Comparison of Surface Characteristics of Hot-Mix Asphalt Pavement Surfaces at the Virginia Smart Road

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Abstract

Pavement surface characteristics are important to both the safety of the pavement surface and the comfort of the drivers. As of yet, texture and friction measurements have not been incorporated into the design of pavement surfaces. Seven different wearing surface mixtures, placed at the Virginia Smart Road pavement facility, were studied over a one year time period for both friction and texture properties. A locked wheel skid trailer and a laser profilometer were used to assess the pavement surface characteristics. Laboratory testing of the pavement wearing surface mixtures was performed to determine volumetric and mixture specific characteristics. Testing included gyratory compaction, specific gravity, maximum theoretical specific gravity, ignition testing, and gradation analysis. These material properties were used to study the impact of material properties on pavement surface characteristics. The pavement surface characteristics were analyzed using regression analysis with some measured and calculated parameters relevant to the pavement wearing surface properties. Analysis variables included the skid number at 64 kilometers per hour measured using the ASTM E501 (smooth) and ASTM E524 (ribbed) tires, the mean profile depth, the slope of a linear SN-speed model, the skid number at zero speed from the Pennsylvania State University (1) model, and the International Friction Index parameters.

Analysis determined that testing particulars such as the grade of the test did not significantly affect the measured skid number. However, there is a significant difference between the skid numbers measured using the two tires. Additionally, the relationship between speed and skid resistance is assessed differently between the two test tires. Regression analysis concluded that there is a relationship between surface characteristics and HMA design properties such as the VMA, VTM, Percent Passing #200 sieve, and Binder Type. The influence of these variables on each of the analysis parameters varied.

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Chapter 1
Introduction

1.1. Background

Traditional pavement design has centered on the structural capacity of the roadway for many years. Pavement systems have been designed to withstand specific levels of repetitive loading over the design life. The Strategic Highway Research Program (SHRP) developed SuperPave™ mixtures, based on performance characteristics, to ensure optimum service and cost-effectiveness to the user. However, the incorporation of safety characteristics into the design process has not yet occurred. Pavement surface friction and rideability are important aspects of a pavement system and should be incorporated into the mixture design process.

Pavement surface characteristics are important for both the safety and comfort of drivers. Pavement surfaces should provide adequate friction and maintain a good level of ride quality to ensure satisfaction of the driving public. In particular, it is important for the safety of the driving public that roads provide adequate friction at the tire-pavement interface. The combination of good friction, low levels of roughness, and low levels of noise are important in pavement wearing surface design. Approximately 15% of fatal and injury causing accidents occur during wet weather, some of which are due to friction deficiencies at the pavement surface (Smith 1976). Although there are no standards requiring specific levels of friction on pavement surfaces, many transportation departments follow recommended guidelines established by the National Cooperative Highway Research Program (Kummer 1967).

The surface texture of a pavement-wearing surface is one of the primary contributors to tire-pavement friction. Both macrotexture and microtexture affect the friction characteristics of pavement surfaces. Increasing the texture of in-service or new pavement surfaces will increase the skid resistance levels of the pavement. However, increases in texture will sometimes increase the level of discomfort for vehicle occupants (Ivey 1996). A decrease in surface texture as a result of aggregates polishing over time is a major factor in decreasing friction levels of pavement wearing surfaces. Some types of aggregate are more susceptible to polishing and should be avoided when designing pavement-wearing surfaces (AASHTO 1976).

To maintain adequate levels of friction on pavement surfaces, many state transportation departments perform routine skid resistance testing. The type of equipment used for testing varies, depending on the preferences of each transportation department. Unfortunately, friction measurements are not consistent among different types of equipment and cannot be directly compared unless the same type of equipment is used. The Virginia Department of Transportation uses a locked wheel skid trailer to assess pavement friction.

The Permanent International Association of Road Congresses devised a method for the comparison of pavement surface frictional properties in 1995. The International Friction Index uses texture properties in conjunction with friction testing to normalize measurements made by different types of equipment. The International Friction Index, which is not yet widely used, may allow for comparisons of pavement surface friction throughout the world, leading to advances in skid resistant pavement design (Wambold 1995).

The frictional properties of pavement surfaces may be improved through proper design of the wearing surface mixture. Although there are no direct correlations, studies indicate that there is a relationship between mixture properties and skid resistance levels. For example, when large aggregates are incorporated into the mixture, studies have shown increases in high-speed skid resistance (Emery 1982). This knowledge has led to the creation of Open Graded Friction Coarses (OGFC), which are widely used in European countries to provide good levels of pavement skid resistance. OGFC mixtures provide ample drainage of surface moisture that aids in the prevention of traction loss. Furthermore, some pavement distresses are known to affect the frictional properties of in-service pavement surfaces. For example, bleeding, a result of excessive asphalt in the mixture prevents adequate tire contact with the surface aggregate, which reduces the level of friction attainable (Beaton 1976).

1.2. Problem Statement

Studies indicate that hot-mix asphalt (HMA) properties impact the skid resistance and texture of pavement wearing surfaces. For example, past studies have shown that there is a relationship between skid resistance at different speeds and properties of individual mixtures (Panagouli 1998). Experience indicates that coarse textured pavements result in consistent skid resistance at all speeds and that fine textured pavements perform better at low speeds than at high speeds. However, the relative contribution of different HMA properties to the skid resistance of a pavement-wearing surface has not been quantified for a wide variety of mixes.

1.3. Objectives

To address the issues in the aforementioned problem statement, the friction and texture characteristics of different HMA mixtures need to be analyzed. The objective of this research was to analyze friction and surface texture characteristics of seven different HMA wearing surface mixtures placed at the Virginia Smart Road. To accomplish this, the skid resistance performance of the different mixtures was compared. Additionally, the relationship between speed and skid resistance was studied for the different mixes. Finally, the effect of design HMA characteristics on the high and low speed skid resistance of a pavement surface was also studied.

1.4. Research Scope

To accomplish the aforementioned objective, periodic evaluations of the surface characteristics of seven mixtures placed at the Virginia Smart Road were conducted. Skid resistance, laser longitudinal profile measurements, and texture measurements were taken in both the instrumented and non-instrumented lanes, in the uphill and downhill directions.

Measurements were taken approximately every four months, weather permitting. Surface HMA samples taken from the road were tested to obtain the “as built” volumetric properties of the pavement.

In this thesis, Chapter 2 presents a review of literature pertaining to investigations performed relating skid resistance, surface texture, and the incidence of material properties to pavement surface characteristics. Chapter 3 describes the experimental program conducted to accomplish the research objectives. Chapter 4 summarizes the data analysis performed and the results obtained from this research. Chapter 5 presents the findings and conclusions and Chapter 6 outlines recommendations for future research.

Chapter 2
Literature Review

2.1. Introduction

Skid resistance and texture are important safety characteristics that need to be considered in pavement design and rehabilitation. Each year approximately 15% of accidents that result in an injury or a fatality occur during wet weather conditions (Smith 1976). These accidents are a result of numerous reasons including driver error, vehicle malfunction, and friction deficiencies at the tire-pavement interface. Accidents resulting from a friction deficiency of the pavement surface are more likely to occur with the accumulation of precipitation such as snow, ice, or rain (Lu 1996). A film of moisture on the pavement surface, resulting from precipitation, may prevent vehicle tires from making adequate contact with the surface of the road.

Numerous factors affect surface friction at the tire-pavement interface. Both the pavement surface characteristics and vehicle tires are major contributors to pavement friction. The type of tire, tread pattern, tire pressure, and tire condition are all influential factors in the frictional interaction between tires and pavement surfaces. Tires in poor condition, with worn treads, or improper inflation, will not have adequate braking friction on any pavement surface. Additionally, vehicle speed, braking system, and load distribution also affect the pavement-tire interaction (Panagouli 1998).

It is nearly impossible to control vehicle characteristics that affect skid resistance for every vehicle. Thus, to minimize the number of accidents that occur as a result of frictional deficiencies, it is imperative that pavement surfaces provide adequate friction. There are many pavement surface characteristics that are known to affect the frictional properties at the tire pavement interface. For in-service pavements, they include the age of the pavement, the condition of the wearing surface, and any structural deficiencies that may exist (Panagouli 1998). The skid resistance properties of both new and old pavement surfaces are affected by numerous HMA design factors, including aggregate properties (Panagouli 1998).

The necessary level of skid resistance for a particular pavement site is dependent upon the volume and speed of traffic using the road. Improving existing pavements or designing new pavements to provide adequate skid resistance, although not compensating for inadequacies in the vehicle itself, may decrease the likelihood of wet weather accidents resulting from inadequate pavement friction (Panagouli 1998). Unfortunately, increasing pavement friction also has negative aspects. They include increased fuel consumption, tire wear, and noise inside the vehicle. However, the negative aspects of increasing pavement friction are outweighed by the potential decrease in the number of accidents occurring from inadequate pavement friction (Ivey 1981).

2.2. Pavement-Tire Interaction

Pavement skid resistance is defined as the ability of a traveled surface to prevent the loss of traction (ASTM E 867). The term “skid resistance” can be applied to any measurement taken concerning the frictional properties of pavement surfaces. To be able to fully comprehend the skid resistance of a tire interacting with the pavement surface, it is important to understand the forces at the tire-pavement interface. These forces are complex and dependent upon tire size, type of braking system, vehicle weight, and other vehicle specific characteristics. A simple block with a known velocity can be used to model frictional forces. The value of friction can be established using the force normal to the block and the counteractive force occurring as a result of the frictional interaction between the object and the pavement as shown in Figure 2.1A. The resistant force F_R is a function of both the frictional properties of the surface and the change in velocity of the sliding block (Serway 1994). For a constant speed, the coefficient of friction can be computed using the following equation:

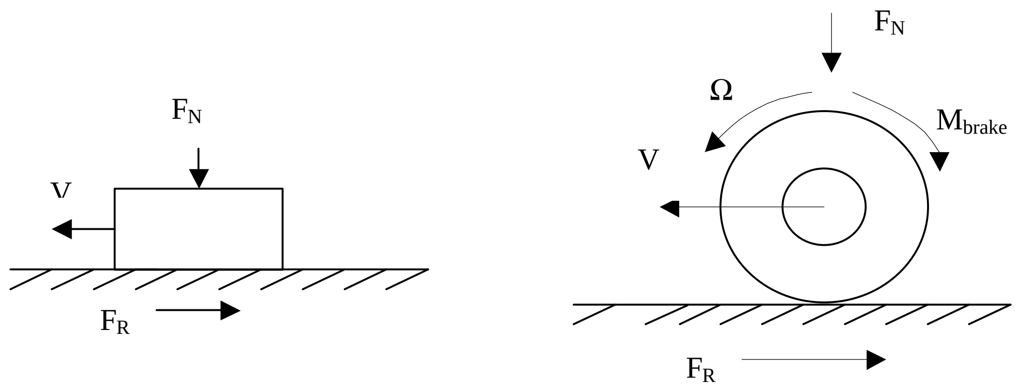
$$\mu = \frac{F_R}{F_N} \qquad (1)$$

Where:

F_R = Resistance force,

F_N = Normal force, and

μ = Coefficient of friction.



(A) **(B)**

F_N = force normal to the object
F_R = resistant force between the object and the pavement surface

V = the velocity of the object
Ω = rotation speed of the wheel
M_{brake} = the moment applied to the wheel from the braking force

Figure 2.1 Simplified Friction Diagrams

This model, while adequate in determining the frictional properties of the surface, does not consider all forces acting on a tire in a vehicle braking system. The diagram in Figure 2.1B shows the forces acting on a tire in motion while the vehicle is braking. The determination of the frictional force for this scenario is more complex than that for the simplified block in motion. To adequately model the friction between tire and pavement, the friction fluctuations resulting from varying braking forces and the slip speed of the tire must be considered (Roadware 1996).

Tire contact with the pavement surface is highly dependent upon the characteristics of the road. Studies have shown that there are three different types of friction that occur when a tire is in contact with a pavement surface, which are dependent upon the pavement surface texture (Takino 1998):

1. Adhesion loss friction occurs on smooth textured pavement surfaces when a force is created between the rubber of the tire and the pavement surface.
2. Hysteresis loss friction occurs on rough textured pavement surfaces when the rubber in the tire tread is deformed by the pavement surface.
3. Cohesion loss friction occurs when the tire tread rubber is ruptured and torn away from the tire by small asperities, or aggregate roughness, on the pavement surface.

Because of the different types of friction that can occur between a tire and pavement wearing surface, the type of tire used for testing skid resistance affects the measurement of the pavement surface friction. It is important to analyze pavement surfaces using the same type of tire to limit variability due to differences in treads or rubber compounds. ASTM E274 specifies the use of standard tires in order to consistently assess pavement surface skid resistance

2.3. Friction and Texture Measurements

There are many different methods and equipment to measure the surface properties of pavements. The frictional characteristics of pavement surfaces have been measured quantitatively for many years. The results of friction testing are used to compare changes in skid resistance over time or to determine the level of safety of pavement surfaces. However, it is important to ensure that the surfaces being compared have been measured using the same type of equipment, as there is not a direct correlation among measurement devices. Although the

International Friction Index provides a common measurement standard, it has not been widely adapted. In addition, the correlations have to be validated for different measurement conditions. The texture properties of the pavement surface, which highly affect the skid resistance, can also be quantified using different techniques.

2.3.1. Skid Resistance

There are different types of equipment that can be used to measure the frictional properties of a pavement surface. The devices can be grouped in four basic classes: locked wheel, side force, variable slip, or fixed slip. These devices operate upon different friction measurement modes and measure different frictional properties of the tire-pavement interaction (Henry 2000). Some of the most commonly used devices are described in the following section.

2.3.1.1. Locked Wheel Friction Devices

The locked wheel friction measurement device depicts the frictional properties of the pavement during the occurrence of an emergency situation in which a vehicle, not equipped with an anti-locking brake system, completely locks its tires (Henry 2000). Some locked wheel testers can also perform tests with the wheel at a variable slip rate, with 0% slip indicating that the wheel is freely rolling and 100% slip indicating that the wheel is fully locked. Studies performed have shown that the typical range of maximum friction values occur at 15% to 20% slip rates (Alsopp 1985).

A locked wheel skid trailer owned by the Virginia Department of Transportation (VDOT) was used in this research to measure the skid resistance of pavement surfaces. The equipment used, as shown in Figure 2.2, consists of a truck containing a large water tank and a trailer with a locking mechanism on one wheel. The locked wheel trailer can be used to test the frictional properties of the pavement surface at any speed.

Figure 2.2 VDOT Locked Wheel Skid Trailer

The standard test procedure for the locked wheel skid trailer is described in detail in the ASTM E274-97 specification. The test begins with the attainment of the desired test speed. An activator, located inside the truck, is used to initiate the test sequence beginning with the application of a thin layer of water to the pavement surface (Figure 2.3). At a test speed of approximately 64 kilometers per hour (40 miles per hour) the application rate should be approximately 600 mL per minute-millimeter (4.0 gallons per minute-inch) with a 10% margin of error allowed in the application rate. The volume of water applied should be proportional to the test speed. After the correct amount of water has been applied the test wheel is locked, and instrumentation in the trailer records the sliding force of the locked tire (ASTM E274-97).

Figure 2.3 Water Dispensing System and Tire of Locked Wheel Skid Trailer

This test can be performed using a ribbed tire (ASTM E501) or a smooth tire (ASTM E524). Testing performed with the locked wheel trailer in accordance with ASTM E274 allows for the computation of the skid number (SN):

$$SN = 100\mu = 100 * \left(\frac{F}{W}\right) \tag{2}$$

Where:

SN = Skid number at the measured speed,

μ = Friction coefficient,

F = Tractive force applied to the tire, and

W = Vertical load applied to the tire.

It is important to note that only friction values recorded in accordance to ASTM E274 can be referred to as a skid number. The value calculated for the skid number should always be presented with the speed at which it was obtained. The ASTM standard is to denote the speed in English units. When metric units are used the speed denotation should be in parenthesis. It is also important to note the tire used during the test. The standard is to use an R for the ribbed tire and an S for the smooth tire. The representation SN40R indicates that the skid number was recorded at 40 miles per hour using the ribbed tire. SN(64)S would be the skid number recorded at 64 kilometers per hour using the smooth tire (ASTM E867-97).

2.3.1.2. Side Force Coefficient Devices

The side force coefficient is measured by a test that uses a freely rolling wheel to determine the frictional properties of the pavement. This type of test uses a wheel that is mounted at an angle to the direction of motion of the test vehicle. The force that is produced on the sideways mounted wheel is used to calculate the friction coefficient of the pavement surface. This method has been used for many years and can be performed using a motorcycle and a sidecar (Alsopp 1985).

Two examples of equipment that utilize the side force coefficient methodology to measure surface friction are the SCRIM and the MuMeter. Both of these pieces of equipment were developed in Britain (Henry 2000). The MuMeter is used for airports and has been used since the 1970’s by the Department of Transportation in Arizona. The MuMeter is a lightweight three-wheeled trailer that does not require a special towing vehicle. Two of the smooth-treaded wheels on the trailer are used to measure the friction of the surface while the third wheel is a stabilizing wheel. The two test tires are at an angle of 15 degrees to allow for the sideways force coefficient to be measured. Attached to the trailer is a unit that records the friction values as the test occurs. The MuMeter measures the dry friction of the pavement surface, as well as the wet pavement friction if a wetting system were included in the towing vehicle. The side force coefficient that is obtained from this type of equipment is calculated using the following equation (Alsopp 1985):

$$SFC = \mu = \frac{F_s}{W} \tag{3}$$

Where:

SFC = Side force coefficient,

F_S = Sideway force, and

W = Vertical reaction between the test wheel and the road surface.

2.3.1.3. Fixed Slip Devices

Fixed slip friction measurement devices are primarily used in European countries. Fixed slip testers operate with a constant rate of slip, typically around 10% to 20%. This allows for the maximum friction value of the roadway surface to be measured. The amount of slip is controlled by hydraulics or by allowing the chain drive of the tester to be lower than that of the testing vehicle. Examples of fixed slip devices include the Runway Friction Tester and the Saab Friction Tester (Henry 2000).

The Saab Friction Tester, used in Sweden, operates at a constant slip rate of 10%. A retractable test wheel subjected to a constant vertical load is located behind the rear axle of the test car. A chain driven transmission, which allows for the constant slip rate, is connected to the rear axle and the test wheel. The Saab Friction Tester measures the wet friction of the pavement surface with the aid of a water pump attached to the test vehicle. Computers inside the vehicle record the forces acting on the wheel as a result of the slip. The frictional properties of the pavement are reported as the Brake Force Coefficient and are calculated using the following equation (Alsopp 1985):

$$BFC = \mu = \frac{F}{W} \qquad (4)$$

Where:

BFC = Brake Force Coefficient,

F = Retarding or braking force, and

W = Vertical reaction between the tire and the road.

2.3.1.4. Variable Slip Devices

Variable slip friction measurement devices measure the friction of the pavement surface in a manner similar to the fixed slip devices. During testing, the slip rate of the test wheel is varied to allow for a range of friction values to be recorded. Japan and Norway are the primary users of variable slip friction devices to measure the condition of roadway surfaces. Some examples of variable slip friction measurement devices include the Norsemeter ROAR used in Norway and the IMAG system used in Japan (Henry 2000). The effect of variable slip speeds on the measured friction of a pavement surface as demonstrated by the Rado model is shown in Figure 2.4 (Henry 2000).

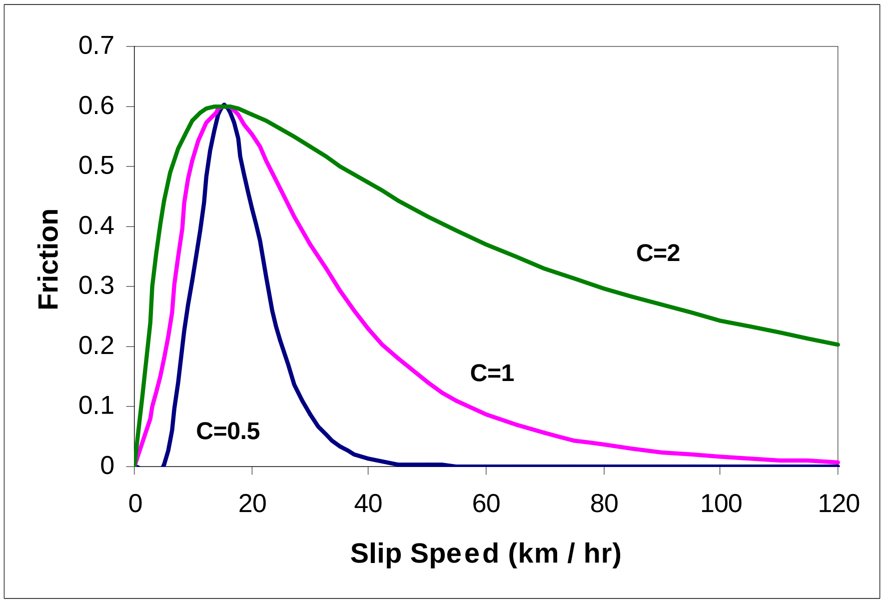


Figure 2.4 Variable Slip Speeds and Friction Measurements, Rado Model
μ_{peak} =0.6, S_{peak} =15 km / hr, Vehicle Speed = 120 km / hr

The value of C incorporated into the Rado model pertains to the texture of the pavement surface. The more harsh the texture, the higher the value of C, hence the lower the slope on the right side of the peak. Figure 2.4 shows the varying amount of friction values that are recorded when the wheel is fully locked (0 km / hr slip speed) to freely rolling (120 km / hr slip speed) (Henry 2000).

2.3.1.5. Other Pavement Friction Measurement Methods

Portable testers are available to measure the frictional properties of pavement surfaces. These testers use a pendulum or slider theory to measure friction in a laboratory or in the field. The British Portable Tester is a well-known portable friction measurement device. During testing with the British Portable Tester, a pendulum is released from a specified height and a rubber slider attached to the end of the pendulum contacts the pavement surface. The retardation of the pendulum motion resulting from the frictional properties of the test surface is used to establish the British Pendulum Number (BPN). The values of the BPN vary from zero to 140.

The BPN is recorded using a specially constructed scale located on the tester, which measures the height of the pendulum after contacting the surface (ASTM E303).

