

Vehicle Mounted Retroreflector; South Dakota IFB #23IFB9190

Addendum Notes:

Addendum 2, October 12, 2023

Made the following changes to the specification document (all addendum 2 changes are in blue text/yellow highlighting):

Specifications:

The driver/headlight geometry will be a 1/5th scaled system **or otherwise scaled** utilizing the ASTM E1710 and EN1436 30-meter geometry with a minimum of 12 cm of ground clearance when in use.

Measurement will be made 6 **or 12** meters in front of the instrument to most closely mimic the driver perspective.

Measurements will be made at any speed up to ~~110~~ **80** mph.

Instrument will have longitudinal resolution of 8 inches (20 cm) to ensure continuous coverage of a line at all speeds up to ~~110~~ **80** mph.

~~Calibration standard will attach to the front of the instrument for simple calibration that takes less than 1 minute, requires no flat ground, nor requires placing any calibration standards on the ground at the measurement distance from the instrument.~~ **Retroreflector will be capable of simple calibration taking less than one minute.**

Calibration Standard will have a traceable certificate from NIST and be compliant with ISO/IEC 17025 **or equivalent international standards.**

The instrument will be fully self-contained inside the optical head and require only a power connection to a vehicle cigarette lighter **or 12V power source.**

Weight of the instrument will be less than ~~26~~ **75** lbs (~~12~~ **34** kg).

Instrument power consumption will be less than ~~50~~ **260** Watts at all times while in operation.

The instrument will automatically adjust its height and tilt to maintain the correct geometry while measuring **or compensate using software.**

General Information:

The South Dakota Department of Transportation (SDDOT) request bids to purchase four **sets of** vehicle-mounted mobile retroreflectometers to collect data on longitudinal pavement markings and all associated parts to efficiently and accurately measure the retroreflection of roadway pavement marking. Each **set** of vehicle-mounted mobile retroreflectometer will consist **either** of two units, one on **either each** side of the vehicle for reading left and right-side pavement markings at the same time, **or a single unit that is capable of reading left and right-side pavement markings at the same time.**

SPECIFICATIONS:

The following specifications are minimum acceptable requirements. All specifications are defined as mandatory minimum requirements unless otherwise stated. SDDOT will be the sole judge of equivalency and acceptability. All attachments, documents, price lists, etc. to support your bid, must include the bid.

1. Instrument will perform real-time pavement marking retroreflectivity measurements.
2. Instrument will also detect, measure, and record the location of retroreflective road studs (raised pavement markers) in the 30-meter geometry.
3. The driver/headlight geometry will be a 1/5th scaled system **or otherwise scaled** utilizing the ASTM E1710 and EN1436 30-meter geometry with a minimum of 12 cm of ground clearance when in use.
4. While not in use, the instrument will raise up to achieve a minimum of 7 inches (17.8 cm) ground clearance.
5. Measurement will be made 6 **or 12** meters in front of the instrument to most closely mimic the driver perspective.
6. Illumination Angle will be 1,24° (per EN 1436)
7. Observation Angle will be 2,29° (per EN 1436)
8. Entrance Angle will be 88.76° (per ASTM E1710)
9. Observation Angle will be 1.05° (per ASTM E1710)
10. Measuring aspects of the total angular spread will not exceed 0.33 degree
11. Operating Temperature Range will be 20° to 131°F (-7 to 55°C)
12. Measuring width of the instrument will be minimum of 1 meter (39.3 inches).
13. Measurements will be made at any speed up to ~~110~~ **80** mph.
14. Measurements will be collected at minimum of 400 measurements per second.
15. Instrument will make a measurement on the line every 3 inches (7.62 cm) at most while traveling at 75 mph.
16. Instrument will have longitudinal resolution of 8 inches (20 cm) to ensure continuous coverage of a line at all speeds up to ~~110~~ **80** mph.
17. Resolution of the measurement will be at least 18-bit.
18. Instrument will utilize a solid-state light source that requires no maintenance for 10,000 hours of operation.
19. Instrument will accurately measure skip lines (broken lines) without any correction factors.
20. Device will be able to measure both white and yellow, flat and profiled road markings of any type on flat and rough, dry and wet surfaces. The device must compensate for the day light and must continue to measure under different light conditions during the day and night.
21. Instrument will give individual readings for each lines of a double line.

22. System will be controlled wirelessly using any iOS, Windows, OSX, Android, or Linux tablet, laptop, or smartphone with a wifi connection using a web browser. The system will be capable of being operated by multiple devices at the same time and not require any software or application installation.
23. The system will have a standard real-time display of retroreflectivity profile of measured markings.
24. The system will have a built-in standard high precision Distance Measuring Instrument to tag data to odometer.
25. GPS system will report GPS coordinates with each measurement point.
26. The system will have real-time event codes, with programmable header labels so the operator can tag data as measurements are being collected.
27. Data file will record and report the following values in a user-specified test distance (adjustable from 0.01 to 10 miles, but typically every 0.1 miles, or 10 to 10000 meters, but typically every 100 meters): Record number; Odometer reading; Date; Time; GPS Coordinates; GPS position fix accuracy; Vehicle Speed; Ambient Temperature; Ambient Humidity; Number of valid scans; Maximum, minimum, average, stripe width of left and right stripes individually, number of road studs found, stripe type, user road condition codes.
28. Data will be recorded to an easily removable USB flash drive in the instrument.
29. The instrument will automatically generate color-coded Google Map Files (KML) with green, yellow, red, and black coding indicating good, marginal, bad, and no line levels, which will be saved to the same removable USB flash drive as the recorded data.
30. Calibration standard will attach to the front of the instrument for simple calibration that takes less than 1 minute, requires no flat ground, nor requires placing any calibration standards on the ground at the measurement distance from the instrument. Retroreflectometer will be capable of simple calibration taking less than one minute.
31. Calibration Standard will have a traceable certificate from NIST and be compliant with ISO/IEC 17025 or equivalent international standards.
32. Retroreflectometer will be capable of being mounted to either the front or each side of a vehicle without making any modifications to the vehicle utilizing a cinema-grade vacuum mount system capable of supporting more than 200 kg.
33. The instrument will be fully self-contained inside the optical head and require only a power connection to a vehicle cigarette lighter or 12V power source.
34. Weight of the instrument will be less than 26 75 lbs (12 34 kg).
35. Instrument power consumption will be less than 50 260 Watts at all times while in operation.
36. The instrument will automatically adjust its height and tilt to maintain the correct geometry while measuring or compensate using software.
37. A video recording system will digitally record the roadway while displaying the Date, Time, GPS Coordinates, Retroreflectivity values, and Odometer reading. The videos will be recorded to a removable USB flash drive on the instrument.

Delivery:

Vehicle Mounted Retroreflectometer will be delivered within 60 calendar days after purchase of the equipment to Aberdeen, South Dakota.

Training:

The vehicle mounted mobile retroreflectometer developer will provide 1 day of training on the system. In addition, the developer will provide free software upgrades for a period of one year from acceptance of the components.

Warranty:

A three-year warranty for defective workmanship and/or replacement of defective products/materials of the contract is required in addition to any warranties provided automatically by the manufacturers of the products/materials. Provide manufacturers' warranties.