



# ARENS PHOTOMETRIC AND VISIBILITY LABORATORY FACT SHEET

*Research that is Essential, Indispensable, and Connected to our Customers.*

## PURPOSE

The Photometric and Visibility Laboratory (PVL) enables researchers to evaluate the photometric and colorimetric properties of signing and marking materials, including fluorescent and retroreflective materials. Studies of human-centered systems related to visibility issues are also performed in this laboratory.

## DESCRIPTION

The laboratory develops recommendations for the specification of traffic control materials, both in photometric and colorimetric terms. The laboratory also evaluates proposed changes to transport-related lighting and signaling systems, including automobile headlamps (as they affect the visibility of signs and pavement markings) and new technologies in traffic lights and changeable message signs (particularly the impacts of light-emitting diodes on detection and recognition). Validation checks of laboratory and field measurement equipment are conducted by the laboratory to ensure that instruments are accurate, both for in-house work and work conducted by contractors, researchers, and State departments of transportation.

## MAJOR/UNIQUE COMPONENTS

- 15-meter automated range for the measure-

ment of retroreflective materials using a three-axis goniophotometer. This setup is also used for the photometric evaluation of some headlamp types.

- Optronic Laboratory Type OL-754 double-monochromator spectroradiometer.
- Photo Research PR-650 array-type colorimeter.
- Photo Research Model 1980A Pritchard Photometer (luminance meter) with Cassegrain lens, with an effective aperture of 0.2 minutes of arc.
- Photo Research PR-880 Spot Photometer (luminance meter).
- Labsphere-type BFC-450 bispectral fluorescence colorimeter.
- Illuminance meters, used to provide validation measurements of laboratory instruments.
- NIST-calibrated luminous intensity standards, precision shunts, and voltmeters for validation purposes.
- NIST-traceable Standard Calibration Source (luminance and color temperature).

## ACCOMPLISHMENTS

PVL has conducted in-house studies and investigations in support of contract research

studies, the development by the Operations Core Business Unit staff of the new edition of the *Manual on Uniform Traffic Control Devices*, and the work of other government agencies. Recent topics include measurement of the color characteristics of retroreflective materials for the revision of the 1979 Federal Highway Administration (FHWA) Color Tolerances, evaluation of pavement markings under automobile headlamps, photometric evaluation of a mobile sign retroreflectometer, evaluation of fluorescent signing materials and ultraviolet headlighting, and design of a universal, multipurpose, computer-controlled roadway lighting system for the Smart Road in Blacksburg, VA.

## PARTNERSHIPS AND CUSTOMERS

Our partners include other offices of FHWA, other Federal agencies (e.g., the National Highway Traffic Safety Administration, Federal Aviation Administration, National Parks Service, Consumer Product Safety Commission), State departments of transportation, Government contractors, professional/engineering organizations (e.g., ASTM, HITEC), and the manufacturers and users of signing and marking materials and light-emitting traffic control devices.

*The Turner-Fairbank Highway Research Center (TFHRC) has more than 24 laboratories for research in the following areas: safety operations, including intelligent transportation systems; materials technology; pavements; structures; and human centered systems. The expertise of TFHRC*

*scientists and engineers covers more than 20 transportation-related disciplines. These laboratories are a vital resource for advancing this body of knowledge created and nurtured by our researchers. The Federal Highway Administration's Research, Development, and Technology*

*Service Business Unit operates and manages TFHRC to conduct innovative research to provide solutions to transportation problems both nationwide and internationally. TFHRC is located in McLean, Virginia. Information on TFHRC is available on the Web at [www.tfhrc.gov](http://www.tfhrc.gov).*