

## Purpose of road surface maintenance:

To provide proper drainage, improve road performance, lengthen maintenance cycles, reduce maintenance costs, and reduce pollution impacts.

## What is surface maintenance?

Maintenance of the road surface is periodic re-shaping of the road surface to ensure proper drainage and traffic passage by:

- Re-establishing crown and proper cross-slope (see Crown & Cross-Slope Informational Bulletin); and
- Incorporating loose stones back into the road surface (see Grading Sequence Technical Bulletin).

Applying new techniques to unpaved road surface maintenance can improve road performance, lengthen maintenance cycles, reduce maintenance costs, and reduce pollution impacts.

## Why is surface maintenance necessary?

Surface maintenance is cyclical by definition. No matter how well maintenance is done, it will need to be re-done. The abrasive action of traffic wears away at the fines which bind the road together. Over time, the coarse stones, which provide the road's strength, are displaced by traffic and accumulate along the edge of the road. This windrow of particles traps water on the traveled surface. Water that cannot flow off the road has more time to penetrate and saturate the road material, softening and lubricating it. Additionally, water accumulates on the road surface and flows toward the lowest point, typically following the wheel tracks. Water concentrated in the wheel track gains velocity, eroding the driving surface. The process starts slowly but if surface maintenance is not completed on a timely basis, the damage to the road can be severe.

## Benefits of surface maintenance

- Limits the potential for water to flow on the road in wheel tracks;
- Creates a tightly packed road surface;
- Reduces dust generation caused by the grinding action of large loose stone under traffic; and
- Minimizes loss of road material to erosion.

## Indicators that surface maintenance is needed:

- Excessive dust;
- Loose stone on the surface;
- Loose stone developing in windrows along the edges of the road (see photo 1);
- Water flowing parallel with the road in the wheel tracks (see photo 2);
- Holes or potholes (see photo 3);
- Ruts;
- Wash-boarding; and
- Loss of crown.



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## Driving Surface Aggregate

Driving Surface Aggregate (DSA) is an aggregate mixture of crushed stone designed specifically as a surface-wearing course for unpaved roads. DSA provides a durable road surface with longer maintenance cycles but it is not maintenance free. DSA is a different type of surface material requiring a different maintenance approach.

### How is surface maintenance of DSA different from traditional road aggregates?

**Fines:** Fine material (less than  $\frac{1}{200}$  of an inch) is the key to the DSA. While larger stones provide the road's structural support, it is a well-balanced mixture, including fines, which holds the road together and produces a dense, tightly packed road surface (see photo 4). Using grading techniques that maintain or re-establish the proper mixture of all particle sizes is critical. Separation of particles by size will lead to failure on even the best of roads.

**Hardness:** DSA is more abrasion resistant than many of the softer aggregates used on unpaved roads. This increased abrasion resistance reduces the amount of dust produced by the grinding action of traffic. Fines lost as dust are not readily replaced. In addition, DSA is usually very tightly compacted. It is necessary to make numerous passes when grading to sufficiently loosen DSA to recover enough fines to re-create an even blend of particle sizes for optimum compaction density.

**Moisture:** Moisture is critical when working with DSA. Because the fines in DSA are ground rock, they do not hold water like clay fines do. DSA does not get sticky or slippery when wet. DSA dries out quickly and is prone to separation under dry conditions. Grading DSA should be done when adequate moisture is present to minimize aggregate separation and maximize compaction density. If the aggregate is too dry, add moisture (see photo 5) or grade only short sections after showers. Always roll for compaction before the road dries.



### Other maintenance operations

Ditch cleaning and shoulder maintenance operations are often combined with surface grading as one operation. Material pulled off the road shoulder is typically displaced aggregate useful in re-grading. Ditch material, often rich in organic material that attracts water, is not useful in re-grading. Combining ditch cleaning and shoulder maintenance with grading typically leads to some of the ditch material getting mixed into the road aggregate. This has several disadvantages:

- Holes and low spots in the road inadvertently filled with ditch material return very quickly, often after the first good rainfall.
- Too much aggregate is lost if ditch material is mixed with shoulder material and discarded.
- Road performance is decreased if ditch material is mixed with shoulder material and blended back into the road.

### Maintenance strategies

- If shoulder cutting is necessary to establish proper crown and facilitate sheet flow off the road, cut the shoulder and blend the material back into the road.
- If ditch cleaning is necessary and it is desired to do both grading and ditch cleaning at the same time, cut the shoulder and blend that material back into the road before cleaning the ditch. Clean the ditch, remove the ditch material from the road, and dispose appropriately.

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