

Module 3-8

Cold In-Place Recycling

Objectives

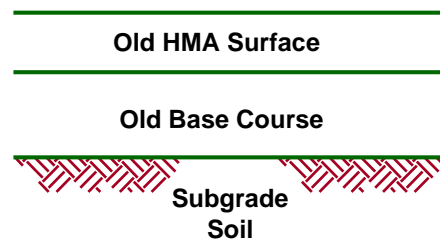
- Types of cold in-place recycling
- Types of equipment and operational sequence
- Mixture design methods
- Structural layer coefficients
- Economics
- Specifications
- Problem Areas

Cold In-Place Recycling

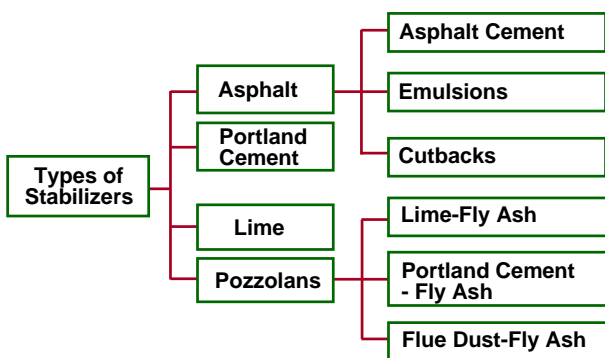
Partial depth

Full depth

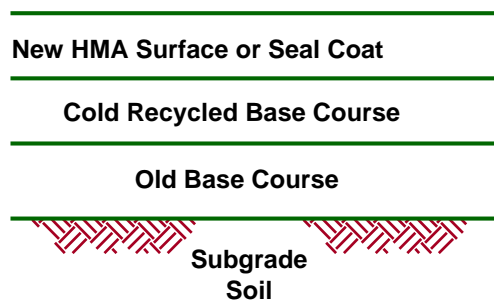
Partial vs. Full Depth



Binders / Stabilizers



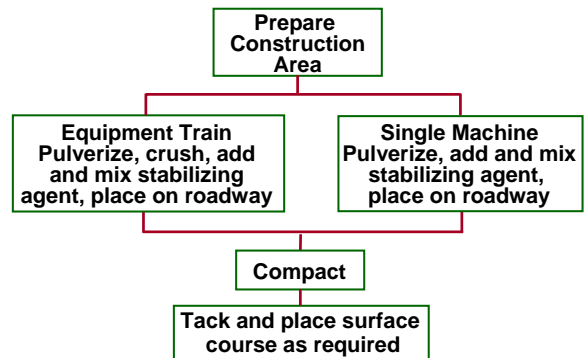
Typical Section



Recycling Methods and Equipment

Pavement sizing
Addition of new aggregate
Addition of new asphalt / recycling agent
Mixing
Laydown
Aeration
Compaction
Curing
Application of wearing surface

Recycling Methods and Equipment



Old Multiple Step Sequence



Old Multiple Step Sequence



Single Machine



Single Machine



Project with Single Machine



Project with Single Machine



Project with Single Machine



Project with Single Machine



Project with Single Machine



Project with Single Machine



Equipment Train



Equipment Train



Project with Equipment Train



Project with Equipment Train



Project with Equipment Train



Project with Equipment Train



Project with Equipment Train



Mixing Operations



Laydown, Aeration and Compaction



Recycled Mix Design

Available methods

- No standard procedure
- The Asphalt Institute
- Chevron USA

Recycled Mix Design

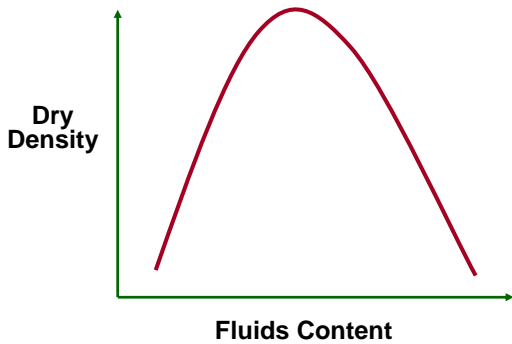
Basic design steps

- Field samples
- Laboratory analysis
- Field adjustments

Mix Constituents

Air Voids
New Asphalt
Old Asphalt
New Aggregate
Old Aggregate (RAP)

Typical Design Criteria



Design methods

AASHTO
The Asphalt Institute
State DOT

AASHTO Structural Layer Coefficients

Stabilizer	Range	Average	Typical
Asphalt	0.22- 0.49	0.36	0.35
Portland Cement	0.23- 0.42	0.31	0.15- 0.23

AASHTO Structural Layer Coefficients

Performance
Economics
Guidelines for use
Specifications

Material Specifications

Aggregate sizes
Asphalt modifier

Equipment Specifications

General description
End result

In-Place Density

Low densities

Limited amount of data

Problem Areas

Depth of removal

Degree of pulverization

Uniformity of mixing

In-place density

Curing

Protection from traffic

Summary

Types of procedures

Equipment

Mix design

Economics

Specifications

Problem areas