Alaska Department of Transportation & Public Facilities

Enhanced Compaction to Improve Durability

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HMA/WMA Pavement Goals

- Perpetual Embankments
- Defect-Free, well compacted asphalt mat and longitudinal joints.
- Pavement Surfaces that last 20 years
- Minimal surface maintenance during pavement life

Required Shift in Philosophy

- Adopt current state-of-practice technology to achieve 100% testing or inspection coverage
  - Pave-IR provides 100% thermal mapping of mat
  - Acceptance based on Systematic testing of cold spots for density minimizes defects
- Improve compaction to limit permeability and thus reduce oxidative aging of asphalt binder

Expected Outcomes

- No potholes or raveling joints
- Longer-life pavements
- Less maintenance
- Lower life-cycle cost

Available Methodology

- Subgrade/subsurface improvement
- Intelligent Compaction of embankment layers
- Pave IR mapping of Thermal Segregation
- Improved mat compaction with IC Rollers, compaction aides in the asphalt mix
- Improved joint compaction by use of joint heaters, echelon paving

Near Future Methodology

- GPR Mapping of %Voids in asphalt mat in real-time as compaction is completed

Pave IR Benefits

- Real-time thermal mapping with color display on paver provides immediate feedback to DOT and paving crew

Pave IR Benefits

- The dump man can see cold spot created when loads are not tied together

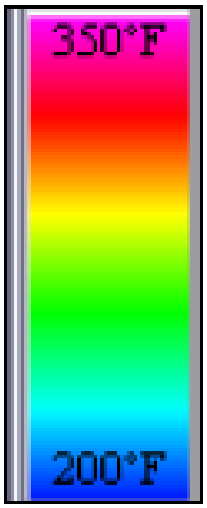
Pave IR Benefits

- A truck driver can be shown the effect of cold crust from an untarped truck

Pave IR Benefits

- The paver operator can see the cold spots created by stopping or dumping the wings of the paver
- Malfunctions of the paver will show as streaking in the mat

Example Pave-IR Display



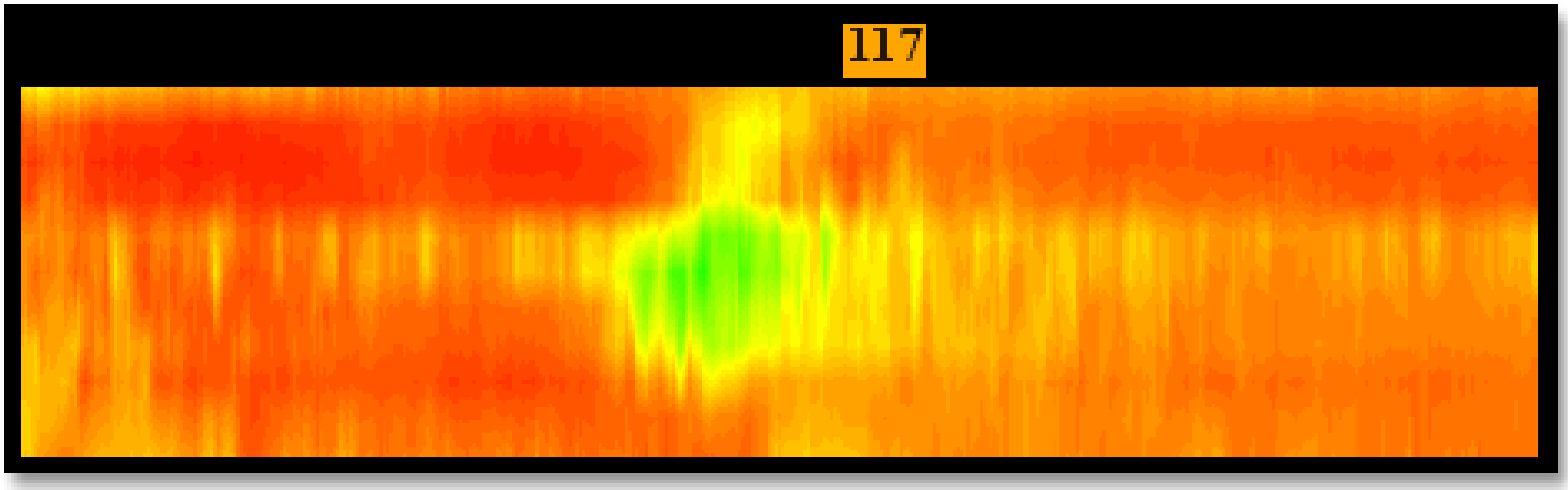


Figure 3.2. Thermal profile from US-29 (continued).