Pavement friction can also be evaluated by measuring the stopping distance of a vehicle. ASTM E445 specifies the test procedure for the determination of the stopping distance on a paved surface using a passenger vehicle with full-scale tires. This test requires the use of the same tires as the aforementioned locked wheel skid trailer test, which is specified in ASTM E501. All four wheels are equipped with a braking system that allows for a more realistic braking scenario of the passenger car. The pavement surface is wetted prior to the test to obtain a minimum of 0.611 liters per square meter (0.015 gallons per square foot) coverage. The desired test speed is attained and the brakes applied. The distance traveled by the vehicle until it stops is recorded with the aid of instrumentation and reported as the stopping distance (SD) (ASTM E445). Using the recorded stopping distance and the velocity of the vehicle upon application of the brakes, the stopping distance number (SDN) can be calculated:

$$SDN = \left(\frac{V^2}{255 * SD} \right) * 100 \tag{5}$$

Where:

SDN = Stopping Distance Number,

V = Speed of the vehicle at the moment of brake application in Kilometers per Hour, and

SD = Stopping distance in meters.

The SDN can be used to evaluate pavement friction but does not report a coefficient of friction. It is helpful in determining the relative adequacy of friction of different pavement surfaces but does not correlate to other skid resistance measurements (ASTM E445).

2.3.2. Pavement Texture Measurements

Pavement texture plays an important role in the skid resistance properties of pavement surfaces. Studies performed in Europe have indicated that good pavement macrotexture decreases accidents in both wet and dry conditions (Henry 2000). There are different levels of pavement texture. The PIARC Technical Committee on Surface Characteristics classified the texture of pavement surfaces in terms of relative wavelengths as shown in Table 2.1 (Descornet 1989).

Table 2.1 Texture Classifications

Texture Classification	Relative Wavelengths
Microtexture	$\lambda < 0.5$ mm
Macrotexture	0.5 mm $< \lambda <$ 50 mm
Megatexture	50 mm $< \lambda <$ 500 mm
Roughness	0.5 m $< \lambda <$ 50 m

In addition to pavement skid resistance, texture properties affect other characteristics of pavement surface behavior. The main texture parameters that contribute to the frictional properties of the pavement surface are microtexture and macrotexture. Studies performed in Great Britain concluded that macrotexture depth is influential in the high-speed skid resistance of pavement surfaces and that when the macrotexture depth of the pavement was less than 1.0 mm (0.039 in) there was a large decrease in the high-speed skid resistance (Elsenaar 1976). Additionally, previous experience has shown that pavements with a smooth texture, that of both low microtexture and low macrotexture, have the lowest skid numbers at any speed (Beaton 1976). Megatexture, a result of pavement surface deteriorations such as alligator cracking, spalling, plucking, and scabbing, is a major factor in pavement noise (Descornet 1989).

Since 1997, the International Roughness Index (IRI) has been used to quantify the roughness or smoothness of pavement surfaces (Hajek 1998). The IRI is based on the Quarter Car method and is assumed to simulate the speed of a vehicle at 50 miles per hour (Sayers 1995).

2.3.2.1. Pavement Macrotexture

The macrotexture of a pavement surface results from the large aggregate particles in the mixture. Macrotexture can be measured using laser profiling methods, volumetric methods, outflow meters, and other techniques. The Ontario Ministry of Transportation and Communications devised a technique to use photo-interpretation to evaluate the macrotexture properties of the pavement surface (Holt 1982).

Traditionally, macrotexture measurements have been made using a volumetric test known as the Sand Patch Test. The Sand Patch Test is used by many transportation departments in the United States and is a relatively simple test to perform. However, the results from this test are dependent upon the individual performing the test, and therefore are not very repeatable. The Sand Patch Test is performed using a known volume of material and a spreading tool. The material traditionally used for this test is Ottawa sand, passing the number 50 sieve and retained on the number 100 sieve (Henry 2000). Currently, the specifications in ASTM E965 recommend the use of glass spheres because of the consistency of the particle shapes and the commercial availability of the spheres. However, the test is still performed using the traditional Ottawa sand in Virginia (Figure 2.5). The results from the test performed using the Ottawa sand are adequate as long as the sand meets the required specifications. The procedure for this test consists of placing a known volume of material on the pavement surface and spreading it using a circular motion until the sand is dispersed around the voids in the pavement surface. The diameter of the area covered with the sand is measured and then used to calculate the mean texture depth of the pavement macrotexture. The mean texture depth is calculated from the test results using the following equation (ASTM E965):

$$MTD = \frac{4V}{\pi D^2} \tag{6}$$

Where:

MTD = Mean texture depth of the pavement macrotexture,

V = Volume of the sample material used, and

D = Average diameter of the area covered by the material.

Figure 2.5 Sand Patch Test

ASTM defines the mean texture depth as the average depth of the pavement macrotexture when determined using the Sand Patch Test. The term "mean texture depth" should only be applied when the test is performed to ASTM E965 specifications. Figure 2.6 shows a diagram depicting a pavement surface with the large aggregate particles protruding from the horizontal. The mean texture depth is labeled on the diagram.

Another method used to evaluate the pavement macrotexture is the outflow meter. The theory behind the outflow meter is similar to that of the Sand Patch Test. The outflow meter is a cylinder with a rubber stopper on the bottom. The cylinder is filled with water and the water is permitted to flow onto the pavement through the rubber bottom. The amount of time necessary for the water level to decrease a specified amount is used to determine the macrotexture properties of the pavement surface (Henry 2000).

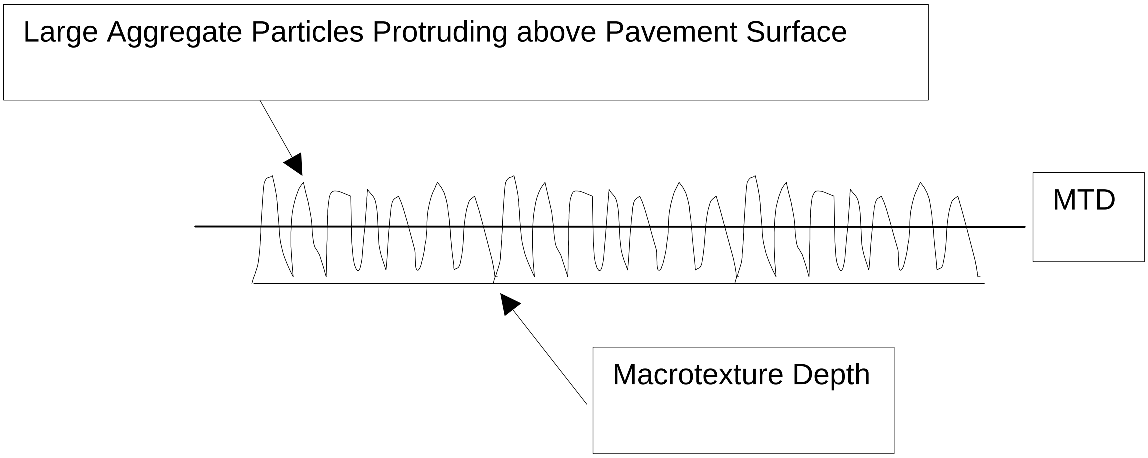


Figure 2.6 Macrotexture Schematic

The outflow meter and the Sand Patch Test are both adequate in evaluating the pavement macrotexture. However, because of difficulty in measuring macrotexture using these methods without disrupting traffic flow, the laser profiler is currently being used for macrotexture measurement by many transportation agencies. The Virginia Department of Transportation uses a laser profiler in conjunction with the Sand Patch Test to evaluate pavement macrotexture.

The laser profiler used in this research consists of a laser attached to the front of the test vehicle as seen in Figure 2.7. The laser emits a beam towards the pavement surface that travels to the pavement and is reflected back from the surface to the test vehicle. A receiver records the time for the light to travel from the test vehicle to the pavement and back. The distance of the traveled light is recorded and used to calculate the surface profile. With the information recorded, the mean profile depth of the pavement surface can be computed.

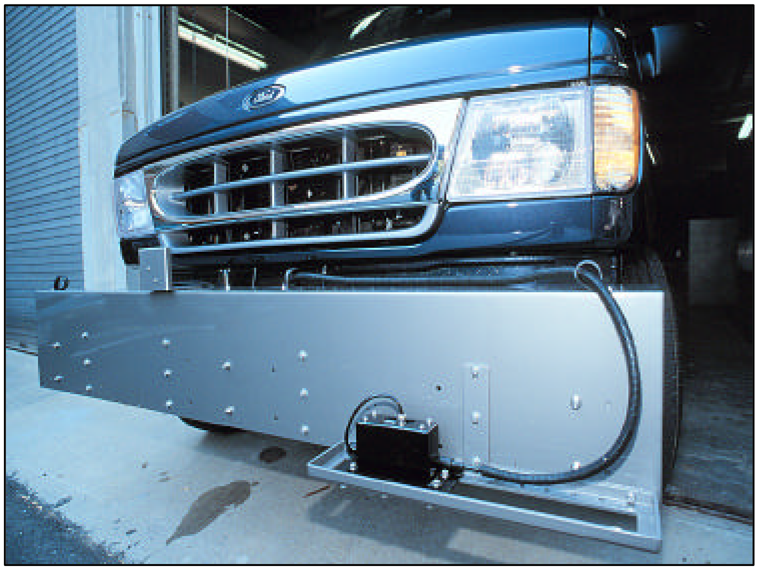


Figure 2.7 Laser Texture Measuring Device

2.3.2.2. Microtexture Measurements

Microtexture, a function of the aggregate particle properties, is not measured directly in the field. Microtexture levels are commonly estimated using low speed friction measurement devices (Wambold 1995). The locked wheel skid trailer can be used to estimate the microtexture properties when testing is performed at low speeds. Research conducted at the NASA Langley Research Center indicates that the locked wheel skid trailer can be used to obtain an estimate of the pavement microtexture if the test speed is equal to or lower than 23.5 kilometers per hour (14.6 miles per hour). NASA testing, performed at an airport runway, indicated that there was a large amount of variance occurring when microtexture parameters were estimated at higher speeds. Variances are caused by the macrotexture properties of the pavement surface becoming more significant in high speed skid resistance (Horne 1983). Past research has indicated that measurements conducted using the ribbed tire (ASTM E501) are highly sensitive to the microtexture properties of the pavement surface and thus good estimators of pavement microtexture (Henry 1983).

Laboratory procedures can be performed on the aggregate to determine their level of microtexture. However, these procedures necessitate the removal of a sample of the pavement surface each time a measurement is desired which is not acceptable for routine pavement monitoring.

2.4. PIARC Experiment to Compare Texture and Skid Resistance Measurements

In 1988, the Permanent International Association of Road Congresses determined a need for the standardization of pavement surface characteristic measurements. Because of the many different methods used to evaluate pavement surfaces, the need for a normalizing parameter was deemed necessary to enable comparisons of pavement surfaces located in different countries. In-service pavements in Belgium and Spain were used for the experiment rather than test tracks to better depict realistic conditions (Wambold 1995).

Different types of equipment were used to analyze skid resistance including side force, variable slip, fixed slip, and locked wheel testers. To assess texture properties of the surfaces stationary measurements, walking speed testers, and high-speed testers were used (Wambold 1995). The measurements recorded were then used to establish a method for the harmonization of a majority of the equipment used worldwide. To normalize the measured data, both a friction measurement and a texture measurement are necessary. Using these values, the International Friction Index can be calculated. The development of the International Friction Index (IFI) is a major advance in the characterization of pavement surfaces. By allowing for a comparison worldwide, knowledge from different countries can be compiled, which may result in the design of pavement surfaces with enhanced skid resistance properties (Wambold 1995). The International Friction Index, which will be described in detail in Section 2.8.2, is reported as two values, F60, the friction value at 60 kilometers per hour, and S_p, the speed constant, a parameter incorporating the wet speed friction into the IFI.

2.5. Variation of Pavement Surface Characteristics

The skid resistance of a pavement surface varies with many factors including the porosity of the surface, wear, polishing, rutting, bleeding, and surface contamination (Haas 1994). During the first two years after construction there are increases in skid resistance due to wearing away of the surface asphalt (Corley-Lay 1998). Long-term skid resistance is reduced as the exposed aggregate is worn and some of its microtexture and macrotexture properties are lost as traffic loads compact the HMA in the wheel paths. Additionally, variations in weather conditions affect pavement skid resistance. Generally, there is a decrease in pavement skid resistance from the seasonal changes of spring to fall. Observations indicate that there can be a day-to-day fluctuation of pavement skid numbers of approximately 10 to 15 skid numbers as a result of extreme changes in weather conditions (Anderson 1986).

A study performed to determine the consistency of measurements using the ribbed and smooth tires indicated that in terms of long-term variances, the tires performed similarly. However, short-term fluctuations resulting from rainfall, temperature, and fluctuating microtexture values were much larger when testing was performed using the ribbed tire than when using the smooth tire (Henry 1983).

2.6. Effects of Texture Properties on Skid Resistance

Several studies have focused on the influence of microtexture and macrotexture on pavement skid resistance. The texture of a pavement surface affects the levels of skid resistance that can be obtained. It has been established that good microtexture is important at low speeds and good macrotexture is important at high speeds (AASHTO 1976). However, some researchers believe that the microtexture of the aggregate is important not only for good low speed skid resistance but at high speeds as well (Dupont 1995). The macrotexture of the pavement is said to provide the hysteresis component of skid resistance (Forster 1989). Studies suggest that while good vehicle tires can compensate for inadequate macrotexture, low levels of microtexture cannot be compensated for (Dupont 1995).

An investigation to establish the parameters of pavement texture that were the most influential in providing adequate skid resistance indicated that there are five factors of extreme importance. The factors that are the most influential are a function of the aggregate types used in the pavement mixture. They include the size, spacing, and shape of the aggregates providing the macrotexture, the microtexture at the peaks of the larger aggregate, and the height distribution of the macrotexture (Britton 1974).

In the attempt to correlate the microtexture of a pavement surface with the skid resistance of the surface, research has established factors that are used to describe the frictional behavior of the materials. The microtexture properties are described in terms of the asperity density, height, and average shape factor of the microtexture. The asperity density is defined as the average number of microtextural peaks in a given length of pavement surface, as measured using a microscope. The average asperity height is the height of the microtexture, and the shape factor is a function of both the height and the density. The research showed that skid resistance is significantly affected by the microtexture of the pavement surface (Forster 1989).

Tire noise is a function of the pavement texture. In 1983 a study was performed to determine whether tire noise was related to the level of skid resistance of pavement surfaces. The results of the study indicated that there was a significant relationship between the amount of noise in the far field, the noise generated from the tire at a distance 15 meters (49 feet) from the source, and pavement skid resistance. Using the smooth tire, the importance of macrotexture to the high-speed skid resistance and noise of the pavement surface was illustrated (Baran 1983).

2.7. Effects of HMA Characteristics on Pavement Skid Resistance

Many HMA design parameters influence pavement skid resistance. Several studies have tried to determine the effects of the aggregate on skid resistance, microtexture, and macrotexture of a paved surface. Other properties, such as asphalt content and void content also affect skid resistance. If an excessive amount of asphalt is incorporated into the pavement mixture, there is a tendency of bleeding of the pavement surface. Bleeding prevents aggregate from properly contacting the vehicle tire and causes large decreases in skid resistance properties of the surface (Beaton 1976). High void content allows for rapid drainage of the pavement surface, theoretically increasing the pavement skid resistance by removing the water.

2.7.1. Aggregate Properties

A survey conducted in 1996 indicated that 18 states incorporated aggregate testing into mix design procedures to provide skid resistant pavements (Jayawickrama 1996). The aggregate properties tested include the polishing value, the acid insoluble residue test, and the Moh's hardness test. Aggregate with low polish values and a high hardness number are desired. In 1996, the Virginia DOT was not using aggregate testing to design for skid resistant pavements. However, the state operates under the theory that proper mix design satisfies the need for skid resistance in pavement surfaces (Jayawickrama 1996). Currently the state of Virginia is experimenting with Open Graded and Stone Mastic Asphalt mixtures to increase the skid resistance of its pavements.

There are numerous aggregate properties that affect the skid resistance of pavement surface mixtures. In a study performed in Michigan in 1973, the British Portable Tester was used to evaluate the skid resistance of HMA mixtures constructed using three different aggregate gradations, created with the same type of aggregate. Asphalt Concrete specimens were constructed in the laboratory and used for analysis. The particle shape of the aggregate was determined and used to evaluate the aggregate influence on pavement skid resistance. This study showed that the fine aggregate shape characteristics had a large influence on the friction values obtained through BPT testing. Additionally, the gradation of the mixture was also influential (Huang 1973).

In 1976, a study performed in California suggested that there are four aggregate characteristics that are important, in terms of skid resistance, in the design of pavement surfaces which are: texture, shape, size, and wear resistance (Beaton 1976). The gradation of the aggregate is also important in that larger aggregates incorporated into the mixture allow for increased surface projections, which in turn increase the contact between the tire and pavement. To allow for adequate skid resistance over the lifetime of the pavement, it is important to ensure that the aggregate does not polish rapidly (Beaton 1976).

AASHTO recommends the use of specific types of aggregates to obtain optimum skid resistance levels. According to AASHTO, the incorporation of blast furnace slag, expanded shale, slate, or lightweight aggregates into the HMA mixture, provides adequate levels of skid resistance. Additionally, AASHTO has determined that sharp silica sand and some types of granite provide high skid resistance when used in mixtures (AASHTO 1976).

Research at Pennsylvania State University (PSU) established characteristics of aggregate that would allow for adequate skid resistance over time. This study showed that while a wear resistant aggregate is desired in the mixture, some wearing of the pavement surface must occur in order to ensure good levels of skid resistance. It was reiterated that angular particles performed better in terms of pavement skid resistance than particles that were rounded (Henry 1979). This study also identified several properties that should be tested prior to mix design to ensure adequate skid resistance. Table 2.2 shows an abbreviated list of the aggregate properties as well as the desired range established during this study (Henry 1979).

Table 2.2 Desired Aggregate Property Ranges

Property	Range
Mohs Hardness Hard Fraction Soft Fraction	 8-9 6-7
Aggregate particles Size (mm) Shape	 3-13 Conical, Angular (< 90°)
Los Angeles Abrasion (%)	≥ 20
Aggregate Abrasion Value (%)	≥ 8
Polished Stone Value (BPN)	≥ 75

The Center for Transportation Research at Texas University performed a study to evaluate the frictional properties of different types of aggregates used for construction of Texas pavements. The pavements evaluated, which all had seal coats, were constructed of aggregate containing limestone, sandstone, siliceous gravel, taprock, and rhyolite. Using different laboratory tests this study predicted the possibility of constructing a model depicting the frictional performance of the pavement relative to the Friction Number (FN), the BPN, and the average texture depth of the surface. However, it was determined that without adequate research correlating the frictional properties of the pavement with methods used to evaluate microtexture and macrotexture in the laboratory, it is impossible to be able to predict frictional properties of the pavement from laboratory procedures entirely. Additionally, the study established that the use of the polish value of the aggregate is adequate in predicting the long-term frictional properties of the pavement when used in conjunction with the soundness of the aggregate. When the soundness of the aggregate is not adequate, a high polish value may not be enough to ensure good frictional properties (Abdul-Malak 1989).

Khandhal (1998) confirmed the importance of aggregate texture properties to low speed skid resistance. The angularity of the aggregate particles contributes to the skid resistance of the pavement by creating points of contact between a road covered with a thin water film and the tread rubber of the tire. Additionally, the idea that pavement macrotexture is a function of the aggregate gradation in the mixture was also confirmed (Khandhal 1998).

2.7.2. HMA Volumetrics

To obtain high macrotexture it is important to incorporate large, sharp aggregate particles into the design mixture. Open graded friction coarses (OGFC) have been developed to have high values of skid resistance of the pavement at high speeds. The OGFC mixture incorporates large, sharp aggregate to allow for rapid drainage and provide high texture, which results in enhanced high-speed skid resistance (Emery 1982).

Canadian engineers studied which properties of the aggregate contribute to the skid resistance of an open graded friction coarse (Emery 1982). Linear regression was used to determine the influence of the following parameters to the skid number of friction courses:

1. Aggregate gradation
2. Polished Stone Value (PSV)
3. Los Angeles Abrasion Value (LAAV)
4. Aggregate Abrasion Value (AAV)
5. HMA Marshall Stability (MS)
6. Marshall Flow (FLOW)
7. Air Voids (VOID)
8. Equivalent Traffic (EQT)

Two models, one for high-volume traffic and another for low-volume traffic were necessary because it was found that the skid resistance of the pavements behaved differently depending on the volumes of traffic using the roads (Emery 1982). The resulting equation for high-volume roads is the following:

$$SN_{100} = 0.738 * MS + 0.377 * FLOW + 1.116 * VOID + \frac{42.772}{(EQT * 28)^{0.092}} - 18.150 \qquad (7)$$

The equation for low-volume roads is as follows:

$$SN_{80} = 0.196 * MS + 5.472 * VOID + 36.320 * (EQT * 4)^{0.016} - 40.32 \quad (8)$$

Where:

SN_{100} = Skid Number at 100 km/hr,

SN_{80} = Skid Number at 80 km/hr,

MS = HMA Marshall Stability in kN,

FLOW = Marshall Flow in 0.25 mm increments,

VOID = Air Voids in %, and

EQT = Equivalent Traffic.

The resulting equations show that there is a higher dependence on void content for lower traffic volumes than for higher volumes. The Marshall Stability and Flow are more influential for high traffic roads. The coefficients of determination, R^2, for these equations were 0.924 and 0.865 respectively, indicating an adequate fit. This model shows the importance of the mixture properties for skid resistant OGFC surfaces and indicates that the properties may also be important in other mixtures as well (Emery 1982).

2.8. Pavement Surface Characteristics Models

Several studies have been performed to establish adequate models to portray the skid resistant behavior of pavement surfaces. Pennsylvania State University (PSU) developed many models depicting the behavior of pavement skid resistance for different conditions. The changes of skid resistance due to variations in speed can be modeled using a relationship defined by the PSU researchers. The differences between friction measurements obtained using the different tires can also be evaluated using established models.

The International Friction Index (IFI) is a model that can be used to normalize friction and texture measurements. The IFI allows for the transformation of measurements conducted at different speeds to a standard speed. Additionally, the IFI allows for a comparison of friction measurements conducted using different types of equipment.

2.8.1. Penn State Models

It is important to be able to estimate the skid number at different speeds because of the difficulty in attaining the required test speeds in all test locations, and the necessity of having skid numbers at the same speed for comparison. A study performed at PSU established four equations to evaluate the skid resistance of a pavement surface using experimental data collected in the field. The recommended model from this research is known as the Pennsylvania State University Model 1 (PSU (1)).

