



## General Aviation Airports

## Airfield Marking Challenges

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# 105 Georgia General Aviation Airports



# Introduction

- Challenges for GA Airports
- What makes a marking “work”
  - Surface Preparation
  - Glass beads
  - Calibration of paint and beads
- Evaluation of marking performance
- Temporary Markings

An **IPRF** Research Report  
Innovative Pavement Research Foundation  
Airport Concrete Pavement Technology Program

REPORT IPRF 01-G-002-05-1

## AIRFIELD MARKING HANDBOOK



Photograph courtesy of NASA

Program Management Office  
5420 Old Orchard Road  
Skokie, IL 60077

September 2008

# Airfield Marking Handbook

## IPRF 01-G-002-05-1

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### Revised February 2019

## Defines BEST PRACTICES

# Overview



# Challenges for GA Airports

- General Aviation airports have unique challenges
  - ✓ Markings are the primary visual aid
  - ✓ Too much or too little maintenance
  - ✓ Selecting materials tailored for the airport
  - ✓ Surface preparation is often neglected

# Marking Maintenance – What makes them “work”?

→ What are the main criteria for markings?

- ✓ Visibility
- ✓ Durability
- ✓ Compliance

# VISIBILITY

- ✓ Markings don't wear on smaller airports
- ✓ Weather (UV, rain, snow) degrades markings
- ✓ Contaminants discolor the markings
- ✓ Striping contractors may not be trained
- ✓ Inspectors may not be trained



# DURABILITY

- ✓ How long do the markings last?
- ✓ Do the markings result in cracking of the asphalt?
- ✓ Is new paint applied over old paint?
- ✓ Are markings applied well?
- ✓ Are reflectivity readings taken?

# COMPLIANCE

- ✓ FAA AC 150/5340-1
- ✓ Adherence to regulations improves standardization
- ✓ FAA funding may increase compliance requirements
- ✓ Are markings inspected before maintenance?

# INSPECTION BEFORE MAINTENANCE

- ✓ Check for marking contamination
- ✓ Evaluate existing reflectivity and color (visibility)
- ✓ Evaluate condition of pavement under the paint
- ✓ Verify marking placement, alignment and dimension
- ✓ Determine if maintenance is needed and what type; develop a scope of work