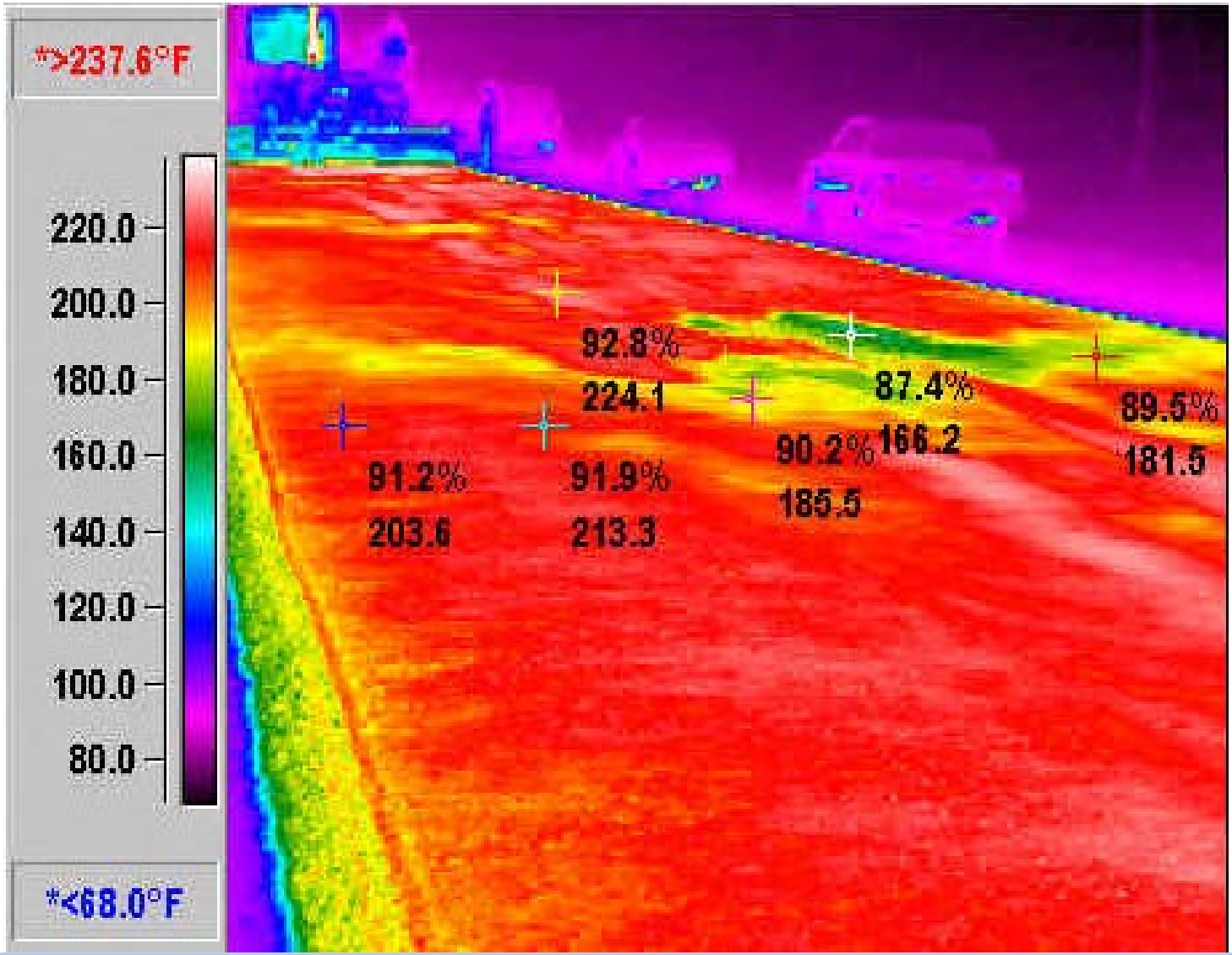
Birth of a Pothole

Research Report – July 1, 2001
Research Project Agreement T9903, Task A3
Cyclic Segregation

