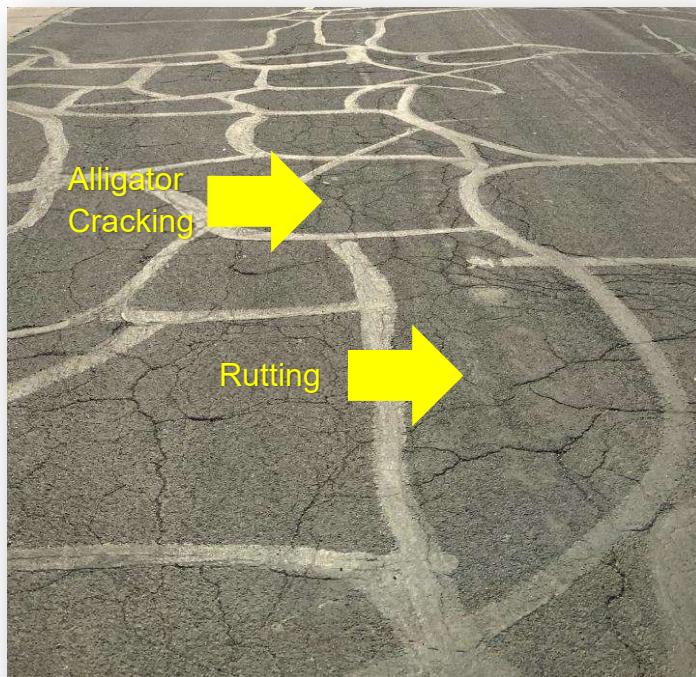


The actual total lifecycle cost could potentially be lower in this second case depending on how much additional maintenance is completed, and/or the actual remaining life that is achieved in this period.

Streets that are below the recommended replacement condition rating tend to have a higher frequency of potholes occur. This is most noticeable during the freeze and thaw periods that occur during the transition between winter and spring. During this seasonal transition, the months receive more moisture, which gets trapped and freezes during the cold nights.

The following photos are illustrative of what a street might look like at various condition levels within this higher risk of deterioration zone:

Condition between 50 – 60



Condition between 40 – 50





Condition between 20 – 30



Currently, approximately 4% (31 lane-miles) of the Town's current pavement inventory has condition ratings that are within this stage of their life that is below the recommended replacement condition. The majority of these lane-miles are just below this recommended condition (in the 50s). It is important to reiterate two components:

1. The recommended replacement condition is a theoretical number. The actual remaining amount of life is still unknown based on a variety of variables, and
2. Conditions below this recommended replacement condition doesn't mean that they can't be safely driven on. It just means they are more susceptible to a rapid deterioration and a higher number of potholes can appear.

Historical funding levels have been good. This is based on prior Town Council's prioritizing funding to the PMP, and Town staff doing well to maximize these funds. Current community surveys completed every two years indicate that the community is content with our current service levels. We also compare favorably to some of our neighboring jurisdictions:

| Agency             | Condition (Average) | % Network < 60      |
|--------------------|---------------------|---------------------|
| Douglas County     | 79                  | 1.4%                |
| <b>CASTLE ROCK</b> | <b>79</b>           | <b>4.4%</b>         |
| Parker             | 75                  | 13.0%               |
| CDOT               | N/A                 | 20% Low Drivability |

Staff is not recommending to increase or decrease this current service level. However, if Town Council desired to increase our current service level we would need to assess the potential drop in service levels in other areas if a new revenue source is not approved.

The Town's website has some great performance metric information at the following pages on [www.crgov.com](http://www.crgov.com):

- Average pavement condition ratings: [www.crgov.com/2775/Pavement-Condition-Information](http://www.crgov.com/2775/Pavement-Condition-Information)
- 2020 Transportation Infrastructure Report Card: [www.crgov.com/DocumentCenter/View/19411/2020-Report-Card?bidl=](http://www.crgov.com/DocumentCenter/View/19411/2020-Report-Card?bidl=)

### 2021 PMP Overview

The 2021 Pavement Maintenance Program (PMP) will address maintenance needs in the North Area of the Town along with applicable Primary Streets (see attached map). Staff has gone through a thorough vetting process to arrive at these selected streets in order to achieve the greatest cost-benefit for achieving a low lifecycle cost with the allocated budget. We have included two other maps that show this vetting process. One map shows the Primary Street Overview and the other shows the Secondary Street Overview. Both maps show the fiscally unconstrained needs based on the pavement's longest life cycle curve at the lowest lifecycle cost, as compared to the fiscally constrained recommendations. With the fiscally constrained recommendations, we have strived to pick the best treatments within allocated budget that will provide the longest life within available resources. This is essentially a shorter overall lifecycle with a bit higher unit cost over the lifespan of our average pavement.

