



Materials sampling and testing methods and documentation procedures prescribed in chapter 8 of the CMM are mobilized into the contract per [standard spec 106.3.4.1](#) and [standard spec 106.3.4.3.1](#).

#### 8.38.1 PROFILE TESTING FOR RIDE QUALITY

Under the QMP Ride special provision, the contractor is required to measure ride quality with an inertial profiler to determine the International Roughness Index (IRI) for each wheel path on mainline travel lanes. This measurement includes bridge approaches, bridge decks, intersections, railroad crossings, and pavement gaps. Roundabouts, ramps, bike lanes, and other auxiliary lanes are typically excluded from ride quality testing. Locations such as high-speed connection ramps may be tested, if specified in the contract special provisions.

#### 8.38.2 EQUIPMENT AND PERSONNEL

The contractor is required to use a profiler on the department's list of approved devices, and operated by a person who is certified under the department's highway technician certification program. A profiling device should be re-approved whenever changes or repairs are made to the device that may affect data collection or analysis, including repairs made to the profiler components or software. The contractor should provide the engineer with documentation related to recent calibration activities the contractor has performed with their profiler. Components to be calibrated include the height sensors, accelerometers, and distance measuring instruments. The engineer should verify that the profiler and operator are certified, the device has been properly calibrated, and daily calibration verification has been performed. The engineer should also verify proper use of the profiler on the project (correct wheel path locations, etc.).

#### 8.38.3 TESTING

The contractor is allowed to determine the schedule for acceptance testing, and should coordinate the testing with the engineer. The department prefers acceptance testing of the ride quality to be performed in a single run from one end of the project to the other, but this is not required.

If there is phased construction or other traffic control issues allowing public traffic onto portions of the roadway, the engineer may direct the contractor to profile those portions of a project separately. When performing acceptance profiling on portions of a project rather than an entire run, be sure to collect the data for whole segments at a time, to allow for easy compilation of the data for the entire profile run.

It is highly recommended that the contractor perform process control testing of the ride periodically during construction to identify problems and ensure that the end result will be a smooth pavement. Process control testing is not required by the contract, nor is the contractor required to have a profiler on site during paving operations. However, the engineer can request ride information if there appears to be a ride-related problem during construction of the pavement, and the contractor should provide the ride information in a timely manner to ensure that corrections can be made to the construction operations. Most contractors will be reluctant to assume the risk of a substantial disincentive pay deduction for ride at the end of the project, and will want to measure ride frequently during construction to avoid that risk.

It is important that the operator follow the manufacturer's recommendations for proper run-in and run-out distances at the beginning and end of each run. Acceleration or deceleration during data collection will adversely affect the testing and cause inaccurate results.

Operators and field staff should be aware that the profile run distances and project stationing distances may not match as testing is performed. The project stationing is a horizontal distance on a specific reference line, while the measured profile distance is a traveled distance affected by vertical and horizontal curves along each wheel path location. The tester should start each profile at either the beginning or ending project station, depending on the direction of travel. It is important to keep proper documentation to ensure that necessary field-locates can be performed after data analysis is completed.

#### 8.38.4 PAVEMENT CATEGORIES

The ride QMP subdivides mainline pavement into categories, as defined in the specification. In general, HMA I is asphalt pavement with more than one opportunity to achieve smoothness. HMA II is asphalt pavement with one opportunity to achieve smoothness. PCC II is all concrete pavement, including gaps. HMA III and PCC III are segments with a posted speed of 55 mph or greater that include certain paving obstacles such as bridges, approaches, intersections, and railroad crossings. Examples of Category III segment locations are shown in

[Figure 1](#). For pavements with a posted speed limit less than 55 mph, segments are either HMA IV or PCC IV and include paving gaps, intersections, bridges, approaches, and railroad crossings.

The pay equations and specification limits vary with each category. Category III and Category IV segments contain features that are difficult to construct without sacrificing ride quality and are therefore eligible for incentives but not subject to disincentives for ride quality. This incentive-only approach is designed to encourage contractors to put more effort into achieving smoothness where it is most difficult to achieve.

Ride quality pay adjustments will not be assessed on segments containing concrete pavement or an upper layer of asphaltic mixture that the engineer directed to be placed in cold weather, as stated in the specifications. This should be determined on a segment-by-segment basis.

### 8.38.5 CORRECTIVE ACTIONS

The engineer and contractor should carefully consider the cause of profile irregularities when analyzing the profile data. It is not always in the best interest of the department to require repairs when roughness is shown on the profile. Grinding may not be warranted nor desired in some locations such as bridge decks or near utility obstructions. The department may require corrective action on bridge decks or excluded pavements after engineer-directed straightedging is performed. Dips will also cause profile irregularities, and consideration should be made in those instances to ensure that proposed corrective actions will improve the ride quality and also not adversely affect roadway drainage.