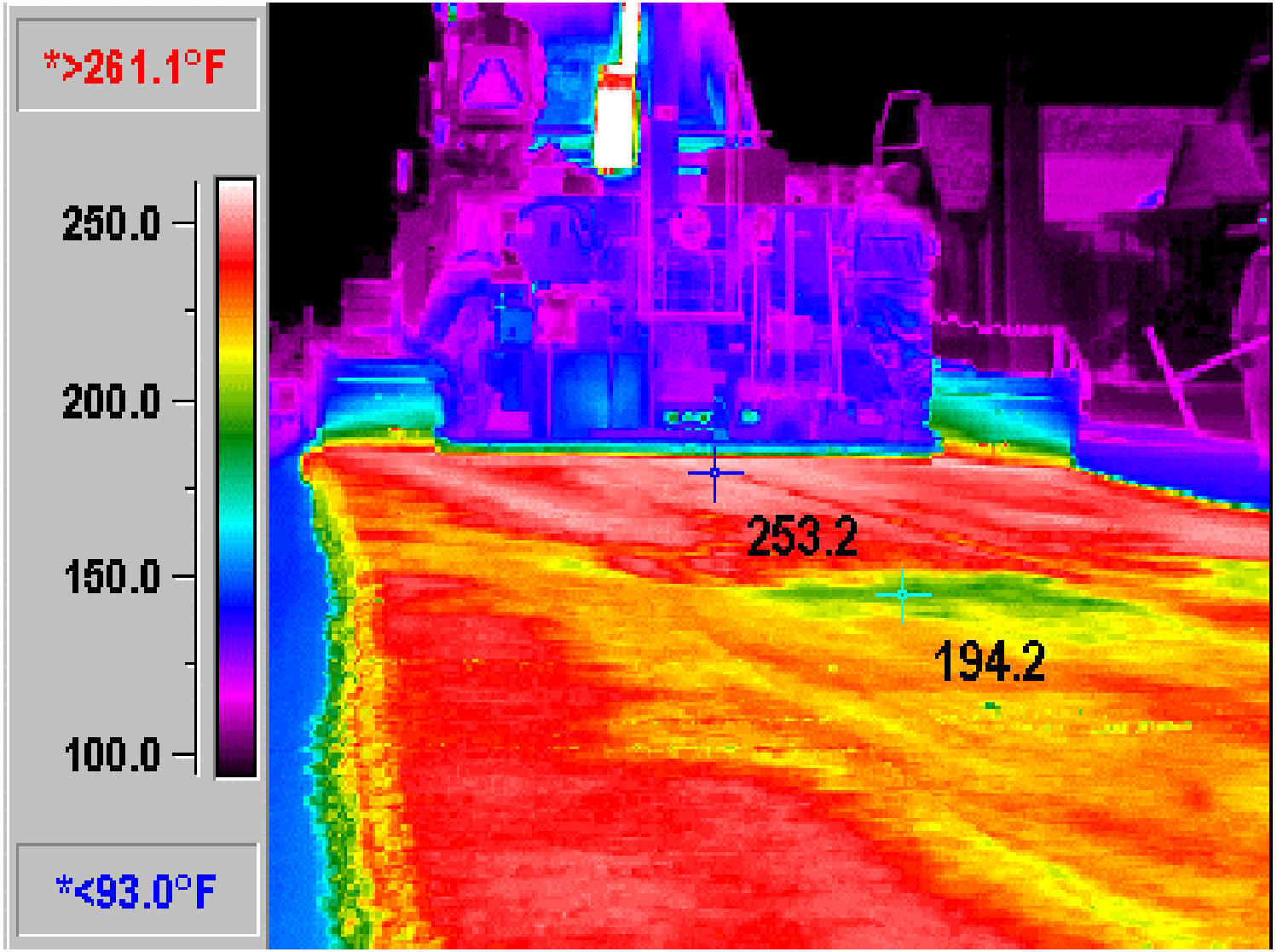
CONSTRUCTION-RELATED ASPHALT CONCRETE
PAVEMENT TEMPERATURE DIFFERENTIALS
AND THE CORRESPONDING DENSITY DIFFERENTIALS –
Report No: WA-RD 476.1

