



Thermography Inspection of Terex Roadmix MTV

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Inspection and Report was made with ThermaCAM products from
FLIR Systems AB.

Introduction:

In the following study of the Terex Roadmix Material Transfer Vehicle the reader will see eight different individual analysis pages contain infrared photographs taken on a project utilizing the Terex Roadmix Material Transfer Vehicle. In order to protect the contractor who allowed these pictures to be taken, the location will not be disclosed. However some specifics of the job are given below.

Haul time: 20 to 30 minutes

Ambient temperature*: 86 degrees Fahrenheit

Relative humidity*: 65%

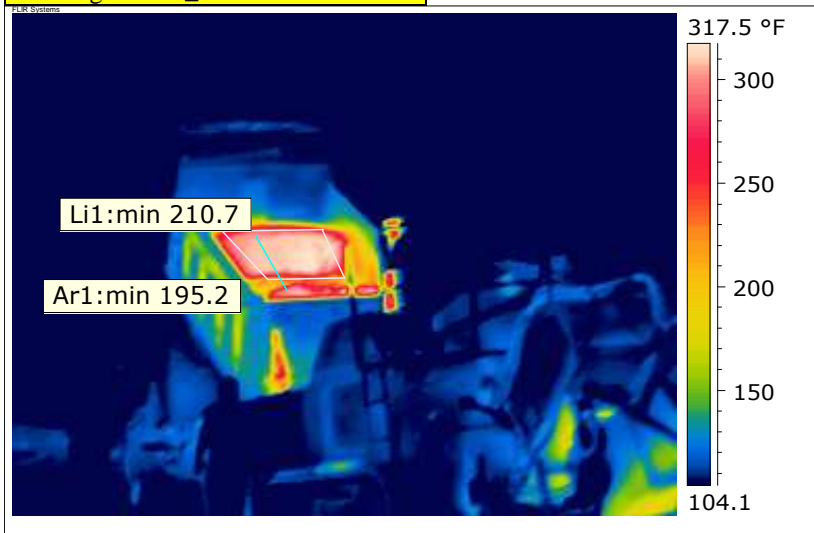
Description: Contractor was paving 4 inches of base material with a Blaw Knox PF-3200 with hopper insert.

Analysis of the infrared images is done using software provided by the infrared camera manufacturer, FLIR Systems. On each of the infrared images there is a line drawn across the mat. Temperature values across this line are displayed in the graph below the infrared image and the maximum and minimum temperatures are displayed. A digital photo is also shown from the same time and as close as possible to the same view of the mat.

*important for calibration of infrared camera

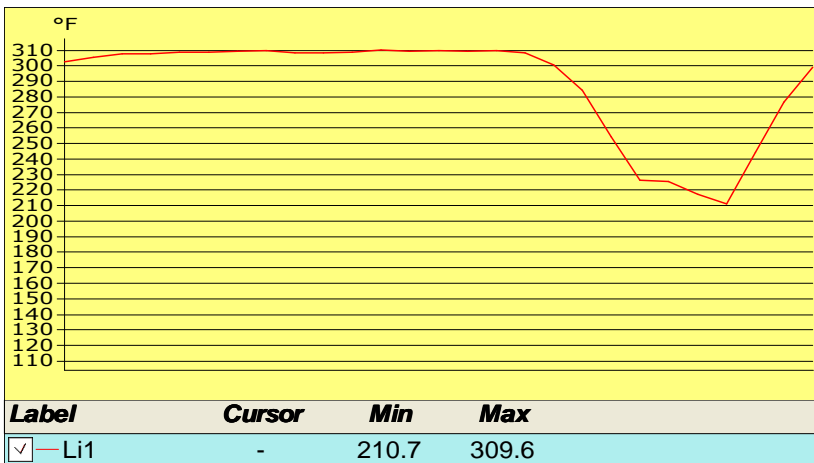


Thermogram: IR_0071.JPG 5/2/2007



Comment:

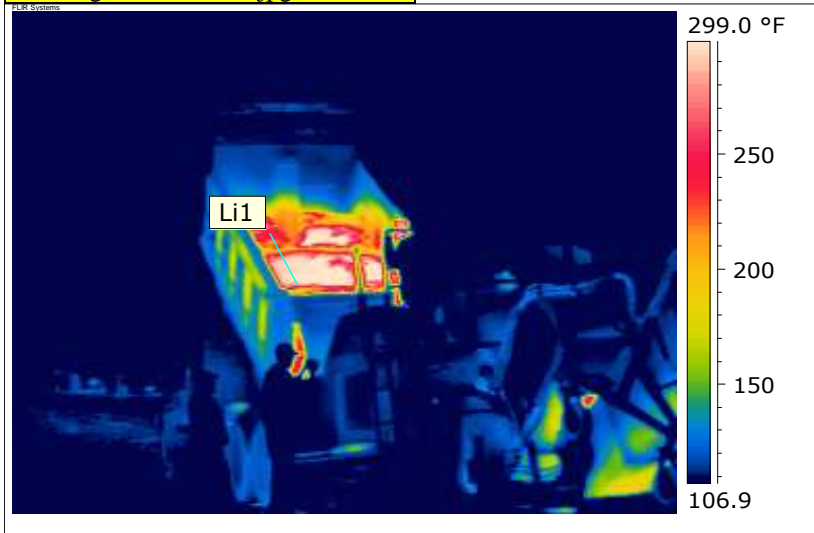
Ar1 is an area box shown in white on the infrared image. The minimum temperature within the box is displayed in the label and the maximum temperature is displayed in the table below. The Li1 graph displays so that the top of the truck is left side of graph and the bottom of the truck is the right side of the graph.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Li1: Max	309.6 °F
Ar1: Max	316.7 °F

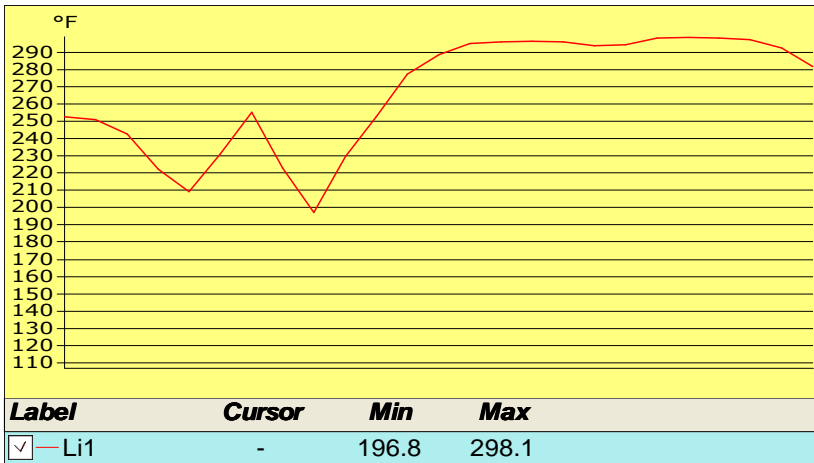


Thermogram: IR_0072.jpg 5/2/2007



Comment:

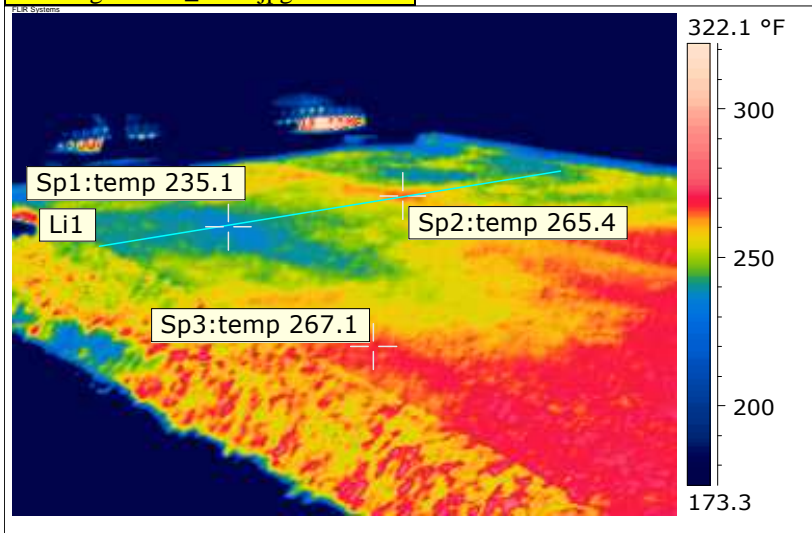
Truck segregation. Haul time was approximately 20 to 30 minutes and all trucks had tarps. Again the graph for Li1 displays from the top of the truck bed to the bottom of the truck bed.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Li1: Max	298.1 °F

