



## **BOARD SUMMARY REPORT**

**Date:** October 5, 2020

**To:** Board of County Commissioners

**Through:** Bryan Weimer, Public Works and Development Director  
Mike Haraldson, Road & Bridge Operations Manager  
Doug Stern, Road and Bridge Infrastructure Manager

**From:** Allen Peterson, Road & Bridge Division Manager

**Subject:** **Alternative Maintenance Approaches for Roadways in Various Subdivisions within County**

### **Direction/Information**

The Road and Bridge Division is faced with numerous challenges in several unincorporated communities where roadway maintenance can no longer be deferred or ignored. Road conditions are approaching the point that significant safety hazards are ultimately eminent. The overall quality of the roadways are affected, which has many detrimental effects on the Quality of Life within the neighborhoods and County citizens.

Citizen calls and complaints have escalated exponentially over the past several years and more than doubled over the past several months. The upcoming winter freeze/thaw cycle will only further compound the deterioration of these roads.

During this Study Session, Road and Bridge managers will discuss these subdivisions in detail and recommend various actions that may provide additional service life without investing the funds to completely rebuild or reconstruct the roads. Since some of these maintenance efforts may seem a bit unorthodox for Arapahoe County, Road and Bridge seeks consensus and/or direction before expending valuable financial resources toward these endeavors. In addition, Road and Bridge is looking at ways to continue to provide services and a sustainable budget when the County will be facing budgetary challenges for the next 5-7 years.

### **Request and Recommendation**

Road and Bridge managers wish to share with the Board of County Commissioners (BoCC) the serious roadway conditions that exist in several subdivisions and also make recommendations or provide alternatives for the effective maintenance of each.

The primary focus of this Study Session is in regard to the roads in Box Elder Creek Ranches. The roads in this area are in particularly poor condition and were first brought to the Boards attention during a series of Study Sessions in 2015. Since that time, the roads in Box Elder have received

only temporary type fixes using cold-mix asphalt as a Band-Aid approach to filling chuckholes and maintaining the deteriorating road surface. This maintenance method, while somewhat effective over the past several years, is no longer feasible nor fiscally responsible.

Other subdivision's roadways will also be discussed during the study session, including Saddle Rock Ridge and South Creek.

Because of the budgetary challenges facing Road and Bridge, we have evaluated numerous maintenance options and techniques to address the various needs in the subdivision. Because of the scarce resources and the necessity to continue providing some level of meaningful service, we are recommending a less expensive option at this time, but is also a less conventional approach for Arapahoe County.

In addition to concurrence on the approach, a public outreach and education program will be necessary for whatever approach is taken. Staff is requesting feedback from the BoCC regarding this need.

Finally, the pros and cons of each alternative will be discussed.

## **Background**

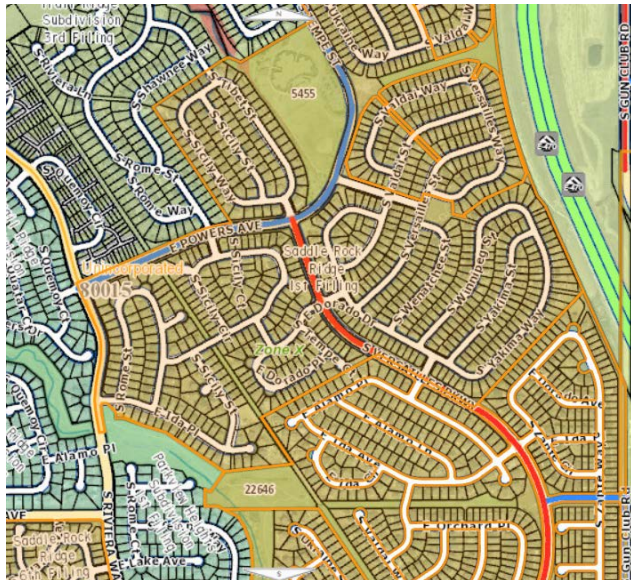
The roadways within Box Elder Creek were resurfaced some 23 years ago with a few inches of recycled and screened asphalt millings with a chip seal treatment placed directly on top of the millings. Residents of Box Elder have the perception that this surface was a traditionally paved asphalt road, but far from it in terms of performance. The photograph below depicts the current condition of the roadways in this subdivision.

### **Box Elder Creek Ranches**



The Saddle Rock Ridge subdivision is another neighborhood with severely deficient roads. Literally built on the banks of the West Toll Gate Creek, the road's subgrade has become saturated with the landscape irrigation of a maturing subdivision over the years and can no longer support the heavy weight of normal traffic without further decimating the asphalt surface.