The budget for the 2021 PMP is \$10,650,000 and the budget for 2021 reconstruction projects is \$850,000 for a total 2021 Budget of \$11,500,000.

Staff is preparing bid packages for the corresponding projects within the PMP program. Staff recommends adding contingencies for the various PMP projects and reconstructions for unforeseen conditions that total \$1,123,900, or about 10% of the contract amounts, for a total authorization of **\$11,238,800**.

The remaining budget of \$261,200 has been identified for use in other miscellaneous concrete needs. As experienced in 2020, these concrete needs tend to grow during the year, so this would be expected to be a good use of these funds.

| <u>Program</u>          | <u>Cost Est. (with 10% cont.)</u> | <u>Low Bid</u>             |
|-------------------------|-----------------------------------|----------------------------|
| Curb, Gutter & Sidewalk | \$957,200                         | pending                    |
| Slurry Seal             | \$3,233,700                       | pending                    |
| Full Depth Reclamation  | \$850,000                         | pending                    |
| Meadows Restoration     | \$1,626,400                       | pending                    |
| Asphalt Overlay         | \$4,571,500                       | pending                    |
| Total                   |                                   | pending                    |
| PMP Total =             |                                   | <b><u>\$11,238,800</u></b> |

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\$11,500,000 PMP Budget 2021  
-\$11,238,800 Prior to bids  
= \$261,200 available for miscellaneous concrete needs

Attachments:

Attachment A: 2021 Fiscally Constrained PMP Recommendations

Attachment B: 2021 Fiscally Unconstrained vs Constrained – Primary Streets

Attachment C: 2021 Fiscally Unconstrained vs Constrained – Secondary Streets

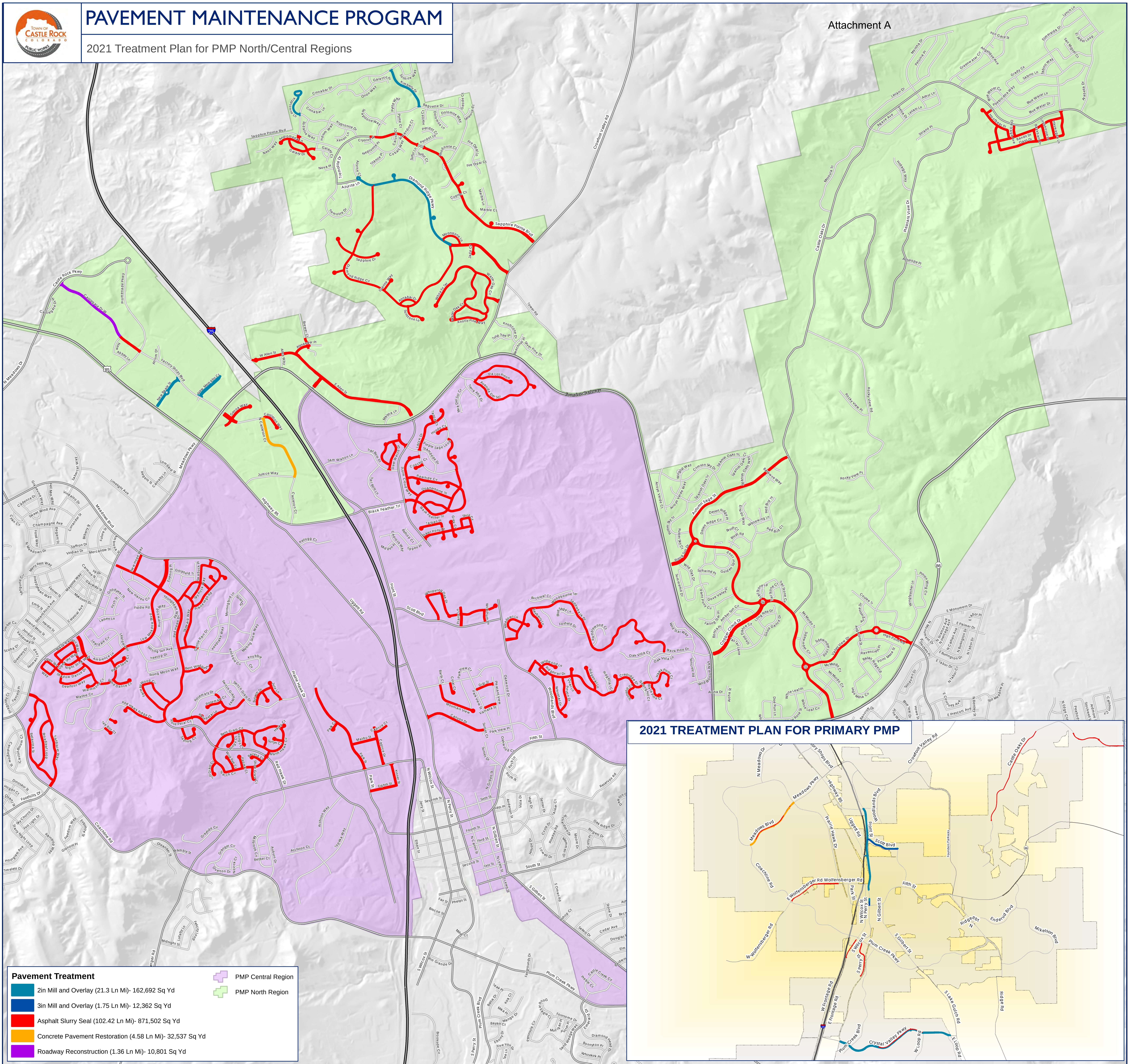




# PAVEMENT MAINTENANCE PROGRAM

2021 Treatment Plan for PMP North/Central Regions

Attachment A



**Pavement Treatment**

2in Mill and Overlay (21.3 Ln Mi)- 162,692 Sq Yd

3in Mill and Overlay (1.75 Ln Mi)- 12,362 Sq Yd

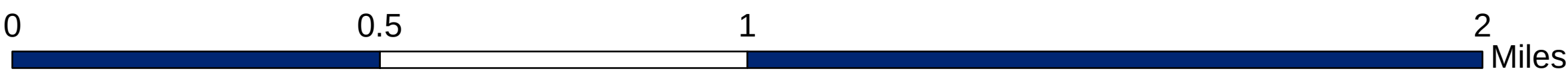
Asphalt Slurry Seal (102.42 Ln Mi)- 871,502 Sq Yd