# Marking Contamination



# Reflectivity and Color (Visibility)



Glass beads





Condition of pavement under the paint

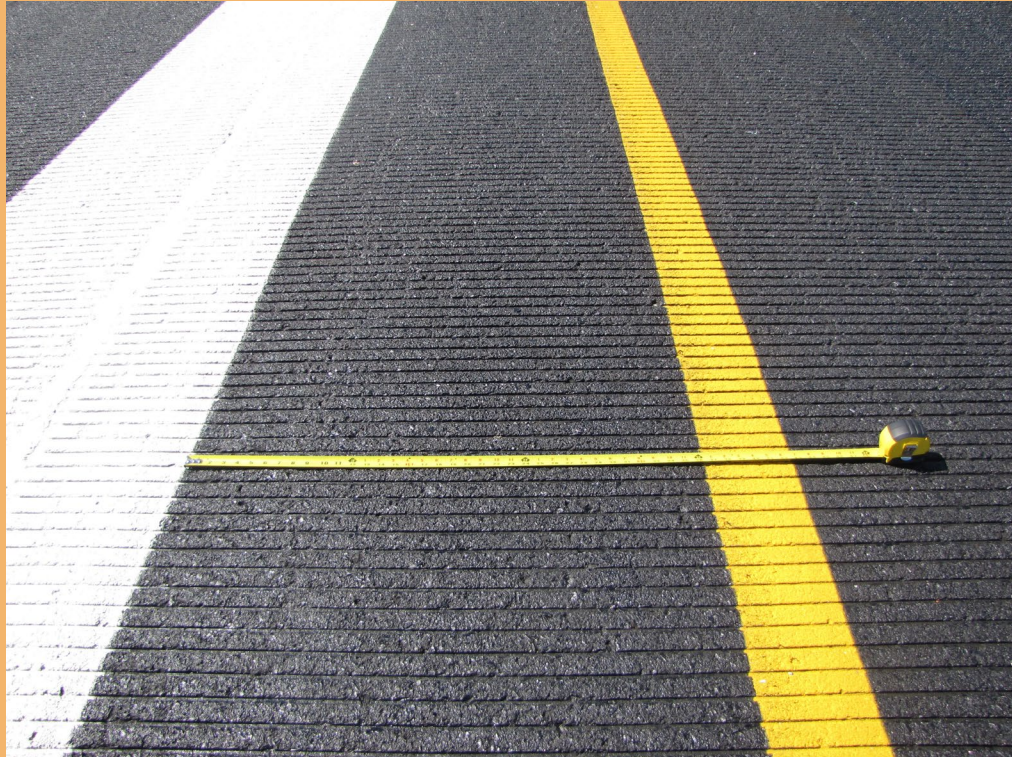


Placement





Alignment



# Dimension

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# Develop the Scope of Work

- ✓ Square Feet of Surface Preparation
- ✓ Square Feet of cleaning in lieu of painting