Localized roughness requirements are not applied to pavements that are within 25 feet of the following surfaces if they are not constructed under the contract: bridges, bridge approaches, or railroad crossings. These areas are profiled and the data is reported to compute segment ride quality pay adjustments. The department may direct the contractor to make corrections to the pavement in the exclusionary zones, and the contractor will be compensated for the extra work. Examples of exclusionary zones are shown in [Figure 2](#).

Category IV segments are found in urban areas where there are many factors to consider when determining the cause of roughness, and the appropriate action to take. The specification does not allow for a localized roughness pay reduction on Category IV segments, but the engineer can direct corrective actions to repair roughness. The engineer is required to ride the pavement prior to making any decisions related to the correction of the ride quality.

It is the responsibility of the contractor to construct all items including manholes, curb & gutter, and the final riding surface according to the plans and specifications. If a design feature is the cause of poor ride quality, and all items, including the riding surface, were constructed as specified, then corrective action is not warranted. Design features that may cause poor ride quality include varying pavement cross-slopes for drainage or matching into roadside features, and stamped pavement or other surface enhancements required in the contract. If it is determined that poor ride quality is caused only by an incorrectly installed roadway feature or improper paving operation, then corrective actions may be appropriate.

### 8.38.6 DOCUMENTATION

[Figure 3](#) shows a recommended protocol for naming the data files of each profile run.

#### 8.38.6.1 ProVAL

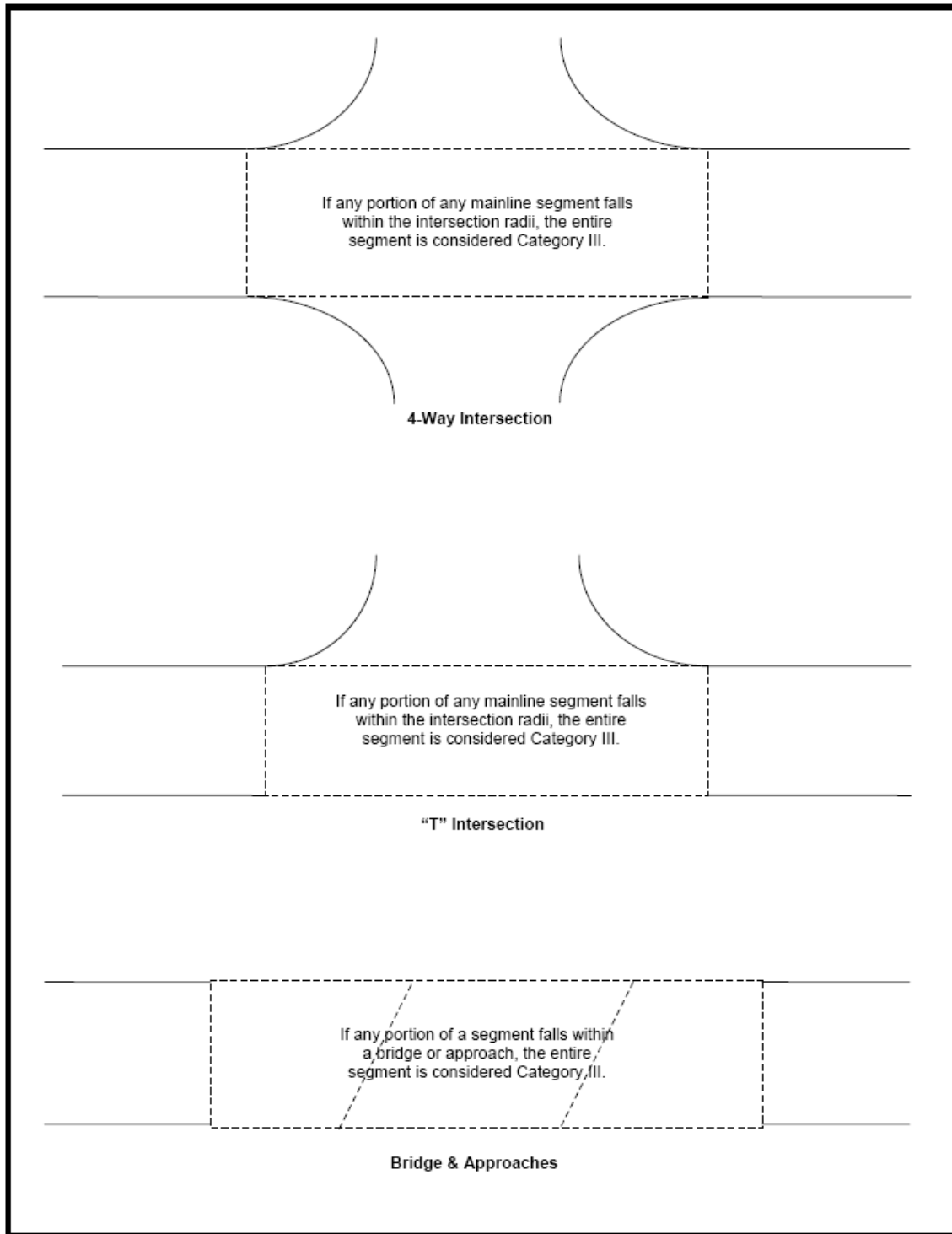
The specification requires the contractor to analyze the ride data utilizing the ProVAL software. ProVAL computes the IRI for each segment, determines areas of localized roughness, and can simulate corrective actions. The contractor must submit the required ProVAL reports and electronic files to the engineer in a timely manner. Instructions for downloading and using the software can be found on the department's web site:

<http://roadwaystandards.dot.wi.gov/standards/qmp/index.htm>

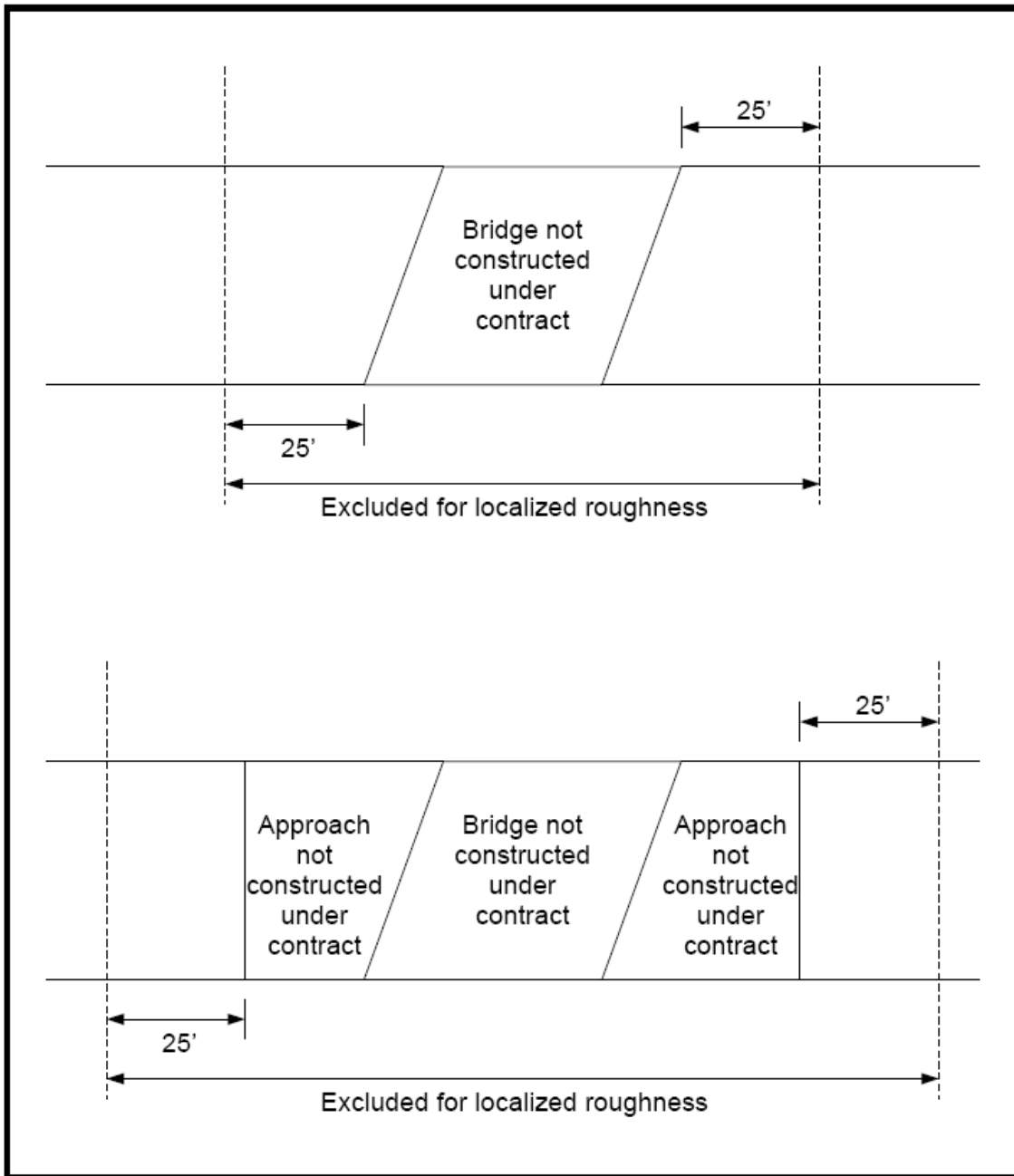
#### 8.38.6.2 Materials Reporting System

