MEMORANDUM
STAFF REPORT ON USING FOG SEAL TREATMENT ON TAR AND CHIP RUSTIC ROADS

INTRODUCTION

What is fog seal? Fog sealing is a maintenance technique that involves applying a light layer of asphalt emulsion to enhance the performance of chip sealing (tar and chip).

The Division of Public Works (DPW) is seeking the input of the Rustic Roads Commission to use a fog seal treatment on Frederick County's tar and chip Rustic Roads. DPW's Pavement Management Program (PMP) has been using this treatment since 2021on roadways that are candidates for Rustic Roads and roadways that have been removed for consideration.

DPW and PMP staff have evaluated the cost efficiency, advantages, and disadvantages and determined that fog seal is an approved treatment on all Frederick County tar and chip roadways.

COST EFFICIENCY ANALYSIS

In a recent PowerPoint presentation to this commission, staff demonstrated the cost of a tar and chip treatment on a roadway one mile in length (5280') and 16 feet wide using current contract pricing. The cost for this treatment including tar and stone chips for a single layer is $23,804.77. The fog seal cost for this example is $5,553.15.

The life-span cycle of a tar and chip wearing course is 3 to 5 years depending on traffic (vehicular and heavy equipment use such as farm equipment), seasonal weather events, and exposure to sunlight or lack thereof. Staff have determined that a fog seal treatment could extend the lifespan of the tar and chip wearing course by 1 to 3 years depending on the same conditions noted above.

For the cost analysis example, staff will use a tar and chip wearing course treatment with a life-span of 4 years, a tar and chip treatment adding fog seal for a life span of 6 years (4 years for the tar and chip + 2 years for the fog seal), the cost data noted above, and a twelve year period of time that the roadway is being treated.

Using tar and chip treatments only over this twelve-year period, the roadway would be serviced three times or $23,804.77 x 3 = $71,414.31.

Over the same period of twelve years, the roadway would be serviced twice with tar and chip and fog seal. One treatment would cost $23,804.77 (cost of tar and chip) + $5,553.15 (cost of fog seal) = $29,357.92. This treatment would be applied twice, and the total cost would be

$29,357.92 x 2 = $58,715.84. Total savings using fog seal are $71,414.31 - $58,715.84 = $12,698.47.

Over a twelve-year cycle of each treatment, using fog seal will decrease the frequency of roadway treatments and provide cost savings to the taxpayers of Frederick County.

ADVANTAGES

Fog sealing tar and chip roadways has many advantages over tar and chip alone. It enhances sealing the road surface and waterproofing the roadway. Water that penetrates roadway surfaces leads to cracking and eventually subgrade saturation.

Fog seals also prevent stone migration. When applied to chip seals it will hold the stone in place and provide a cleaner surface. This will control dust and enhance the appearance of the surface. The thin layer of asphalt emulsion retains more stone over time and keeps the roadway from losing its rougher surface texture. The initial appearance is darker (as shown in Figure 1.1) but over a longer period compared to no fog seal, it fades and reveals the grayish appearance of a tar and chip (see Figures 2.1, 2.2, 3.1, 3.2, and 3.3 below).

Fog seals are also cost efficient as described in the cost efficiency analysis. Less maintenance cycles provide savings over time and reduce the annoyance of construction activities being performed more frequently.

DISADVANTAGES

Fog seals can release Volatile Organic Compounds (VOCs) into the air during application. Once set and cured the environmental threat of the VOCs is reduced but may linger over time as the fog seal weathers.

Like most construction materials, the materials to create fog seals may not be sourced sustainably raising concerns about environmental impact.

Although fog seal does help retain stone chips, it will not completely prevent the issue of chips being displaced over time.

CONCLUSION

Fog seal is a cost-effective maintenance treatment that benefits the lifespan of a tar and chip treatment. Maintenance is less frequent, which saves on cost and benefits the residents that utilize the roadways in a vehicle, on a bike, or walking. Less maintenance also benefits the

residents that reside along the roadways, reducing the inconvenience and disruption that construction activities create.

Fog seal prevents stone chip migration which makes the roads safer, reduces dust, protects migration of stone into neighboring streams and residences, prevents stones from clogging drainage culverts, and protects the rougher texture of the tar and chip roadway.

Asphalt materials, and most construction materials, have environmental concerns. The methods which they are sourced use equipment which pollutes the air, and the processes utilized to convert the raw materials have environmental impacts. Over the past few decades these impacts have been recognized and drastically reduced.

DPW has recognized fog seals as an effective maintenance technique that benefits the life cycle of Frederick County's tar and chip roadways. Frederick County's PMP continuously reviews new technologies that will be cost effective, extend pavement maintenance cycles, and reduce the effects of construction on the environment.