- ✓ Quantity of white, yellow and black (red)
- ✓ Type of glass beads to be used
- ✓ Type of paint coating to be used

# Surface Preparation


Definition:

Surface preparation is the cleaning of *anything* that would prevent the bond of the new coating to either the pavement or existing coatings.

# Surface Preparation

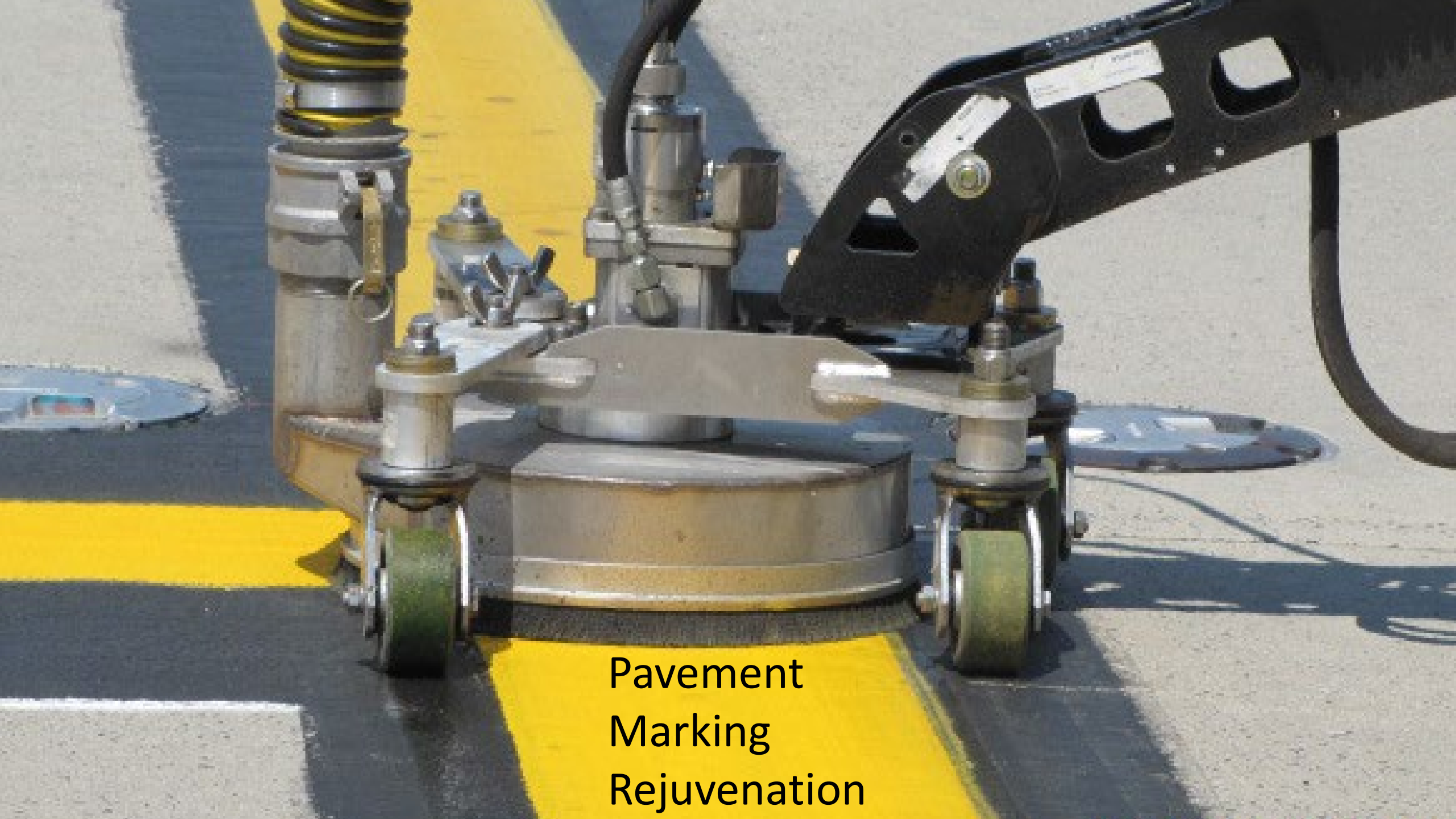
Poor Surface Preparation!