Concrete Pavement Restoration (4.58 Ln Mi)- 32,537 Sq Yd

Roadway Reconstruction (1.36 Ln Mi)- 10,801 Sq Yd

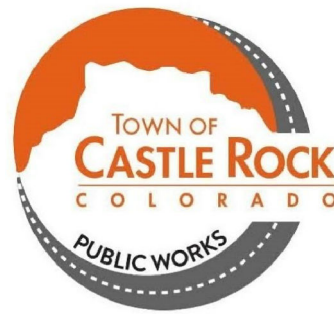
PMP Central Region

PMP North Region



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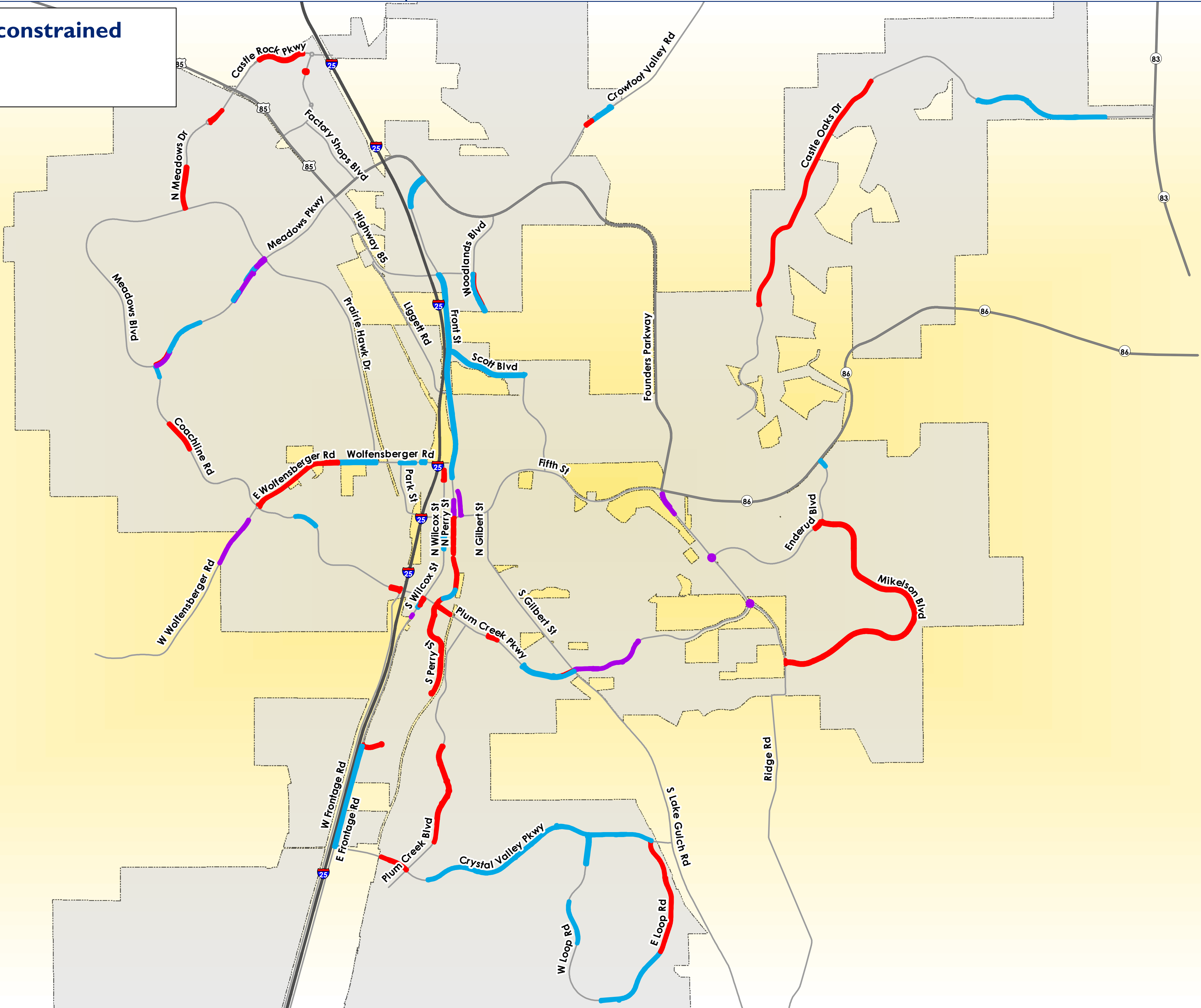




