



# Construction & Materials Tips

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## *Frequently Asked Questions for Ride Specifications*

### **What is the IRI?**

IRI is the International Roughness Index and measures pavement smoothness. The units of IRI are usually in/mile, m/km, or mm/m. For more detailed information on IRI refer to *The Little Book of Profiling* (Sept 1998) By Michael W. Sayers and Steven M. Karamihas. The book can be downloaded from [www.umtri.umich.edu/erd/roughness/litbook.html](http://www.umtri.umich.edu/erd/roughness/litbook.html).

### **What is the inertial profiler?**

The inertial profiler is a device that uses laser sensors to measure the profile of the pavement surface. There are generally three types of inertial profilers: 1) one that can travel at highway speeds, a high speed profiler, 2) a light weight profiler that can travel at a minimum speed of 12 mph, and 3) a portable profiler. Figures 1 and 2 show pictures of a high speed profiler and a light weight profiler.



Figure 1. High Speed Inertial Profiler

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Figure 2. Light Weight Profiler

### **What is the difference between profilograph and inertial profiler?**

The profilograph is a manually propelled device that uses rolling wheels. Profilographs have limited and erratic frequency response to the pavement roughness. The inertial profiler uses laser sensors and can travel at highway speed. Inertial profilers provide more consistent results.

### **What is the pay schedule referred to in Special Specification 5880 and Item 585?**

The pay schedule is used to determine the level of bonus or penalty for each 0.1-mi. section on the project.

### **What is the difference between Pay Schedules 1, 2 and 3?**

Pay Schedules 1 & 2 have the same bonus schedule. Pay Schedule 3 has the same bonus schedule as 1 & 2 in Special Specification 5880 but a lower bonus schedule than Pay Schedules 1 & 2 under Item 585. Penalty schedule is most severe for Schedule 1 less severe for Schedule 2 and there is no penalty for Schedule 3.

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## **How do I select the pay schedule?**

The Construction Division has a written guideline that should be used to determine the most appropriate pay schedule. The pay schedule should be selected based on the existing IRI, class of the road, posted speed, the number of smoothness opportunities, and other mitigating factors. If you need a copy of the "Ride Guidance Document," please contact Dale Rand, P.E., from the Flexible Pavement Branch at 512/506-5836.

## **What is a smoothness opportunity?**

A smoothness opportunity is defined as a chance for the contractor to improve ride quality. Examples: 1) placing an overlay on an existing pavement surface is considered one smoothness opportunity, 2) placing a level up and overlay is considered two smoothness opportunities, 3) hot in place recycling with a new overlay is considered two smoothness opportunities, and 4) grading for a base course is considered one smoothness opportunity.

Spot level-ups, milling operations, or seal coats, are not considered a smoothness opportunity. Mill and fill operations that require matching the existing pavement are not considered a smoothness opportunity.

## **How much IRI improvement is expected with one lift of hot mix?**

As a general rule the IRI will improve by approximately 50% with one lift of hot mix.

## **What is a good IRI Number?**

The lower the calculated IRI, the smoother the pavement will ride. The higher the IRI, the rougher the pavement will ride.

Typically for construction projects an IRI value less than 60 is considered "excellent." An IRI greater than 95 requires corrective action.

## **Where can I find the list of profilers certified for use on TXDOT projects?**

The list is available on TXDOT web site under the producers list.  
<ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/profiler.pdf>

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## **Where can I find the list of operators certified to work on TXDOT projects?**

The list is available on TXDOT web site under the producers list.

<ftp://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/operator.pdf>

## **Where is the IRI for existing pavements?**

The IRI for an existing pavement is available in the Department Pavement Management Information System (PMIS) Database. Request this data from the district pavement engineer or the PMIS coordinator for the district.

## **How is the ride data analyzed to determine the bonus and penalty?**

The ride data submitted by the contractor will be analyzed using TXDOT's Ride Quality computer program. If you need a copy of the program please contact Dale Rand, P.E., from the Flexible Pavement Branch at 512/506-5836.

## **What does the analysis include?**

The output file from the analysis includes a description of the project: District, county, highway, beginning reference marker, end reference marker, CSJ, lane designation, IRI values every 0.1 mile, pay, locations of bumps or dips and total pay adjustment.

## **What is the latest ride specification?**

The latest ride specification is 5880 from the 1993 Specification; 5440 from the 1995 Specification. From the new 2004 Specification, the ride specification will be Item 585.

## **What is difference between Surface Test Type A and Surface Test Type B?**

Surface Test Type A uses a 10-ft. straightedge while Surface Test Type B uses a high speed or lightweight inertial profiler.

## **When should Surface Test Type A or Surface Test Type B be used?**

The default in the specification is to use Surface Test Type B. Use Surface Test Type A on shoulders and service roads, ramps, when project pavement limits are less than 2,500 ft. Use Surface Test Type B on the finished riding surface of all travel lanes.

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The Construction Division “Ride Guidance Document” addresses these situations. If you need a copy of the “Ride Guidance Document,” please contact Dale Rand, P.E., from the Flexible Pavement Branch at 512/506-5836.

**Should I use the penalty for localized roughness?**

Currently, with Item 5880 or 5440 (ref. [1993 Standard Specifications](#)), the default set up excludes the penalty for localized roughness. Penalty usage is recommended

The new [2004 Standard Specifications](#) default set up includes the penalty for localized roughness (bumps, dips) and cannot be waived by a general note.

**Is the contractor required to correct areas of localized roughness?**

Yes, the new 2004 Specification, Item 585, will require the contractor use diamond grinding or other approved methods to remove localized roughness when using Pay Schedule 1 or 2. In lieu of corrective action, the engineer may assess a penalty for localized roughness at: \$500 per occurrence for Pay Schedule 1 and \$250 per occurrence for Pay Schedule 2. For Pay Schedule 3, localized roughness penalties will not be assessed.

**When should the contractor take corrective action to correct localized roughness?**

The corrective action should be made after the initial QA test. The engineer will determine the areas of localized roughness.

**Should the ride specification be used for the approach slabs and bridges?**

Bridge structures, approach slabs, or both will not be subjected to surface test Type B.

**Should the ride specification be used for curb and gutter sections?**

The ride specification should be used for curb and gutter sections and the pay schedule should be selected based on the existing IRI, class of road, speed limit and smoothness opportunities.

**Can IRI results be converted to PI for payment?**

Do not use Profile Index (PI) for payment. Some inertial profiler manufacturers have profilograph simulations that vary from manufacturer to manufacturer. TXDOT does not verify these simulations. These simulations can not be used for quality assurance and bonus/penalty payment.

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**When should the IRI measurements be made?**

The specifications Item 5880 and 585 require the contractor to obtain IRI measurements on the finished surface of the completed project or at the completion of a major stage of construction.

**Can the surface texture affect the IRI measurements?**

Generally speaking uniform texture does not affect the IRI values. “Tex-1001-S, Operating Inertial Profilers and Evaluating Pavement Profiles,” is the test method used for profile measurements. It requires recording of the elevations at 6 in. intervals. The measurements at this interval should not affect the 0.1 mile IRI summary.