Loose and  
poorly bonded  
material was  
removed by  
waterblasting.

No surface  
preparation has  
taken place



Pavement  
Marking  
Rejuvenation







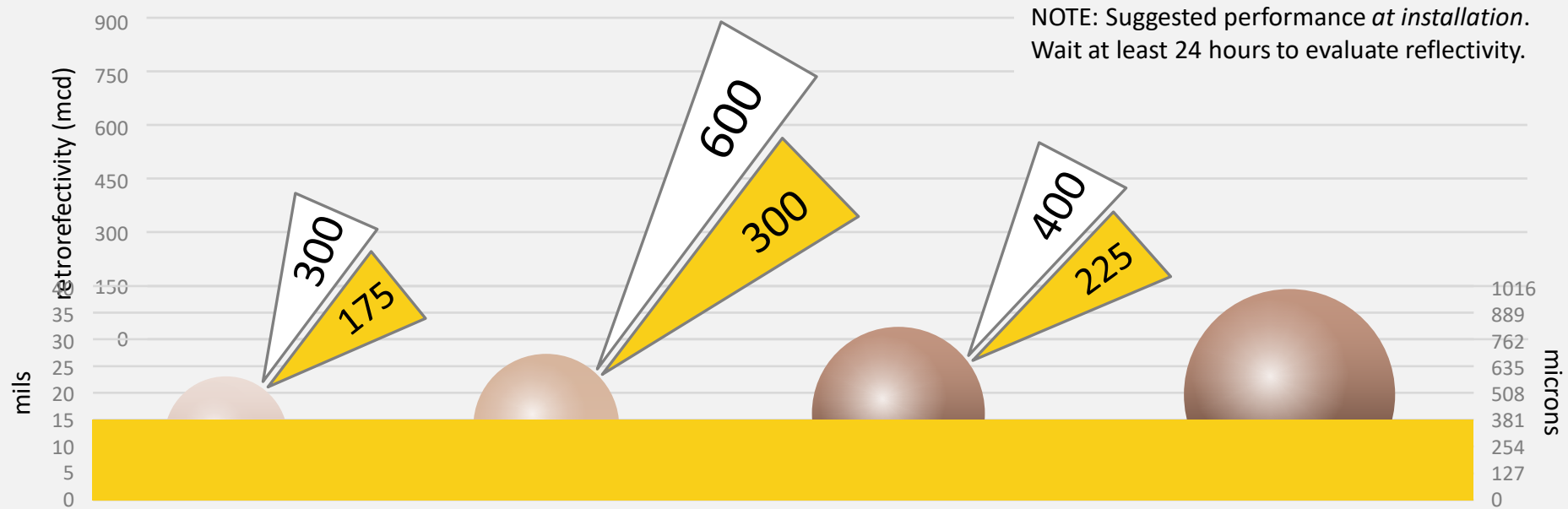








# Glass Beads



Type I  
Gradation A

Type III

Type IV  
Gradation B

Type IV  
Gradation A

Low Index  
(1.5 IOR)  
Recycled Glass

High Index  
(1.9 IOR)  
Virgin Materials

Low Index  
(1.5 IOR)  
Direct Melt

Low Index  
(1.5 IOR)  
Direct Melt

# Minimum Retro-reflectance Values

Material	Retro-reflectance mcd/m <sup>2</sup> /lux		
	White	Yellow	Red
Initial Type I	300	175	35
Initial Type III	600	300	35
Initial Thermoplastic	225	100	35
All materials, remark when less than <sup>1</sup>	100	75	10

- 1 Prior to remarking, determine if removal of contaminants on markings will restore retro-reflectance.

# AC 150/5370-10H - P620

## Runway and Taxiway Markings

### 620-3.8 – Retro-Reflectance

Reflectance **shall be** measured . . . The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

This is intended to ensure more even distribution of glass beads so that there is a uniform appearance during darkness.





# AC 150/5370-10H - P620

## Runway and Taxiway Markings

### 620-3.2 – Equipment

The mechanical marker shall be an atomizing spray-type or airless marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an **even and uniform film thickness and appearance of both paint and glass beads** at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. **The marking equipment for both paint and beads shall be calibrated daily.**



# AIRPORT GLASS BEAD CALIBRATION GUIDE

DROP RATE FOR 15 MIL (380 MICRON) WET FILM

BEAD VOLUME IN MILLILITERS PER 10 SECONDS FOR A 6" (15 CM) WIDE LINE

BEAD VOLUMES MUST BE DOUBLED WHEN APPLYING A 12" (30 CM) LINE USING ONE DISPENSER

**TTB-1325D, TYPE I BEAD CALIBRATION CHART**

	5#/GAL	7#/GAL	8#/GAL	10#/GAL
7 MPH	700	980	1120	1400
6 MPH	600	840	960	1200
5 MPH	500	700	800	1000
4 MPH	400	560	640	800
3 MPH	300	420	480	600
2 MPH	200	280	320	400
1 MPH	100	140	160	200

**TTB-1325D, TYPE III BEAD CALIBRATION CHART**

	7#/GAL	8#/GAL	10#/GAL	12#/GAL
7 MPH	560	630	805	980
6 MPH	480	540	690	840
5 MPH	400	450	575	700
4 MPH	320	360	460	560
3 MPH	240	270	345	420
2 MPH	160	180	230	280
1 MPH	80	90	115	140



ml 3  
2.5  
2  
1.5  
1  
0.5

3000  
2800  
2600  
2400  
2200  
2000  
1800  
1600  
1400  
1200  
1000  
800  
600  
400

### BEAD FLOW CALIBRATION

- REQUIRED: Stomacher, 30% ml beaker, calibration chart
1. Fill the stomacher and the graduated cylinder with the bead/gun for use plastic bag.
  2. Turn on the bead/gun for 30 seconds.
  3. Using the calibration chart for the appropriate bead type (1 or 2) find the required amount delivered by the bead/gun. Adjust required bead/gun volume to greater than the chart value. Increase the amount of the bead/gun volume to greater than the chart value. Increase the amount of the bead/gun volume to greater than the chart value. Increase the amount of the bead/gun volume to greater than the chart value.



Flowmeter 30 ml graduated cylinder. Volume calibration chart and instructions. Part of the calibration chart. Volume calibration chart and instructions. Part of the calibration chart.





Check the control strip during darkness to ensure uniform appearance of both paint and glass beads.