## Saddle Rock Ridge



Another subdivision that needs to be brought to the attention of the Board is Southcreek. Repaving plans were deferred in this area after completing resurfacing operations in the northern sections of Southcreek in 2018.

Before paving could begin at that time, delaminated asphalt was removed and repaired in preparation for repaving. Once the top layer of asphalt was removed, extremely poor subgrade conditions were exposed. Without removing this saturated material first and then compacting with appropriate structural fill, the new asphalt pavement would not have lasted even a year. Moreover, almost 3 years later, surface cracks are already starting to reappear on these roads.

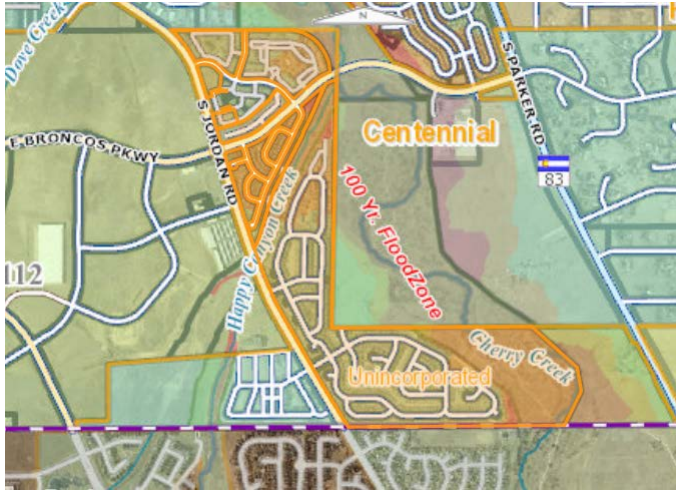
Underneath the loads of heavy construction equipment, while reconstruction and repairing the roads in the northern sections of Southcreek, numerous other deficiencies were identified. Road and Bridge crews would no more than complete one repair when other pavement sections would begin to crumble.

Recognizing that a serious situation was erupting in Southcreek, two asphalt patching crews were dispatched to the neighborhood in an effort to speed up necessary repairs before paving operations could proceed. Despite progressive efforts, a series of severe rainstorms further complicated and delayed this work. As a result of these unfortunate circumstances, the total cost to resurface these roads not only exceeded project cost estimates twofold, but our entire 2018 paving program was pushed beyond the normal paving season and into November. At that time, given financial constraints, the decision was made to further defer the resurfacing needs in the rest of the subdivision.

Similar to the Saddle Rock Ridge Subdivision, the Southcreek Subdivision was built adjacent to the Happy Canyon Creek which converges with Cherry Creek to the east. Southcreek is bordered

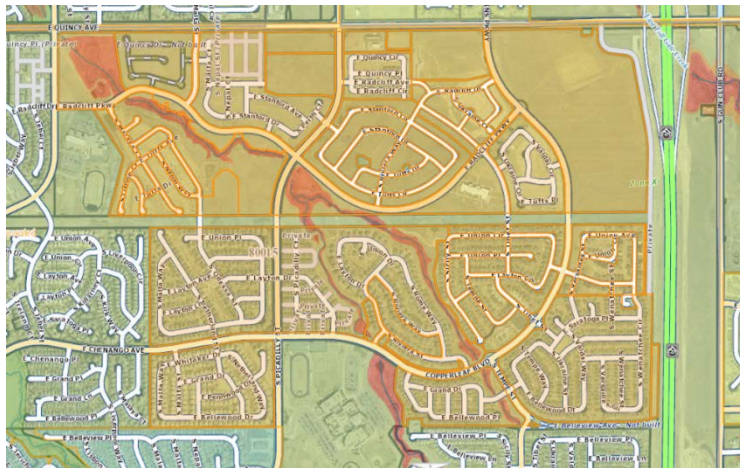
by Jordon Road to the west and the Parker Jordan Centennial Open Space to the east (undevelopable land). This combined with landscape irrigation that occurs as a subdivision matures, it is no surprise that the subgrade materials beneath the asphalt in Southcreek is also saturated and unable to support the traffic loads placed upon the streets in this neighborhood.

### Southcreek



Although there are no plans to resurface roads in the Copperleaf Subdivision within the next couple of years, it is important to also recognize that similar subgrade issues appear prevalent. This has been determined during the course of routine asphalt and pothole patching repairs.