The PSU (1) model is based on results from a locked wheel skid trailer and uses logarithmic linear regression to determine equation parameters. Other studies have shown that this regression model correlates well with experimental data. The equation for the PSU (1) model is the following (Yeh 1982):

$$SN = SN_0 e^{-\left(\frac{PNG}{100}\right)*V} \qquad (9)$$

Where:

SN = Calculated skid number,

SN_0 = Skid number intercept, or skid number at zero speed,

PNG = Percentage normalized gradient (hours per mile), and

V = Sliding velocity in miles per hour.

To establish the parameters SN_0 and PNG, experimental data from the test site at no fewer than three different speeds should be used. It is important to use different speeds to ensure that the best fit for the curve is established. The percentage-normalized gradient (PNG) represents the relationship between the skid number and speed and is calculated to represent the value at a specific speed. However, past research indicates that the change in PNG with respect to the change in speed is minimal, and a single PNG can be used to represent a wide range of speeds. Using experimental data taken at different velocities the PNG can be estimated by fitting the data points to the curve defined by Equation 9. The PNG can also be calculated from two skid numbers and velocity values using Equations 10 and 11 (Yeh 1982).

$$PNG_v = 100 * \left(-\left(\frac{dSN}{dV} \right) * \frac{1}{SN} \right)_v \tag{10}$$

Where:

PNG_v = Percentage Normalized Gradient at speed v,

$\frac{dSN}{dV}$ = G_v = Speed gradient, and

SN = Skid number at the desired velocity.

The speed gradient can be estimated using the following equation:

$$G_v \approx -\frac{(SN_1 - SN_2)}{(V_1 - V_2)} \tag{11}$$

Where:

$SN_{1,2}$ = Skid numbers measured at two different speeds, and

$V_{1,2}$ = Velocities for the respective skid numbers.

ASTM E274 contemplates the use of smooth or ribbed tires. The experimental results from each tire vary slightly, as one is more sensitive to microtexture and the other to macrotexture. The PSU study established a procedure to incorporate the skid measurements using both tires into a model to estimate the texture properties of the pavement surface. The model consists of two equations, which can be solved simultaneously to predict the British Pendulum Number and the Mean Texture Depth of the pavement surface. Both equations incorporate the use of the skid numbers at 64 km/hr as follows (Yeh 1982):

$$SN_{64}^{S} = -16.87 + 0.54 * (BPN) + 0.50 * (MTD) \tag{12}$$

$$SN_{64}^{R} = -9.19 + 0.74 * (BPN) + 0.15 * (MTD) \tag{13}$$

Where:
SN^{S}_{64} = Measured skid number at 64 kilometers per hour using the smooth tire,
SN^{R}_{64} = Measured skid number at 64 kilometers per hour using the ribbed tire,
BPN = British Pendulum Number, and
MTD = Mean Texture Depth.

Further investigations at PSU established models depicting the skid number at zero speed (SN_0) and the percentage normalized gradient using both tires. The regressions performed established equations incorporating skid numbers from both the ribbed and bald tires. To estimate SN_0 and PNG (Wambold[2] 1988):

$$SN_0 = 5.6 + 1.8 * SN^R - 0.72 * SN^S \tag{14}$$

$$PNG = 1.1 + 0.02 * SN^R - 0.03 * SN^S \tag{15}$$

Where:
SN_0 = Skid number at zero speed,
PNG = Percentage normalized gradient,
SN^R = Skid number measured from the ribbed tire, and
SN^S = Skid number measured from the smooth tire.

The equations can be used for skid values at any speed, as long as the skid numbers used for the equation are measured at the same speed. Equation 14 shows the effect of the ribbed tire measurement on SN_0. This reemphasizes the idea that the ribbed tire is more sensitive to the microtexture of the pavement (Wambold[2] 1988). Further studies indicate that the smooth tire has more effect on the PNG. The correlation between the SN_0 and PNG and the ribbed and smooth tires was studied using values obtained from research performed in New York, Florida, and Texas. The values obtained, shown in Table 2.3 reiterate the sensitivity of each tire to the PNG and SN_0 factors. These findings can be helpful when deciding how to correct pavement surfaces with low skid numbers. An analysis of the PNG and SN_0 values computed based on skid testing alone would allow for rapid determination of whether the microtexture or the macrotexture of the pavement surface were in need of repair (Wambold, 1988[1]).

Table 2.3 Correlation of Tire Type to Skid Parameters

	SN_{40}^{S}	SN_{40}^{R}
SN_0	0.059	0.869
PNG	-0.832	-0.151

Meyer established, using limited data, an equation that relates the PNG with the macrotexture properties of the pavement surface. This equation allows for a direct comparison and correlation of the pavement surface mean texture depth to the percentage normalized gradient. The PNG calculated using this equation may be used in conjunction with the skid resistance measurements taken in the field. The form of the equation established in his study is as follows:

$$PNG = 0.157\left(MTD^{-0.47}\right) \qquad (16)$$

Where:

PNG = Percent normalized gradient, and

MTD = Mean texture depth measured in the field.

Since only a minimal amount of data was used to establish this equation, there is a high probability that the model will not adequately fit measurements collected under different conditions. The exponential form of the equation appears to be appropriate, but the correlation constants may need to be re-evaluated for other situations (Huang 1993).

2.8.2. International Friction Index

The International Friction Index (IFI) was developed during the PIARC International Experiment to Compare and Harmonize Texture and Skid Resistance Measurements to overcome the differences among measurement devices (Wambold 1995). The IFI uses measurements of skid resistance and texture to evaluate the pavement surface characteristics and is being adopted worldwide for skid resistance comparison. To calculate the IFI it is necessary to have at least one friction measurement and one macrotexture measurement (ASTM E 1960). The IFI is reported in two parameters: the normalized wet friction value at 60 kilometers per hour (F60) and a speed constant related to the wet pavement friction value (S_p). A transformation equation has also been established to allow for calculation of the IFI at speeds other than 60 kilometers per hour based on the 60-kilometer per hour values.

The speed constant, S_p, is calculated using Equation 17 if an appropriate texture measurement is available.

$$S_p = a + b * TX \tag{17}$$

The constants a and b are dependent on the measurement method used to obtain the macrotexture parameter TX in millimeters. The applicable values for the texture measurements used in this research are shown in Table 2.4.

Table 2.4 Constants for Speed Constant Equation

TX (mm)	a	b
MPD (ASTM E 1845 Standard Practice for Calculating Pavement Macrotexture Depth)	14.2	89.7
MTD (ASTM E 965 Test Method for Measuring Pavement Macrotexture Using a Volumetric Technique)	-11.6	113.6

For calculation of the IFI, the speed at which the friction parameters are measured needs to be adjusted to the required 60 kilometer per hour. Using the speed constant and the measured friction values, the adjusted value of friction can be calculated as follows:

$$FR60 = FRS * e^{\frac{S-60}{S_p}} \qquad (18)$$

Where:

FR60 = Adjusted friction value to 60 km/hr,

FRS = Friction measured by the equipment at the slip speed,

S = Slip speed in kilometers per hour, and

S_p = Speed constant.

The adjusted friction value and the texture measurement are then used to calculate the value for F60.

$$F60 = A + B * FR60 + C * TX \qquad (19)$$

Where:

F60 = Normalized friction value,

A, B, and C = Calibration constants,

FR60 = Value calculated using Equation 18, and

TX = Macrotexture measurement in millimeters.

The parameters used in Equation 19 are dependent upon the measurement equipment used. ASTM E 1960 lists values for many different types of equipment. The values for the parameters pertaining to the locked wheel skid trailer used in Virginia are listed in Table 2.5. It can be observed that the macrotexture term appears only when the ribbed tire is used.

Table 2.5 Parameters for Equation Calculating F60

Tire Type Used	Slip Speed (km/hr)	A	B	C
Blank	65	0.045	0.925	0.000
Ribbed	65	-0.023	0.607	0.098

2.9. Summary

The importance of pavement skid resistance in terms of safety has been well established in many studies. Although the interaction of the tire and pavement interface is complex, skid resistance is known to be dependent on not only the tire properties, but also pavement texture properties. Numerous investigations concerning the frictional behavior of pavement surfaces have been performed. These studies have resulted in several models that adequately depict the behavior of the pavement surface characteristics under different conditions.

The texture of the pavement surface is primarily a function of the type and gradation of the aggregates that are used in the mixture. Large, open graded aggregates produce a high macrotexture value, which results in good skid resistance at high speeds. The microtexture of the pavement is a function of the type of aggregate that is used in the mixture. Microtexture has been shown to contribute to good skid resistance at low speeds.

When the texture of the pavement surface decreases, there is generally a decrease in skid resistance of the pavement surface. A decrease in the skid resistance over time is expected, but measures can be taken to ensure that it does not occur at an accelerated rate. After construction, some wearing of the aggregate surface must occur to remove the initial asphalt film and expose adequate microtexture. Although some wearing of the aggregate is necessary, aggregate with high polish values should still be avoided.

In addition to the aggregate properties, other HMA properties also affect the skid resistance of a pavement-wearing surface. If the asphalt content of the mixture is high, bleeding may occur, which prevents vehicle tires from adequately contacting the aggregates in the pavement surface. Open mixes typically drain well, increasing the skid resistance of the pavement, especially at high rates of speed.

There are several models that have been established for the evaluation of pavement surface characteristics. The most commonly used models include the PSU (1) model and the International Friction Index. The PSU (1) model can be used to evaluate the contributions of the pavement surface to low and high-speed skid resistance. The International Friction Index, which has evolved from the PSU (1) model, allows for a comparison of friction values worldwide. The ability to compare friction of different pavement surfaces and share knowledge despite the differences in measurement equipment may lead to advances in skid resistant pavement design.

Chapter 3

Experimental Program

A research program was developed to aid in the analysis of the surface characteristics of the different wearing surface mixtures at the Virginia Smart Road. This chapter describes the program in detail.

3.1. Virginia Smart Road

The Virginia Smart Road contains a 3.2 kilometer fully instrumented pavement test facility. Located in Montgomery County, Virginia, once completed, the Smart Road will be a connector road between US 460 and Interstate 81. The flexible pavement portion includes 12 instrumented sections, each with a different pavement design. Seven different HMA wearing surfaces were placed in the 12 sections. The average length of each of the test sections is approximately 100 meters. The lengths and wearing surface mixture types for all sections are listed in Table 3.1.

Table 3.1 Virginia Smart Road Flexible Pavement Sections

Section	Date Completed	Length (meters)	Mixture Type
A	11/11/99	104	SM-12.5D
B	11/11/99	90	SM-9.5D
C	11/12/99	87	SM-9.5E
D	11/10/99	117	SM-9.5A
E	11/5/99	76	SM-9.5D
F	11/5/99	94	SM-9.5D
G	11/5/99	90	SM-9.5D
H	11/5/99	90	SM-9.5D
I	11/8/99	98	SM-9.5A* (High Lab Compaction)
J	11/8/99	92	SM-9.5D
K	11/10/99	86	OGFC
L	11/9/99	104	SMA-12.5

The SM-9.5A mixture consists of aggregate with a maximum nominal size of 9.5mm and a PG 64-22 asphalt binder. The nominal maximum size of the aggregate is considered to be one sieve size larger than the sieve that retains more than 10% of the aggregate through gradation analysis. The letter at the end of the mixture type name denotes the binder type used for each mixture type. The binders used at the Virginia Smart Road are listed in Table 3.2.

Table 3.2 Asphalt Binder Types

Binder Type	PG Grade
A	64-22
D	70-22
E	76-22

The binder type used in the OGFC mixture is a PG 76-22. The SMA-12.5 mixture has a surface binder of PG 70-22.

3.2. Testing Equipment

The surface characteristics of the different mixtures evaluated were measured using a locked wheel trailer system and a laser profiler owned by VDOT. Two different test tires were used with the locked wheel trailer system.

3.2.1. Locked Wheel Skid Trailer

An International Cybernetics Corporation SFT 5040 locked wheel skid trailer (Figure 3.1) was used in this study. This device allows for skid number measurements to be conducted in accordance with the ASTM specification E274. The equipment consists of a pickup truck equipped with computers and a trailer that is towed over the pavement surface. A wetting system connected to the trailer from the truck is used to wet the pavement surface prior to testing. The measurement transducers, which record the forces acting on the tire, must be calibrated to within ± 1.5% of the applied load to ensure accurate pavement friction measurement (ASTM E274).

Figure 3.1 Locked Wheel Skid Trailer

The pickup truck that was used for testing is a ¾ ton truck containing a 0.946 m^3 (250-gallon) water tank in the truck bed. The truck is able to attain high speeds when fully loaded with water and supplies all of the electrical power for the trailer measurement and braking systems. The test vehicle must be able to maintain highway speeds of between 64 and 96 kph (40 and 60 miles per hour) with a deviation of ± 1.6 kph (1.0 miles per hour) (ASTM E274).

The test trailer contains the equipment to measure the speed of the vehicle, the traction, and the load applied to the tire. The tires on the test trailer are subjected to a load of 4800 ± 65 N (1085 ± 15 lbf) (ASTM E274). The wetting system connected to the trailer supplies water to the pavement at a 20 to 30 degree angle at a rate of 600 milliliters per minute-meter (4.0 gallons per minute-inch) at a speed of 64 kph (40 mph). The wetted area must be 25 millimeters (1 inch) wider than the width of the test tire to ensure proper measurement of the wet pavement friction. (ASTM E274).

Two different test tires are used with the locked wheel skid trailer to measure pavement skid resistance. A smooth, or blank tire, is more sensitive to the macrotexture skid properties of the pavement surface. A treaded (ribbed) tire is more sensitive to the microtexture skid properties of the pavement. Specifications for the tires are given in ASTM E524 and ASTM E501, respectively.

Both the ribbed and the smooth tires should be size G78-15 tubeless tires with belted bias construction (ASTM E501). The smooth tire is a treadless rubber tire with a wearing indicator located on the edge of the tire. The tire should be 21.2 centimeters (8.35 inches) wide at proper inflation with a 14.86 centimeter (5.85 inch) tread arc contacting the road surface. The ribbed tire has the same dimensions as the smooth tire and is different only by the presence of treads. The depth of the treads should be 0.9779 centimeters (0.385 inches) to ensure adequate measurements. Both tires need to be properly inflated to measure the skid resistance properties adequately and tire pressure should be verified prior to testing.

3.2.2. Laser Profiler

A specially equipped van was used to measure the pavement longitudinal profile at high speeds (Figure 3.2). This profiler measures the profile of the pavement at three locations; under each wheel path and at the center of the vehicle (McGhee 1996). The mean profile depth of the pavement surface is measured in the outer wheel path of the test vehicle.

Figure 3.2 Laser Profiler

The longitudinal profile was used to compute the mean profile depth. Although the laser profiler is not used as a primary means of texture measurement, studies have shown that it has good repeatability rates and compares adequately with other texture measurement systems (McGhee 1996).

Laser profilers are classified as accelerometer established inertial road profiling systems (McGhee 1996). Accelerometers measure the vertical position of the vehicle with respect to a reference plane. Lasers attached at the front of the test vehicle measure the height with respect to the pavement. The lasers emit a beam towards the pavement surface, and a receiver records the time it takes the light to travel from the initial source to the pavement and back. The travel time for the light is then used for the calculation of the distance from the vehicle to the pavement. The pavement profile is then computed based on the vehicle vertical location and distance to the pavement.

3.3. Testing Program

A testing plan that included skid testing and laser profiling was initiated to compare the safety and performance of the different wearing surface mixtures. Periodic measurements have been performed throughout a one year time period as weather permitted. The dates of the skid resistance and texture tests conducted are listed in Table 3.3.

Table 3.3 Pavement Characteristics Testing Schedule

Type of Test	Test ID	Test Date	Equipment Used
Texture	R1, Q1	12/2/99	Laser Profiler
Skid resistance	1B	3/9/00	Locked Wheel Trailer, Smooth Tire
Texture	R2, Q2	3/15/00	Laser Profiler
Skid Resistance	2T	3/27/00	Locked Wheel Trailer, Ribbed Tire
Texture	R3, Q3	6/20/00	Laser Profiler
Texture	R4, Q4	9/14/00	Laser Profiler / Sand Patch Test
Skid resistance	3T	9/19/00	Locked Wheel Trailer, Ribbed Tire
Skid resistance	4B	10/4/01	Locked Wheel Trailer, Smooth Tire
Skid resistance	5B, 5T	2/7/01	Locked Wheel Trailer, Smooth and Ribbed Tires
Texture	R5, Q5	2/21/01	Laser Profiler

Some of the originally planned test dates had to be adjusted because of weather conditions. Test dates were very limited during the winter months because skid resistance testing cannot be performed under rainy or snowy conditions. Limited Sand Patch Tests were performed on one of the test dates to allow for comparison of macrotexture values. An attempt was made to have both skid and texture tests performed on relatively close dates to enable a comparison of skid resistance and texture properties.

Testing was performed for both the instrumented and non-instrumented lanes. The instrumented lane is the outside lane of the two lanes that will eventually carry westbound traffic. Currently, the instrumented lane carries westbound traffic and the non-instrumented lane carries eastbound traffic. Testing was performed in both lanes because of possible differences in the placement of the mixtures in the two lanes, some of which were placed on different dates.

To assess the effect of the grade on the friction measurements, skid resistance testing was performed in both the uphill (westbound) and downhill (eastbound) direction in both instrumented and non-instrumented lanes. The grade in some of the sections is significant (6%) and may affect the forces acting on the tire as a result of the angle of the test vehicle.

To analyze the effects of speed on skid resistance, tests were performed at three speeds. The initial skid tests, March 9, 1999 and March 27, 1999, were performed at approximate speeds of 32, 64, and 96 kilometers per hour (20, 40, and 60 miles per hour). However, because of difficulties with the measurements at 96 kilometers per hour, the remaining skid resistance tests were conducted at speeds of approximately 32, 64, and 80 kilometers per hour (20, 40, and 50 miles per hour). Three replicates of each lane, direction, and speed combination were conducted.

Smoothness and texture testing was performed in both directions during the initial test performed on December 2, 1999. For this test, the profiles of the road were obtained in both the uphill and downhill directions for each lane. Three replicates were obtained in all cases. For all other test dates the instrumented lane was tested in the uphill (westbound) direction and the non-instrumented lane tests were performed in the downhill (eastbound) direction only. The profile data recorded by the van was used to establish the macrotexture and the International Roughness Index for each section.

Limited Sand Patch Tests were performed on September 14, 2000. The Sand Patch Tests were performed for Section A, G, J, K, and L. Tests were performed at consistent increments along the section 23.6, 46.5, and 69.3 meters (77.5, 152.5, and 227.5 feet) from the beginning of the sections.

3.4. Surface Characteristics Database

The test data was compiled into a database to allow for easy handling and analysis of the data. The data was then used for comparisons between mixes and analysis of the effects of mixture types to the pavement surface characteristics. In the database, tests are identified by the test date, type, lane, grade, section, and replicate. Examples for the coding scheme used for the different measurements are provided in Table 3.4.

Table 3.4 Test Data Designations

Measurement	Database Code
Skid Resistance Testing	1B-ID-20-1
Laser Profiling	Q1-NID-1
Sand Patch Test	4-SP-A-1-2

The designation for the skid resistance data includes the following information:

1. Date of the test: 1 in the example; Test dates are identified in chronological order with 1 being the first skid resistance test date and 5 being the last skid resistance test date.
2. Tire type used: B for the blank tire, T for the ribbed
3. Lane: I for the instrumented Lane, NI for the non-instrumented Lane
4. Target speed at which the test was performed: 20, 40, 50, or 60 miles per hour
5. Number of the replicate: 1, 2, or 3

Texture test designations follow a similar convention. The first parameter in the test id, Q or R, indicates how the calculation of the International Roughness Index was performed, Q indicates that the IRI was calculated using the profilometer software, and R indicates that it was computed using the RoadRuff program (University of Michigan 1995). The number following the Q or R indicates the test number, or date of the study. Lanes are designated NI or I for non-instrumented or instrumented, and direction is uphill (U) or downhill (D). The last number represents the replicate number (1, 2, or 3).

The Sand Patch Test designation includes corresponding texture tests, date the test performed (Sand Patch), the section that the test was performed in, the location of the test, and the replicate number. This nomenclature will be used to refer to the data throughout the analysis.

The database of testing properties was constructed using Microsoft Access. Figure 3.3 shows the structure of the database and relationships between information incorporated into the database.

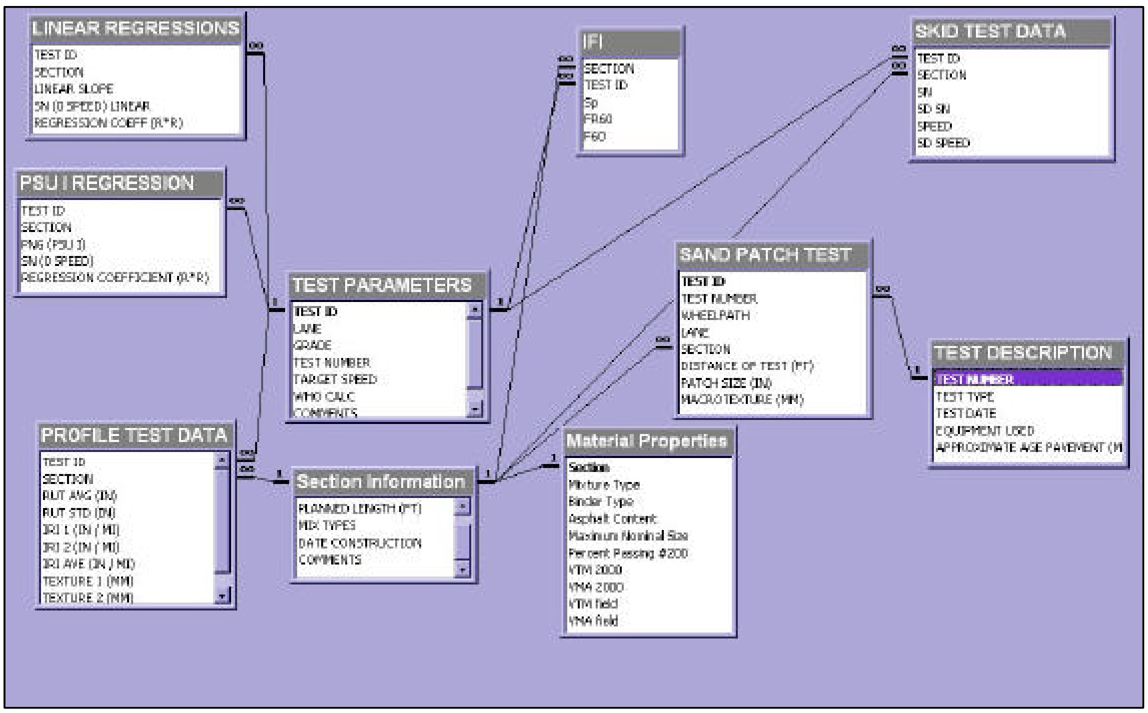


Figure 3.3 Microsoft Access Database Configuration

The tables shown in the Figure 3.3 are connected to each other with different relationships. A majority of the relationships are one to many, which indicate that for each one entry in the first table, there are many corresponding entries in the attached table. The other type of relationship is a one to one, for example the section information table and the material properties table, for which there is one entry in the first table for each entry on the connected table. The tables include all of the relevant parameters and are connected to each other by section, test date, or test identification number.

