



APWA WA ★ 2023 FALL CONFERENCE

RISE UP! REACH OUT!

October 4-5, WENATCHEE



Full Depth Reclamation (FDR) vs. Milling & Filling

Patrick Zellner

Street Maintenance & Solid Waste Services Manager

City of Renton



OBJECTIVES

- **Recommendations for Mill & Fill vs Full Depth Reclamation (FDR)**
- **Cost savings through doing more in-house road repairs**
- **FDR Soil / Base Stabilization options**



What is Milling?

- The milling process involves removing the existing asphalt layer to prepare it for asphalt resurfacing.
- Road crews use a specialized milling machine with rotating cutting drums to grind away the existing pavement.
 - Removing the top asphalt layer of the pavement usually 1 to 4 inches deep.
 - Resurfacing - a new layer of asphalt is applied to the existing material.
 - Asphalt recycling potential: road crews haul away the asphalt millings. They use the recycled asphalt for future construction projects.



Asphalt Milling





What is Full Depth Reclamation (FDR)?

- **Pulverize (Reclaiming) existing road surface into Spec Comparable Base Material**
- **Uniformly blend with a portion of existing base**
- **Incorporate stabilizing additives if needed**
- **Compact, Compact, Compact with sufficient moisture**

Rip, Water and Roll!



FDR Candidate Roads



When to do Asphalt Milling or FDR for Road Repairs?

When deciding between asphalt milling or full depth recycling a few factors to consider:

- 1. Road Condition:** Surface defects, minor cracks, unevenness or aging asphalt, asphalt milling might be a good solution. Milling selectively removes the top layer of asphalt while preserving the underlying layers. FDR is better if you have an unstable road base with rutting, alligator cracking and potholes.
- 2. Road Repair Budget:** Asphalt milling can be less expensive short term because it treats only the asphalt surface. Full depth reclamation is a more in-depth process that may involve a little more of an upfront investment. However, with the right equipment it can cost significantly less long-term.
- 3. Asphalt Pavement Outcome:** Asphalt milling can address defective asphalt surfaces, improve road smoothness, or prepare for a new asphalt layer. Full depth reclamation is a long-term solution. FDR addresses the underlying structural issues and provides a more stable road foundation.
- 4. Environmentally Friendly:** both asphalt milling and full depth reclamation recycle asphalt. With the milling process, you will need to haul away the used material for other projects. Full depth reclamation recycles the asphalt millings into road base that can be used in place, avoiding the cost of transportation and purchasing new materials.



Milling Machines

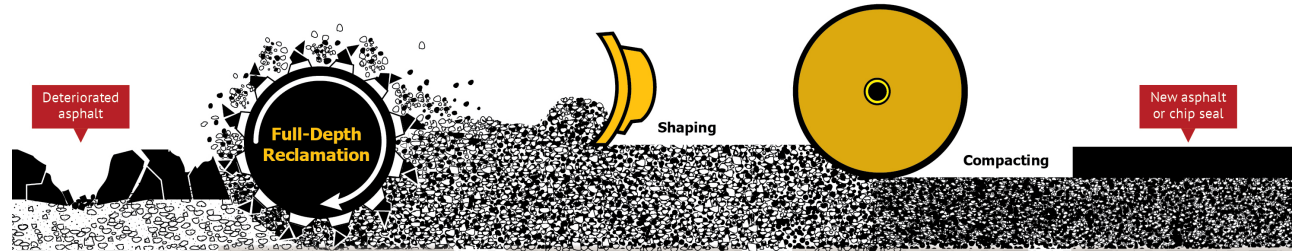


Reclaimers / Recyclers





Longer Lasting Road Repairs for Less Than Half the Cost!

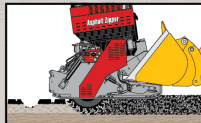


"Compared to traditional asphalt road reconstruction methods, Full-Depth Reclamation has numerous engineering, economic, and environmental benefits."

