

The Regular Meeting of the  
Brian Head Town Council  
Town Hall - 56 North Highway 143  
Brian Head, UT 84719  
**TUESDAY, OCTOBER 25, 2016 @ 1:00 PM**

## AGENDA

- A. CALL TO ORDER** **1:00**  
**B. PLEDGE OF ALLEGIANCE**  
**C. DISCLOSURES**
- D. PUBLIC INPUT/ REPORTS (Limited to three (3) minutes) Non-Agenda Items**
- E. APPROVAL OF THE MINUTES:** October 11, 2016 Town Council Meeting
- F. AGENDA ITEMS:**
- 1. STATE FIRE STATUTE DISCUSSION ON RESIDENTIAL FIRE SPRINKLER REQUIREMENT.** Dan Benson, Public Safety Director. The Council will hold a discussion regarding whether the town should allow the State to revise their statute by eliminating Brian Head Town specific state statute referencing residential fire sprinklers.
  - 2. STREETS PRESERVATION PROGRAM DISCUSSION.** Shane Williamson, Public Works Director. The Council will hold a discussion on a proposed street preservation program for its town roads.
- G. ADJOURNMENT**

**Date: October 21, 2016**

Available to Board Members as per Resolution No. 347 authorizes public bodies, including the Town, to establish written procedures governing the calling and holding of electronic meetings at which one or more members of the Council may participate by means of a telephonic or telecommunications conference. In compliance with the Americans with Disabilities Act, persons needing auxiliary communications aids and services for this meeting should call Brian Head Town Hall @ (435) 677-2029 at least three days in advance of the meeting.

### CERTIFICATE OF POSTING

I hereby certify that I have posted copies of this agenda in three public and conspicuous places within the Town Limits of Brian Head; to wit, Town Hall, Post Office and The Mall on this 21<sup>st</sup> day of October 2016 and have posted such copy on the Utah Meeting Notice Website and have caused a copy of this notice to be delivered to the Daily Spectrum, a newspaper of general circulation.

\_\_\_\_\_  
Nancy Leigh, Town Clerk





## Town Council Staff Report

**Subject:** State Fire Statute  
**Author:** Dan Benson, Public Safety Director  
**Department:** Public Safety  
**Date:** 10/20/16  
**Type of Item:** Council Direction

### **SUMMARY:**

We are requesting direction from Council on whether we should allow the state to clean up their statutes by eliminating a Brian Head specific state statute that references what is already being managed by local ordinance. This state statute is regarding our requirements on residential sprinkling systems.

### **PREVIOUS COUNCIL ACTION:**

Adopted a local ordinance on top of the State Statute in late 2000's

### **BACKGROUND:**

It is our understanding that in the late 2000's a push was made by multiple municipalities to have a state statute written that would require sprinklers be installed on new construction of residential structures. Brian Head was specific on wanting this passed as the State Statute specifically names Brian Head.

The "Home Builders Association" is requesting some cleaning up of the State Statute and wish for this to be removed but continue to allow local municipalities the right to govern their communities by local ordinance. Brian Head currently has a local ordinance that we are enforcing that follows this State Statute. Thus making it redundant.

The State Fire Marshal's Office has approached us to see what our feelings are in regards to this action. An inquiry was made as to whether we would allow them to proceed with (1) eliminating this Brian Head specific State Statute, (2) requesting that it be left the same and fight to keep it as a State Statute, or (3) do nothing and see what happens with our legislator's.

### **ANALYSIS:**

As staff has looked at this it seems that we were unaware of the State Statute regarding the requirements of fire sprinklers on residential new construction, but have been working off of our own Town Ordinance to enforce this law. The State Statute appears to have had no effect on our subjecting this requirement on new construction.

**DEPARTMENT REVIEW:**

The Public Safety Department has reviewed this and feels that we can continue as we have by using our own Local Ordinance and does not see the benefit of having the redundancy of a State Statute.

**FINANCIAL IMPLICATIONS:**

None

**RECOMMENDATION:**

It is Staff's recommendation that we allow the State Fire Marshal's Office discretion in regards to this Statute. Staff feels confident in our own ordinance (8-1-4: Residential Automatic Sprinkler Requirements) where it has been utilized for the past 6 years and we have not had to fall back on any State Statute.

**PROPOSED MOTION:**

Advise staff to allow the State Fire Marshal's Office discretion in repealing this Statute and continue to enforce our own local ordinances as such.