3.5. Material Properties Characterization

To correlate the HMA properties with the surface characteristics a complete volumetric analysis of each mixture was performed. Properties determined included the gradation, asphalt content, and bulk and maximum theoretical specific gravity of each mixture. Mixtures were extracted during construction and specimens were prepared in the laboratory according to VDOT mixture design practices.

Gradation analysis was performed in accordance with AASHTO T 27 specifications. Gradation analysis using standard sieve sizes was performed to determine the maximum nominal size of the wearing surface mixture in accordance with AASHTO T 248. The gradation analysis was also used to determine the percentage of materials passing the number 200 sieve, or material that were finer than 75 micrometers.

The AASHTO test T 308-99, Determining the Asphalt Binder Content of Hot-Mix Asphalt (HMA) by the Ignition Method, was used for analysis of the percent of asphalt in each mixture. In this test, the asphalt is ignited in a furnace after preliminary measurements have been made. The percent of binder is then calculated from the difference between the initial mass of the sample and the mass of the remaining aggregate after ignition.

To determine the volumetric properties of the asphalt mixture Rice Specific Gravity testing was performed on the loose samples taken during construction. The specimens were compacted using a gyratory compactor and the bulk specific gravity was determined according to AASHTO T 166. Specific Gravity was then used to determine the total voids in the mixture and the voids in the mineral aggregate. The value used in the analysis for the voids is taken from lab compacted replicates of mixtures placed in the field.

Chapter 4
Data Analysis and Results

This chapter presents the analysis of data collected from the experimental program outlined in Chapter 3 to study pavement surface characteristics at the Virginia Smart Road. Most of the analysis, except for the analysis of the incidence of speed, uses measurements conducted at a target speed of 64 kilometers per hour (40 miles per hour).

4.1. Pavement Surface Characteristic Measurements

Measurements from the Smart Road were used to calculate values for the determination of the impact of material properties on different parameters. To study the pavement surface characteristics, data from the February 7, 2001 testing date was used. This test date was chosen because it represents the in-service pavement skid resistance as would be recorded in the field. Initial skid resistance values were used only in the analysis of skid resistance changes with time.

4.1.1. Initial Skid Resistance

Tables 4.1 and 4.2 present the initial skid numbers measured, using the smooth and ribbed tires respectively, shortly after construction at a target speed of 64 kilometers per hour (40 miles per hour). This speed is recommended by AASHTO as the standard skid testing speed. Attainment of the target speed was not always possible because of vehicle mechanics as reflected in the speed variances in Tables 4.1, 4.2, and 4.3. When testing was performed in the uphill direction, the target speed was often difficult to obtain because of the grade of the road. For the quantitative analysis that required exact speed measurements, actual speeds within 2.4 kilometers per hour (1.5 miles per hour) of the target speed were deemed acceptable. Measurements with speeds differing more than 2.4 kilometers per hour from the target speed were not included in analysis

Tables 4.1 and 4.2 depict the test speed and a corresponding skid number for that speed. A complete listing of data from the locked wheel trailer testing is provided in Appendix A. Tables 4.1 and 4.2 also present the average velocity and skid numbers for each test.

Table 4.1 Initial Skid Number Data -3/9/00-Smooth Tire

(Speeds are in Kilometers per Hour)

		Instrumented Lane								Non-Instrumented Lane							
		R1		R2		R3		AVERAGE		R1		R2		R3		AVERAGE	
	Section	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN
	A	63.4	52.6	63.2	45.9	63.2	41.3	63.3	46.6	65.3	26.1	65.2	31.7	64.4	36.6	65.0	31.5
	B	62.9	57.1	62.9	50.8	62.9	53.1	62.9	53.7	64.7	43.7	64.5	38.3	64.1	46.4	64.4	42.8
U	C	65.2	45.8	63.1	44.4	62.9	46.1	63.7	45.4	64.1	41.1	64.1	38.2	63.9	53.5	64.0	44.3
P	D	62.8	47.8	63.6	42.3	63.9	37.2	63.4	42.4	64.2	40.6	64.9	34.7	64.2	42.4	64.4	39.2
H	E	63.7	43.3	63.4	42.8	64.1	36.9	63.7	41.0	65.2	36.1	64.9	44.3	64.4	47.0	64.8	42.5
I	F	65.2	36.6	63.6	32.3	63.6	29.9	64.1	32.9	64.5	29.2	64.9	28.2	63.9	29.8	64.4	29.1
L	G	62.6	54.1	63.4	44.2	63.9	40.4	63.3	46.2	64.7	35.8	64.7	36.5	65.0	42.3	64.8	38.2
L	H	63.4	47.4	64.2	40.9	63.9	44.4	63.8	44.2	64.9	42.7	64.7	37.0	64.4	52.8	64.7	44.2
	I	63.9	49.5	63.2	48.0	63.6	45.8	63.6	47.8	64.5	50.5	64.7	51.4	64.7	50.9	64.6	50.9
	J	63.6	45.6	59.9	41.6	63.9	37.4	62.5	41.5	63.9	47.1	63.9	44.4	64.1	51.0	64.0	47.5
	K	63.7	37.7	56.6	37.5	63.6	40.0	61.3	38.4	64.4	39.2	64.2	37.2	64.4	37.9	64.3	38.1
	L	63.6	34.5	57.8	31.8	63.4	30.8	61.6	32.4	64.5	35.6	64.7	31.2	64.9	32.1	64.7	33.0
	A	64.5	50.2	63.7	43.0	63.7	44.0	64.0	45.7	65.8	31.4	66.1	25.3	66.3	27.3	66.1	28.0
	B	64.4	51.1	64.1	43.4	64.1	43.9	64.2	46.1	65.7	27.7	65.8	25.4	65.8	26.7	65.8	26.6
D	C	64.2	37.9	64.4	33.0	64.5	29.5	64.4	33.5	65.3	34.1	65.3	34.0	65.2	34.3	65.3	34.1
O	D	64.9	21.5	65.0	20.8	64.9	18.9	64.9	20.4	65.7	20.4	66.1	18.2	66.1	20.0	66.0	19.5
W	E	64.5	45.1	64.2	43.4	64.4	40.1	64.4	42.9	65.5	41.8	66.0	46.7	65.2	37.4	65.6	42.0
N	F	65.2	38.4	65.2	33.7	65.3	33.2	65.2	35.1	66.3	46.8	66.3	43.1	66.3	39.3	66.3	43.1
H	G	64.5	52.2	64.4	42.8	64.7	41.0	64.5	45.3	66.3	41.5	66.6	40.8	65.8	43.9	66.2	42.1
I	H	63.7	57.5	64.2	52.1	60.0	50.9	62.6	53.5	65.8	34.5	65.7	33.7	65.8	32.5	65.8	33.6
L	I	65.5	48.1	64.7	54.2	61.2	45.0	63.8	49.1	66.0	43.1	66.0	40.0	66.0	39.5	66.0	40.9
L	J	62.6	54.2	64.5	47.2	63.2	56.3	63.4	52.6	65.3	49.3	65.5	46.0	64.9	45.5	65.2	46.9
	K	62.8	44.5	64.7	37.2	63.7	35.4	63.7	39.0	66.3	41.2	65.7	34.3	65.7	38.3	65.9	37.9
	L	62.6	34.0	66.1	26.8	62.4	32.7	63.7	31.2	67.1	30.3	67.3	29.4	67.3	27.1	67.2	28.9

The measurements shown in Table 4.2, which were conducted using the ribbed tire, were taken a few days later than those using the smooth tire. This short time period in between the two tests may eliminate any significant changes occurring in the skid resistance with time. The traffic during the period was limited to a very small number of passes by research vehicles.

Table 4.2 Initial Skid Number Data –3/27/00-Ribbed Tire

(Speeds are in Kilometers per Hour)

		Instrumented Lane								**Non-Instrumented Lane**							
		R1		**R2**		**R3**		**AVERAGE**		**R1**		**R2**		**R3**		**AVERAGE**	
	Section	**V**	**SN**	**V**	**SN**	**V**	**SN**	**V**	**SN**	**V**	**SN**	**V**	**SN**	**V**	**SN**	**V**	**SN**
	A	64.5	50.2	64.9	47.8	64.9	48.8	64.8	48.9	64.5	55.1	64.7	55.5	64.9	57.9	64.7	56.2
	B	64.4	58.4	65.0	54.6	64.9	55.5	64.8	56.2	65.0	51.6	65.8	50.4	64.7	48.6	65.2	50.2
U	C	65.0	52.8	65.5	50.7	65.0	47.8	65.2	50.4	64.1	51.4	65.8	50.6	65.0	52.2	65.0	51.4
P	D	63.7	51.8	64.7	47.1	65.7	46.6	64.7	48.5	66.9	45.9	66.1	41.4	64.5	52.4	65.8	46.6
H	E	62.8	55.1	63.1	54.6	66.6	49.8	64.2	53.2	63.9	56.5	64.1	55.0	66.5	50.2	64.8	53.9
I	F	62.6	53.7	62.6	52.7	67.4	49.0	64.2	51.8	63.7	54.2	63.9	49.3	65.8	48.0	64.5	50.5
L	G	63.1	56.2	63.6	51.8	65.5	46.3	64.1	51.4	64.7	60.7	64.7	56.0	62.1	58.2	63.8	58.3
L	H	63.9	57.8	65.3	48.3	63.1	53.6	64.1	53.2	65.2	56.6	67.9	55.1	61.5	54.1	64.9	55.3
	I	65.5	56.7	66.3	51.2	64.1	54.4	65.3	54.1	62.9	58.7	69.5	52.3	62.0	62.7	64.8	57.9
	J	65.8	56.1	62.3	54.6	63.9	52.0	64.0	54.2	63.1	56.6	67.8	52.5	62.4	53.4	64.4	54.2
	K	63.7	35.8	63.2	34.1	65.5	34.1	64.1	34.7	65.7	38.9	66.0	38.5	64.2	36.7	65.3	38.0
	L	61.0	46.3	64.1	32.9	66.1	31.9	63.7	37.0	65.0	40.8	61.0	31.3	65.0	34.8	63.7	35.6
	A	60.8	50.8	66.0	47.1	66.3	43.6	64.4	47.2	66.1	49.2	66.0	55.3	65.2	49.6	65.8	51.4
	B	62.0	59.3	65.8	53.1	66.0	52.5	64.6	55.0	66.9	53.9	65.7	53.5	65.2	49.2	65.9	52.2
D	C	60.0	53.0	66.0	45.8	65.5	47.6	63.8	48.8	66.1	49.5	65.3	44.6	65.7	50.3	65.7	48.1
O	D	60.2	42.1	64.9	38.5	65.0	40.5	63.4	40.4	65.7	47.3	65.8	45.2	65.7	45.1	65.7	45.9
W	E	64.7	50.7	65.2	48.9	65.3	42.9	65.1	47.5	66.0	55.3	64.7	54.5	65.2	50.6	65.3	53.5
N	F	65.5	51.7	65.5	52.2	66.5	47.4	65.8	50.4	66.5	53.2	65.7	52.1	65.8	47.4	66.0	50.9
H	G	66.3	50.4	66.5	49.8	66.0	45.5	66.3	48.6	66.8	54.8	65.5	50.3	65.3	45.5	65.9	50.2
I	H	65.8	56.7	65.8	54.2	66.1	55.5	65.9	55.5	65.8	55.8	65.3	49.5	65.8	47.3	65.6	50.9
L	I	66.3	51.4	66.6	51.5	66.6	54.0	66.5	52.3	66.5	59.3	65.3	52.5	65.7	53.6	65.8	55.1
L	J	65.7	53.5	66.1	55.9	66.1	55.9	66.0	55.1	65.7	59.5	64.2	58.3	65.3	56.9	65.1	58.2
	K	66.9	34.7	66.8	35.4	66.9	33.6	66.9	34.6	67.4	36.3	66.6	35.2	66.3	37.6	66.8	36.4
	L	67.1	34.7	67.4	32.2	67.6	30.0	67.4	32.3	67.4	37.0	67.3	34.7	67.3	32.4	67.3	34.7

4.1.2. In-Service Skid Resistance

The data for the last test conducted (both tires) is shown in Table 4.3 for the uphill and downhill directions. The data listed in Table 4.3 represents the in-service pavement skid resistance at the Virginia Smart Road. Although this data was taken several months after the initial tests, it must be noted that only a very limited amount of research traffic accessed the road.

Table 4.3 In-Service Skid Resistance, Average Grade, 2/7/01

(Speeds are in Kilometers per Hour)

		INSTRUMENTED LANE								NON-INSTRUMENTED LANE							
		R1		R2		R3		Average		R1		R2		R3		Average	
	Section	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN	V	SN
	A	63.8	53.2	63.8	53.8	64.8	51.4	64.1	52.8	63.7	25.5	65.6	22.6	64.9	23.7	64.7	23.9
	B	64.5	48.1	62.9	47.9	64.6	45.8	64.0	47.3	63.6	37.4	65.0	37.3	64.3	37.5	64.3	37.4
	C	64.2	42.5	65.2	46.0	65.0	41.0	64.8	43.2	63.5	46.7	64.9	44.8	64.1	42.0	64.2	44.5
S	D	64.5	40.3	63.5	39.4	65.0	38.8	64.3	39.5	64.1	34.2	65.1	41.2	64.1	39.0	64.4	38.1
M	E	64.7	44.4	65.0	44.8	65.3	43.2	65.0	44.1	63.6	41.0	64.8	39.6	63.7	37.1	64.0	39.2
O	F	64.0	42.8	65.7	38.5	66.4	35.1	65.4	38.8	63.9	42.0	64.9	41.8	63.8	38.9	64.2	40.9
O	G	64.1	50.1	64.9	50.0	66.0	44.7	65.0	48.2	64.3	41.3	65.1	39.8	64.2	37.8	64.5	39.6
T	H	64.0	50.8	63.9	49.5	65.9	47.0	64.6	49.1	64.6	43.4	65.0	39.8	64.9	42.4	64.8	41.8
H	I	65.0	41.5	65.3	43.6	66.8	39.6	65.7	41.5	65.5	38.8	65.3	38.0	64.8	37.3	65.2	38.0
	J	64.9	50.4	66.2	48.6	65.7	46.5	65.6	48.5	65.2	48.8	64.7	47.6	64.4	51.2	64.8	49.2
	K	64.5	52.7	65.7	51.0	64.9	51.7	65.0	51.8	64.5	56.9	64.9	53.3	64.1	54.8	64.5	55.0
	L	64.2	48.4	64.9	45.4	65.3	43.8	64.8	45.9	63.6	44.0	64.6	43.6	64.5	42.7	64.2	43.4
	A	63.2	66.7	62.4	64.8	62.9	63.6	62.8	65.0	64.1	65.6	63.2	65.6	63.9	62.6	63.7	64.6
	B	62.8	67.6	64.3	64.6	63.8	63.4	63.6	65.2	64.8	63.5	63.2	65.2	64.0	63.7	64.0	64.1
R	C	62.8	63.8	62.0	66.9	65.4	63.0	63.4	64.6	63.3	61.2	63.6	62.7	63.9	61.3	63.6	61.7
I	D	62.5	63.9	62.2	65.5	62.6	62.9	62.4	64.1	64.3	61.9	63.7	61.7	64.4	61.7	64.1	61.8
B	E	62.7	65.2	62.7	65.8	64.2	65.6	63.2	65.5	63.5	64.4	63.9	63.5	64.5	63.5	64.0	63.8
B	F	63.0	65.5	63.9	66.2	65.0	61.8	64.0	64.5	63.8	65.8	63.9	64.4	63.8	64.8	63.8	65.0
E	G	63.6	61.3	64.3	64.0	65.3	63.0	64.4	62.7	64.5	64.9	64.6	62.7	64.4	63.6	64.5	63.7
D	H	64.6	61.5	64.9	63.0	65.9	62.5	65.1	62.3	64.4	63.1	65.6	62.7	64.5	61.5	64.8	62.4
	I	64.4	62.7	65.3	61.1	65.6	63.5	65.1	62.4	64.9	63.6	65.3	62.2	65.2	64.5	65.1	63.4
	J	64.1	63.2	65.1	61.7	65.3	64.3	64.8	63.1	64.7	64.2	65.2	63.3	65.3	63.5	65.1	63.6
	K	63.4	52.6	64.4	50.8	65.2	52.6	64.3	52.0	65.5	54.2	64.6	57.0	65.4	55.7	65.2	55.6
	L	64.4	52.0	64.5	52.2	64.5	50.2	64.5	51.5	64.2	48.3	63.8	49.4	63.4	46.6	63.8	48.1

The average of the uphill and downhill tests for all of the measurements taken at 64 kilometers per hour are presented in Figure 4.1. It can be observed that there is a noticeable difference between measurements made using the smooth and ribbed tires. Figure 4.1 shows the average skid measurements made for the two tires for all sections. The figure also indicates that there are noticeable differences between lanes when the measurements are conducted using the smooth tire. These differences are not apparent with testing performed using the ribbed tire.

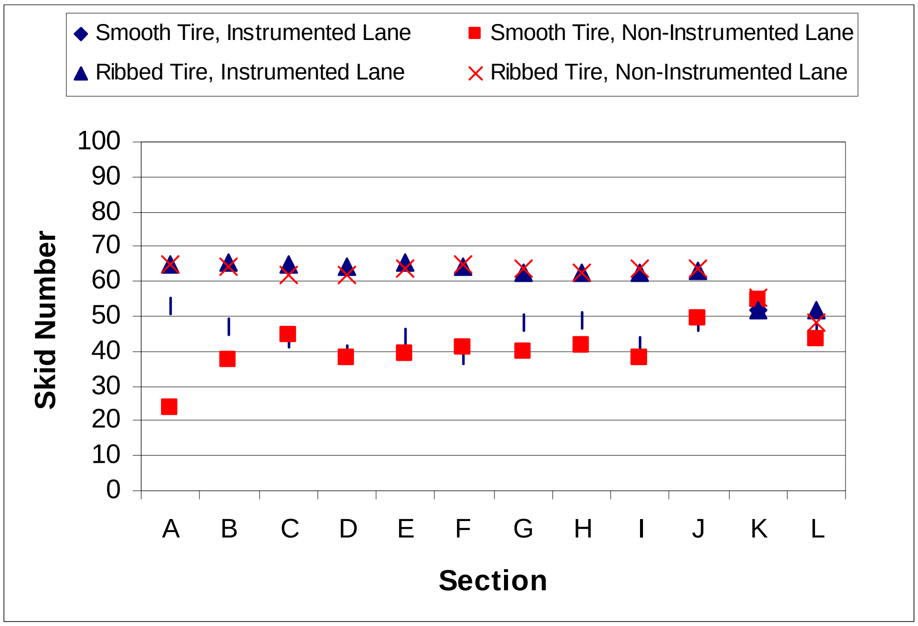


Figure 4.1 Average In-Service Skid Numbers

4.1.3. Surface Texture

The surface texture of the pavement was also analyzed. Five data sets, consisting of three replicates each, were obtained. A summary of the texture parameters obtained throughout the testing period can be found in Appendix B. The first test performed was not included in the analysis because of difficulty in determining section breaks in the data. The profile depths measured during the second test, which was performed on March 15, 2000, are shown in Table 4.4. The variability between replicates for runs conducted the same day is very small. The averages for Tests Two through Five are shown in Table 4.5. The mean profile depth used in the analysis was an average of values taken from Tests Two, Three, Four, and Five for each section. The average values were chosen because of the small variances in the texture measurements over time. Figure 4.2 shows the average and measured values.

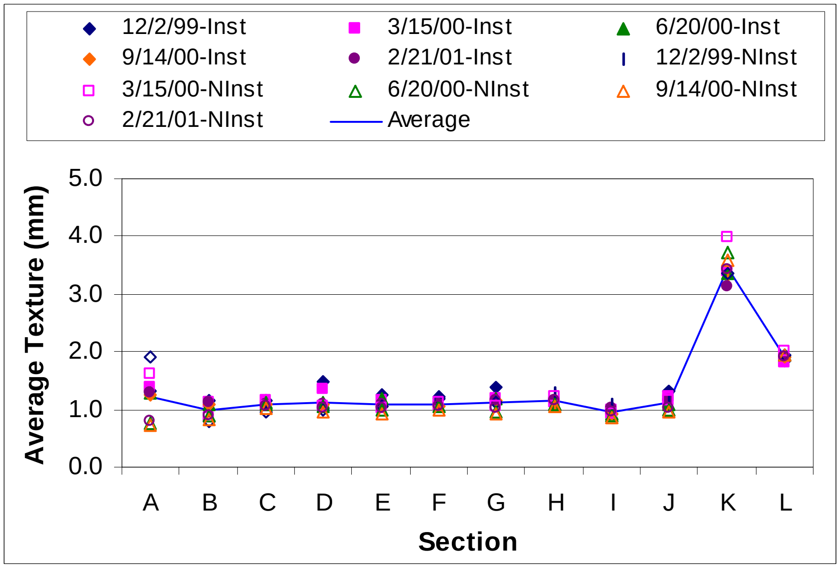


Figure 4.2 Mean Profile Depth Measurements for All Sections

Table 4.4 Texture Measurements Average of Wheel Paths-3/15/00 (mm)

	Instrumented (Uphill)					Non-Instrumented (Downhill)				
Section	**R1**	**R2**	**R3**	**AVG**	**STDEV**	**R1**	**R2**	**R3**	**AVG**	**STDEV**
A	1.36	1.38	1.39	1.38	0.02	1.6	1.65	1.61	1.62	0.03
B	1.11	1.09	1.1	1.1	0.01	0.84	0.81	0.86	0.84	0.03
C	1.15	1.14	1.13	1.14	0.01	1.01	1.05	1.06	1.04	0.03
D	1.33	1.3	1.39	1.34	0.05	1.01	1.06	1.05	1.04	0.03
E	1.18	1.16	1.16	1.17	0.01	1.06	1.02	1.03	1.04	0.02
F	1.08	1.05	1.05	1.06	0.02	1.12	1.14	1.11	1.12	0.02
G	1.16	1.21	1.15	1.17	0.03	1.03	1.08	1.07	1.06	0.03
H	1.11	1.14	1.12	1.12	0.02	1.2	1.26	1.23	1.23	0.03
I	0.98	0.96	1	0.98	0.02	0.91	0.94	0.93	0.93	0.02
J	1.2	1.21	1.24	1.21	0.02	1.17	1.15	1.16	1.16	0.01
K	3.46	3.36	3.38	3.4	0.05	3.92	4	4.01	3.98	0.05
L	1.8	1.81	1.8	1.8	0.01	2.01	2	2.04	2.02	0.02

Table 4.5 Average Texture Measurements For all Tests (mm)

	Instrumented Lane					Non-Instrumented Lane					Overall Average MPD
SECTION	**MPD 2**	**MPD 3**	**MPD 4**	**MPD 5**	**Average MPD**	**MPD 2**	**MPD 3**	**MPD 4**	**MPD 5**	**Average MPD**	
A	1.38	1.28	1.26	1.28	1.30	1.62	0.75	0.72	0.78	0.97	1.13
B	1.10	1.10	1.08	1.12	1.10	0.84	0.87	0.84	0.89	0.86	0.98
C	1.14	1.12	1.08	1.10	1.11	1.04	1.08	1.01	1.06	1.05	1.08
D	1.34	1.12	1.07	1.10	1.16	1.04	1.05	0.94	1.01	1.01	1.09
E	1.17	1.18	1.07	1.09	1.13	1.04	1.00	0.93	1.02	1.00	1.06
F	1.06	1.05	1.06	1.09	1.07	1.12	1.05	1.00	1.06	1.06	1.06
G	1.17	1.18	1.16	1.17	1.17	1.06	0.97	0.93	1.01	0.99	1.08
H	1.12	1.09	1.09	1.14	1.11	1.23	1.10	1.05	1.14	1.13	1.12
I	0.98	0.92	0.93	1.02	0.96	0.93	0.90	0.86	0.97	0.91	0.94
J	1.22	1.10	1.10	1.16	1.14	1.16	0.98	0.94	1.03	1.03	1.09
K	3.40	3.36	3.27	3.11	3.29	3.98	3.71	3.57	3.43	3.67	3.48
L	1.80	1.95	1.90	1.91	1.89	2.02	1.95	1.95	1.91	1.96	1.92

With the exception of Section H, K, and L, texture values observed in the instrumented lane are higher than those for the non-instrumented lane. This may indicate that there is slightly more texture in the instrumented lane than the non-instrumented lane. Likewise, skid numbers measured in the instrumented lane are higher than those obtained from the non-instrumented lane smooth tire testing which correlates with the texture measurements.

