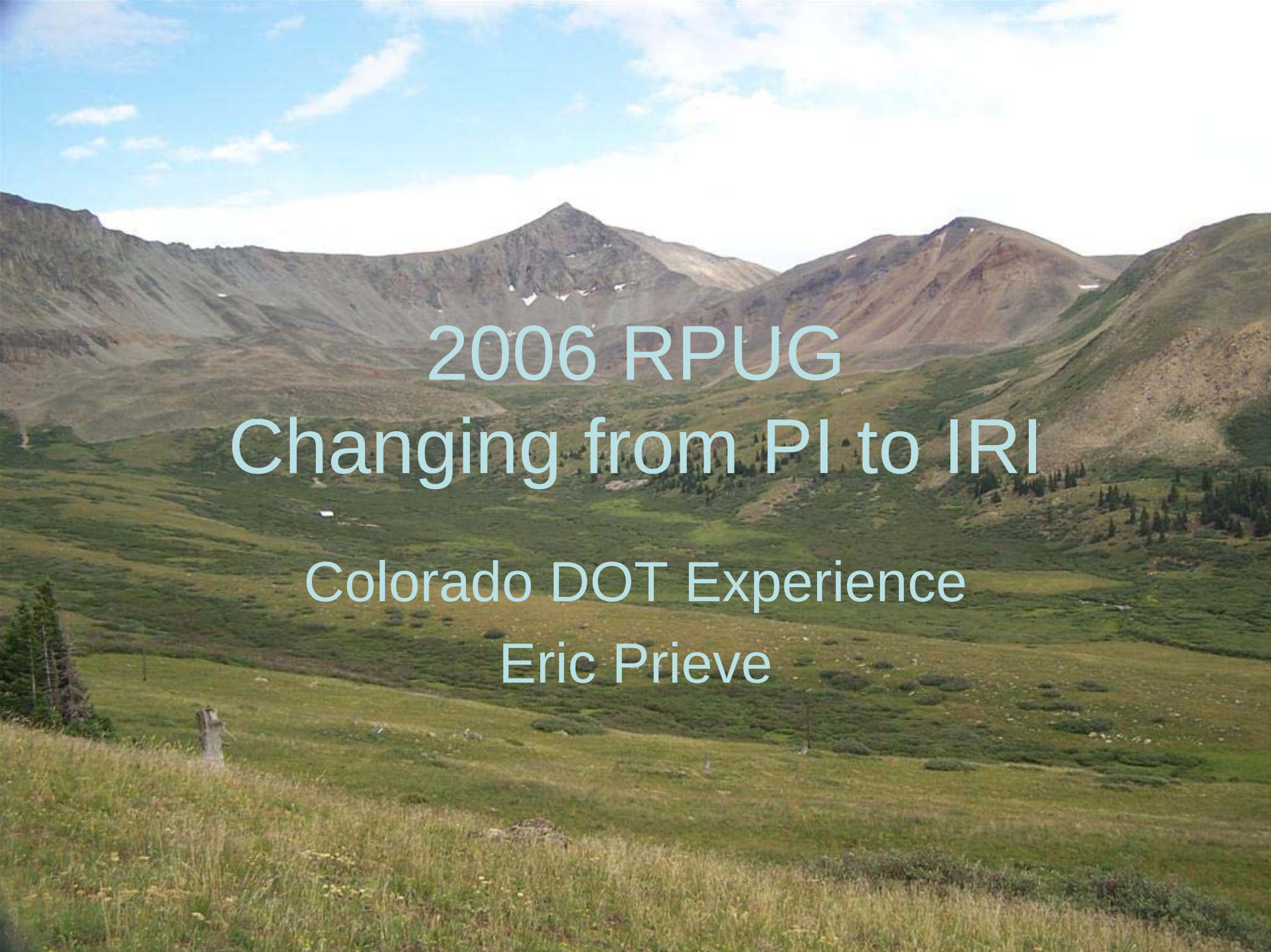


2006 RPUG
Changing from PI to IRI

Colorado DOT Experience

Eric Prieve

Current Specification

- Since 1999 CDOT has used the profilograph for pavement smoothness quality
- Incentives based on the average PI for each lane in 0.10 mile increments.
- PI based on the 0.10 inch blanking band

Current Specification

- Contractors perform all testing with CDOT inspectors observing the testing.
- CDOT certifies contractor profilographs on a certification site.
- CDOT didn’t have a profilograph to QA the contractor results

Problems with PI

- Project Engineers complained that PI numbers did not correlate to how the pavement road.
- PI numbers were not repeatable between various profilographs.
- CDOT couldn't verify contractor results

Can PI be Improved

- A CDOT & industry task force was formed to investigate a better way of measuring smoothness in late 2001.
- Originally focused on changing to a 0.0 inch blanking band for PI and how to adjust the specification limits.
- In 2002, the focus switched to high speed profilers & IRI.