Washington State Transportation Center (TRAC)
University of Washington, Box 354802
University District Building
1107 NE 45th Street, Suite 535
Seattle, Washington 98105-4631

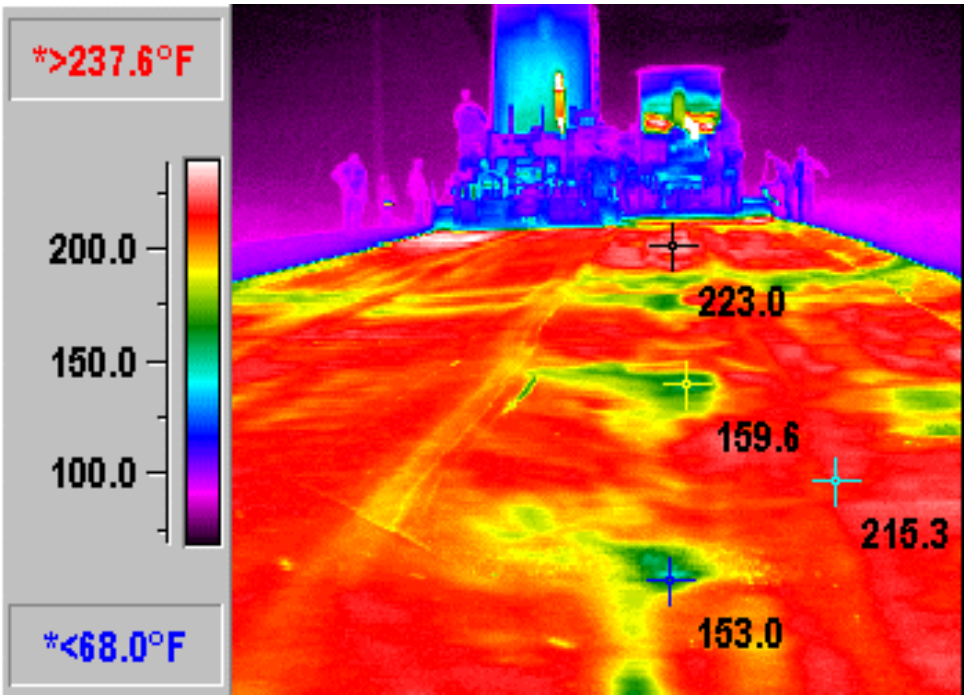
Infrared Image w/Density & Temp



Tarped vs Not Tarped



Cold Spots - Infrared vs Photo



Incentive

- Minnesota pays a $20 Bonus for each 150’ segment with No Thermal Segregation (0-25^{0} F variation)

No Incentive

- Minnesota pays No bonus for 150’ segments with Moderate Thermal Segregation (25-50^0 F)

Penalty or Disincentive

- Minnesota assesses a $20 Penalty for each 150’ segment with Severe Thermal Segregation (>50^0 F)

Penalty or Disincentive

- On the Glenn Highway: Highland to Eklutna project in the summer of 2016 ADOT&PF will require a nuclear density test profile across each cold area with a temperature differential of more than 25^0 F. (Our specification for this project will require infrared heating and re-compaction of any mat area found with compaction of less than 92.0% of Gmm and any longitudinal joint below 91.0% of Gmm.)

Carrot and Stick

- Pave IR is an objective tool for rewarding best practices such as:

1. Tarping all loads
2. Steady delivery of material to project with a minimum number of paver stops
3. Tying loads together when dumping
4. Use of Material transfer vehicle to smooth out flow to paver and maintain constant temperature

Joint Incentive

- On the Glenn Highway project a very significant joint density incentive will be offered for the 160,512 feet of longitudinal joint:
  - Greater than 92.0% MSG add $0.50 per linear feet
  - Greater than 93.0% MSG add $1.00 per linear feet
  - Greater than 94.0% MSG add $1.50 per linear feet

  Full bonus could be $240,768

Mat Density Target

- Mat density target is 96.0% MSG which matches the mix design done at 4% air voids
- Minimum mat density is 92.0% MSG and any area below that value will require infrared heating and re-compaction.
- Proposed Mat density incentive:

  92.0 to 92.9% MSG = 1%
  93.0 to 93.9% MSG = 2%
  94.0 to 94.9% MSG = 3%
  95.0 to 95.9% MSG = 4%
  >96.0 MSG = 5%

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