4.2.   Pavement Surface Characterization

To study the impact of the different mixtures on pavement skid resistance, it was necessary to calculate several analysis parameters. The coefficients for the PSU (1) model and the IFI were calculated for the different sections. Prior to calculation of the parameters, observances of raw data indicated that a linear relationship may exist for the data. To verify the adequacy of the linear and exponential models to represent the skid number-velocity relationship, both models were fit to the data and analyzed.

4.2.1. Skid Number Speed Model Parameters

The change in skid resistance with speed for the Smart Road was studied using two models. Collected data was modeled using the exponential PSU (1) model and a linear model. Data points were separated by test date, tire, and section prior to analysis to ensure that only the speed-skid resistance relationship was modeled. The best-fit coefficients for both models were computed for all sections and tests, using regression analysis. A sample of the resulting plots is presented in Figure 4.3. The data shown in Figure 4.3 represents measurements taken in Section A, February 7, 2001, using the smooth (4.3A) and ribbed (4.3B) tires during locked wheel trailer testing.

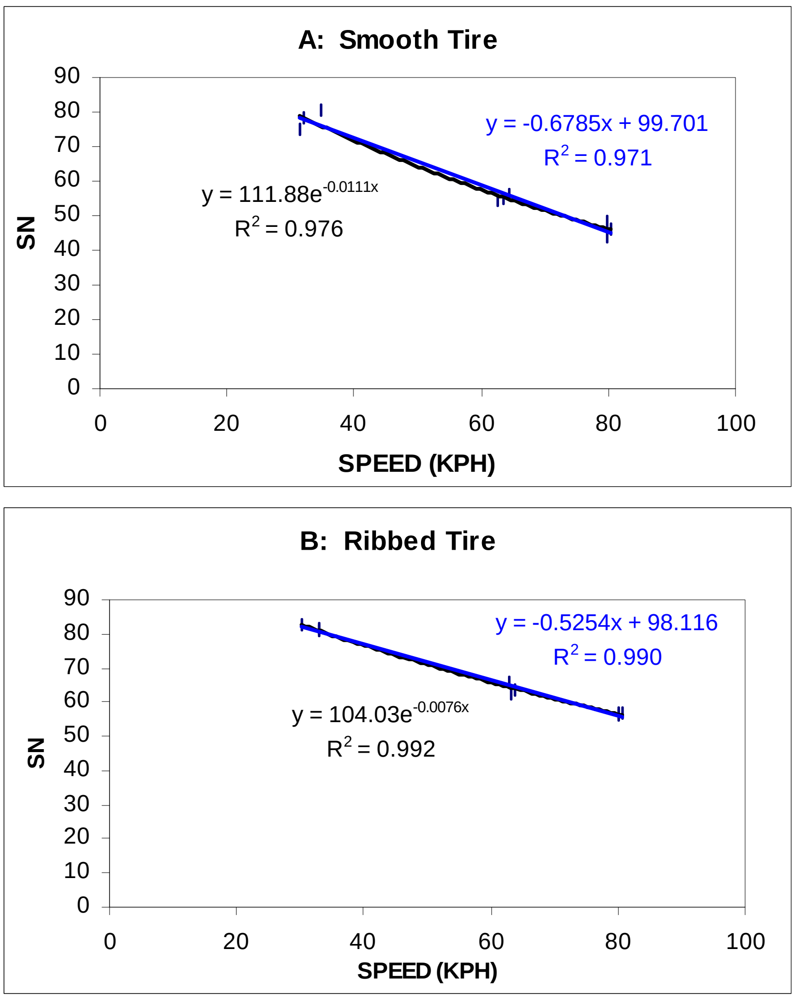


Figure 4.3 Comparison of Linear and Exponential SN / Speed Models

Figure 4.3 shows that for these data sets there was not a significant difference in fit between the linear and the exponential models. To assess the overall fit of the linear and exponential models, the average regression coefficient of determination (R^2) for each of the models was calculated. The average coefficients for each model are listed in Table 4.6.

Table 4.6 Average R^2 for Linear and Exponential Models

Model Type	Average R^2	RMSE
PSU (1)	0.898	10.46
Linear	0.905	4.75

The high average coefficients indicate that both models appropriately fit the skid resistance data recorded at the Virginia Smart Road. Although the linear model does have a slightly better fit overall, with an R^2 0.007 higher than the PSU (1) model, the difference is very small. Parameters from regression models for all sections, lanes, and grades, are in Appendix C. An interesting point to note is that for the in-service skid testing performed on February 7, 2001, the average PNG and slope parameters from the regression equations show a higher value for both PNG and slope when the smooth tire is used during testing versus the ribbed tire. This may indicate that the smooth tire is more susceptible to changes in speed than the ribbed tire.

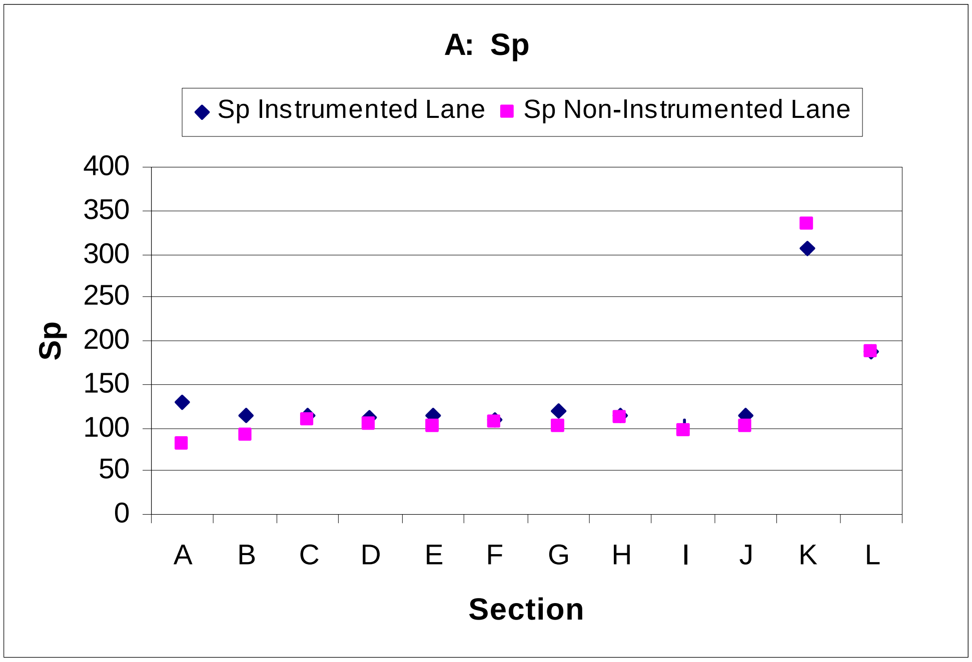
4.2.2. International Friction Index

The IFI was calculated for every skid number measured at the Virginia Smart Road. Because the texture parameters measured during the different test periods did not change significantly over time, the average of all of the texture measurements, with the exception of Test 1 as explained previously, were used to compute the speed constant for all tests. A summary of the initial IFI parameters, F60 and S_P, calculated for the 64-kilometer per hour test is presented in Table 4.7. A complete list of computed IFI values is included in Appendix D.

Table 4.7 International Friction Index Parameters, Testing on March 9, 2001, Smooth Tire

		Instrumented Lane					Non-Instrumented Lane				
			R1	R2	R3	Average		R1	R2	R3	Average
	Section	SP	F60	F60	F60	F60	SP	F60	F60	F60	F60
UPHILL	A	128	0.54	0.48	0.44	0.487	81	0.30	0.36	0.40	0.354
	B	113	0.59	0.53	0.55	0.554	92	0.47	0.42	0.49	0.46
	C	113	0.49	0.47	0.48	0.479	108	0.44	0.41	0.56	0.47
	D	113	0.5	0.45	0.4	0.449	104	0.44	0.38	0.45	0.424
	E	114	0.46	0.45	0.4	0.437	102	0.4	0.47	0.50	0.457
	F	110	0.4	0.35	0.33	0.361	107	0.33	0.32	0.33	0.325
	G	119	0.56	0.47	0.43	0.484	101	0.39	0.40	0.46	0.416
	H	114	0.5	0.44	0.47	0.468	112	0.46	0.40	0.55	0.471
	I	100	0.52	0.5	0.48	0.503	96	0.53	0.54	0.54	0.54
	J	115	0.48	0.43	0.4	0.437	102	0.5	0.47	0.54	0.502
	K	305	0.4	0.39	0.42	0.402	335	0.41	0.39	0.04	0.283
	L	186	0.37	0.34	0.34	0.347	188	0.38	0.34	0.35	0.358
DOWNHILL	A	128	0.53	0.45	0.46	0.482	81	0.36	0.30	0.32	0.324
	B	113	0.54	0.46	0.47	0.488	92	0.32	0.40	0.31	0.34
	C	113	0.41	0.36	0.33	0.367	108	0.38	0.38	0.38	0.377
	D	113	0.25	0.25	0.23	0.242	104	0.24	0.22	0.24	0.236
	E	114	0.48	0.46	0.43	0.457	102	0.45	0.50	0.41	0.455
	F	110	0.42	0.37	0.37	0.386	107	0.5	0.47	0.43	0.468
	G	119	0.55	0.46	0.44	0.481	101	0.45	0.45	0.48	0.459
	H	114	0.59	0.55	0.52	0.552	112	0.38	0.37	0.36	0.372
	I	100	0.52	0.57	0.47	0.517	96	0.47	0.44	0.43	0.447
	J	115	0.56	0.5	0.58	0.546	102	0.53	0.49	0.49	0.502
	K	305	0.46	0.39	0.38	0.41	335	0.43	0.37	0.41	0.402
	L	186	0.36	0.3	0.35	0.339	188	0.34	0.33	0.31	0.323

The in-service pavement skid number of the different sections after they were exposed to a limited amount of research traffic was also used to calculate the IFI. Since both tires were used to perform testing on that day, two IFI parameters were calculated for each of the sections; one for the ribbed tire and one for the smooth tire. Figure 4.4 shows the IFI parameters calculated using the in-service pavement skid resistance.



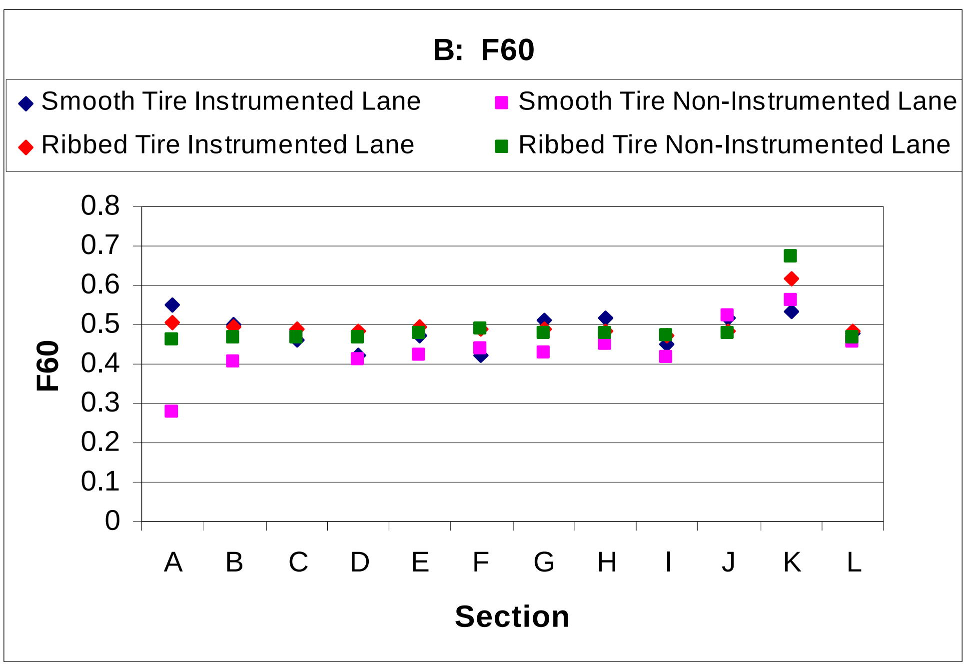


Figure 4.4 IFI Parameters for February 7, 2001

4.3. Analysis of Parameters Affecting Skid Resistance Measurements

Different aspects of the skid resistance measurements were observed to determine any significance that they may have on the obtained values. Parameters from the linear equations fit to the data were used to study the effects of speed on measured skid resistance. Additionally, tests on the means of the measurements were performed to determine whether the lane, grade, mixture, and test tire affected the skid number measurement. Also a comparison of the skid resistance of the different mixtures was performed.

4.3.1. Speed and Skid Number Changes for Different Mixtures

The impact of speed on the skid resistance properties of pavement surfaces was evaluated using the linear and exponential models described in the previous section. The skid resistance of the different sections was also compared at different speeds using the models.

The slope of the linear skid number model can be used to characterize the changes in measured skid number with respect to speed. When the slope of the line nears zero, it can be assumed that there is no significant change in the mixture performance with respect to changes in velocity. The average slope for each section was calculated for the different tests to determine whether there was a noticeable difference in the speed-skid resistance relationship for the different mixtures. The average values consisted of data from both lanes and grades.

Figure 4.5 shows the average changes in slope for each section using the two different tires. It can be observed that Section K, the Open Graded Friction Coarse, has a much lower Skid Number-velocity slope. This indicates that there is little change in skid resistance with speed, which is to be expected with this type of mixture because of its high macrotexture.

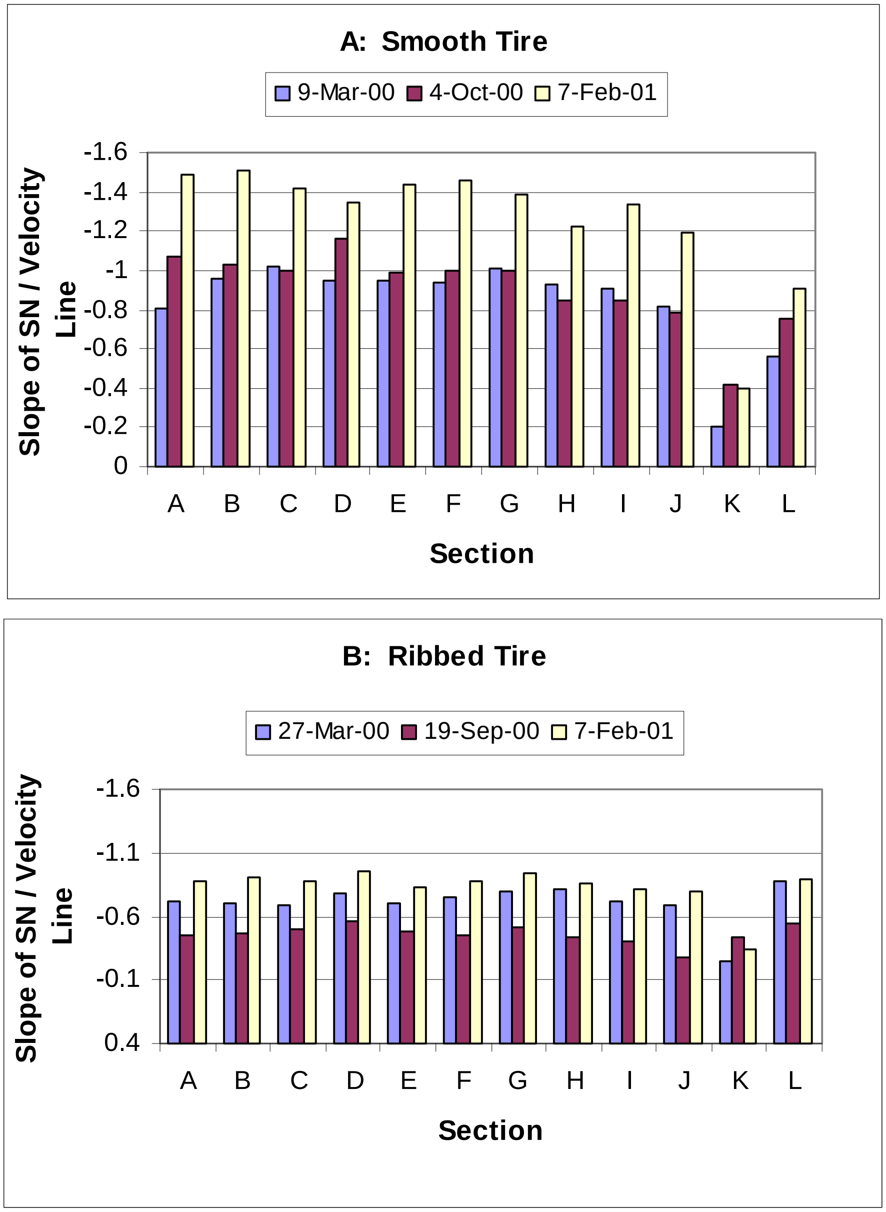


Figure 4.5 Average SN / Velocity Slope

Section L also has a lower change in skid number than the other sections when the skid number is measured using the smooth tire. The remaining sections have similar skid resistance-speed relationships as indicated by the similar slopes. The SN gradient for the majority of the sections is higher when using the smooth tire than those recorded using the ribbed tire. The final test, February 7, 2001, shows that this is true even when the tests are performed on the same date and operating under the same environmental conditions.

An important thing to note is the change in the speed-skid number relationship with time. Although there is a significant change in the slope of SN, it is not consistent between the two tires. Testing performed using the smooth tire indicates that for all sections there is an increasing dependence of skid numbers on velocity with time, but a relationship cannot be defined with the available data. Results of fluctuations in slope when testing is performed using the ribbed tire show that there is a decrease in the speed dependence from the first test to the second test and then an increase. The exception for this observation is Section K, which does not follow the same trends. Testing performed with the ribbed tire indicates that there is a slight decrease in speed dependence on the second test while the dependence increases by the third test.

In addition to time, the temperature of the wearing surface may also affect the skid resistance-velocity slope. Figure 4.6 shows the slope of the lines with wearing surface temperatures obtained from thermocouples embedded in the pavement.

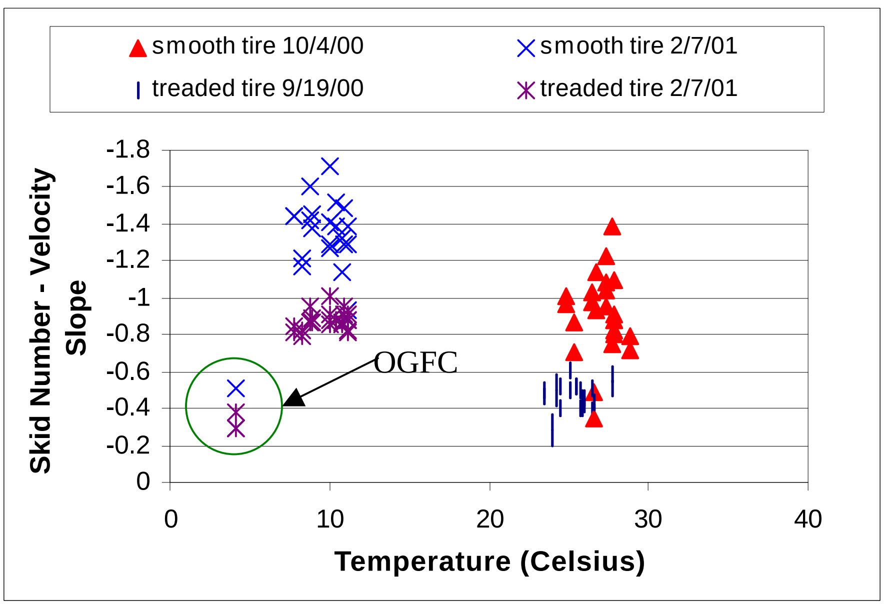


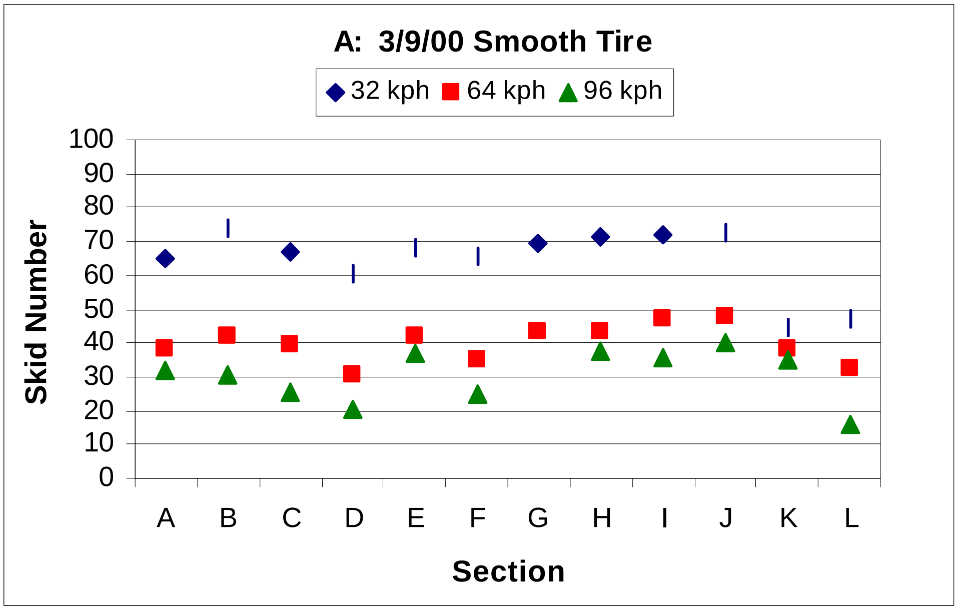
Figure 4.6 Skid Number-Velocity Slope with Temperature

Figure 4.6 seems to indicate that there may be an increase in the skid number-velocity slope with decreasing temperature. It is possible that the slope of the skid number-velocity relationship is dependent on the temperature of the pavement surface. However, the change can also be due to changes in the surface characteristics (microtexture and/or macrotexture) with time.