Investigating IRI

- 2002 CDOT attended the joint FWDUG/RPUG in Roanoke to meet with vendors of profilers.
- 2003 CDOT obtained funding to proceed with purchasing a HSP
- 2003 CDOT joined the TPF- 5(063) “Improving the Quality of Pavement Profiler Measurement” study.

HSP Procurement

- CDOT invited vendors to demonstrate their HSPs & pre-qualify for bidding.
- Two vendors, Dynatest & ICC participated
- Each vendor showed that their HSP met the requirements of AASHTO MP-11.
- Required to be certified in Texas prior to delivery.
- ICC was awarded as the low bidder.
- December 2003 HSP is delivered.

2004 Initial Testing

- Tested as many projects as possible with the HSP to become familiar with the technology & what the IRI numbers meant.
- Allowed contractors to schedule the HSP to compare with their profilograph.
- Hope for a PI vs IRI correlation quickly faded
- IRI limits were set for a pilot specification for the 2005 construction season.
- Moved forward despite lack of an IRI “Must Grind” locator .

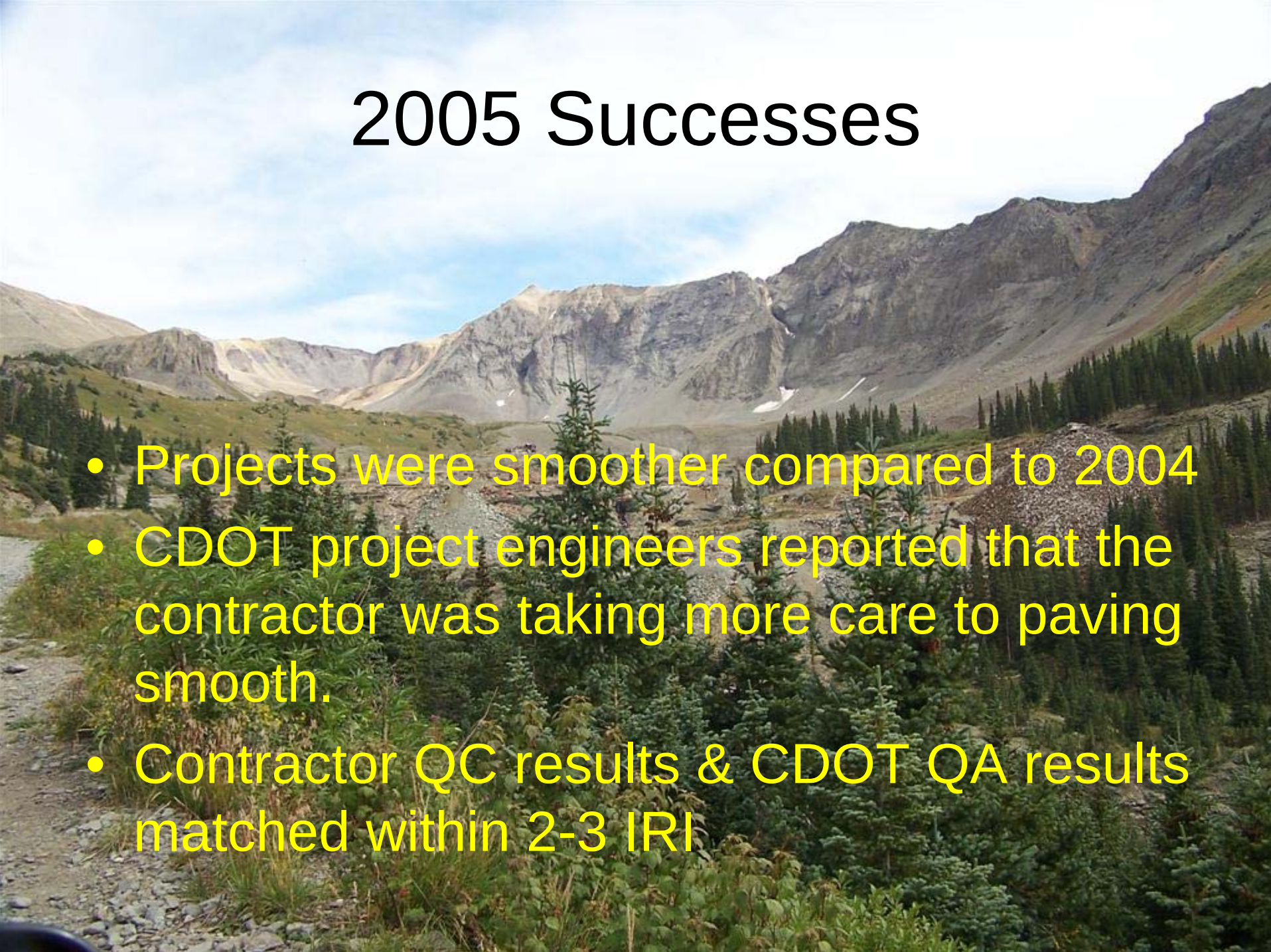
2005 Pilot Specification

- CDOT would test for acceptance and incentive payments on final pavement surface.
- Incentive paid in 0.10 miles sections.
- Maximum incentive of $2252.80/mi for HMA & $9,856.00/mi for PCCP
- PCCP IRI levels were increased by 15 in/mi to account for longitudinal tining
- Disincentive payment were reduced by 1/2

2005 Pilot Specification

- 11 HMA projects & 1 PCCP project
- Most projects earned incentives
- The contractor was required to use a profiler for QC.
- The contractor was required to fix all corrective work areas prior to CDOT measuring for pay.
- Each lane measured 3 times & the IRI averaged

2005 Successes



- Projects were smoother compared to 2004
- CDOT project engineers reported that the contractor was taking more care to paving smooth.
- Contractor QC results & CDOT QA results matched within 2-3 IRI

2005 Lessons Learned

- A “must grind” locator was needed.
- Exclusions in urban percent project caused problems.
- Does not work well on tined concrete pavement.
- Contractors wanted a correlation site so they could trust that their QC results match CDOT’s QA results.
- CDOT project engineers/inspectors needed training