### Copperleaf



It should be noted that up until 2014, Road and Bridge owned the specialized equipment to chip seal County roadways using internal crews. When the chip spreader became overly worn and was due for replacement, Road and Bridge managers could no longer justify the expense of replacement. Not only is a chip spreader an extremely expensive piece of equipment to replace, it was only used for a few weeks out of each year. Infrequently used, it was difficult for in-house

crews to become proficient at chip sealing. It became readily apparent that this function could be contracted much more effectively, and as such internal chip seal services no longer occur.

Furthermore, chip sealing has been discouraged in residential neighborhoods where residents had driveways because of public acceptance, tracking of chip into driveways and houses, tracking of tack oil onto driveways and sidewalks, excess chips in the gutter and sidewalk, rough roadway surfaces for bikes, skateboards, kids playing in the street, and general appearance that the roadways look “rural”.

## **Links to Align Arapahoe**

The purpose of this Study Session links directly to every aspect of the Align Arapahoe objectives. Road and Bridge management and staff are in the business of maintaining our vast infrastructure. Maintaining our roads and right-of-way in a superior fashion directly affects not only our citizen’s **quality of life**, but also that of the business culture in Arapahoe County. We feel there is a direct link between the condition of our infrastructure and the potential for economic growth.

Finally, we are able to demonstrate our **fiscal responsibility** by the steps taken to streamline a number of our operations. Thoroughly analyzing all our services and costs of providing these services has led to a prioritization process and also several innovative means to provide better, more efficient services. Nevertheless, Road and Bridge continues to face financial obstacles that can no longer be overlooked without further deferring critical maintenance needs that will only become more and more expensive to rebuild.

## **Discussion**

The issues that need to be discussed during this Study Session center around the possible maintenance treatments and alternatives to address the problematic roadways in the neighborhoods referenced above. With regard to Box Elder Creek Subdivision we offer the following alternatives for consideration.

### **BOX ELDER CREEK RANCHES:**

#### **Alternative #1 – Status Quo, Patching**

Continue patching the deteriorating surface using cold-mix asphalt as has been the maintenance practice since before 2015. This option is not desirable as citizen complaints will persist at an alarming rate as the roadway surfaces continue to disintegrate at an increasing pace. Furthermore, this alternative does not provide a sustainable solution, as it is costly with limited long-term performance. Over the last 3 years, we have spent approximately \$22,000 on cold mix materials alone. This amount does not include the labor or equipment to place these materials and represents a 111% increase between 2018 and 2020.

- Pros:**
- Easy to complete and relatively inexpensive
  - Is an effective means to temporarily patch chuckholes in a surface constructed with millings
- Cons:**
- Not acceptable to residents
  - Increased citizen complaints
  - Not cosmetically pleasing – it’s ugly!

- Perception that the County is not doing enough to provide adequate service

### **Alternative #2 – Turn Back to Gravel**

Rent a reclaiming machine as has been done on other gravel roads to churn the existing surface into the subgrade material. Internal crews would then place 6 inches of Arapa-Blend material onto the roadways and thoroughly compact the new surface. Although an Arapa-Blend surface will look and ride a bit differently and also require routine grading, it will at least provide a uniform surface and a structurally sound foundation for possible future asphalt paving.

Although, this surface would then require additional routine blading maintenance and add additional work for our blade operators, this alternative is also the simplest and least expensive solution. Estimated initial cost is: \$370,500 in addition to the on-going cost of grading approximately once every month.

- Pros: - Easier and less expensive to maintain
- Relatively simple process to revert roads back to their initial state when Box Elder was first developed
- Provides a base to pave upon in the future
- Cons: - Residents may view as a “step backwards”
- Will require regularly scheduled grading maintenance

### **Alternative #3 – New Asphalt**

This alternative includes reclaiming the existing surface as described in Alternative #2, but would not include adding the Arapa-Blend material. Instead, 5 inches of hot mix asphalt would be placed in two separate lifts and compacted. This particular surface treatment would add 10 to 12 years of life to the roadways provided periodic crack seal and other routine maintenance treatments are scheduled. Estimated cost is: \$1,480,000

- Pros: - Good alternative to satisfy residents
- Increased service life – 10 to 12+ years
- Increased level of service to residents
- Increase HUTF revenue (increased percentage of paved roads)
- Cons: - This alternative provides a greater level of service than afforded to other citizens
- Still expensive treatment that will require routine pavement maintenance

### **Alternative #4 - Reconstruction**

This alternative would involve a full depth reconstruction and would involve reclaiming the existing surface as described in Alternative #2 and #3. The underlining subgrade material would be treated to achieve a structurally sound foundation before 5 inches of hot-mix asphalt is placed on the treated subgrade surface. This work would be completely contracted as Road & Bridge does not have the necessary equipment or expertise to thoroughly complete this level of construction. Estimated cost is between: \$4.4M to \$4.9M.