The dependence of skid numbers with speed is an important safety characteristic of pavement-wearing surfaces. The optimal surface would obtain similar skid numbers at all speeds, as the Open Graded Friction Coarse placed in Section K does. This mixture obtains consistent skid numbers at all speeds because of the high macrotexture obtained by using coarse aggregate and an open gradation.

4.3.2. Mixture Comparisons

Figures 4.7 A and B summarize initial data obtained at the Virginia Smart Road for the first tests performed with the ribbed and smooth tires, respectively. Figure 4.8 summarizes data taken using both tires approximately 16 months after construction. Initial measurements taken at the Virginia Smart Road show a large difference in the skid numbers measured at different speeds, as previously discussed. Sections K and L, the coarser mixtures placed at the Virginia Smart Road, have the lowest initial skid numbers at low speeds. However, it can be seen in Figure 4.7 that Section K also has the least difference between the low SN measured at 32 kilometers per hour (20 mph) and high, 96 kilometers per hour (60 mph), speeds. Other sections have relatively similar skid numbers. Sections B, E, F, G, H, and J, which are all SM-9.5D mixtures have similar measurements.



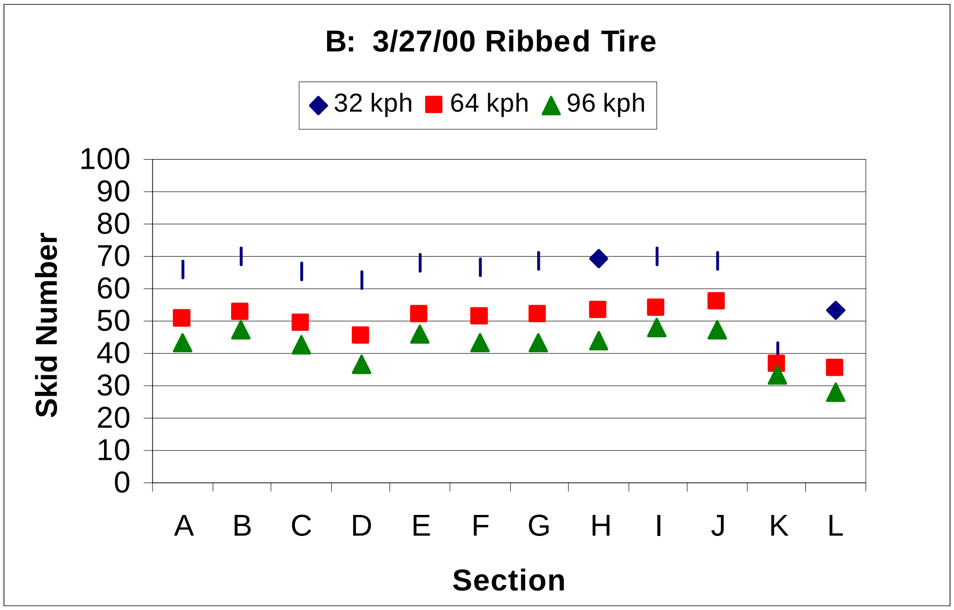
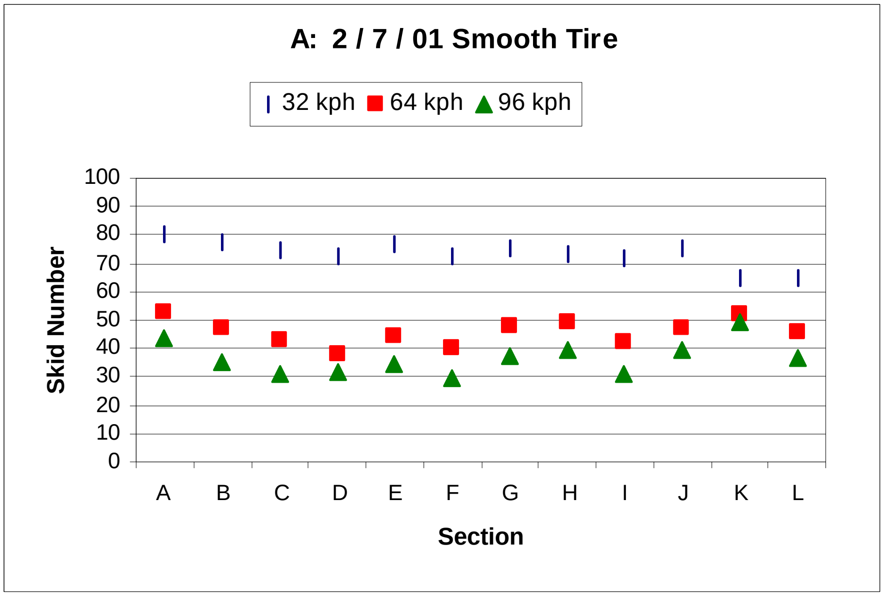


Figure 4.7 Average Initial Skid Number Measurements



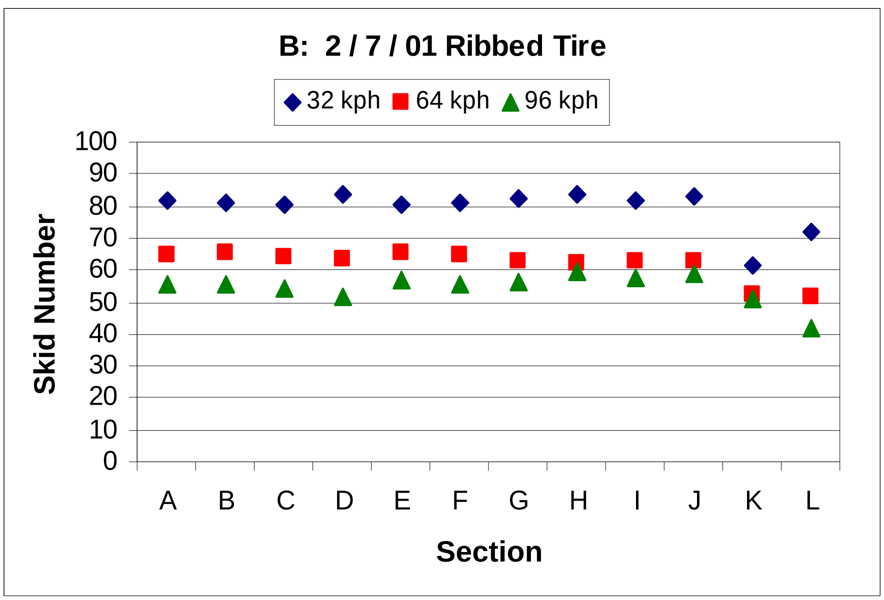


Figure 4.8 Average In-Service Skid Numbers Smooth and Ribbed Tires

An important observation is that the OGFC still shows lower skid numbers using the ribbed tire than the other mixtures at 32 and 64 kilometers per hour (20 and 40 miles per hour). The wearing of the asphalt film on the OGFC mixture may play a major factor in this. For an

OGFC mixture to achieve its optimum skid resistance, some of the asphalt must be worn away to provide adequate tire-aggregate contact. The OGFC has a thicker asphalt film, and thus it may take longer to achieve its optimum skid resistance especially if the low traffic volumes at the Virginia Smart Road are taken into consideration. All of the HMA surface mixtures placed at the Virginia Smart Road appear to be providing relatively good and similar skid resistance values at the February 7, 2001 test. However, differences between the mixtures and the sections can be observed when the data is analyzed in more detail.

4.3.3. Impact of Grade, Tire, and Lane on the Measured Skid Resistance

The skid tests were performed under different testing conditions. The SAS system statistical software was used to analyze the impact of the test parameters on the skid resistance of the surface mixtures.

An analysis of variance was performed using all of the test data measured at 64 ± 2.4 kilometers per hour (40 ± 1.5 miles per hour). Tests were divided, according to the date of the test, into three groups; each one consisting of a test performed using a bald tire, and a test using the ribbed tire. The ANOVA table shown in Table 4.8 lists the results of analysis of the skid data.

Table 4.8 ANOVA Table for Test Parameters

Source	DF	ANOVA SS	Mean Square	F Value	Pr>F
Model	16	70250	4390.62	117.54	<0.0001
Tire Type	1	39834	39833.52	1066.35	<0.0001
Lane	1	880	880.30	23.57	<0.0001
Grade	1	19	18.56	.5	0.4811
Test	2	20645	10322.3	276.33	<0.0001
Section	11	8873	806.63	21.59	<0.0001
Error	744	27792	37.35		
Corrected Total	760	98042			

The analysis performed indicates that the grade of the test was not significant in the model when all of the observed data is analyzed. The variable grade may be insignificant because of the high slope of the road that is prevalent in only some of the sections. As expected, the tire type and test date are highly significant. There are also significant differences among sections and lanes.

In addition to performing analysis using all of the data, the skid resistance of each mixture type was analyzed independently to eliminate a majority of the variation due to the different sections that was seen in the overall analysis. The SM-9.5D mixture is located in multiple sections at the Virginia Smart Road, and as a result of this, the variable representing section was incorporated into the analysis for this mixture. The remaining mixture types were analyzed in terms of tire type, lane, and grade. The findings from the t-test performed for each of the mixtures are listed in Table 4.9. For the analysis, tests recorded at 64 ± 2.4 kilometers per hour (40 ± 1.5 miles per hour) were used to eliminate any errors due to speed variability.

Table 4.9 Impact of Test Parameters on the Means

Mixture Type	Section	Tire Type	Lane	Grade
SM-12.5D	A	Significant	Significant	Not Significant
SM-9.5E	C	Significant	Not Significant	Significant
SM-9.5A	D	Significant	Not Significant	Significant
SM-9.5D	B, E, F, G, H, J	Significant	Significant	Not Significant
SM-9.5A*	I	Significant	Not Significant	Not Significant
OGFC	K	Significant	Not Significant	Significant
SMA-12.5	L	Significant	Not Significant	Significant

4.3.3.1. Testing Grade

Although overall analysis indicates that testing grade does not impact the skid number measured, each mixture type was individually studied to determine the impact of the grade on skid numbers. The results indicated that when observed separately, the impact of grade on the different mixtures, measured using the locked wheel skid trailer, varied. However, the SM-9.5D mixture consists of more sample points than the remaining mixtures and because of this, it is viewed as a more reliable data set. The skid numbers measured in both directions for the SM-9.5D mixture were not significantly different, with means of 53 for each direction. This implies that there is not a significant impact of pavement surface grade on skid resistance measurements with the locked wheel trailer.

The remaining mixtures did not have large differences in their uphill and downhill means. Though they were considered significantly different in the SAS analysis, the percentage change in skid number for each grade was minimal. There was not a consistent increase or decrease in skid values obtained for the different grades. This indicates that there is no direct trend with skid number measurements and test grade and that the resulting variability may be due to variability in the testing itself. All of the mixtures, with the exception of the SM-9.5A, had differences in uphill and downhill skid number means between –3.51% and 4.34%, with respect to the uphill direction. Measurements made in the uphill direction for the SM 9.5A mixture were 16.78% higher than those in the downhill direction.

To determine why there was such a large difference between the grades of the testing procedure for the SM-9.5A mixture, analysis was performed to isolate the origin of the difference. Through statistical analysis, it was determined that the test grade impacted only measurements made using the smooth tire. Once this determination was made, the data was separated by lane and test group to ensure that the differences evaluated resulted from the grade of the testing alone. When analysis was performed it was determined that the impact of grade on the skid numbers was prevalent through testing with the smooth tire in the SM 9.5A mixtures. As stated before, the smooth tire is an indicator of the macrotexture properties of skid resistance. When skid testing is performed in the opposite grade (direction), a different wheel path is tested. The difference between the two grades may result from different texture in the two wheel paths of that lane. To confirm that the texture measurements were different for the uphill and downhill grades, texture measurements performed on December 2, 1999 were used. These measurements, performed in the uphill and downhill direction for both lanes, confirmed that there is a difference between the two wheel paths. A t-test on the means showed that the difference between the two wheel paths was significant to the 0.05 level.

4.3.3.2. Tire Type

Studies have shown that the tire used in testing has a significant impact on skid resistance measurements performed. This is confirmed in the SAS analysis in that the means for all mixture types placed at the Virginia Smart Road were shown to be significantly different for the two tires. The analysis shows that the average difference between the means for the two tires is 23%. All of the mixtures show ribbed tire measurements at least 23% higher than the smooth tire measurements, with the exception of the OGFC and SMA-12.5 mixtures. The increase in skid number for those mixtures are 3.03% and 13.90% respectively.

The smooth tire has been shown to measure primarily macrotexture induced skid resistance. Therefore, it is possible that there is a relationship between the differences in skid number measurements using the different tires and the texture of the pavement wearing surface. Figure 4.9 shows the difference in the measured skid numbers versus the average mean profile depth (MPD) measured using the laser profiler. The data is separated into sets that include both ribbed and smooth tire data observed within one month of each other.

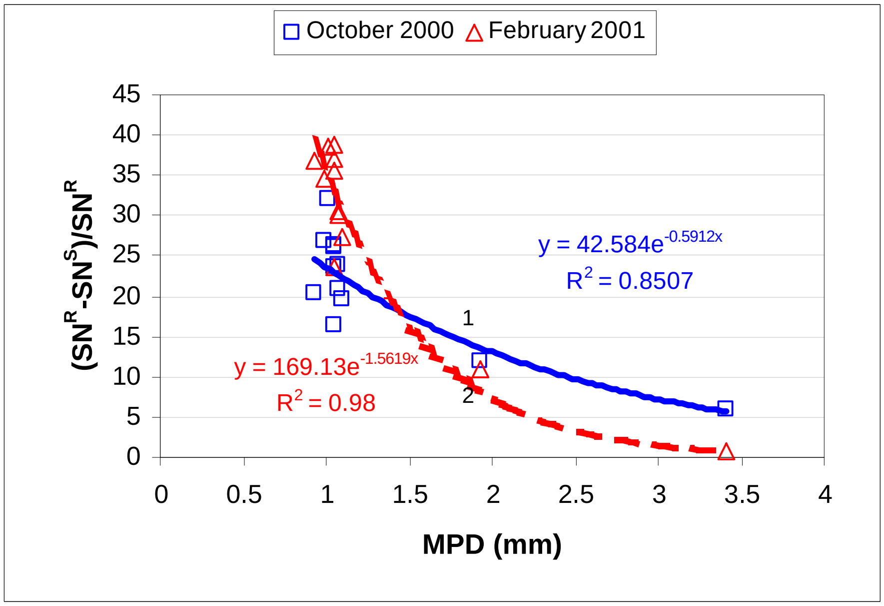


Figure 4.9 Difference between Tire Measurements and Mean Profile Depth

Exponential curves were fit to the data for October 2000 and February 2001. These curves adequately fit the modeled data. Although the data presented does not depict an exact model for the difference between the two tires, it does demonstrate the possibility for a relationship between the tire measurement differences, mean profile depth measurements, and time. The curves show that the difference is smaller for mixtures with high macrotexture. The plot also shows that there is an increase in the difference between the SN measured using the two tires with time for the finer mixtures (9.5 MNS) and a small decrease for the coarser mixtures (SMA and OGFC). This is probably a result of changing microtexture of the pavement surface because of exposure of the aggregate microtexture due to weathering of the asphalt film, since the macrotexture of the surface appears to remain the same over a short period of time. This is accentuated for the finer mixtures that have a thinner asphalt film.

4.3.3.3. Lane Differences

The SN of the instrumented and non-instrumented lanes was compared using the SAS software to determine if there were differences in skid resistance between the two lanes. It was suspected that the two lanes may show some different surface characteristics since some of them were not paved simultaneously and may not have obtained the same level of compaction. Figure 4.10 shows the average skid number measured for each mixture type for the two different lanes.

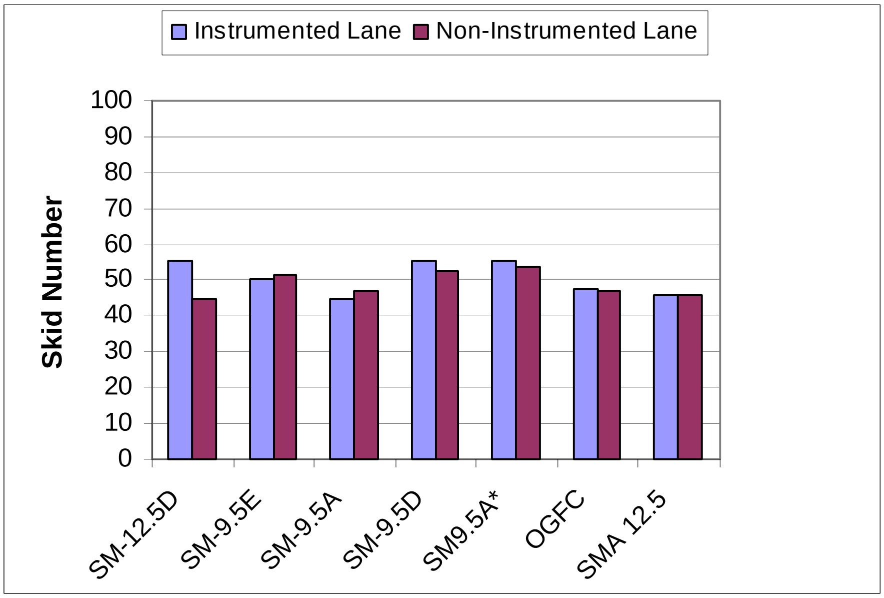


Figure 4.10 Average Skid Numbers for Different Lanes

The SM-9.5D mixture, which has the most data points, indicates that there is a significant difference between the two lanes according to the SAS analysis. Section A, a SM-12.5D mixture has the largest difference between the two lanes, 18.8%; however, it must be noted that the two lanes were paved on different dates and also show different macrotexture (Figure 4.2). The remaining mixtures have differences ranging from –2% to 4.94%. There does not appear to be a trend in the differences between the two lanes. The variability is most likely a result of production variability and placement conditions. The differences between the two lanes, which vary in terms of statistical significance according to the SAS software, are to be expected and most likely cannot be anticipated in terms of quantity.

4.4. Change in Measured Skid Number with Time

It is well known that the skid resistance of a pavement surface changes with time. To study the changes in the Virginia Smart Road HMA wearing surfaces over time, tests performed at speeds of 64 ± 2.4 kilometers per hour (40 ± 1.5 miles per hour) were plotted with respect to time. The percentage difference between the test dates was then calculated for tests performed using the ribbed and smooth tires, in both lanes, and in both directions. The averages obtained for the smooth tire and the ribbed tire in the instrumented lane, uphill, are shown in Figures 4.11 A and B.

Measurements made with the ribbed tire show fluctuations in the measured skid number over time for all of the sections (Table 4.10). There is a significant average increase of 38.5% in the skid number during the first six months immediately after placement of the wearing surface. This is probably due to increased aggregate exposure as a result of asphalt film weathering. Sections K and L have a dramatic increase in the measured skid numbers of 52% and 82%, respectively. The last six months of the study period shows an average decrease in measured skid numbers of 7.70%. The small decrease in skid numbers is consistent for all mixture types with the exception of that placed in Sections K and A. These sections show a very small decrease in measured skid numbers of 1.14% and 1.35%, respectively. The difference can also be due to environmental conditions (temperature) as discussed in Section 4.3.1.

The skid number measured using the smooth tire shows an increase in the first six months followed by a decrease that brings the values close to the original levels. The exceptions to this are Sections K and L that maintained almost the same SNS for the last test. The SN using the smooth tire also showed greater variability among sections because it is possibly more sensitive to mixture properties.