Spencer Guthrie, Ph.D.
Professor of Pavement and Materials Engineering
Brigham Young University

Base problem

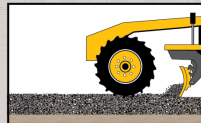
Step 1



Full-Depth Reclamation

Uniform blend of pulverized asphalt and existing base

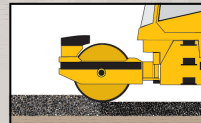
Step 2



Shaping

Compacted, stable base

Step 3



Compacting

Step 4



Paving





Midstate Full Depth Reclamation

FULL DEPTH RECLAMATION

Surface Coarse

6-10" FDR
(more solid)

Subgrade

VS.

TRADITIONAL METHOD

1.5" Overlay

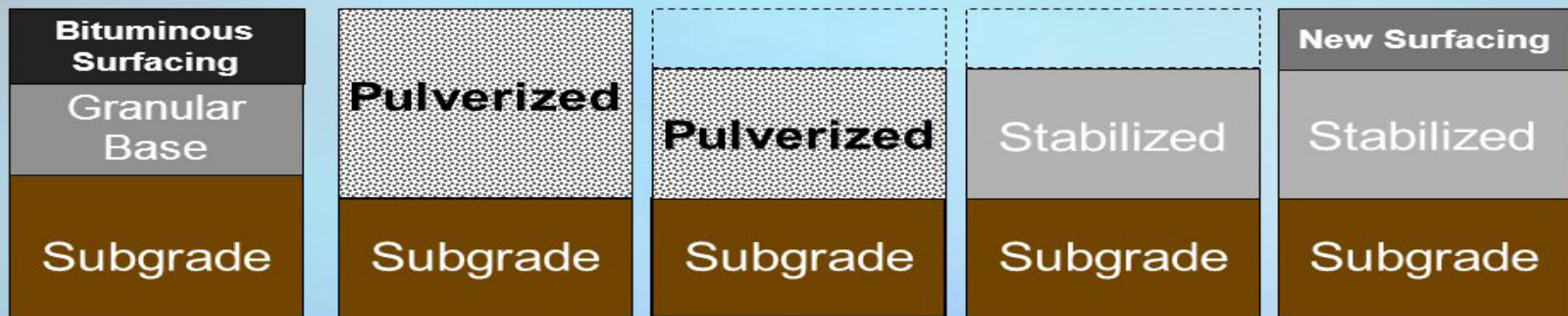
HMA

Base/Sub-base

Subgrade

FDR Construction Process

Pulverize, Shape, Add Cement, Mix In Place,
Compact, and Surface



Existing road

Pulverization to desired depth

Removal of excess material (if necessary) and shaping

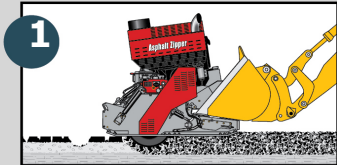
Addition of cement, mixing, reshaping, and compaction

Final surface application

3 Proven Approaches to Full-Depth Reclamation (FDR)

Basic Stabilization

FDR with existing material

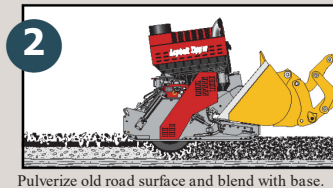
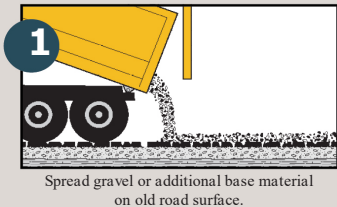


When Basic Stabilization Is Not Enough ...

then **Mechanical Stabilization** and/or **Chemical Stabilization** may be advisable.

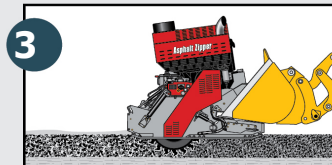
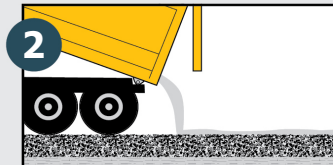
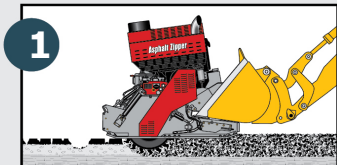
Mechanical Stabilization