## Town Council Staff Report

**Subject:** Streets Preservation Program  
**Author:** Shane Williamson  
**Department:** Public Works  
**Date:** October 25, 2016  
**Type of Item:** Discussion

### SUMMARY:

The Council should discuss and direct staff concerning the proposed Streets Preservation Program. The plan seeks to act as an asset management model that implements a structured plan for maintaining and improving our streets. As such, the plan includes the descriptions of the different preservation treatments as well as a life cycle plan describing the timing for each treatment to occur.

### PREVIOUS COUNCIL ACTION:

Previously, the Council has directed staff to move forward with projects that meet the Transportation Master Plan, the allotted budget, and address the needs within the town. The Streets Preservation Program provides a vehicle with which we can execute this direction.

### BACKGROUND:

Given the direction to fund streets maintenance and rehabilitation by setting aside \$200,000 per year, it is important to develop and plan and program to make sure the funds are used effectively. As such, with the Transportation Master Plan in mind, the Streets Preservation Program (SPP) looks to support these efforts. Specifically, the SPP helps identify the needs and priorities proactively and helps schedule, budget, and solicit streets projects in advance.

### ANALYSIS:

In review of the capital facilities plan for streets, UDOT Standards, Federal Highways Administration recommendations, and LTAP proposals, the plan identifies industry standard treatments and life cycles specific to Brian Head Town. For example, UDOT's secondary roads, like the road between Parowan and Paragonah, operate on a six to seven-year life cycle based on traffic volumes and pavement conditions. As such, the traffic volumes and conditions on Brian Head's collector roads align with an eight-year life cycle with the intent to maintain a desired pavement condition. Overall, the proposed Streets Preservation Program generates a way to proactively manage the condition of our pavement assets rather than reacting to condition failures.

DEPARTMENT REVIEW:  
Public Works and Administration

FINANCIAL IMPLICATIONS:  
The proposed plan seeks to align and support the \$200,000 per year budget in street maintenance and improvement projects.

BOARD/COMMISSION RECOMMENDATION:  
n/a

RECOMMENDATION:  
Consider the Streets Preservation Program as a model to improve, budget, plan, and execute our streets activities.

PROPOSED MOTION:  
Direct Staff to move forward with the proposed plan.

# **Brian Head Town**

## **Streets Preservation Program**

### **Preservation Treatments and Cycles**



**Public Works Department**

**2016**

*(Updated October 18, 2016)*

## **Foreword**

The Brian Head Town Streets Preservation Program concurs with the Brian Head Town and the Utah Department of Transportation (UDOT) metrics and methods used in pavement preservation, rehabilitation, and maintenance. Separate design manuals and standards are being used to provide guidance on the mechanistic design method (i.e. The Standards Specifications for Public Works Construction Manual, The Transportation Master Plan, and UDOT Standards and Specifications).

### **Streets Preservation Program:**

Part 1 – Asphalt Surface Maintenance

Part 2 – Asphalt Surface Rehabilitation Treatments

Part 3 - Gravel Surfaces – Maintenance/Reactive Treatments

Part 4 – Appendices - Costs and Life Cycles

Many factors influence the decisions being made on when and how to best maintain our pavements. Specifically, our pavements are aging and are being subjected to continuously increasing levels of traffic, harsh weather, and erosion. Our challenge as the stewards of our Town's pavements is to select the right treatment at the right time, within our available funding limits, to maximize our pavement life. It has been well established that taking care of our pavements with well-timed preservation treatments is more efficient than being in a reactive repair mode of maintenance or reconstruction.

In this context, "Preservation" will be understood to include routine maintenance, preventive maintenance, minor rehabilitation and some of the major rehabilitation treatments. Brian Head Town has committed \$200,000 per year for these preservation treatments.

Much of the information in this manual has been taken from UDOT, the Federal Highway Administration (FHWA), and the pavement Industry. This information has been taken and adjusted to meet the needs unique to Brian Head Town. The information is general in many places intentionally.

See the Brian Head Town Standards and Specifications for Public Works Construction and the UDOT Standard Specifications for mix design and other material specifications.

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## **Introduction**

Brian Head Town currently appropriates the streets projects with an annual \$200,000 in earmarked funds, which emerges from the Class B and C Roads funds via the General Fund. In addition, Brian Head Town seeks to leverage grant funding and Utah's State Transportation Improvement Program (STIP) to make projects happen more timely and with the appropriate treatments. The STIP funds are based on prioritization and application from the Iron County Rural Planning Organization (ICRPO) of which Brian Head Town is a member.

