Cold Central Plant Recycling Paving with 100% RAP

Brad Neitzke
Senior Materials Engineer
Western Federal Lands Highway Division

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Who is Western Federal Lands?

- Part of FHWA
- 1 of 3 Federal Lands Divisions
- Located in Vancouver, Washington
- Develop and administer construction projects
- On or access to Federal Land
- Territory includes
  - Alaska
  - Idaho
  - Montana
  - Oregon
  - Washington
  - Wyoming (Yellowstone and Grand Teton)

Our Clients

- National Park Service
- National Forest Service
- Department of Defense
- Bureau of Indian Affairs / Individual Tribes
- Local counties / agencies

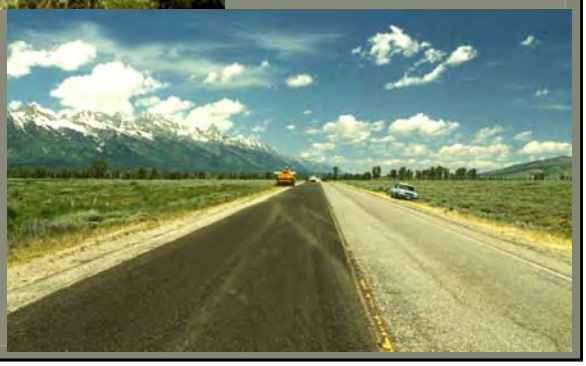
Recycling History

- Started in the 1980's
- Numerous projects
- CIR, FDR, CTB, Foam
- Central plant recycling

Grand Teton National Park

Eastside Highway -1985

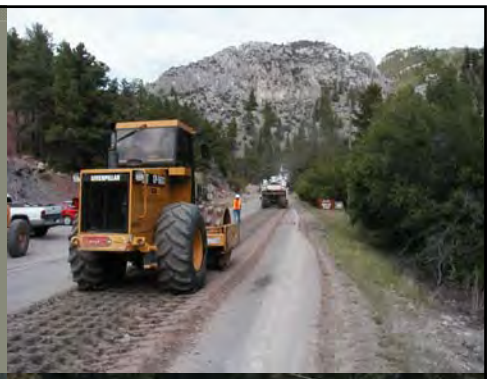
Cold In-place Recycling

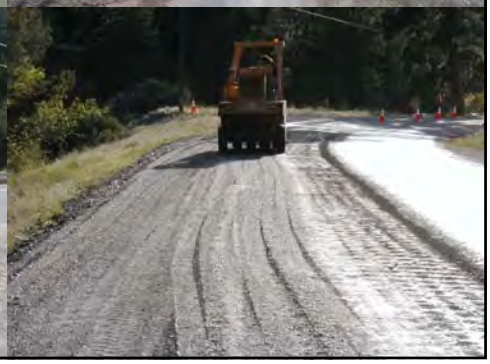


Lakeside – Nelson Road - 2004

Helena National Forest

Foamed Asphalt





Wise River – Polaris – 2010

Pioneer Mountain Scenic Byway

Cold In-place Recycling

Central Plant Recycling

Got pavement in a pile?

Old milled pavement in a pile?

Commodity

- Value – make an economic case
- Sustainability
- Most likely higher quality material
- Local on-site material source

Mix Design

- Total fluids content (Water & Emulsion)
- Fluids content range from 6% to 8%
- Disperse the emulsion (CMS-2)
- Use lime (1%) for curing and stripping
- Establish targets
- Field adjust (snowball test)

Mix Design Method

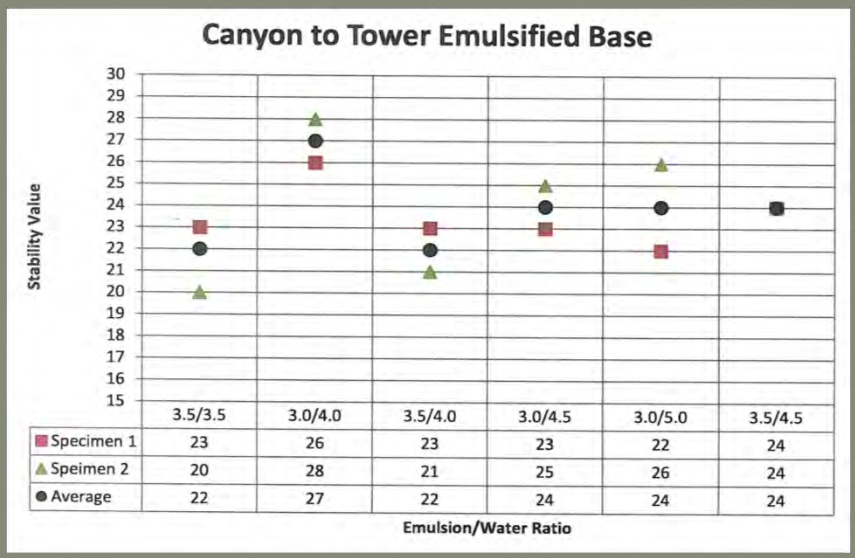
- Sieve and batch RAP
- Dry
- Add water – varying percent
- Add lime – 1% in all mixtures
- Add emulsified asphalt – varying percent
- Compact (Hveem)– observe moisture
- Cure for 16 hours at 140 °F
- Perform Hveem Stability

3.0% Emulsion and 4.0% Water

3.5% Emulsion and 3.5% Water

4.0% Emulsion and 3.0% Water

Specimen Comparison



	3.5/3.5	3.0/4.0	3.5/4.0	3.0/4.5	3.0/5.0	3.5/4.5
Specimen 1	23	26	23	23	22	24
Speimen 2	20	28	21	25	26	24
Average	22	27	22	24	24	24

Placement

Placement

Placement

Compaction

- No need for urgency
- Watch edge shoving – delay compaction
- Roller checking is not an issue
- Pneumatics a must
- If unstable – let it cure
- Monitor break-over with nuke gauge

Compaction

Compaction

Compaction

Surface after pneumatic roller

Check marks – not a problem

Finish with fog seal

Fog seal

After traffic

Problems

- Too juicy (total fluids too high)
  - Unstable
    - Let it sit and dry out
    - Pneumatic rolling may help
    - If not fog sealed, reprocess with grader
- Moisture sealed in mix
  - Remove and replace (removed material can be reused)
  - May stabilize over time
- Standing traffic on fog
  - Tracking and picking of surface
  - Use blotter

Unstable area that firmed up

Close up

The Future

- Changes in additives / technology
- Improved structural value
- Revised mix design method
  - Using gyratory compaction
  - Raveling test (ASTM D7196)
  - Indirect tensile test
  - Tensile strength ratio

Questions??

Brad Neitzke
brad.neitzke@dot.gov
360.619.7725