After verifying the contractor's data, the department calculates pay adjustments using the department's MRS software. The contractor must submit the required ride quality information electronically using the MRS software available on the department's web site at:

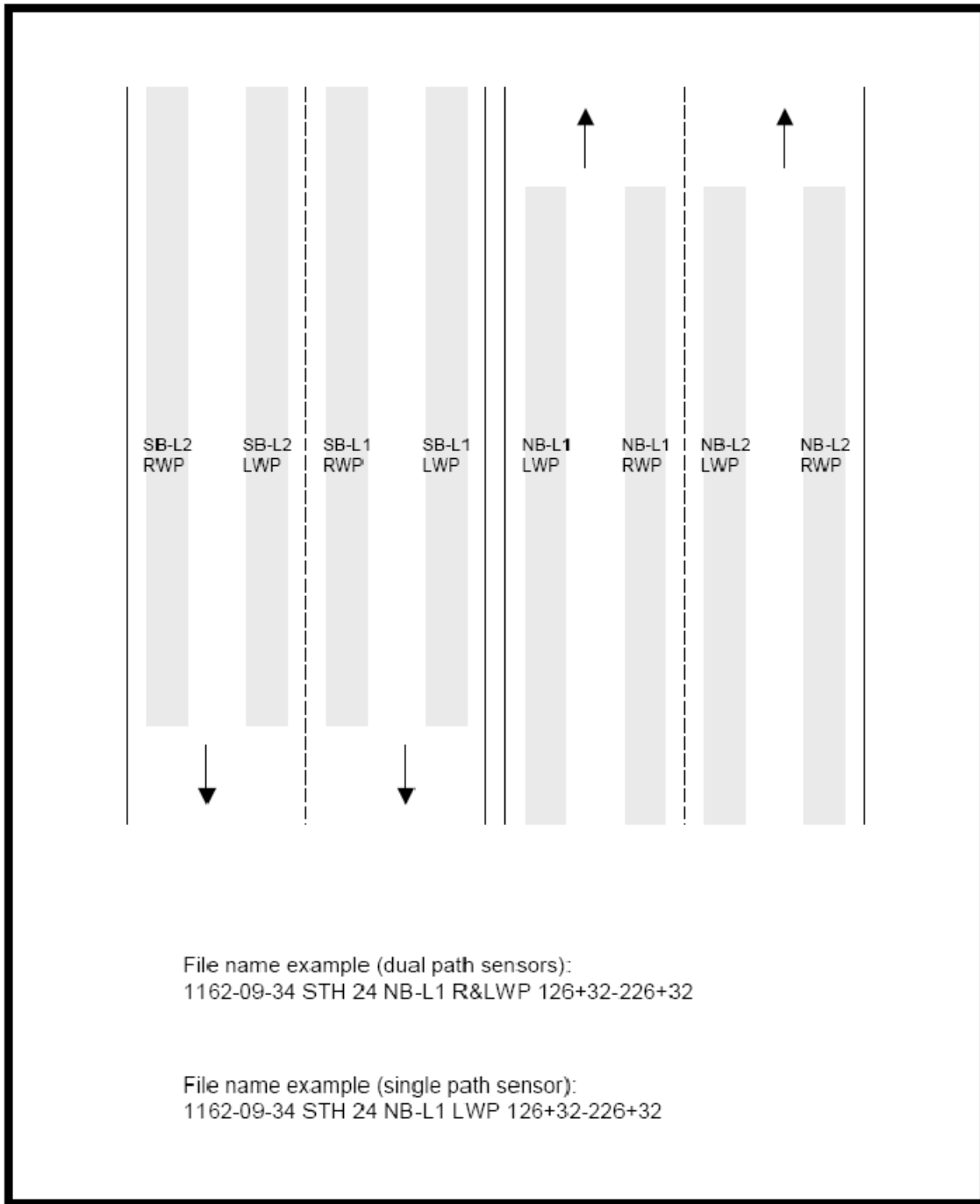
<http://www.atwoodsyste.ms.com/mrs/>



**Figure 1: Category III Segment Locations**



**Figure 2: Localized Roughness Exclusionary Zones**



**Figure 3: Recommended Protocol for Naming Profile Runs**