As mentioned in the foreword, Brian Head Town uses funds for two main programs, Maintenance and Rehabilitation, with major reconstruction and new construction coming as a part of the STIP process.

### **Typical Routine Maintenance Treatments**

- Crack Filling/Sealing
- Crack/Depression Leveling - Mastic
- Fog Sealing / Rejuvenation
- Lane Leveling
- Pothole Patching
- Skin Patching
- Rotomilling

### **Typical Rehabilitation Treatments**

- Milling and Hot Mix Asphalt Overlay
- Cold in Place Recycle and Overlay
- Thick Asphalt Overlay,  $\geq 1 \frac{1}{2}$ " Hot Mix Asphalt
- Thin Asphalt Overlay,  $\leq 1 \frac{1}{2}$ " Hot Mix Asphalt
- Thin Asphalt Overlay,  $\leq 1 \frac{1}{2}$ " Stone Matrix Asphalt
- Chip Sealing
- Slurry Sealing
- Microsurfacing

# Part 1 - Asphalt Surface Maintenance

## Crack Sealing

**Description:** Sealing cracks in asphalt pavements is one of the most effective methods of preventative maintenance. Crack sealing is typically performed on working cracks (movement equal to or more than 0.1 inches) and involves thorough crack preparation and placement of high- quality materials.

### Crack Filling:

Crack filling serves the same purposes as crack sealing but is less comprehensive. Preparation is typically limited to “blowing out” the cracks with compressed air. Crack filling is normally conducted on cracks that experience little movement (less than 0.1 inches) and are only slightly or moderately deteriorated.

### Full Depth Crack Repairs:

When cracks get excessive or too close together, often it is better to affect a full-depth repair of the area rather than work on the individual crack. Usually when cracking is of this nature it is better to address the underlying problems causing the cracking as well as the effects.

**Purpose:** Correctly applied, and properly timed, the application of crack sealant material will help reduce moisture infiltration, retain material strength and reduce the potential for moisture-related distresses such as stripping, pumping of fines and accelerated fatigue cracking. Mostly used as a surface preparation for surface treatments.

**Pavement condition:** The condition of the existing bituminous surface depends on upon the other Preventative Maintenance treatment the surface seal treatment will be combined with.

**Surface preparation:** Before sealing, the crack must be completely free of dirt, dust, and other materials that might prevent bonding of the sealant.

**Performance:** This treatment will help extend the service life of the treatment it is being used with and thus extend the service life of the pavement structure.

**Limitations:** Use caution in pavement selection if this treatment is to be used as a standalone where there are too many cracks. Cold latex modified emulsion based sealants are suitable for smaller cracks with little movement. Fully cure emulsion based sealants before overlaying.

### Typical Sealer:

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# Part 1 - Asphalt Surface Maintenance

## Fog Sealing / Rejuvenation

**Description:** Fog sealing is spraying an existing pavement surface with a slow setting diluted asphalt emulsion, without an aggregate cover to seal the pavement surface or to bind the surface material into place reducing surface attrition. Rejuvenators are also a spray applied emulsion designed to penetrate the surface to modify and improve the chemical and rheological properties.

**Purpose:** The purpose of rejuvenation is to renew old asphalt surfaces. As a pavement ages, its components undergo a variety of chemical and physical changes. Pavement will undergo oxidation of its asphalt binder, making the pavement brittle and susceptible to cracking and raveling. Rejuvenator products are typically used more on dense graded surfaces.

Fog seals are used to seal small cracks and surface voids, address raveling of chip seals and open graded surfaces on high volume roads, and to maintain and delineate shoulders on high volume roads.

**Pavement condition:** The existing pavement surface must be sufficiently porous to absorb a substantial amount of the rejuvenating emulsion. For fog seals, the pavement should display low to moderate weathering or raveling.

**Surface preparation:** The pavement needs to be thoroughly cleaned before applying the products and must be dry. Test a small area of the pavement with different application rates to determine the optimal application rate for the entire area. Use higher application rates for passing lanes and shoulders where the traffic is lighter than on travel lanes where the traffic is heavier.

**Performance:** The life of the treatment depends on the condition of the pavement when the treatment was placed, the amount applied, traffic, and the environmental conditions.

