OUTLINE

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- EARLY LIMITATIONS PERCEIVED
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COLD IN-PLACE RECYCLING DEFINITION

THE COLD IN-PLACE RECYCLING (CIR) PROCESS INVOLVES MILLING THE EXISTING ASPHALT SURFACING TO A SPECIFIED DEPTH, SIZING THE MILLED MATERIAL, ADDING VARIOUS ADDITIVES (EMULSION, FOAM, LIME SLURRY, CEMENT), MIXING THE RAP AND THE ADDITIVES, LAYING AND COMPACTING THE RECYCLED MATERIAL.
EARLY CIR HISTORY

- First attempts at the "Train" process were in the early 80’s in California and Arizona.
- In mid 80’s, other states such as Oregon and New Mexico began using the process.
- The WFLHD and other Western states began to use the process as well.
- Eventually, all the Western states were using the process.
THE MAJORITY OF THE EARLY TRAINS WERE MULTI UNIT TRAINS CONSISTING OF A MILLING MACHINE, CRUSHER/SCREENING UNIT, AND A SEPARATE PUGMILL UNIT
EARLY LIMITATIONS

- Early on, it was perceived as a process that could only be used on low volume roads in rural areas.
- Many different types of emulsions were used with varying degrees of success.
- Many agencies were reluctant to specify the process because there was no universally accepted mix design process.
IMPROVEMENTS TO THE PROCESS

- EARLY RESEARCH DONE BY OREGON STATE (DR. GARY HICKS) AND GORDON MCKEEN WAS INSTRUMENTAL IN THE GROWTH OF THE PROCESS
- ARRA CONTRACTORS WORKED DILIGENTLY TO CRAFT EVER IMPROVING SPECIFICATIONS FOR AGENCIES
- IMPROVEMENTS IN EQUIPMENT AND ADDITIVES ALSO CONTRIBUTED TO A BETTER QUALITY PRODUCT
PRESENT DAY TRAINS

- SINGLE UNIT TRAINS
- SINGLE UNIT FRONT DISCHARGE TRAINS
- DIRECT DISCHARGE INTO THE PAVER
- RECYCLE UNITS WITH BUILT IN SCREED
- EMULSION OR FOAMED ASPHALT CAPABILITIES
ADVANCES IN THE PROCESS

- Virtually all specifying agencies utilize some form of a mix design process.
- The advent of engineered emulsions has improved coating characteristics, improved early strength characteristics.
- Additives such as lime and cement have shown to improve the overall quality of the final product.
OVERALL GROWTH OF THE PROCESS

- As a result of the continued quality improvement as well as the advent of shorter length trains, it is no longer limited to low volume roads in rural applications.
- The number of CIR trains in the U.S. and Canada now numbers over 30!
- Every state in the West has performed CIR.
- City and county agencies specifying CIR continues to grow.