FDR with additional material



Chemical Stabilization

FDR with chemical additives





Advantages of the FDR Process

- **Use of in-place materials**
- **Little or no material hauled off and dumped**
- **Maintains or improves existing grade**
- **Conserves virgin material**
- **Saves cost by using in-place “investments”**
- **Saves Energy by reducing mining and hauls**
- **Very sustainable process**



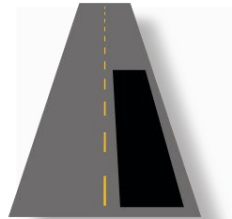
For All Sizes of Road Repairs



SMALL

(A few hundred square feet or less)

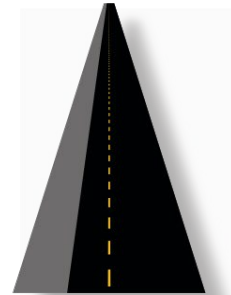
Do in **1 to 2 hours**
what used to
take **all day.**



MEDIUM

(Up to a city block)

Do in **a day**
what used to take
a week or two.



LARGE

(Up to a half mile or more)

Do in **a couple of days**
what used to
take **weeks.**

Comparison—1000 Foot Trench



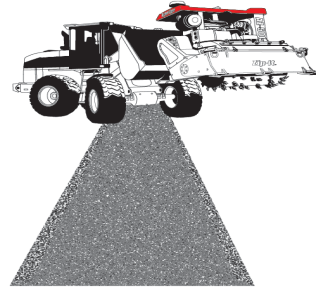
Traditional Method

Saw-cutting

Chunking
Loading
Hauling
Disposal
Backfill

\$6,000 to \$18,000

3 to 5 days



VS. *Asphalt Zipper* Method

**SAVE
\$10,000**



on average

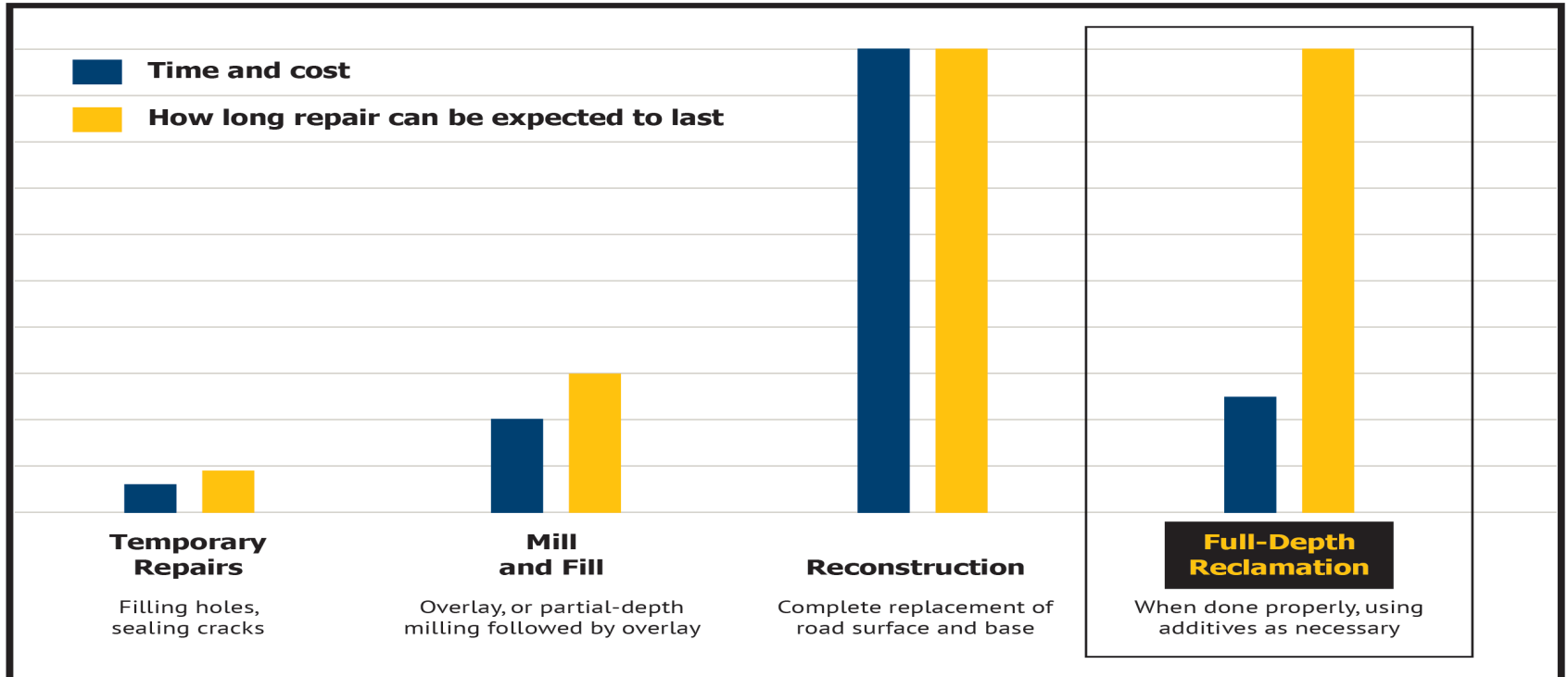
Just Zip-it®

\$550

Includes cost of fuel, cutting teeth, maintenance, depreciation, loader, and labor.

1 hour

Full-Depth Reclamation Compared to Other Repair Methods

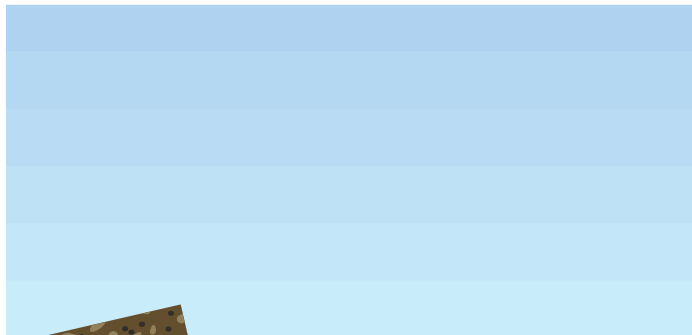




Superior Straight Edge