**Limitations:** Do not use rejuvenation on a pavement that has low skid resistance or where the asphalt is unstable as indicated by rutting or shoving. Apply rejuvenation very cautiously to interstate and high volume roads. These roads might not need rejuvenation in the travel lanes because of the heavy traffic. Rejuvenation of the shoulders on these roads is a good use of rejuvenators. Apply sand to blot wet spots.

### Typical Sealers:

SS-1h, CSS-1, CSS-1h, CRS-2Pd, MC-70

### Typical Rejuvenators:

Pass QB, CRF, ERA-1, Reclamite, GSB (B)

# Part 1 - Asphalt Surface Maintenance

## Lane Leveling

**Description:** Lane leveling is an application of a course of hot-mix asphalt.

**Purpose:** Lane leveling is used to restore the profile and cross section to the surface. This treatment is then followed with an overlay.

**Pavement condition:** The existing pavement has a deficient profile and cross section.

**Surface preparation:** Clean the pavement with a power broom immediately prior to construction.

**Performance:** A lane leveling will not last very long if an overlay is placed over it. The mix is a finer gradation and placed in thin lifts, so the quality of the pavement is not as robust as a coarser gradation placed with a laydown machine. The performance is very dependent on the mix, how well it's compacted, the condition of the existing pavement, and the expected traffic.

**Limitations:** Not a good application for heavy traffic. Not a good application for rutting due to stripping.

## Localized Failure Treatments

### Pothole Patching:

Potholes are a danger to the traveling public and can lead to serious accidents and injuries. If left unattended, potholes will enlarge and cause the degrading of more of the road surface. Pothole patching includes repairing sewer cuts, utility cuts, crevices, surface subsidence, sinks, and dips as well as potholes.

### Skin Patching:

Skin patching or blade patching is used to repair a full lane width of deteriorated surface.

# Part 1 - Asphalt Surface Maintenance

## Rotomilling

**Description:** The removal of an existing asphalt surface by cold milling. This treatment is then followed with an overlay.

**Purpose:** The cold milling is used to remove an old open grade surface course or other surface layers. Also use to remove rutting when not caused by a weak base, and the pavement has deteriorated to a point where it is not practical to correct the rutting with a more economical treatment. Use to remove surface courses that are delaminating. Use to correct deficient crown or super elevation sections. Use to correct isolated deficiencies in one lane while leaving the existing pavement in the other lanes. Use to maintain elevations along curb and gutter sections. Use to maintain clearances under structures.

**Pavement condition:** Core the existing pavement to ensure the depth of milling does not expose a weak layer or result in the thickness of the existing pavement being less than desired.

**Surface preparation:** Lower manholes.

**Performance:** NA

**Limitations:** Have a plan for what to do with the milled material.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Overlays

Typical rehabilitation treatments come in the form of a pavement overlay. For definition purposes, it comes down to the thickness of the overlay. If it is less than 1.5” it is a rehabilitating thin overlay. If it’s more than 1.5” over the existing thickness, it becomes a thick/structural overlay.

#### Typical Overlay Applications

**Pavement Overlay** – When the existing pavement is found to be in a sound, structural state, the overlay can be applied directly to the existing pavement. The process requires sweeping the surface and applying a binder oil (tack coat) before paving the overlay to affirm adherence between the existing pavement and the overlay pavement.

**Milling and Hot Mix Overlay** - Often a road cannot be overlaid because its surface is rough or badly oxidized. In this case, the surface of the road needs to be prepared before new pavement can be applied. The poor quality or rough asphalt is cold planed off using a milling machine in preparation for the new layer of hot-mix asphalt. Sometimes milling is to keep the same profile adjacent to curb and gutter.

**Cold in Place (CIP) Recycle & Overlay** - Cold in Place Recycle & Overlay is the removal of the top two to four inches of an existing pavement, combining that material with recycling agent and sometimes fresh aggregate on site, replacing and compacting the reworked material and overlaying it with hot-mix asphalt. Sometimes the surface is milled and removed first, to recycle a deeper layer – or to maintain the existing surface elevation after the overlay.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Thin Asphalt Overlay – Hot Mix / Stone Matrix

**Description:** A thin asphalt overlay is limited to 1.5 inches. Hot mix asphalt (HMA) is the most common. Stone Matrix Asphalt (SMA) is also being used.

**Purpose:** The purpose of a thin asphalt overlay is to protect the pavement structure, slow the rate of deterioration, correct many surface deficiencies, improve the ride quality, and add a minor amount of structural enhancement to the existing pavement.