- Profiler Certification needed.

2006 Pilot Specification Changes

- PCCP goes back to the profilograph.
- Switch to Half-Car IRI to take advantage of ProVAL 2.6's "Must Grind" locator (25 ft continuous HRI)
- Percent improvement no longer has exclusions
- Required corrective work on lower pavement layers to avoid grinding on top mat.

2006 Successes

- More contractors have profilers. (mostly ICC)
- Colorado profiler user group established with the contractors
- Specification training for engineers & contractors
- Pavement smoothness has increased
  - 2005 HRI average of 49.0 in/mile
  - 2006 HRI average of 42.3 in/mile

2006 Lessons Learned

- Slight differences in CDOT & contractor localized roughness areas.
- Exclusion area limits need to be extended.
- Profiler Certification needed for CDOT & Contractor.
- Some asphalt recycling processes are not capable of building smooth roads.
- Requiring corrective work on lower pavement layers was a huge burden on the contractor.
- The New Mexico DOT has a profiler certification program the CDOT can pirate.

Changes for 2007

- Specification will be standard on all HBP projects.
- Profiler certification program will be developed prior to the 2007 paving season.
- Profiler operators will be certified
- Contractor will not be required to fix corrective work areas on lower layers
- Contractor cannot perform elective corrective of final layer to lower disincentive

Changes for 2007

- CDOT will designate areas requiring corrective work.
- The contractor will fix these areas and retest the areas with their profiler.
- The contractor will demonstrate to the project engineer that the corrective work areas have been fixed.
- Raised the localized roughness threshold for corrective work

Changes for 2007

- PCCP projects will be tested with CDOT's profiler.
- ProVAL's profilograph simulation will be used to determine the PI.
- Contractors will be required to perform QC with a profilograph or profiler

Future Changes

- PCCP to HRI
- Reevaluate the HRI levels for incentive
- Raise the available incentive
- Using a standard program for calculating HRI (ProVAL?)
- Contractor measurements used for pay with CDOT HSP used for quality assurance


Questions?