- Pros: - New roadways would add 20+ years of service life to pavement network
- Citizen satisfaction
- Cons: - Expensive
- Other maintenance efforts elsewhere would be deferred
- High level of service for a relatively small population
- Would still require routine pavement maintenance
- Increase HUTF revenue (increased percentage of paved roads)

### **Alternative #5 – Local Improvement District**

This alternative would be to approach the homeowners in Box Elder Creek Ranches and let the residents decide if they would be interested in creating a Local Improvement District in accordance with CRS 30-20-601, *et seq.* There are approximately 113 individual properties in Box Elder. Typically, the assessment is based on the frontage foot of the property. On average this would equate to roughly \$13,000/property for Alternative #3 to over \$43,000/property for Alternative #4. Either of these amounts could be less if Arapahoe County chose to participate in funding options. This assessment is typically amortized over a 10-year period of time, which could be a viable option.

- Pros: - Could be an affordable alternative for County and residents
- Increased service life with routine maintenance
- Leverage available County funding for higher level of service
- Cons: - Likelihood that not all residents would be willing participants
- Expensive
- Higher level of service not afforded to other communities
- May affect support for sustainable transportation funding

### **Use of Chip Seals**

The second issue is to discuss and bring to light the poor subgrade conditions in the Saddle Rock Ridge and Southcreek Subdivisions. Copperleaf, as well as other neighborhoods in Arapahoe County may also likely have subgrade issues that have yet to be uncovered. These conditions lead to significant and very expensive maintenance challenges. Since proper funding options are mostly nonexistent, Road and Bridge managers must search for responsible options and would like to discuss chip seal surface treatments on urban residential roadways, as a possible alternative.

Although numerous other jurisdictions (ex. Cherry Hills) routinely chip seal both their arterial and residential roadways, Arapahoe County has been reluctant to introduce this particular surface treatment in the more urban and residential areas of the County.

The chip seal process itself is usually not initially very popular with the motoring public, residents, bi-cyclists and parents who allow their children to play in the street. Although a chip sealed surface is relatively rough, it also provides an effective durable, wear surface that provides additional traction during winter driving conditions.

Another frequent complaint about chip seals is that the 3/8" aggregate used tends to shed for a period of time up to a week or two after applied. This can lead to chipped or broken windshields if traffic speeds are not carefully controlled during and immediately after the process has been completed. Chips that are not properly seated will also track onto private driveways or other intersecting roads that can often lead to citizen complaints. Since the chip seal surface would be placed by an experienced contractor, the burden of these common problems would be borne by the contractor.

Further, to combat this shedding problem, it is necessary to ensure that the chips or aggregate is thoroughly compacted and evenly lodged into the thick liquid asphalt that is sprayed directly onto the road surface. Proper oil and aggregate application rates are both critical to alleviate the chips

from becoming displaced. Internal Infrastructure staff would carefully monitor these application rates on a daily basis.

Additionally, after the oil has completely set and the chips are securely in place, one or more street sweepers are used to pick up any remaining chips. Sweeping usually occurs the next day following the chip application. This is usually the time when most complaints are received.

After the new chip seal has been placed and loose aggregate removed, the final step in the process is to spray a thin coat of oil over the entire surface. This is actually another form of surface treatment called a “fog seal” that helps to further seat any remaining aggregate. Fog sealing leads to one more inconvenience to motorists as lanes must be closed again to allow for curing time – usually no more than a couple of hours. It should be noted that during slurry seal operations, traffic lanes remain closed for six to eight hours before lanes can be reopened to traffic.

Once the chip seal has been fog sealed, only a trained eye can determine the difference between a new asphalt overlay and a chip seal.

Even though some complaints are inevitable, chip seal surface treatments are much less expensive than typical asphalt pavement overlays and only slightly more than slurry seals. Road and Bridge managers believe that chip seal surface treatments can be used on residential roadways as an effective means to help prevent moisture and runoff from penetrating beneath the paved surface. Additionally, chip seal surface treatments can add substantial life to existing pavements without having to further defer this critical maintenance.

It is important to understand; however, that as with any resurfacing activities that place heavy loads onto a roadway, inherent risks exist. Most prevalent among these risks are the possibility that the subgrade structure cannot support construction traffic and the existing and adjacent pavements are decimated. When this occurs, the subgrade must either be removed and replaced with suitable structural material or chemically treated in place. In either case, considerable effort and expense are undeniable.