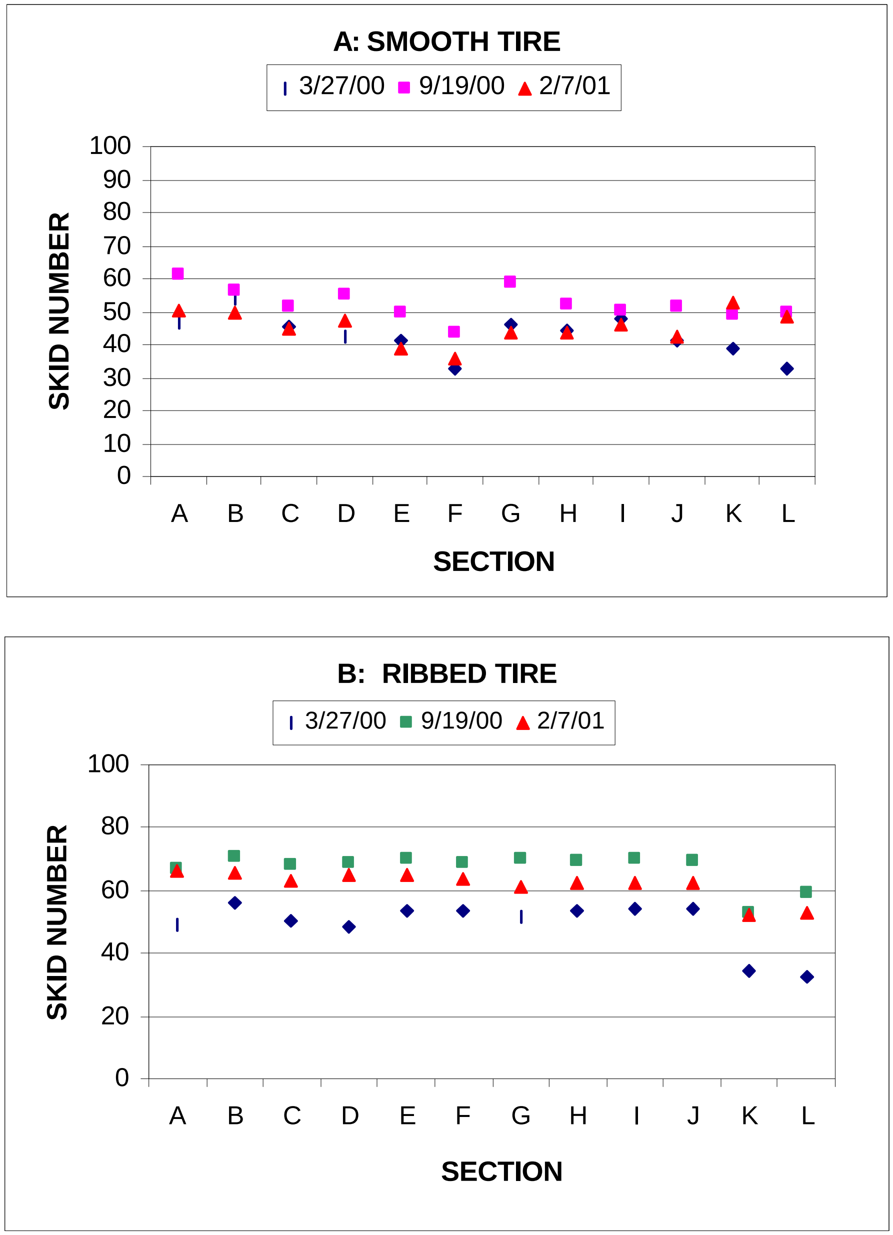


Figure 4.11 Skid Number Measurement Changes with Time (Instrumented Lane, Uphill)

Table 4.10 Average Changes with Time Measured by the Ribbed Tire

Section	% Change test 1 to test 2	% Change test 2 to test 3
A	32.84	-3.43
B	29.72	-5.31
C	33.55	-4.48
D	44.91	-4.27
E	31.55	-5.66
F	32.49	-4.68
G	33.68	-8.29
H	25.62	-8.17
I	23.39	-7.40
J	25.21	-9.05
K	38.49	6.83
L	59.05	-10.55

The average data for the two lanes for both grades indicate that there are increased skid number measurements for the first six months overall, especially when measured with the ribbed tire. The difference between measurements made during the third test from the second test indicates that there is a slight decrease in skid numbers for all of the wearing surfaces at the Virginia Smart Road with the exception of the OGFC mixture. The ribbed tire, which is theoretically a microtexture measurement tool, indicates that there is still a positive wearing of the surface in Section K.

4.5. Analysis of the International Friction Index Parameters

The IFI, which was calculated for all skid tests performed as previously described, has increasingly been used to evaluate pavement surface skid resistance. The two terms of the IFI, S_p and F60 were both plotted for all of the sections for initial and final tests performed at 64 kilometers per hour. The S_p calculated for each of the sections is shown in Figure 4.12. The S_p is calculated from measured texture parameters taken from the field. Sections with the highest texture are expected to have the highest value for S_p, which is the case of the OGFC and SMA-12.5 mixtures. The remaining sections have similar values for the speed constant parameter of the IFI. There are some differences between the Sp in each of the lanes, predominantly Section A because of the differences in macrotexture.

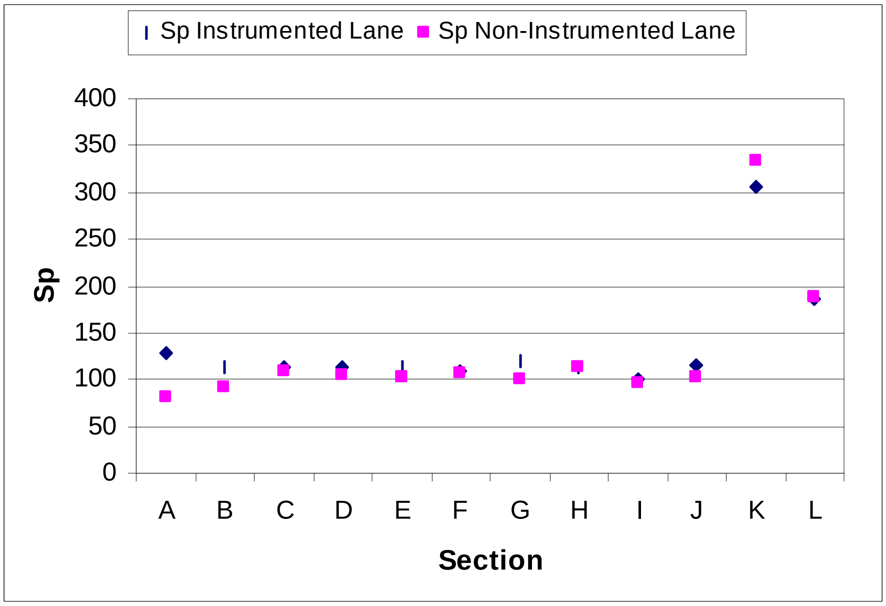


Figure 4.12 S_p for All IFI Measurements

Figure 4.13 shows the initial F60 calculations made for various sections. Figure 4.13A shows the results using the smooth treaded tire, and Figure 4.13B shows the F60 parameter calculated using the ribbed tire. Theoretically, the values for the F60 should be the same because of coefficients that are used in the calculation of the F60 for the two different tires. This is true for some of the sections at the Smart Road.

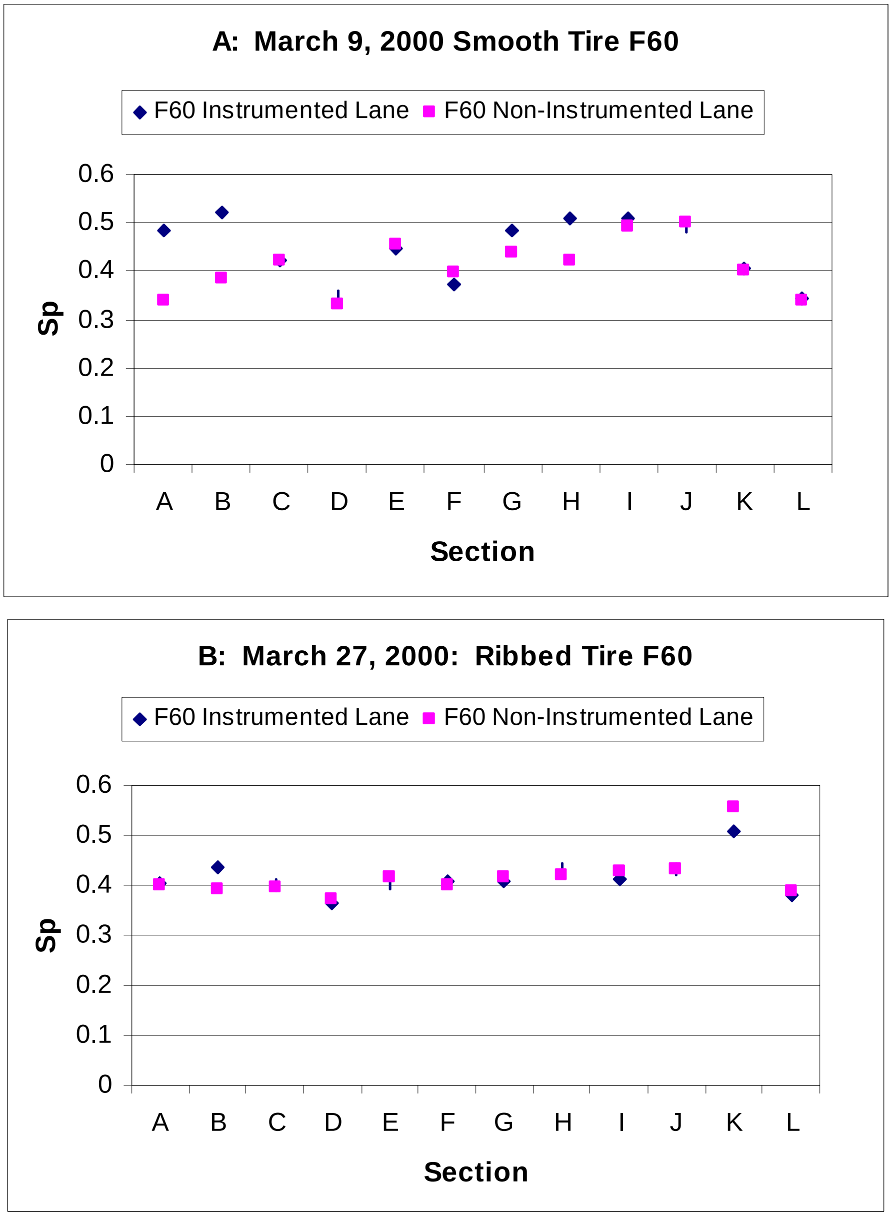
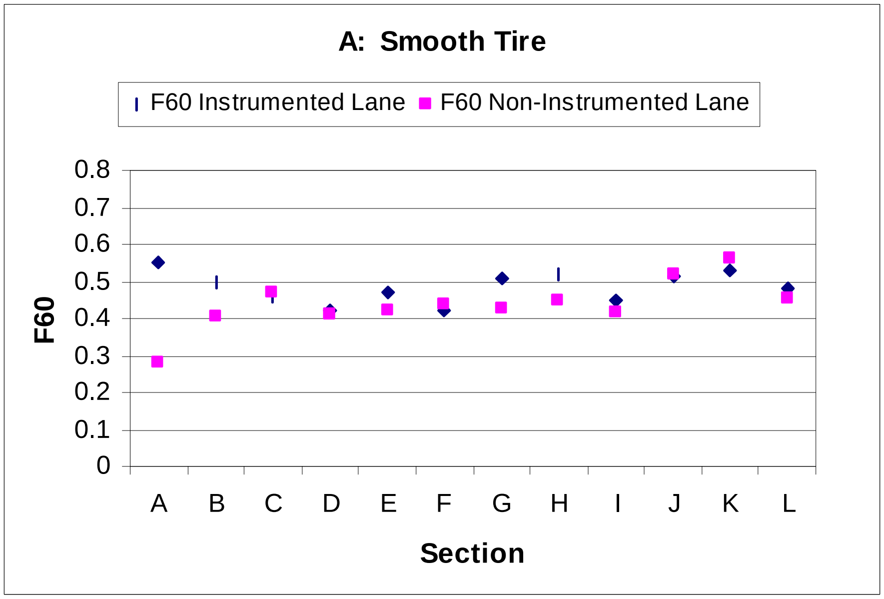


Figure 4.13 Initial F60 for All Sections

The two initial tests show varying results. However, the values obtained for the F60, as shown in Figure 4.13, are more consistent between the two lanes for testing performed with the ribbed tire than the smooth treaded tire. F60 parameters computed based on the in-service skid resistance measurements are shown in Figure 4.14.



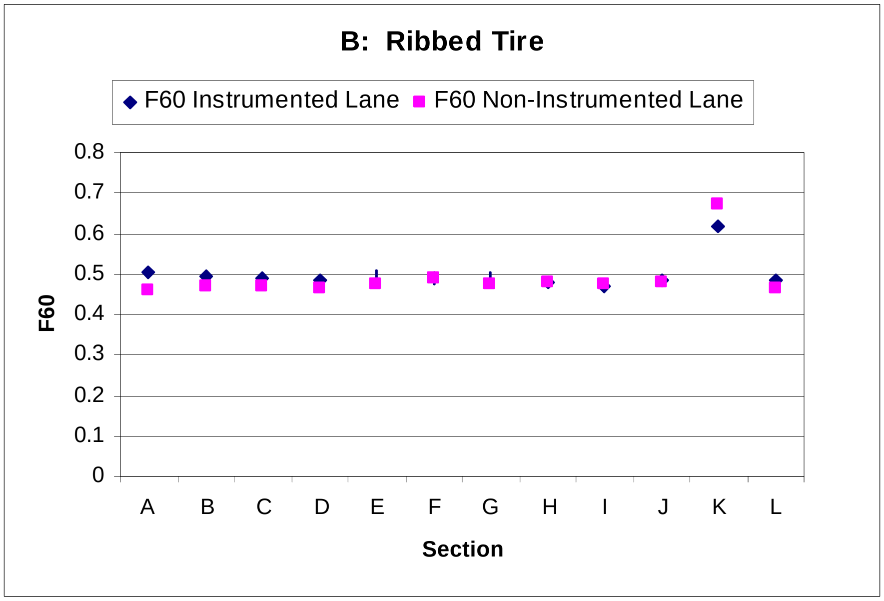


Figure 4.14 In-Service F60 for All Sections

It is apparent in Figure 4.14 that the ribbed tire is again more consistent between the two lanes than the smooth tire. In all cases, Section K has the highest F60. However, the computed

F60 for the OGFC wearing surface (Section K), are higher when computed using the ribbed tire than with the smooth tire.

4.6. Relationship between Mixture Properties and Surface Characteristics

SAS statistical software was used to study the impact of specific mixture properties with different HMA design and analysis parameters. The stepwise regression function in SAS was used to establish relevant mixture properties for each parameter. The parameters studied are as follows:

1. SN(64)
2. MPD
3. IFI
4. SN_0 from the PSU (1) model

Mixture properties that were used in the analysis include:

1. Asphalt Content
2. Maximum Nominal Size
3. Percent Passing #200 sieve
4. Voids in the Mixture
5. Binder Type: (-1) for PG 64-22, (0) for PG 70-22, (1) for PG 76-22
6. Voids in the Mineral Aggregate

These properties were used to aid in determining the contribution of HMA volumetric properties to the frictional properties of the wearing surface. It must be noted that some of the ranges for the independent variables were too narrow to clearly assess their influence on the skid parameters. Table 4.11 shows values for each of the sections in terms of material properties included in the analysis. Figure 4.15 shows graphically, the difference between material properties incorporated into the mixtures at the Virginia Smart Road.

It can be observed that the maximum nominal size for most of the wearing surfaces at the Virginia Smart Road is relatively close in value. However, the total voids in the mixture are dramatically different for the OGFC placed in Section K. Additionally, the VMA_{Lab} recorded in the laboratory is significantly higher for the OGFC mixture than the remaining sections. This resulted in a high influence of this mixture's properties in the regression models.

Table 4.11 Material Properties

Section	Binder Type	Asphalt Content	Maximum Nominal Size	Percent Passing #200	VTM Lab	VMA Lab	VTM Field	VMA Field
A	PG 70-22	5.86	9.5*	5.9	5.3	17.0	8.0	20.7
B	PG 70-22	4.62	9.5	6.7	6.2	16.7	7.4	17.9
C	PG 76-22	5.64	9.5	8.4	2.2	14.8	3.6	18.5
D	PG 64-22	5.83	9.5	8.0	0.8	15.0	.1	12.3
E	PG 70-22	5.68	9.5	7.0	3.4	16.1	6.7	18.4
F	PG 70-22	5.71	9.5	8.0	3.1	15.9		
G	PG 70-22	5.58	9.5	7.9	2.8	15.3		
H	PG 70-22	5.63	9.5	7.2	3.5	16.2		
I	PG 64-22	5.2	9.5	7.3	4.2	15.2	3.0	16.7
J	PG 70-22	4.86	9.5	6.5	7.1	17.4	10.6	24.0
K	PG 76-22	5.46	12.5	1.1	22.4	34.4		
L	PG 70-22	6.55	12.5	10.5	1.2	15.6	6.5	21.1

*Although the wearing surface mixture for Section A was planned to have a 12.5 MNS, actual production values indicate a 9.5 MNS

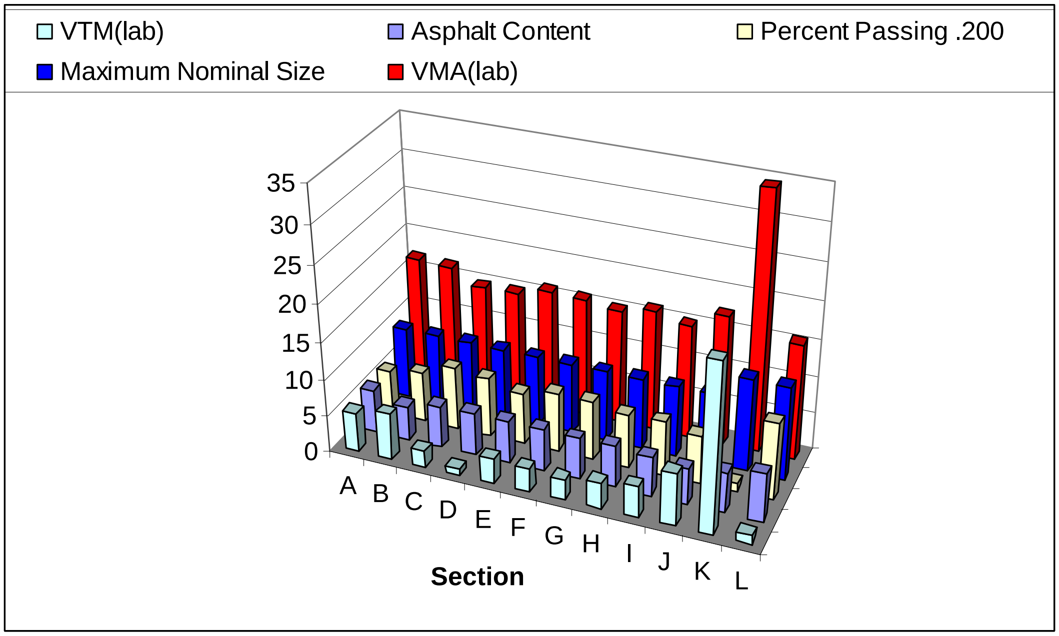


Figure 4.15 Material Properties

4.6.1. Regression Analysis with the SN(64) Parameter

The SN(64) is used by many transportation departments as the established test parameter for pavement skid resistance. This value represents the skid number measured at 64 kilometers per hour (40 miles per hour). Regression analysis was performed on the SN(64) measured on February 7, 2001. The ribbed and smooth treaded tires were analyzed separately. To ensure that speed was not a factor, data with a speed variation greater than 2.4 kilometers per hour from the target speed was purged from the data set prior to analysis.

4.6.1.1. Smooth Tire SN(64) Analysis

The equation obtained from the analysis has a regression coefficient of 0.2308 indicating that the SN(64) cannot be accurately predicted with the independent variables used. Additionally, the range of values for variables included in the study may have been too limited to adequately assess variable influences. If a larger range of mixtures were used, a better correlation between the chosen variables and the SN(64) may be possible. The equation resulting from the analysis is the following:

$$SN(64)S = 26.865 + 2.079 * Binder + 1.601 * PP200 + 1.03 * VTM_{Lab} \tag{20}$$

Where:

SN(64) = Smooth tire skid number at 64 kph,

Binder = Binder code,

PP200 = Percent of material passing the #200 sieve, and

VTM_{Lab} = Total voids in the mixture.

The resulting regression equation, though it can only explain 23% of the variability in the data, does have logical variables incorporated into the analysis. The increase in skid number with the total voids in the mixture is logical. This is because more voids in the mixture results in more surface voids, which would allow water to flow from the tire-pavement interface. The type of binder incorporated into the mixture and the percentage passing the number 200 sieve also are affecting the measured skid number. The ANOVA table resulting from the regression analysis is shown in Table 4.12.

Table 4.12 ANOVA from SN(64)S Regression

Source	**DF**	**ANOVA SS**	**Mean Square**	**F Value**	**Pr>F**
Model	3	1792.2	597.4	13.3	<0.001
Intercept				13.73	0.0003
BINDER				2.9	0.0910
PP200				4.04	0.0465
VTM_{Lab}				9.80	0.0021
Error	133	5974.3	44.9		
Corrected Total	136	7766.6			
Root Mean Square Error			6.70222		
R^2		0.2308	**Adjusted R^2**		0.2134

4.6.1.2. Ribbed Tire SN(64)Analysis

Skid numbers measured using the ribbed tire correlated better to the analysis material properties than those measured by the smooth tire. The regression coefficient for this data was 0.7683, indicating an adequate fit to the parameters. The equation resulting from the analysis is:

$$SN(64)R = 104.211 - 4.356 * MNS + 0.1833 * VTM_{Lab} \qquad (21)$$

Where:

SN(64)R = Ribbed tire skid number at 64 kph,

MNS = Maximum nominal size, and

VTM_{Lab} = Total voids in the mixture.

Table 4.13 shows the regressed ANOVA table for the SN(64)R analysis.

Table 4.13 ANOVA SN(64)R

Source	DF	ANOVA SS	Mean Square	F Value	Pr>F
Model	2	2646.5	1323.2	220.52	<0.0001
Intercept				2382.57	<0.0001
MNS				675.3	<0.0001
VTM_{Lab}				16.4	<0.0001
Error	133	798.1	6		
Corrected Total	135	3444.6			
Root Mean Square Error			2.4496		
R^2		0.7683	**Adjusted R^2**		0.7648

The regressed equation indicates a decreased skid number measured with increased maximum nominal size; which is consistent with previous studies. Larger aggregate incorporated into wearing surface mixtures may reduce the amount of contact the tire has with the small asperities of the aggregate surface. However, the OGFC placed in Sections K and the SMA in Section L may have too much influence on the regressed equation. These two mixtures have large aggregate sizes and have resulted in lower SN(64)R values. The remaining mixtures have the same sized maximum nominal size. To confirm the importance of nominal size to the skid resistance microtexture properties, more mixtures containing a wider range of MNS (between the 9.5 and 12.5 mm) should be evaluated.

The increase in the SN(64)R with total voids in the mixture logically depicts the behavior of the wearing surface skid resistance. Although the ribbed tire allows for the flow of water from the surface through the treads, additional removal of water would increase the skid resistance. An increase in the total voids in the mixture will increase the surface voids; therefore, increasing the rate at which water is repelled from the pavement-tire interface.