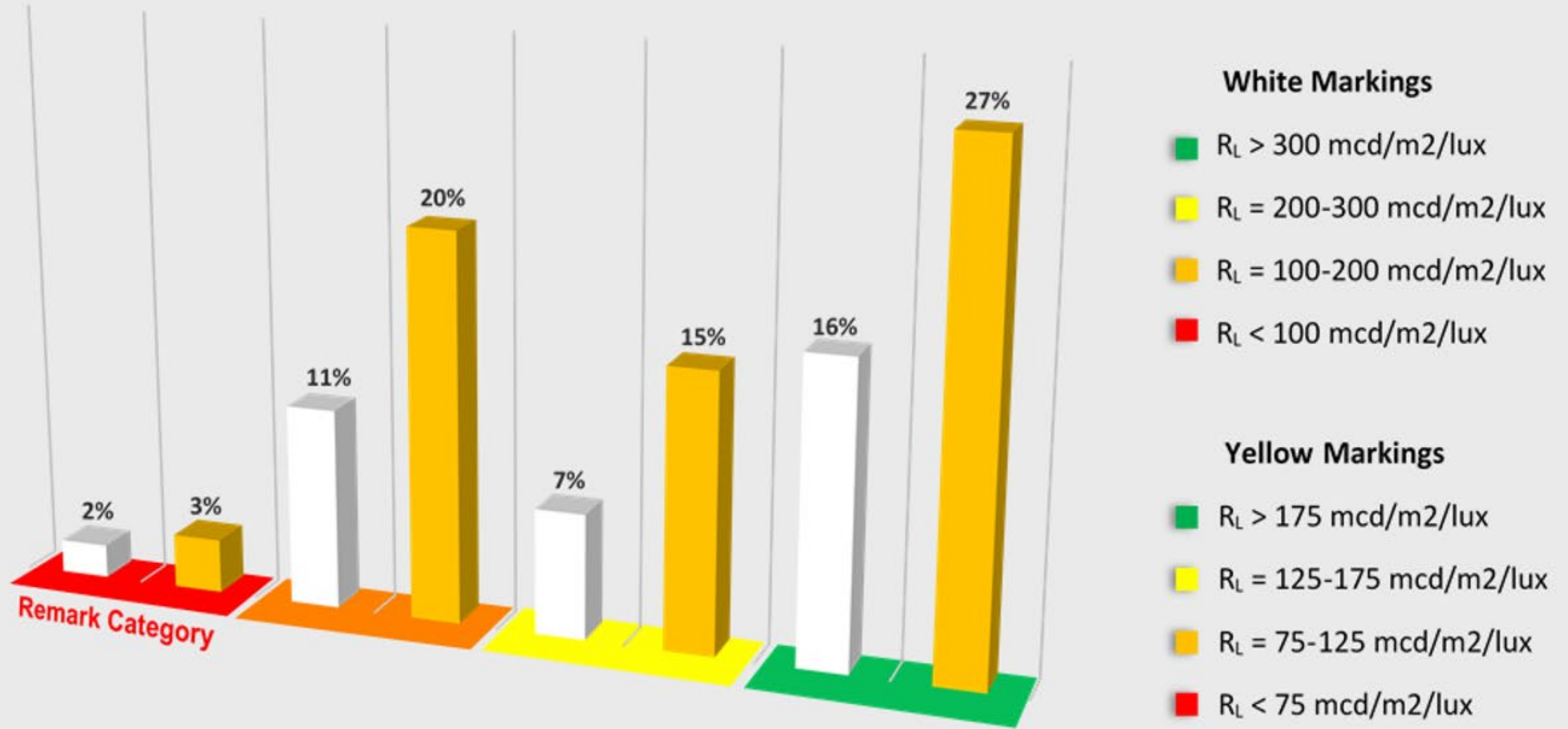




# Retro Assessments



# Airfield Marking Retro-reflectance Data



Know what you don't have to paint. Clean more, paint less.

**AIRPORT COOPERATIVE RESEARCH  
PROGRAM  
PROJECT 09-19**

Airfield Pavement Markings  
Effective Techniques for Removal and  
**TEMPORARY APPLICATIONS**

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No scarring  
No damage to crack seal  
Minimal damage to  
existing markings

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Before and After



# SUMMARY

- Challenges for GA Airports addressed
  - Attention to Visibility, Durability and Compliance
  - Prepare all surfaces before/in lieu of repainting
  - Use materials tailored for airport needs
  - Calibrate equipment and monitor material usage
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- Evaluate what you have to determine what you need
  - Advocate FAA evaluation of temporary paint

QUESTIONS?

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