**RESIDENTIAL STREETS IN SOUTHCREEK AND SADDLE ROCK RIDGE SUBDIVISIONS AND/OR OTHERS AS DEEMED APPROPRIATE:**

Other than Alternative #2 discussed below (reconstruction), the alternatives presented are just a stop gap measure for a period of time and truly do not address the issue of subgrade stability and long term performance. As such, reconstruction will be necessary and with substantial funding increase that will be a challenge and affect other maintenance activity levels of service.

**Alternative #1 – Status Quo, Patching**

Continue patching and repairing asphalt deficiencies as has been the current process. This alternative is not recommended as all repairs are more temporary in nature and do not typically reduce citizen complaints. Additionally, many areas of concern are re-patched on nearly an annual basis if not sooner. The recurring estimated cost of this alternative averages between \$135,000 to \$170,000 annually. This amount is for materials only and does not include equipment and labor rates.



- Pros: - Ability to resolve most customer complaints in a timely manner  
 - Generally alleviates the immediate problem
- Cons: - Not a fiscally responsible maintenance activity  
 - Defers proper maintenance  
 - Not cosmetically pleasing – piecemeal patching

### **Alternative #2 - Reconstruct**

Commit the necessary funds to properly repair the subgrade in these subdivisions and then repave the roads using conventional means. The effort would include keeping the subgrade at the same moisture level and using chemical stabilizing materials (Cement, Fly Ash, etc.) to create a paving platform and then repaving. Since Road and Bridge does not have the necessary equipment or expertise to perform subgrade stabilization to this extent, the work would be contracted at an estimated cost of \$1.85M for just these two neighborhoods. This amount does not include the additional cost of placing the new asphalt surface.

- Pros: - Brand new roads with at 20+ year life cycle provided scheduled routine maintenance is completed
- Cons: - Expensive  
 - Level of service not afforded to all neighborhoods  
 - Use of substantial amount of funding, which would further defer other critical maintenance efforts

### **Alternative #3 – Patching and Chip Seal**

Patch necessary sections of deteriorating asphalt using internal resources and then place a 3/8” chip seal surface treatment. The cost to pave these roads, once structurally deficient sections have been properly prepared, averages between \$7.50 to \$8.50 per square yard using internal staff. Contracted paving ranges from approximately \$12 to \$15 per square yard.

Contracted chip seal surface treatments, on the other hand, is approximately \$3.50 per square yard. While a 2 inch hot-mix asphalt paved road will last 10 to 12 years (think lane mile years), a chip sealed surface will last about 7 years or longer for a fraction of the cost.

- Pros: - Less expensive than paving  
 - More durable surface than conventional slurry seal  
 - Extend service life by 7+ years  
 - Beyond 7 years, a cape seal can add an additional 5 years of service life to the roadway  
 - Surface provides additional friction during winter months  
 - Chip seal process does not generally disturb fragile subgrades  
 - Entire process is completed in a short period of time once the street is properly prepared
- Cons: - Loose or excess aggregate can result in broken windshields if traffic speeds are not carefully controlled.  
 - Initial citizen complaints are prevalent, but subside shortly after the process is completed.  
 - Chip seals tend to shed for up to two weeks after the process is completed  
 - Additional lane closures are necessary for fog sealing operations – usually up to 2 hours

- Does not eliminate underlying subgrade issues.

### **Fiscal Impact**

The Road and Bridge Division of Public Works and Development has suffered structural funding issues for well over a decade with no immediate solutions on the horizon. Rather than letting these valuable, vulnerable and costly assets completely deteriorate, Road and Bridge managers are forced to consider other alternate methods to preserve the County's investment.

While normal asphalt patching, crack sealing and then chip sealing roads with poor subgrade conditions does not eliminate the underlining structural issues of the road, this proposed maintenance process is expected to add an additional 7 years of service life to roadways.

Beyond that 7 year timeframe, most chip sealed roads are then good candidates for a slurry seal. A slurry seal over the top of a chip sealed surface is called a cape seal and can add an additional 5 years of service life to the roadway. Once the cape seal application has worn and begins to delaminate, other more expensive reconstruction efforts must be considered.

### **Concurrence**

Whatever decisions may be reached during this Study Session, Road and Bridge Managers must work with the County's Communications Office to thoroughly develop a communication strategy to educate and explain maintenance plans in Box Elder, Southcreek, Saddle Rock Ridge and likely other similar neighborhoods throughout the County.

### **Attorney Comments**

The County Attorney Department has reviewed this Board Summary Report and have no further comments.

### **Reviewed By**

This report has been reviewed by the following staff:

Bryan Weimer, Director of Public Works and Development

Todd Weaver, Director of Finance

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