**Pavement condition:** The existing pavement exhibits a good base condition and a uniform cross section. The visible surface distress may include moderate to severe raveling, longitudinal and transverse cracks with the first signs of raveling and secondary cracking, first signs of edge cracking, block cracking, extensive to severe bleeding or polishing, some patching in good condition or any of the above. The pavement may also have some minor base failures and depressions.

**Surface preparation:** Limit this preparation work to the repair of any minor base failures and depressions, the filling of voids in the surface, the removal of any patched areas with a very high asphalt content that may bleed up through the new surface, the correction of any tented joints and the correction of deficient super-elevation, if required.

**Performance:** This fix is preferred for higher volume roads. The life expectancy of a thin overlay is seven to ten years; however, with a consistent surface seal program, the life can reach 20 years.

**Limitations:** Don't place a thin asphalt overlay on a rutted pavement, a pavement with a weak base, or a delaminated surface. If placed on a concrete pavement expect reflective cracking. The existing pavement should be cored to evaluate its condition.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Thick Asphalt Overlay / Structural Overlay

**Description:** A thick asphalt overlay over 1.5 inches used to increase or establish pavement structure. Hot mix asphalt (HMA) is the most common. Stone Matrix Asphalt (SMA) is also being used.

**Purpose:** The purpose of a thick/structural asphalt overlay is to correct and create the pavement structure, correct many surface deficiencies, improve the ride quality, and add reaffirm the soundness of the base course.

**Pavement condition:** The existing pavement exhibits deteriorating or poor base condition and an uneven cross-section. The visible surface distress may include severe raveling, longitudinal and transverse cracks with noticeable signs of raveling and secondary cracking, severe edge cracking, block cracking, extensive bleeding, and rutting.

**Surface preparation:** Preparation work looks to rotomill the all of the existing asphalt or only the top layer with the majority of failure. Also, repair of base course failures and depressions, the filling of voids in the surface, the removal of any patched areas with a very high asphalt content that may bleed up through the new surface, the correction of any tented joints and the correction of a deficient super-elevation.

**Performance:** This fix is preferred for collector roads that experience a higher traffic volume. The life expectancy of a thin overlay is seven to ten years; however, with a consistent surface seal program, the life can reach 20 years.

**Limitations:** The biggest limitation to this type of treatment is the cost, where a short section of roadway can consume the majority, if not all, of the annual budget.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### HMA Mix Types:

- **Dense-Graded Mixes**

A dense-graded mix is a well-graded HMA intended for general use. Generally referred to by their nominal maximum aggregate size, 1/2" or 3/4 ". Suitable for all pavement layers and traffic conditions. Works well for structural, friction, leveling and patching needs.

- **Stone Matrix Asphalt (SMA)**

A stone matrix mix is a gap-graded mix designed for a stone on stone contact specifically to resist rutting and maximize durability. Used for surface courses on higher volume roads.

- **Open-Graded Mixes**

Open-graded mixes are designed to be water permeable with a high percent of air voids. Used for surface courses only. Typically, smoother and quieter than dense-graded HMA. Due to the high freeze-thaw factor in Brian Head, this mix will rarely, if ever, used in our maintenance and rehabilitation programs.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Sealants

#### Chip Sealing

**Description:** Chip sealing is the adhering of a layer of crushed aggregate to an existing roadway surface using a polymer modified asphalt emulsion. A single or double chip seal can be used. The emulsion is sprayed onto the surface, immediately followed by the chip spreader. The chips are then rolled after spreading over the emulsion.

**Purpose:** Chip seals are one of the most cost-effective ways to improve skid resistance. A chip seal will rejuvenate or retard the oxidation of the existing asphalt binder, seal fine surface cracks reducing the intrusion of water into the pavement structure, and will retard the raveling of aggregate from a weathered pavement surface.

**Pavement condition:** The existing pavement exhibits a good cross section and a good base. The visible surface distress may include slight raveling and surface wear, longitudinal and transverse cracks with a minor amount of secondary cracking and slight raveling along the crack face, first signs of block cracking, slight to moderate flushing or polishing and/or an occasional patch in good condition.

**Surface preparation:** Seal all visible cracks and construction joints for single chip seals. It may be more economical and practical to place a double chip seal in lieu of a single chip seal when the number of cracks to be sealed reach a certain quantity and eliminate the sealing of the cracks.