RECOMMENDATION

DPW staff recommends that the Commission support using fog seal treatment on Rustic Roads with a tar and chip surface.

Figure 1.1: New fog seal treatment on Links Bridge Lane applied 7/21/2025.

Figure 1.2: New tar and chip treatment with no fog seal. Mountaindale Road applied 7/1/2025

Figure 2.1: Putman Road fog sealed on 3/30/2023.

Figure 2.2: Chestnut Grove Road fog sealed on 10/19/2023.

Figure 3.1: Mt Ephraim Road fog sealed on 9/27/2021 non-shaded area.

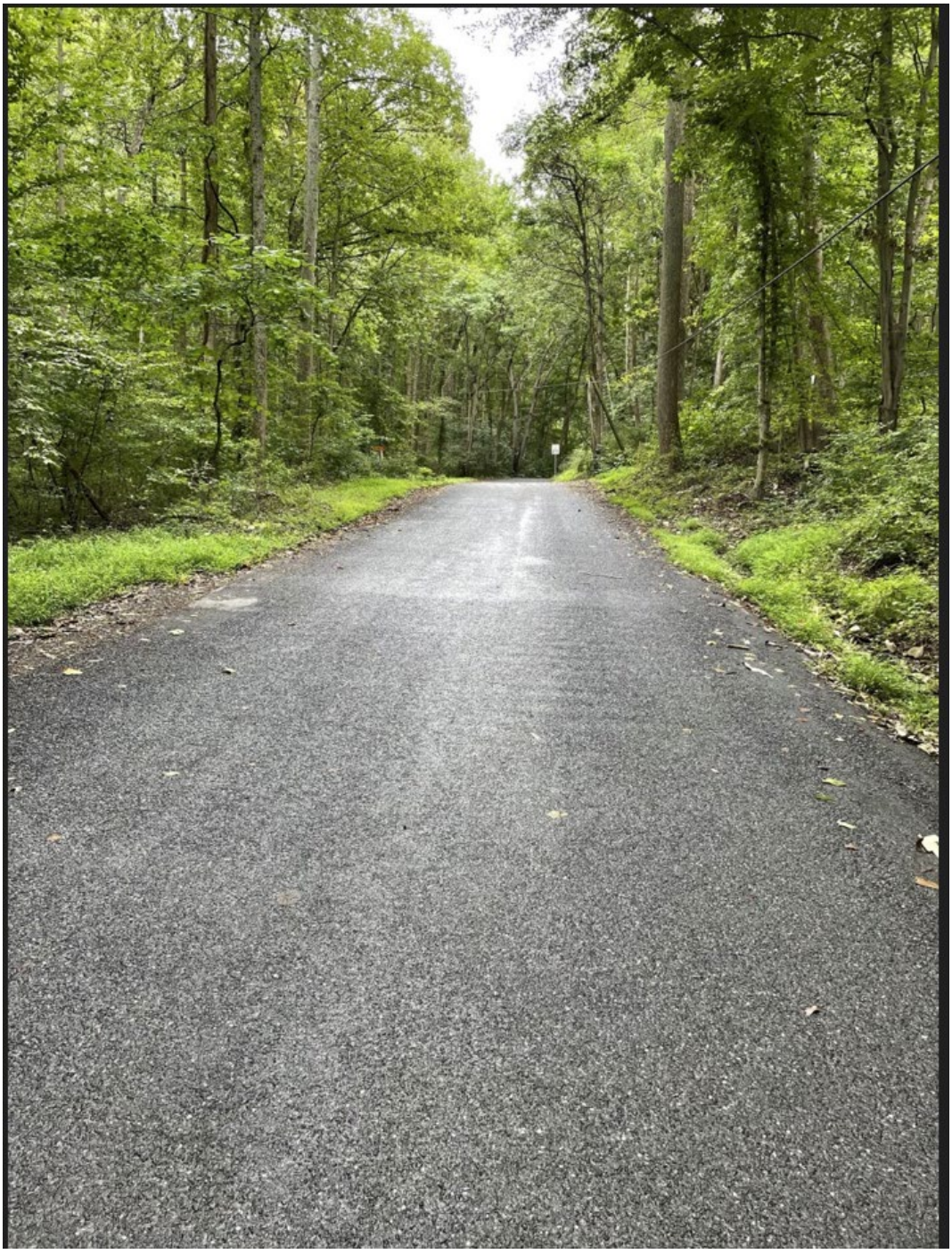

Figure 3.2: Mt. Ephraim Road fog sealed on 9/27/2021 shaded area.

Figure 3.3: Wilhide Road just off of Lewistown Road. Tar and chip no fog seal applied on 9/20/2021. Signs of bleeding.