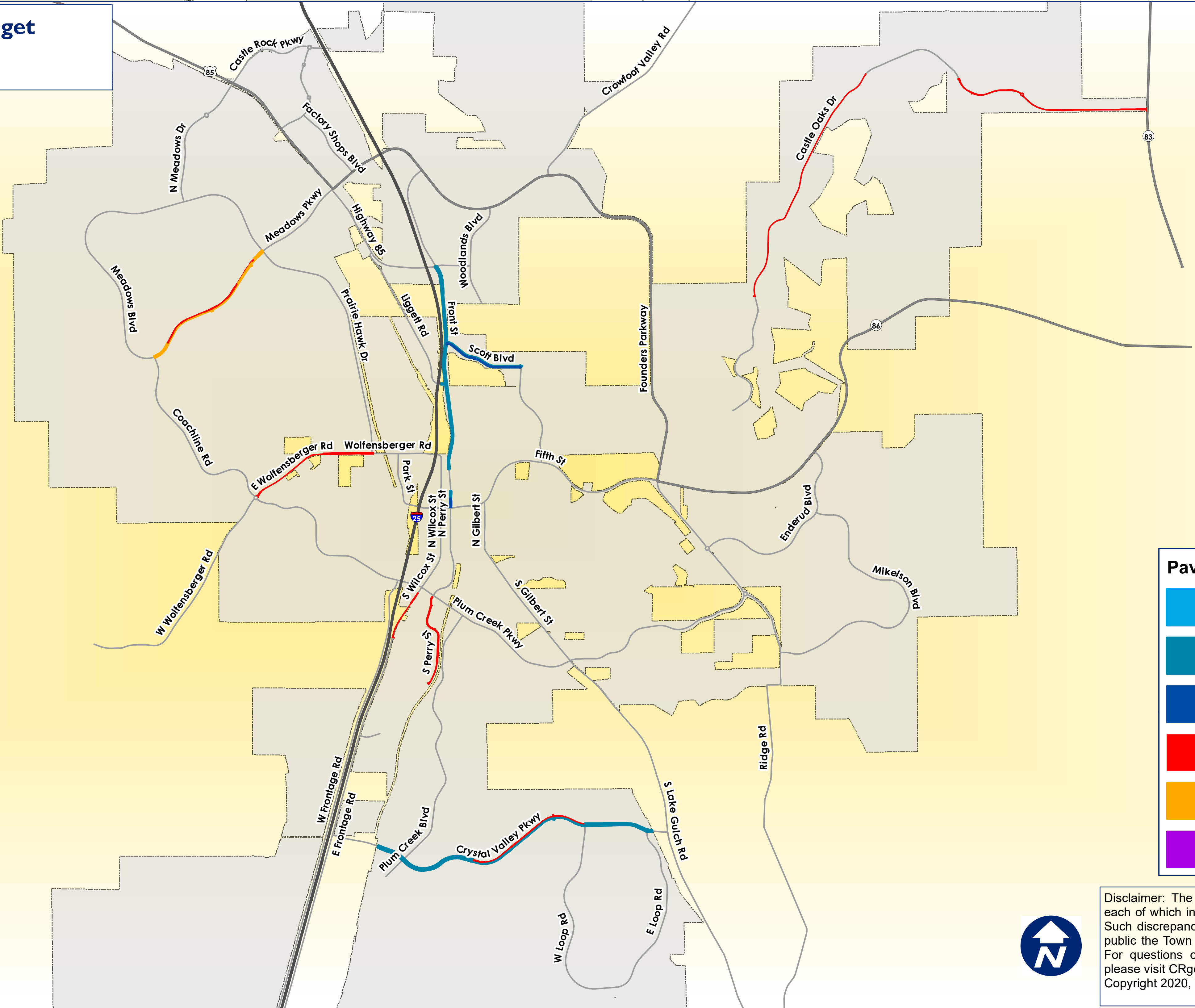
RECOMMENDED PAVEMENT TREATMENTS

PMP Primary Streets- 2021 Plan Year

Recommended Treatments- Fiscally Unconstrained  
Estimated Cost \$9,345,477



Recommended Treatments- Primary PMP Budget  
\$4,373,100



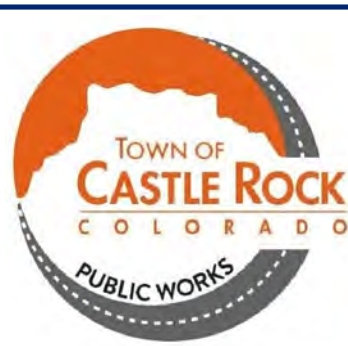
Pavement Treatment

- 1.5in Mill and Overlay
- 2in Mill and Overlay
- 3in Mill and Overlay
- Asphalt Slurry Seal
- Concrete Pavement Restoration
- Roadway Reconstruction