**Performance:** The life expectancy of a polymer modified single chip seal is five to 10 years, depending on average daily traffic (ADT). Double chip seals are reported to give about twice the service life as a single chip seal. This is the assumption that both applications were placed on pavements in like condition. Since the double chip seals are used in lieu of crack sealing, the life expectancy may not be twice that of a single chip seal.

**Limitations:** Do not place chip seals on a plant mix seal coat. The construction season for this work is relatively short. Do not place chip seals if the temperature is below 65 degrees and falling. It usually requires about one month of warm weather following construction for the aggregate particles to become reoriented and properly embedded in the asphalt membrane. Loose aggregate not embedded in the asphalt membrane will become airborne and possibly damage windshields of vehicles of the traveling public. Traffic noise will also increase after a chip seal is placed.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Slurry Sealing

**Description:** A slurry seal is a mixture of asphalt emulsion, well-graded fine aggregate (sand, 1/8" size) and a mineral filler mixed with water to produce a slurry consistency. Additives are often used to aid setting the slurry. Types of slurry seals are specified by the size of the aggregate used. The slurry is mixed in a self-propelled pug mill and uniformly applied through a spreader box.

**Purpose:** Slurry sealing will seal minor surface cracks and voids, retard surface raveling, improve surface friction characteristics, and delineate different pavement surface areas.

**Pavement condition:** The existing pavement must not have large cracks that move under traffic. The existing pavement has to be stable with no excessive rutting or shoving. The treatment is too thin to correct surface profile or rutting.

**Surface preparation:** Crack sealing and patching must be done enough in advance of the slurry seal to allow for complete curing. Clean the pavement with a power broom immediately prior to construction of the slurry seal. Use a tack coat on dry or raveled pavements.

**Performance:** The life expectancy of a slurry seal is three to five years.

**Limitations:** Do not apply slurry seal on a pavement where the cracks move under traffic. Slurry seals require longer curing time than chip seals. Do not place during rain or if rain is expected before the slurry is set. Do not place at night, or if the temperature will drop below 45 degrees.

## Part 2 - Asphalt Surface Rehabilitation Treatments

### Microsurfacing

**Description:** Microsurfacing is a slurry seal mixture of polymer modified asphalt emulsion, high-quality dense-graded aggregate and a mineral filler mixed with water to produce a slurry consistency. Additives are often used to aid setting the slurry. Types of micro-seal are specified by the size of the aggregate used. The slurry is mixed in a self-propelled specialized pug mill and uniformly applied through a spreader box.

**Purpose:** Used to retard raveling and oxidation, improve surface friction, reduce the intrusion of water, and fill surface irregularities. Asphalt roads are susceptible to rutting which often requires milling the road then overlaying, which is expensive. A less expensive alternative is to fill the ruts with microsurfacing to restore the original pavement profile. With the polymers and other additives, the seal can be placed thicker than a traditional slurry seal. This provides all of the benefits of a slurry seal with the additional benefits of being able to fill any ruts and improve the surface profile. Thicker applications should be done with multiple layers with a cure interval in between applications.

**Pavement condition:** The existing pavement has to be stable with a good base. The surface can include slight to moderate cracking, rutting, minor surface irregularities, flushed or polished surface and/or severe raveling. The existing pavement must not have large cracks that move under traffic.

**Surface preparation:** Crack sealing and patching must be done enough in advance of the microsurfacing to allow for complete curing. Clean the pavement with a power broom immediately prior to construction of the slurry seal. Use a tack coat on dry or raveled pavements. Existing striping should be removed.

**Performance:** Performs well on high volume roads. The life expectancy of microsurfacing is six to eight years. Microsurfacing is a poor crack sealer due to the stiffness of the mix, and cracks will reflect through in a few months.

**Limitations:** Do not apply on a pavement where the cracks move under traffic. Microsurface mixes are very aggregate specific because of the chemically triggered quick reaction characteristics of the mixture. Requires special equipment and experienced contractors. Do not place during rain or if rain is expected before the slurry is set. Do not place if the temperature will drop below 45 degrees. Requires multiple lifts if placed on a milled surface.

## Part 3 - Gravel Surfaces – Maintenance/Reactive Treatments

Gravel Surfaces do not perform in the same manner as those with a hard surface treatment. As such, a definitive preservation program does not carry the same relevance as it does for the Town's asphalt streets. In this sense, the gravel surface preservation program follows a base program cycle with an understanding that a flexible approach to the type and timing of each treatment emerges from year to year. For example, what may be a clean, graded, and dust limiting surface one year may be completely in ruins the following year based on the amount of spring run-off or monsoon storms.

