
Standard Practice for Definition of Terms Related to Transverse Pavement Profiling Systems and Ground Reference Equipment

AASHTO Designation: PP 111-23¹

Technically Revised: 2023

Technical Subcommittee: 5a, Pavement Measurement



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1. SCOPE

- 1.1. This standard practice is to provide standard definitions for terms used in transverse pavement profiling system specifications, test methods, standard practices, and the various quality assurance procedures.

2. TERMINOLOGY

2.1. *Data Types:*

- 2.1.1. *gridded data*—A set of point cloud data whose elevation values have been interpolated to a regularly spaced grid in the horizontal plane (either X-Y or V-U). Gridded data are often calculated from edited point cloud data.

- 2.1.2. *ground reference data*—A set of point cloud data for which there has been no filtering, smoothing, or elimination of outliers. Set of three-dimensional measurements that constitutes reference data for evaluation of point cloud or gridded data and is collected using a GRE.

- 2.1.3. *longitudinal profile*—Perpendicular deviations of the pavement surface from an established reference parallel to the lane direction, usually measured in the wheel tracks.

- 2.1.4. *mapping sensor measurement*—A set of data points from an individual mapping sensor in a sensor or global reference frame. This measurement may not span the complete lane width and may be oriented at an angle relative to transverse direction.

- 2.1.5. *point cloud data*—A set of data points that is defined in the same reference frame. Point cloud data are often irregularly spaced, defined in a global or path reference frame, and calculated from a combination of mapping and location sensor measurements of the road surface.

- 2.1.6. *point cloud reporting format*—A text file containing three columns of data where each row represents the projection of that point onto a set of three orthogonal axes in a reference frame. The reference frame, typically global or path, must be known so that the columns correspond to the (X-Y-Z) or (V-U-Z) axes, respectively.

- 2.1.7. *system scan*—Combined set of mapping sensor measurements acquired over a single sampling time from all mapping sensors on the TPP.

- 2.1.8. *transverse profile*—Vertical deviations of the pavement surface from a horizontal reference perpendicular to the lane direction.
- 2.2. *Directions:*
- 2.2.1. *longitudinal direction*—Direction parallel to two consecutive lane center locations. The longitudinal direction is denoted by the U axis in the path reference frame.
- 2.2.2. *transverse direction*—Direction perpendicular to two consecutive lane center locations. The transverse direction is denoted by the V axis in the path reference frame.
- 2.2.3. *vertical direction*—Direction normal to the WGS84 ellipsoid.
- 2.3. *Fabricated Surfaces:*
- 2.3.1. *excitation boards*—A manufactured surface that contains consecutive square bumps of specified dimensions to ensure the primary and secondary ride modes of the TPP are excited between a prescribed range of speeds.
- 2.3.2. *macrotexture object*—A manufactured object that has at least one surface (macrotexture surface) with a specified mean profile depth. The macrotexture surface shall contain a set of verifiable dimensions.
- 2.3.3. *reference object*—An object with a set of verifiable dimensions that has distinguishable features allowing for the global position and orientation of the object to be established from the TPP point cloud.
- 2.4. *Ground Reference Equipment (GRE) Measurement Regions:*
- 2.4.1. *gauge block region*—All GRE point cloud measurements that lie on all visible surfaces (e.g., top and sides) of a given gauge block or set of gauge blocks. If multiple gauge blocks are present in the point cloud, then each should be uniquely identified.
- 2.4.2. *ground reference*—All GRE point cloud measurements that lie along the road surface bounded by the straightedge, straightedge with gauge blocks, and two transverse bounding beams. All measurements shall be reported in path reference frame.
- 2.4.3. *macrotexture*—All GRE point cloud measurements that lie on the top surface of the macrotexture surface.
- 2.4.4. *planar flatness*—All GRE point cloud measurements that lie on the top surface of the flat plate upon which the macrotexture surface is placed. Note, the measurements of the macrotexture surface are not included in this region.
- 2.4.5. *transverse straightness*—All GRE point cloud measurements that lie on the top certified surface of the straightedge.
- 2.5. *Measurement Analysis:*
- 2.5.1. *effective transverse width*—Relative lane width a measurement system is capable of measuring based on the relationship between the total transverse width and the transverse wander.
- 2.5.2. *measurement error*—Difference between the measurement of an object or surface made by a sensor, sub-system, or system being assessed and the verifiable dimension. The measurement error