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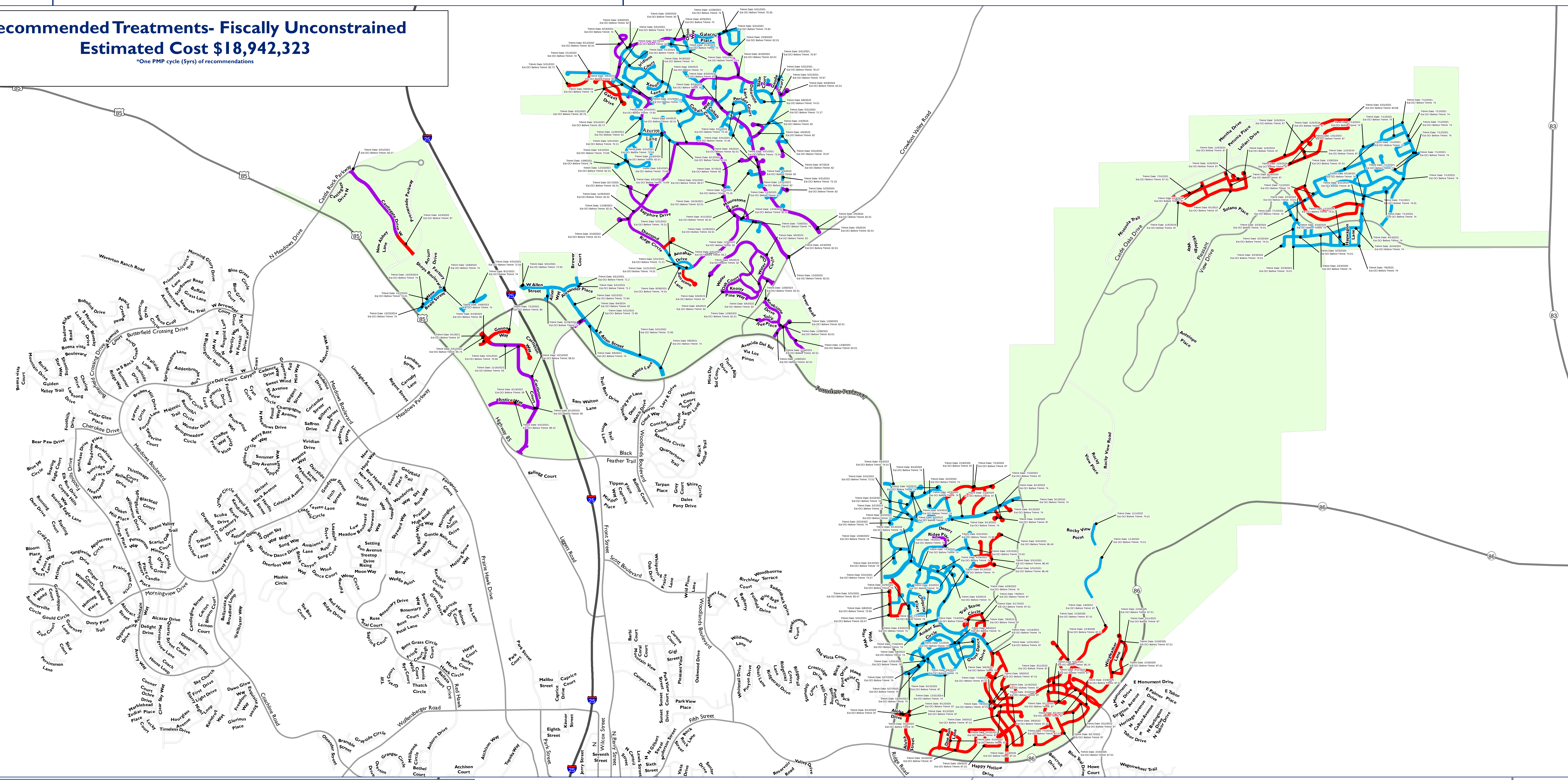