### Grading

**Description:** Grading involves reworking the existing gravel or rotmill tailing surface of the street.

**Purpose:** Grading activities incur to smoothing the driving surface, repair wash-boards, repair rutting, establish cut ditch drainage, and maintain the crown of the street.

**Surface condition:** Typically, grading activities occur when the surface rideability becomes rough, the gravel has washed away, or erosion occurs.

**Surface preparation:** In areas that are not structurally sound, the street requires over-excavation to bridge the issues and provide structure. Also, preparation involves the evaluation of whether additional gravel needs to be added to the surface.

**Performance:** Typically, it is common to receive two years of life when grading has been executed.

**Limitations:** The limitations of grading develop from the many variables disable the intent of the activity, like flooding, run-off, or traffic volumes.

## Part 3 - Gravel Surfaces – Maintenance/Reactive Treatments

### Mag-Chloride (Dust Control)

**Description:** The application of liquid Magnesium Chloride to gravel surface streets via a spray bar.

**Purpose:** A Mag-Chloride treatment facilitates an avenue to provide dust control on local, gravel surfaced streets.

**Surface condition:** The surface should be graded.

**Surface preparation:** Grade the street, establish drainage, and dampen the surface prior to a Mag-Chloride application.

**Performance:** A Mag-Chloride treatment performs for up to two-years on less traveled streets, and around on-year on heavier traffic volumes.

**Limitations:** The application is not a long-term treatment, and can make the surface more slippery when receiving large volumes of precipitation.

### Rotomill Tailings

**Description:** Apply and grade 1” – 2” of rotomill tailing as the driving surface.

**Purpose:** The roto mill tailing treatment serves as a stable driving surface that is less muddy and temperamental than gravel.

**Surface condition:** The surface needs to be stable, graded, and receive heavier traffic volumes.

**Surface preparation:** Grade the existing service, establish a crown, and affirm drainage prior to applying rotomill tailings.

**Performance:** Rotomill tailings perform well when rolled and watered periodically. Also, when a double chip seal is applied on top of a properly installed rotomill tailing surface, the performance acts more like a paved surface. As such, this can be a less expensive way to transition local gravel streets into paved, local streets.

**Limitations:** Similar to gravel, the limitations are subject to the variables, like run-off, flooding, and thickness of the application. The surface may appear to be similar to a paved, hard-surface but it does not perform in the same manner.

## Part 4 – Costs and Life Cycles

### Treatment Costs

Average treatment costs have been calculated from recent bid price averages. Unit costs are for typical paving items associated with the treatment. Project unit costs are also included, which imply a project of two miles in length. These are the unit prices used in our modeling.

Project costs include additional pay items typically included in projects. Mobilization, traffic control, and striping are typical for surface seal jobs. More involved treatments typically include work for adjusting utilities, curb gutter sidewalk and driveway adjustments, signs, guardrail, drainage etc.

<i>Treatment</i>	<i>Unit Costs</i>	<i>Project Costs</i>
<i>Crack Sealing Crack Filling (Sq. Ft.)</i>	\$0.05	\$10,560
<i>Crack Filling – Mastic (Sq. ft.)</i>	\$0.055	\$11,616
<i>Fog Sealing / Rejuvenation (Sq. ft.)</i>	\$0.10	\$21,100
<i>Lane Leveling (Tons)</i>	\$60	\$5,000 - \$15,000
<i>Pothole Patching (Mile)</i>	\$600	\$1,200
<i>Skin Patching (Ton)</i>	\$94.38	\$46,141
<i>Rotomilling (Sq. ft.)</i>	<i>No recent data available</i>	
<i>Milling &amp; Overlay (Sq. ft. + Tons)</i>	<i>No recent data available</i>	
<i>Cold in Place (Tons)</i>	<i>No recent data available</i>	
<i>Thick/Structural Overlay (Tons)</i>	\$94.38	\$230,706
<i>Thin HMA Overlay (Tons)</i>	\$94.38	\$69,212
<i>Thin SMA Overlay (Tons)</i>	\$102.45	\$75,130
<i>Chip Sealing (Sq. ft.)</i>	\$0.28	\$59,136
<b><i>Chip Sealing w/ Flush Coat</i></b>	<b>\$0.38</b>	<b>\$80,236</b>
<i>Slurry Sealing (Sq. ft.)</i>	\$0.18	\$38,016
<i>Microsurfacing (Sq. ft.)</i>	\$0.40	\$84,480
<i>Engineering (12%)</i>	-	12% of total

## Part 4 – Costs and Life Cycles

### Pavement Life Strategy

Brian Head Town has developed the following strategies to preserve and maximize the service life of our pavements. If we had sufficient funding, these time-based treatments are what would be done.