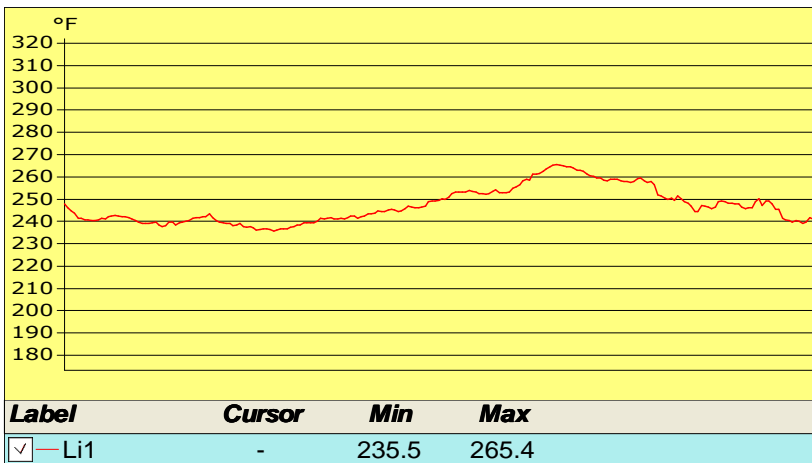


Thermogram: IR_0074.jpg 5/2/2007



Comment:

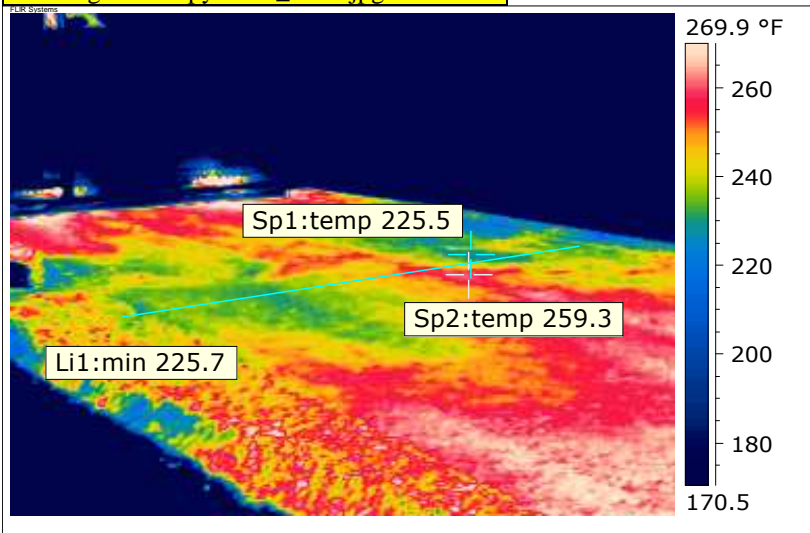
End of load segregation is apparent. Differences of 30 degrees across the mat.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Sp1	235.1 °F
Sp2	265.4 °F
Sp3	267.1 °F
Li1: Max	265.4 °F

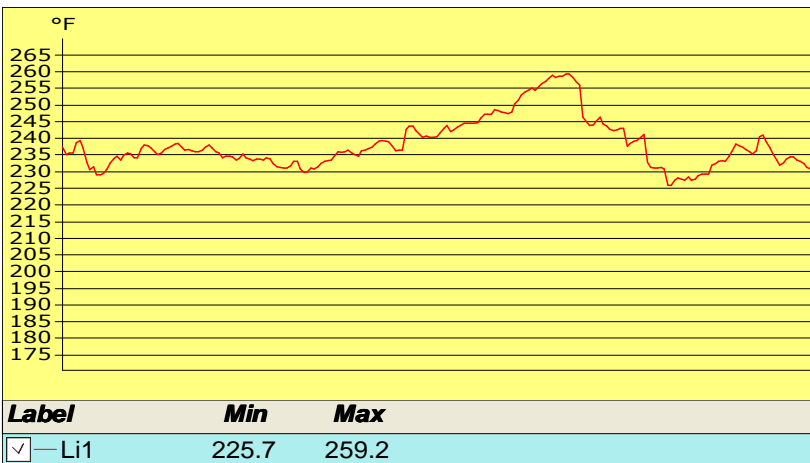


Thermogram: Copy of IR_0075.jpg 5/2/2007



Comment:

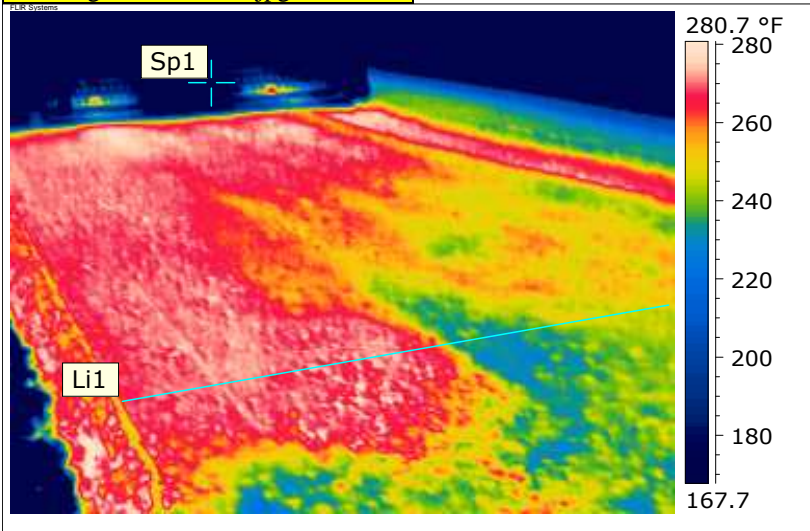
Another end of load segment containing temperature differences greater than 30 degrees across the mat



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Sp1	225.5 °F
Sp2	259.3 °F
Li1: Max	259.2 °F

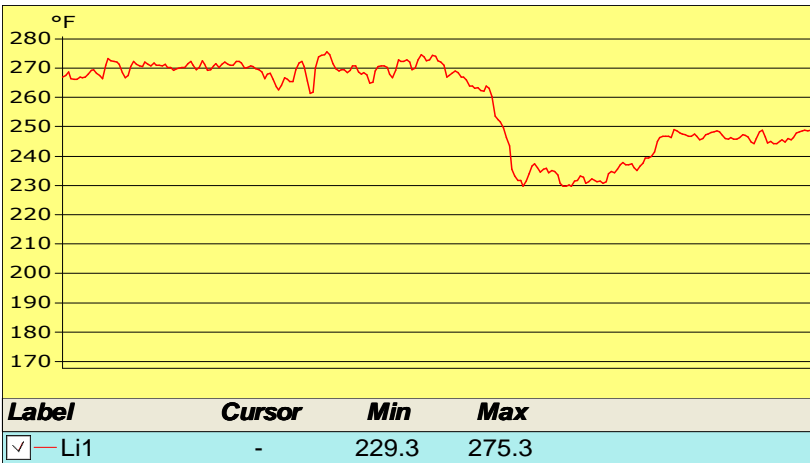


Thermogram: IR_0079.jpg 5/2/2007



Comment:

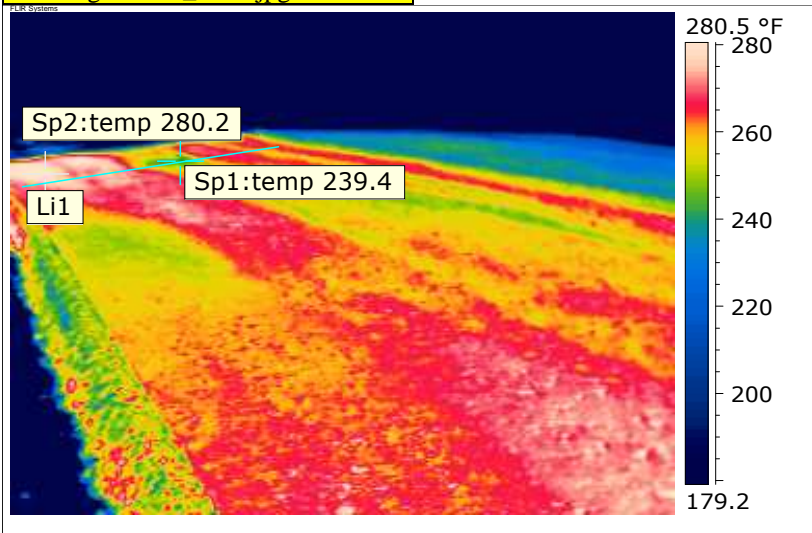
Over 45 degree differential.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Sp1	145.4 °F
Li1: Max	275.3 °F