# RECOMMENDED PAVEMENT TREATMENTS

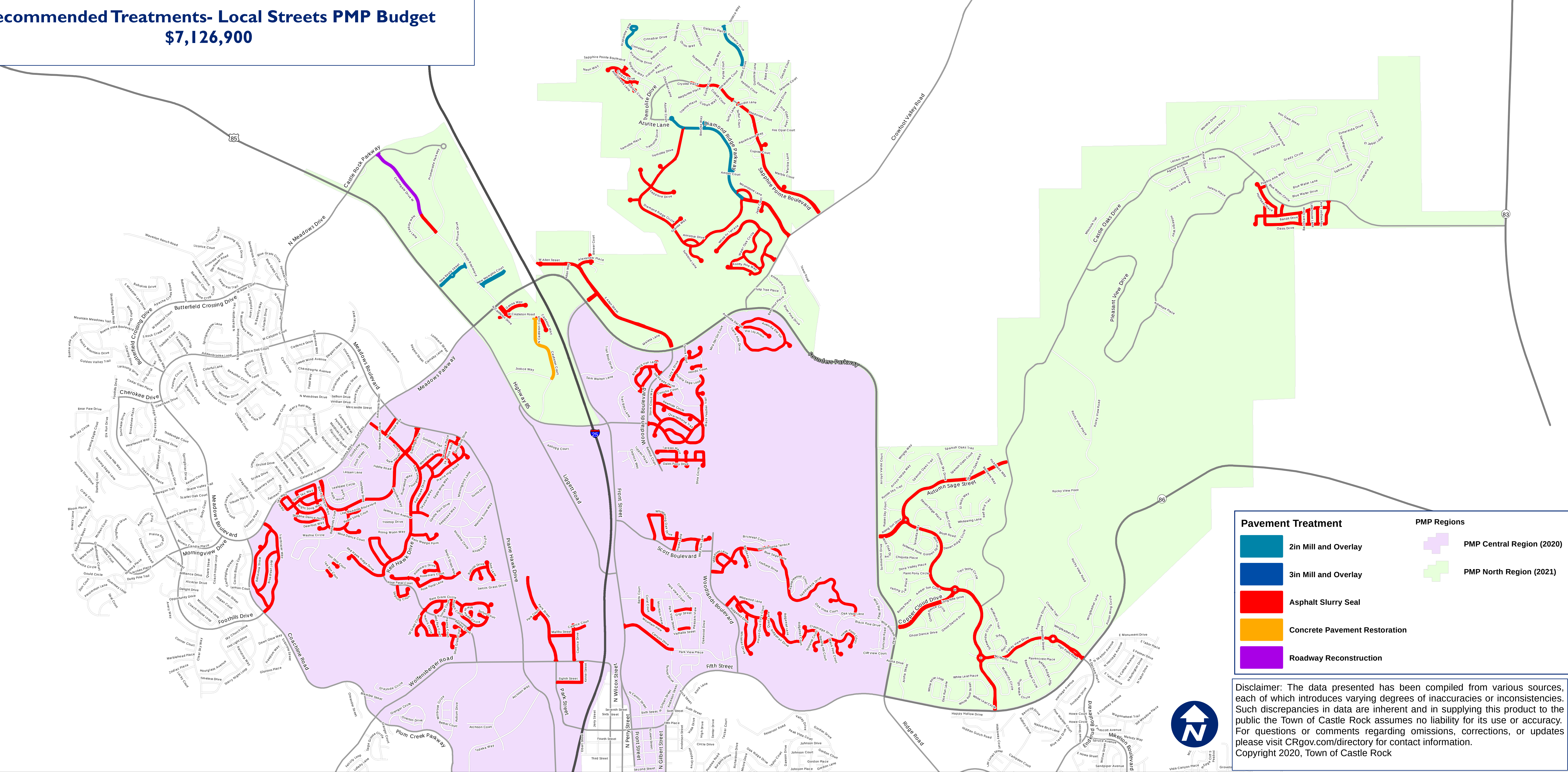
PMP North/Central Regions

Attachment C

**Recommended Treatments- Fiscally Unconstrained**  
**Estimated Cost \$18,942,323**  
\*One PMP cycle (5yrs) of recommendations



**Recommended Treatments- Local Streets PMP Budget**  
**\$7,126,900**



**Pavement Treatment**

- 2in Mill and Overlay
- 3in Mill and Overlay
- Asphalt Slurry Seal
- Concrete Pavement Restoration
- Roadway Reconstruction

**PMP Regions**

- PMP Central Region (2020)
- PMP North Region (2021)

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