Brian Head Town pavements/surfaces are divided into the following:

**Level 1:** Collector streets with a hard surface pavement.

**Level 2:** Local streets with a hard surface pavement.

**Level 3:** Local Streets with gravel or milling surfaces.

These categories are slightly flexible and have been set to establish different performance criteria. Our Level 1 pavements carry the highest traffic volumes at the highest speeds. These are clearly our highest priority pavements and have the highest performance goals for smoothness and overall condition. At the other end of our performance spectrum are our lower volume Level 2 and 3 pavements and surfaces. These are generally older pavements, have an environmental distress, have lower performance goals for smoothness and overall condition, or are surfaced with gravel or millings.

The following treatment strategies are guidelines for planning design life treatments and estimating life cycle costs. These will be listed in general categories. The starting point for each cycle will be initial construction or new pavement. Actual treatments and timing will be based on actual condition, available funding, and Town priorities.

#### Level 1 Asphalt – 8-year Treatment Cycle:

Preservation: Surface Seal	Year 8
Preservation: Surface Seal	Year 16
Minor Rehabilitation: Recycle or Thin Overlay	Year 24
Preservation: Surface Seal	Year 32
Preservation: Surface Seal	Year 40
Major Rehabilitation: Thick/Structural Overlay	Year 48

## Part 4 – Costs and Life Cycles

### Level 2 Asphalt – 10-year Treatment Cycle

Preservation: Surface Seal	Year 10
Preservation: Surface Seal	Year 20
Minor Rehabilitation: Recycle and Thin Overlay	Year 30
Preservation: Surface Seal	Year 40
Preservation: Surface Seal	Year 50
Major Rehabilitation: Structural Overlay	Year 60

### Level 3 Gravel/Millings – Maintenance/Reactive Treatment Cycle

Maintenance: Grading	Year 2
Dust Control: Mag Chloride Treatment	Year 3
Maintenance: Grading	Year 4
Dust Control: Mag Chloride Treatment	Year 6
Maintenance: Grading	Year 6
Surface Treatment: New Roadbase/Millings	Year 8

## Part 4 – Costs and Life Cycles

### Brian Head Town Streets Classifications

#### Level 1 – Paved Collector:

Hunter Ridge	Steam Engine	Ridgeview	Vasels	Village Way
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#### Level 2 – Paved Local:

Trails @ Navajo	Shooting Star	Leslie	Eagles Roost
Yarrow	Sierra	Kodiak	Crystal Aire
Willow	Autumn	Pinehurst	Bristlecone

#### Level 3 – Gravel Local:

Aspen Drive	Aspen Circle	Snowman	Dry Lakes Rd
Fir	Arrow Leaf	Boulder	Ermine Ct
Spruce	Pine Top	Pine	Feather Ct
Columbine	Hidden Lake	Quill	Granit Ct
Navajo Trail	Pine Trail	Spiney	Kokopelli
Circle	Alpine Lane	Marge	Nordic Ct
Half Circle	Shady Dell	Salt Pile	Olympic Dr
Gurr	Snow Show	Highland	Plateau Place
Adams	Toboggan	Grand Ski View	Pond
Corry	Alpine Ct	Brook	Poppy Ct
Holyoak	Ponderosa	Spring	Range Ct
Pine Tree	Lookout Circle	Skate	Raven Ct
Rue Jolley	Irish Trail	Sleigh	Rocky Rd
Lee	Old Mill	Driftwood	Saddle Back Rd
Aoki Michi	Park-U-Pine	Paintbrush	Sandstone Dr
Jensen	Ridge Top	Paddington Circle	Scenic Dr
Forest	Sunrise	Peak Drive	Shale Dr
Mountain View	Blue Jay	Antelope Dr	Ski View
Trail	Meadow	Blue Bell Ct	Snow Mobile
Deer Trail	Snowflake	Bobcat Rd	Timbercrest Dr
Falcon	Bear Flat	Copper Ln	Yankee Lookout
Elk	Mammoth Tank	Cougar Ct	

## References

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