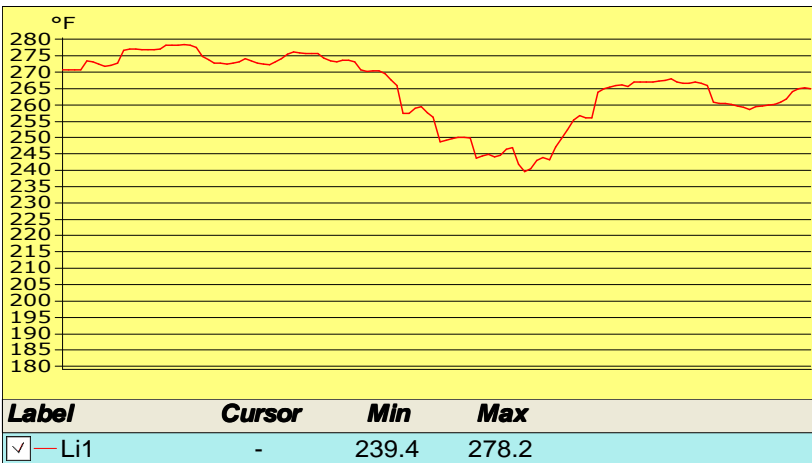


Thermogram: IR_0081.jpg 5/2/2007



Comment:

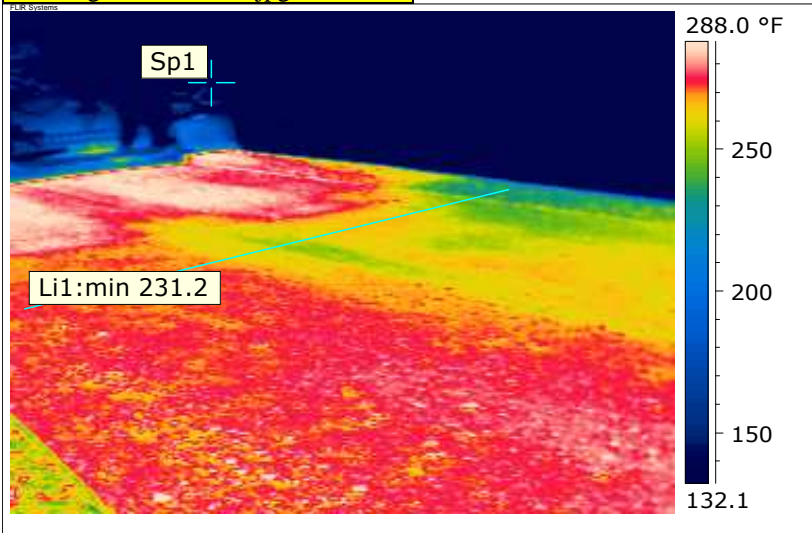
Over 40 degree differential.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Sp1	239.4 °F
Sp2	280.2 °F
Li1: Max	278.2 °F

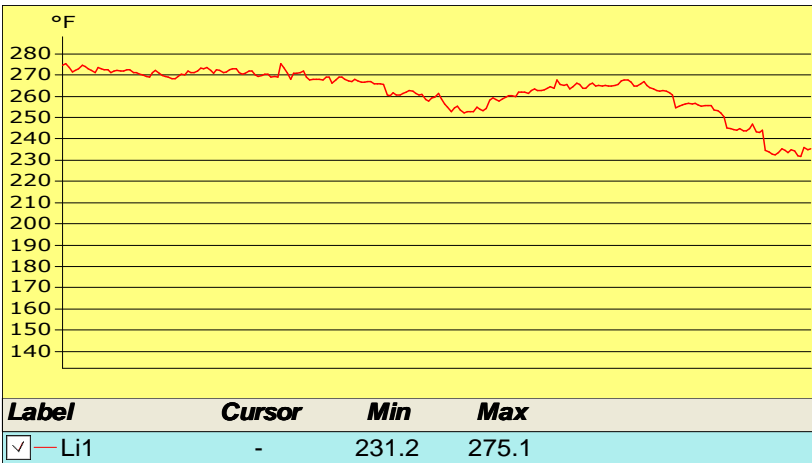


Thermogram: IR_0086.jpg 5/2/2007



Comment:

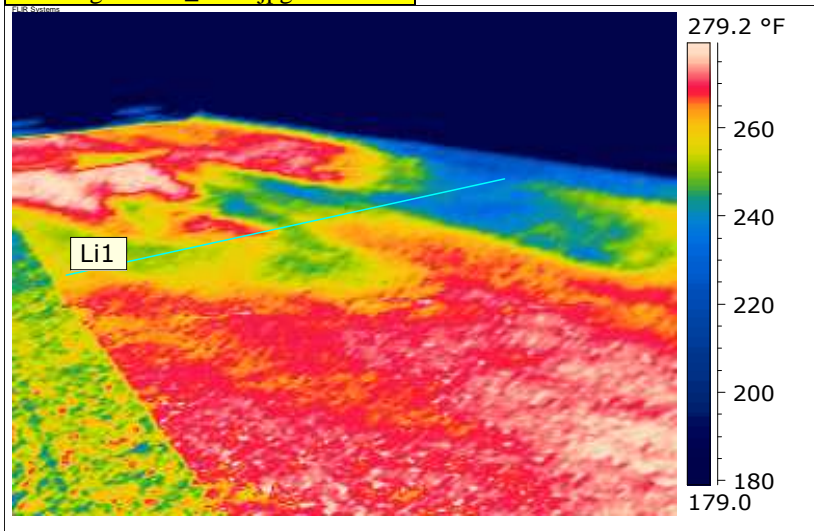
Another over 40 degree differential.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Sp1	138.6 °F
Li1: Max	275.1 °F

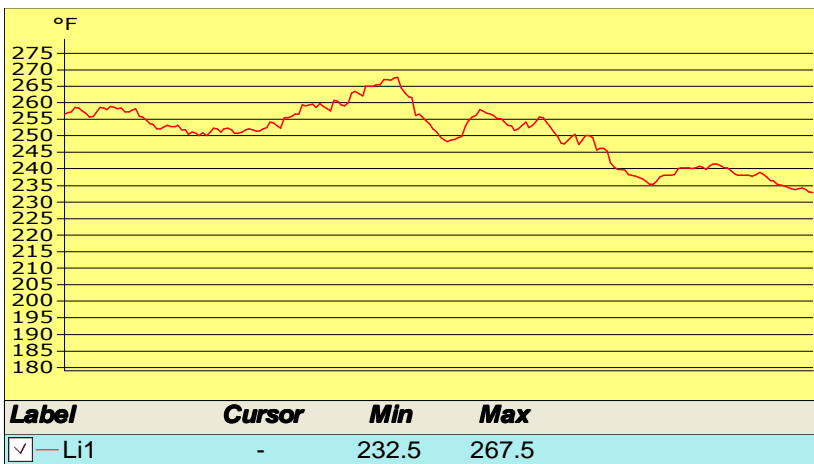


Thermogram: IR_0090.jpg 5/2/2007



Comment:

Another highly visible end of load cold spot.



Object Parameter	Value
Emissivity	0.96
Object Distance	6.6 ft
Reflected Temperature	68.0 °F
Label	Value
Li1: Max	267.5 °F

Conclusion:

The Terex Roadmix Material Transfer Vehicle did not satisfactorily remix. This is supported by the non-uniform mat behind the paver. Truck end load segregation areas were readily apparent throughout the project as well as other intermittent cold spots as evidenced by the multiple infrared images. These temperature differentials will result in drops in compaction. As shown by research done by the state Washington State Department of Transportation, temperature differentials of 25°F or greater result in failing density profiles approximately 90 percent of the time and, conversely where temperature differentials are less than 25°F, approximately 80 percent of the density profiles pass the density criteria (<http://www.wsdot.wa.gov/biz/mats/Pavement/Technotes/TemperatureDifferentialTechNote2001.pdf>). Some states, to ensure passing densities have specified that the mat shall not vary by more than 10° transversely (*Arkansas State Department of Transportation Specification 409.04 (b)*). From this evidence the project shown in this study will most likely result in failing densities and premature failure of the pavement.