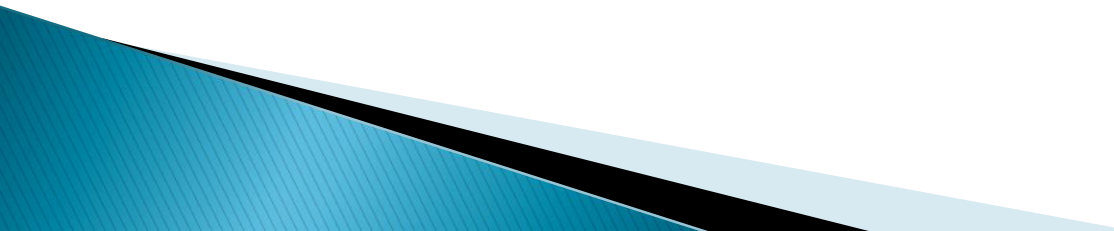


WESTERN STATES REGIONAL IN-PLACE RECYCLING CONFERENCE

SEPTEMBER 11-13, 2012
ONTARIO RADISSON AIRPORT HOTEL
ONTARIO, CA.

COLD IN-PLACE RECYCLE OVERVIEW

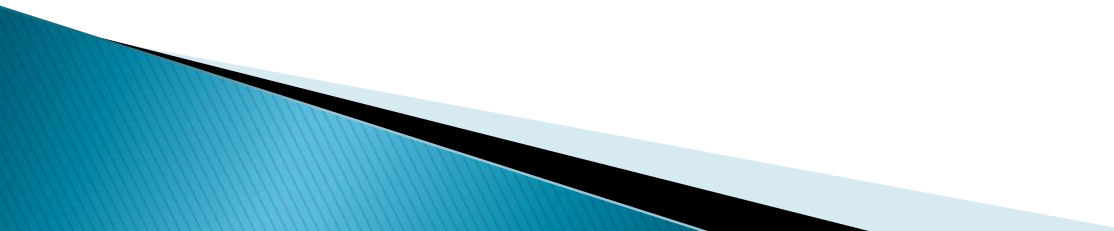
OUTLINE

- ❖ DEFINITION OF CIR
 - ❖ EARLY HISTORY IN THE WEST
 - ❖ TYPES OF CIR TRAINS USED
 - ❖ EARLY LIMITATIONS PERCEIVED
 - ❖ IMPROVEMENTS TO THE PROCESS OVER TIME
 - ❖ PRESENT DAY CIR TRAINS
 - ❖ ADVANCES IN THE PROCESS
 - ❖ OVERALL GROWTH OF THE PROCESS
- 

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

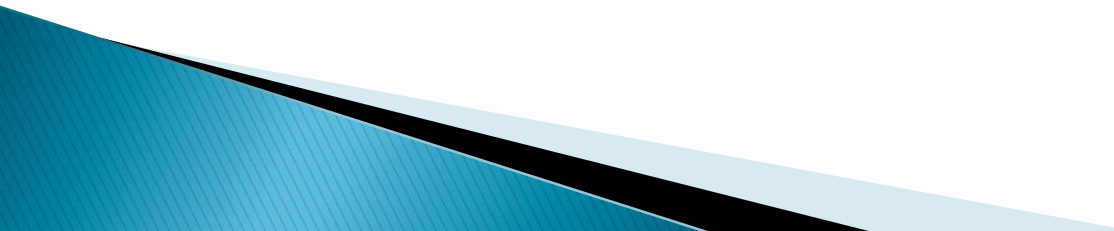
- ❖ FIRST ATTEMPTS AT THE “TRAIN” PROCESS WERE IN THE EARLY 80’S IN CALIFORNIA AND ARIZONA
 - ❖ IN MID 80’S, OTHER STATES SUCH AS OREGON AND NEW MEXICO BEGAN USING THE PROCESS
 - ❖ THE WFLHD AND OTHER WESTERN STATES BEGAN TO USE THE PROCESS AS WELL
 - ❖ EVENTUALLY, ALL THE WESTERN STATES WERE USING THE PROCESS
- 

TYPES OF CIR TRAINS USED

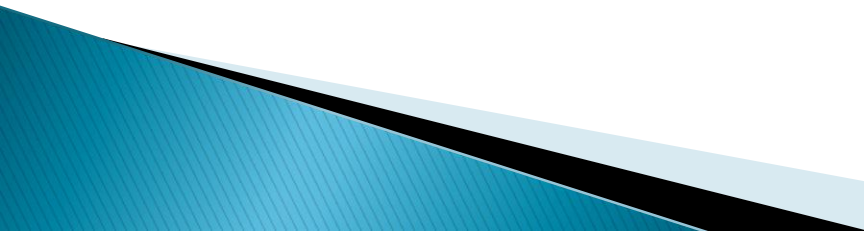
- ❖ THE MAJORITY OF THE EARLY TRAINS WERE MULTI UNIT TRAINS CONSISTING OF A MILLING MACHINE, CRUSHER/SCREENING UNIT, AND A SEPARATE PUGMILL UNIT



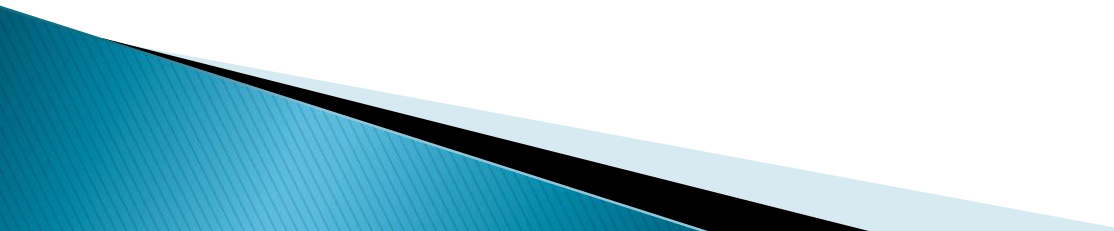
EARLY LIMITATIONS

- ❖ 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
- 







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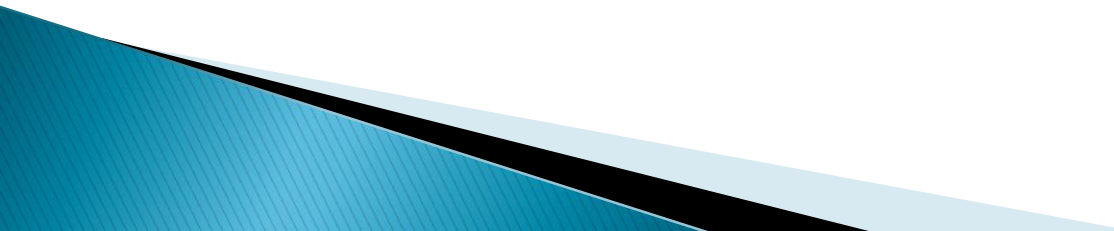
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ADVANCES IN THE PROCESS

- ❖ 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



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