- ▶ Cuts straight
- ▶ Creates interlocking edge
- ▶ Proven superior bonding



University research has proven that a scarified interlocking "Zipped" edge improves joint bond strength 25 percent over a saw-cut edge.

One Machine, Multiple Uses

Patches



Alleyways



Parking Lots



Blocks



Full Roads



Shoulders



Gravel Roads

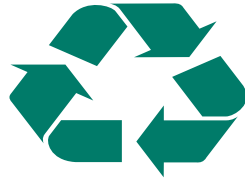


Surface Milling



Utility Trenching





The Greenest Way to Repair Roads

- ▶ Recycles asphalt or chip seal into “spec comparable” base material
- ▶ Up to 100% material savings
- ▶ Requires less trucking and other heavy equipment, resulting in lower fuel usage and cleaner air



How Most Municipalities Can Afford an Asphalt Reclaimer / Recycler

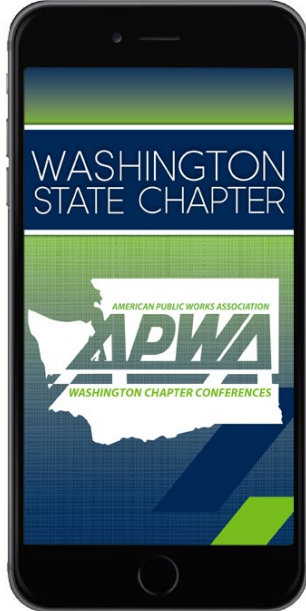
Special Municipal Financing Program

- **Special cost over 5 years**
- **Nothing down; first annual payment not due for an entire year**
- **Low municipal interest rate**
- **With less than 40 hours of use, savings most often are greater than the annual payment; The machines pay for themselves**



Summary

- ▶ **Do in a day what used to take a week or longer**
- ▶ **Enjoy cost and time savings of up to 70% or more**
- ▶ **Make repairs that last up to 3 to 5 times longer**
- ▶ **Bring road repairs back in-house**



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