4.6.2. Mean Profile Depth Analysis

The MPD at the Virginia Smart Road, which was measured using the laser profiler was analyzed according to mixture properties of the pavement to determine which properties had the largest effect on the MPD. The equation resulting from the regression analysis is:

$$MPD = -3.596 + 0.1796 * MNS + 0.0913 * PP200 - 0.0294 * VTM_{Lab} + 0.1503 * VMA_{Lab} \quad (22)$$

Where:
MNS = Maximum nominal size,
PP200 = Percent passing the #200 sieve,
VTM_{Lab} = Total voids in the mixture, and
VMA_{Lab} = Voids in the mineral aggregate.

The regression coefficient for this equation was 0.9724, indicating an excellent fit. Table 4.14 shows the ANOVA table for analysis performed for the mean profile depth.

Table 4.14 ANOVA MPD

Source	DF	ANOVA SS	Mean Square	F Value	Pr>F
Model	4	28.95	7.24	590.3	<0.001
Intercept				261.38	<0.001
MNS				21.95	<0.001
PP200				5.93	0.0176
VTM_{Lab}				3.86	0.0536
VMA_{Lab}				61.08	<0.001
Error	67	0.82	0.0122		
Corrected Total	71	29.77			
Root Mean Square Error			0.1107		
R^2		0.9724	**Adjusted R^2**		0.9708

It is expected that the maximum nominal size of the wearing surface mixture would have the largest impact on the mean profile depth because of the larger aggregate protruding from the pavement surface. However, the increase in the MPD with an increase in the percentage of material passing the #200 sieve is unexpected. Logically, the lower the amount of fines in the mixture the greater the resulting MPD. In addition, there is a decrease in MPD with an increase in the total voids in the mixture. This does not make sense either, since an increase in voids would increase the MPD. Most likely the difference between the increase in PP200 and decrease resulting from the VTM_{Lab} is combined to compensate for the effect of the voids in the pavement surface. A revised model is presented in Section 4.6.4. The increased MPD with increased VMA_{Lab} does make sense, as more voids in the mineral aggregate will create a rougher surface and result in higher texture.

4.6.3. Speed Constant

The speed constant parameter of the IFI is calculated using the mean profile depth of the pavement surface. Analysis of the S_p with the different material characteristics resulted in Equation 23 for the average values of the mean profile depth measured over the testing period.

$$S_P = 23.907 * MNS - 5.272 * VTM_{Lab} + 12.878 * VMA_{Lab} - 305.06 \quad (23)$$

Where:

S_p = Speed Constant,

MNS = Maximum nominal size,

VMA_{Lab} = Voids in the mineral aggregate, laboratory compacted at 65 gyrations, and

VTM_{Lab} = Voids total in the mixture, laboratory compacted at 65 gyrations.

The equations established fit the measured data for the in-service skid resistance testing with regression coefficients of 0.9718. Figure 4.16 shows the difference between the calculated and predicted values for S_p values.

The equation established with the regression analysis indicates that the maximum nominal size of the aggregate in the mixture has the highest influence on the S_p value. The next influential factor for the S_p is the VMA_{Lab}, which is followed by VTM_{Lab}. However, the sign of the VTM_{Lab} coefficient does not appear to be correct. Therefore, a revised model that does not include this variable was selected and is presented in the next section.

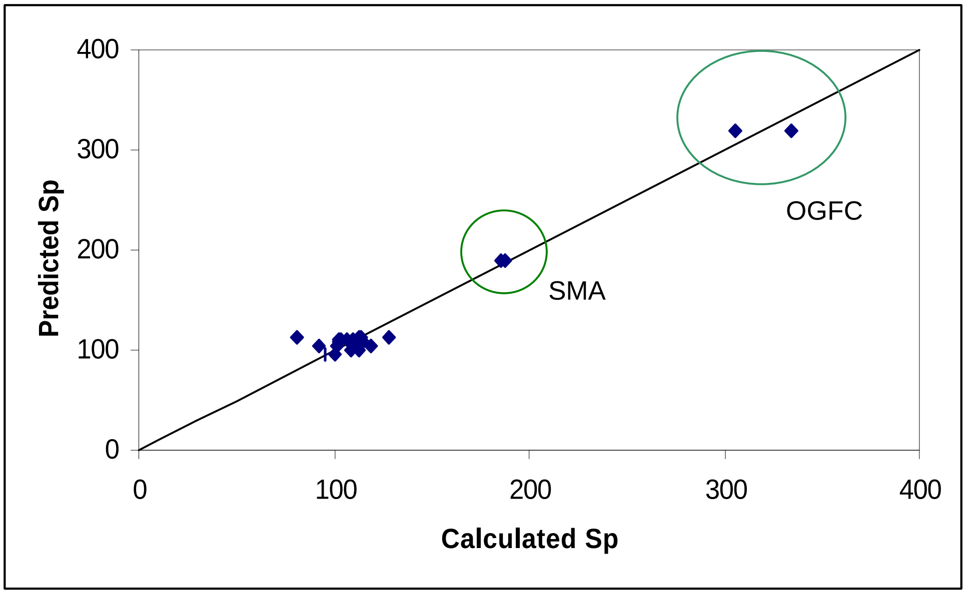


Figure 4.16: Measured and Calculated Values of S_p

The resulting ANOVA table from regression analysis performed with the S_p parameter is shown in Table 4.15.

Table 4.15 ANOVA Table for S_p

Source	**DF**	**ANOVA SS**	**Mean Square**	**F Value**	**Pr>F**
Model	3	88898	29633	229.9	<0.0001
Intercept				126.43	<0.0001
Maximum_Nominal_Size				50.37	<0.0001
VTM_{Lab}				5.02	0.0366
VMA_{Lab}				21.4	0.0002
Error	20	2578	128.9		
Corrected Total	23	91476			
Root Mean Square Error			11.4		
R^2	0.9718		**Adjusted R^2**		0.9676

It is important to note that many of the mixtures have similar characteristics for the material properties incorporated into the S_p equation. The values of S_p circled in Figure 4.16 are those calculated for the OGFC and SMA mixtures. It can be seen in this figure that there is a large difference between measurements in a majority of the sections and the maximum value of S_p. The OGFC mixture is the only mixture in the sections at the Virginia Smart Road that is greatly different in terms of material properties than the remaining mixtures; therefore, this mixture may bias the regression.

4.6.4. Speed Constant and Mean Profile Depth Comparison

The S_P and the MPD are both functions of the same texture measurements conducted. However, there are some differences in the regressed equations due to the data used for the analysis. The speed constant parameter was calculated from the average texture measurements over all test periods. The mean profile depth value analyzed was the in-service mean profile depth as measured on February 21, 2001. The slight difference in values is a result of the variance between the average mean profile depth and that of the test date analyzed.

There are similarities between the two measurements and the resulting regression analysis. Both regressions incorporate the maximum nominal size of the aggregate, the voids in the mixture, and the voids in the mineral aggregate. All of these values are shown to be significant to the 0.05 level. However, the mean profile depth analysis includes the variable concerning the percent passing the #200 sieve. In addition, the sign of the VTM_{Lab} is not logical since MPD was expected to increase with higher VTM_{Lab}. Regression was performed again to determine whether an adequate model depicting the MPD could be established using only the MNS and the voids in the mineral aggregate. The model containing only those variables had a regression coefficient of 0.9650 which is almost unchanged from that of the model with the two additional variables. The resulting equation is as follows:

$$MPD = -2.896 + 0.2993MNS + 0.0698VMA_{Lab} \tag{24}$$

Where:
MPD = Mean profile depth,
MNS = Maximum nominal size, and
VMA_{Lab} = Voids in the mineral aggregate.

In addition to revisions made to the MPD equation, an equation depicting the S_p parameter of the IFI was established using the same variables included in the MPD equation. The equation for S_p, with and R^2 of 0.9647 is the following:

$$S_p = -270.02 + 28.31MNS + 6.79VMA_{Lab} \tag{25}$$

Where:
S_p = Speed constant,
MNS = Maximum nominal size, and
VMA_{Lab} = Voids in the mineral aggregate.

4.6.5. F60 Analysis

The second parameter of the IFI is the F60. Regression analysis was used to evaluate the impact of material properties on the F60. Analysis of the F60 parameter was first performed for all of the measurements with both tires. Then the data was separated between the two tires to determine whether there was equality between the two measurements. Each tire was then analyzed individually, and the results obtained are discussed in the following paragraphs.

All skid data obtained from testing on February 7, 2001 was used for the IFI analysis. The speeds and skid numbers recorded were transformed using the equation suggested in the procedure for calculating the IFI. Initial analysis included only the material property variables and was performed using the F60 parameter computed using both tires at all speeds. The resulting regressed equation (Model 1) has a correlation coefficient of 0.2226. To determine whether the introduction of a variable representing tire type and speed would improve the fit, these variables were forced into the model. A comparison of variables included in the analysis and the resulting R^2 and adjusted R^2 are shown in Table 4.16. The values shown in the table indicate regression coefficients for the variable.

Table 4.16 Variables Included and R^2 Values

Variable	Model 1	Model 2	Model 3
Intercept	0.33631	0.41512	0.42101
Tire	0	0	-0.01212
Speed	0	-0.00137	-0.00136
Binder	0.00793	0.00756	0.00756
Asphalt Content	-0.01062	-0.01132	-0.01132
Percent Passing #200	0.00787	0.00827	0.00827
VMA_{Lab}	0.00897	0.00916	0.00916
R^2	0.2226	0.3542	0.3607
Adjusted R^2	0.2189	0.3504	0.3562

When the speed (model 2) parameter and speed and tire parameters (model 3) were included in the analysis, the fit of the model to the recorded data improved. The relative impact of the material properties, however, did not change with the addition of the new parameters. Taking this into consideration, data not conforming to the speed of 64 kilometers per hour (± 2.4) was removed from the analysis set. The best-fit equation of those obtained is the one that uses the reduced data of speeds conforming to the 64±2.4 kilometers per hour with the incorporation of the tire type. The ANOVA table for this model is shown in Table 4.17.

$$F60 = 0.38189 - 0.02962 * Tire + 0.01295 * Binder + 0.00911 * PP200 + 0.00897 * VTM_{Lab} \quad (26)$$

Where:

F60 = Friction parameter of the IFI,

Tire = Tire type,

Binder = Binder code,

PP200 = Percent passing #200 sieve, and

VTM_{Lab} = Total voids in the mixture.

Table 4.17 ANOVA for F60 Including Tire Parameter

Source	**DF**	**ANOVA SS**	**Mean Square**	**F Value**	**Pr>F**
Model	4	0.43992	0.10998	47.01	<0.001
Intercept				102.92	<0.001
Equipment Used				25.59	<0.001
Binder				4.21	0.0412
Percent Passing #200				4.88	0.0281
VTM_{Lab}				28.03	<0.001
Error	268	0.62696	0.00234		
Corrected Total	272	1.06688			
Root Mean Square Error			0.04837		
R^2	0.4123		**Adjusted R^2**	0.4036	

Because the equipment used was determined to be a primary influence in the determination of the F60 parameter, analysis was then performed with the data separated by the tire type used during testing.

The first data set consisted of the F60 values computed based on skid numbers for all speeds in the analysis. Results from this analysis indicated that there was no significant correlation between the selected material properties and the IFI as measured using the smooth treaded tire, as the resulting equation had a regression coefficient of 0.0703. However, the IFI calculated based on ribbed tire skid number measurements resulted in a regression coefficient of 0.7755.

To improve these coefficients, an additional term was incorporated into the analysis to account for the actual test speed prior to transformation. This was performed to assess the impact of the variance in speeds with the IFI parameter. Results from this analysis were regression coefficients of 0.5366 for the smooth treaded tire and 0.7978 for the ribbed tire. The only variable added in the analysis was the parameter of speed. The different coefficients that were obtained through this analysis are shown in Table 4.18.

Table 4.18 Coefficients Obtained for Analysis With and Without Speed

TIRE		# Obs.	Intercept	Test Speed	MNS	Percent Passing #200	VMA Lab	VTM Lab	R^2
RIBBED	Initial Speed Excluded	432	0.2566	0	0	0.0059	0.0113	0	0.7755
	Test Speed Included	432	0.2337	0.00025	0	0.0058	0.0113	0	0.7978
	Including Only Tests @ 64 ± 2.4 kph	136	0.27755	0	-0.0098	0.01021	0.01383	0	0.8654
SMOOTH	Initial Speed Excluded	432	0.3464	0	0	0.01302	0	0.00870	0.0703
	Initial Speed Included	432	0.5265	-0.0019	0	0.0134	0	0.0089	0.5366
	Including Only Tests @ 64 ± 2.4 kph	137	0.29174	0	0	0.01642	0	0.01076	0.1823

The improved coefficients indicate that there is a dependency on speed for the IFI. To further investigate this, the data obtained was filtered to ensure that only tests performed at the target speed of 64 ± 2.4 kilometer per hour (40 ± 1.5 mph) were included in the analysis. Filtering the speed parameter improves the equation for the ribbed tire, but does not improve the equation for the smooth tire because there are no consistent differences among sections. The MNS of the mixture significantly influences the F60 when computed based on measurements performed using the ribbed tire. The regression analysis seems to indicate that the influence of material properties on the F60 computed based on measurements conducted using the smooth tire is negligible.

Theoretically, the influence of the parameters on each of the F60 values, whether measured using the ribbed tire or the smooth tire, should be the same as a result of coefficients in calculation of the F60 parameter that are correlated to either piece of test equipment. Though the equations are similar, it appears as though, because the equation is not a good fit to the smooth tire data, that the tire measurements might not be equivalent. Figure 4.17 shows the calculated and predicted values obtained for the F60 equations. As mentioned before, the model for the F60 computed using the smooth tire does not fit the experimental data, as shown in Figure 4.17.

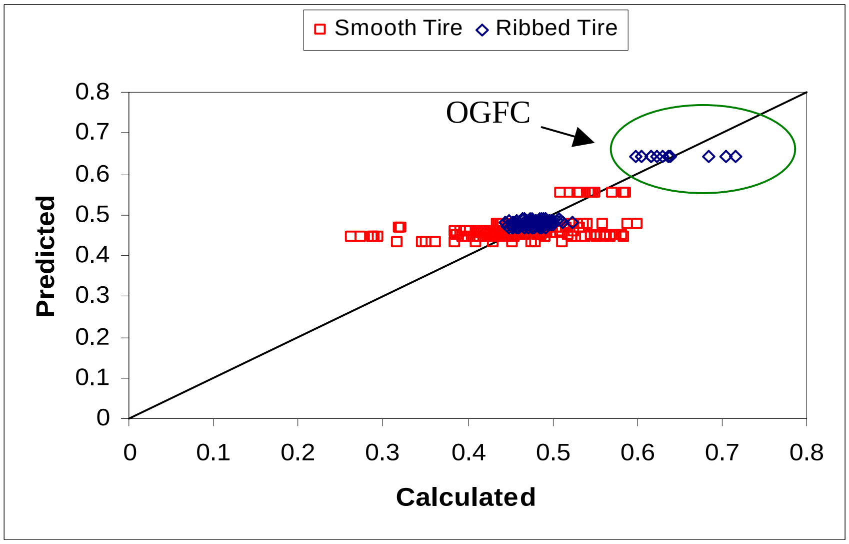


Figure 4.17 Comparison of Calculated and Predicted Values for F60

Figure 4.18 shows that there is a significant difference in the calculated F60 values using measurements from the ribbed and smooth tires.

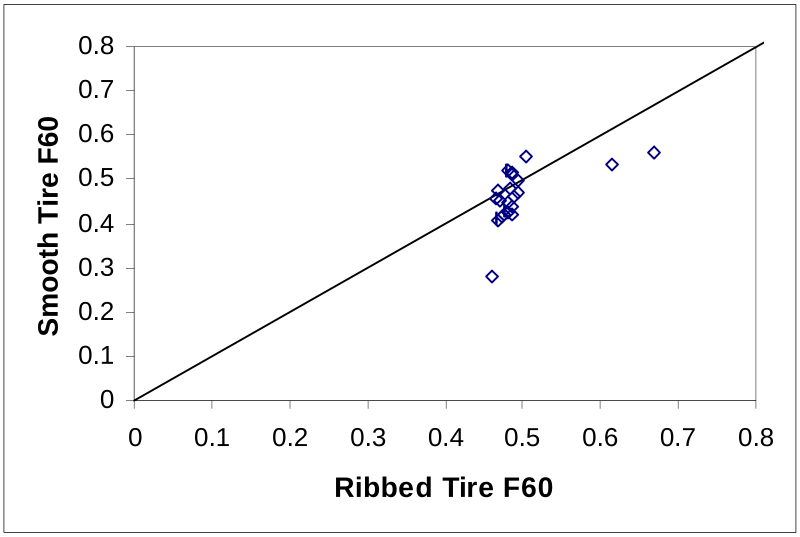


Figure 4.18 Ribbed Tire F60 vs. Smooth Tire F60

It appears that the IFI coefficients may not be consistent with the equipment use. This should be further studied using a larger database of in-service pavements. Figure 4.19 shows the difference between the F60 measurements and calculations for each of the sections.

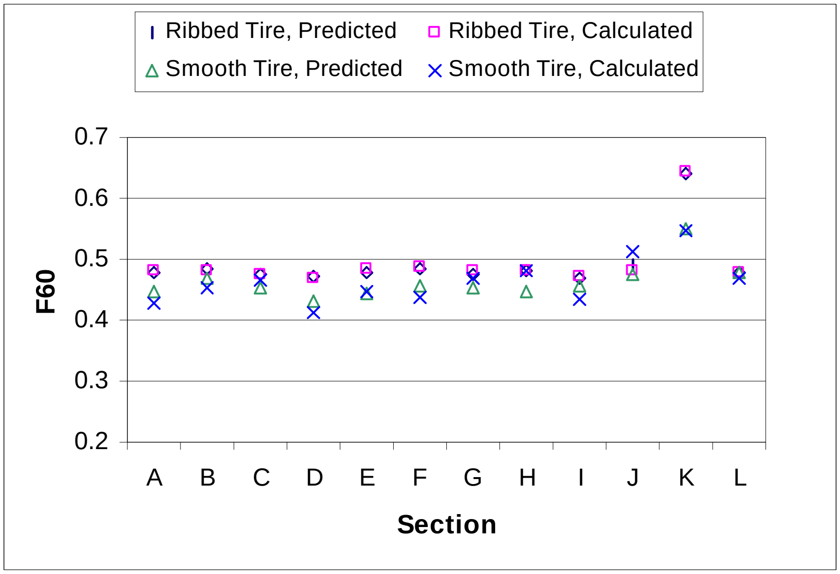


Figure 4.19 Calculated and Predicted Values for F60 by Section

4.6.6. F60 and S_P

The impact of material properties on the calculation of the F60 is difficult to determine because of the different measurements from the two different tires. If the ribbed tire measurement is used, an adequate fit to the regressed equation is obtained. When the smooth tire is used, no significant differences among sections are detected. Because the IFI is reported as two variables, the S_p and the F60, it is important to observe the impact of material properties on each of the parameters together. A summary of the material properties relevant to each parameter is shown in Table 4.19.

Table 4.19 Material Properties Relevant to Each IFI Parameter

F60 Computed Using SNR	F60 Computed Using SNS	S_p
• Maximum Nominal Size • Percent Passing #200 • VMA_{Lab}	• Percent Passing #200 • VTM_{Lab}	• Maximum Nominal Size • VMA_{Lab}

It is interesting to note the appearance of the different variables in the regression analysis of IFI parameters. The maximum nominal size appears in the ribbed tire F60 because of the inclusion of the texture parameter in the calculation of the F60 for this tire. The texture parameter is not included in the smooth tire analysis, which could be why the maximum nominal size does not appear relevant in the regression analysis. The variable VMA_{Lab} appears in the slip speed analysis; however only the VMA_{Lab} appears in the ribbed tire F60 and the VTM_{Lab} in the smooth tire F60. It must be noted that VTM_{Lab} and VMA_{Lab} show some degree of correlation.

4.6.7. Smooth Tire SN(0) Analysis

Regression analysis performed with data measured using the smooth treaded tire resulted in the following equation, which had a regression coefficient of 0.6440:

$$SN(0)S = 343.5 + 7.769 * Binder - 12.308 * PP200 - 7.74 * VMA_{Lab} \quad (27)$$

Where:

SN(0)S = Smooth tire skid number at zero speed,

Binder = Binder code,

PP200 = Percent passing #200, and

VMA_{Lab} = voids in the mineral aggregate.

Table 4.20: SN(0)S ANOVA

Source	DF	ANOVA SS	Mean Square	F Value	Pr>F
Model	3	16716	5572	209.9	<0.0001
Intercept	1			118.01	<0.0001
BINDER	1			3.18	0.0816
PP200	1			31.12	<0.0001
VMA_{Lab}	1			62.74	<0.0001
Error	44	9238.9			
Corrected Total	47	25955			
Root Mean Square Error			14.49		
R^2		0.644	**Adjusted R^2**		0.6198

As can be observed, VMA_{Lab} has the most significant effect on the static SN using the smooth tire. The second most significant factor affecting the skid numbers measured using the smooth treaded tire is the percentage passing the #200 sieve. The smooth treaded tire has been studied in the past and is perceived to evaluate the macrotexture contributions of the pavement surface skid resistance. A large decrease in the skid number with an increase in the percentage of material passing the #200 sieve reiterates this concept. When the number of fines is increased in the mixture, many of the surface voids are filled, and water is not able to drain from the pavement surface as easily. This would create a decrease in the wet pavement skid resistance. The type of binder used in the mixture also affects the skid number measured with an increased SN(0) for the modified binder.

4.6.8. Ribbed Tire SN(0) Analysis

The static SN measured with the ribbed tire was also evaluated using regression analysis. The best-fit regression equation for the ribbed tire, with a regression coefficient of 0.8740, is as follows:

$$SN(0)R = 161.693 - 3.281 * AC - 3.414 * MNS - 1.374 * VTM_{Lab} \tag{28}$$

Where:

SN(0)R = Ribbed tire skid number at 64 kilometers per hour,

AC = Binder content,

MNS =Maximum nominal size, and

VTM = Total voids in the mixture.

Table 4.21: ANOVA for SN(0)R

Source	DF	ANOVA SS	Mean Square	F Value	Pr>F
Model	3	4932.4	1644.2	101.69	<0.001
Intercept				479.68	<0.001
Asphalt Content				2.93	0.0938
Maximum Nominal Size				13.83	0.0006
VTM_{Lab}				59.78	<0.001
Error	44	711.4	16.2		
Corrected Total	47	5643.8			
Root Mean Square Error			4.021		
R^2		0.8740	**Adjusted R^2**		0.8654

The ribbed tire has been used as a microtexture indicator for many years. The fact that this tire measures the microtexture part of the pavement surface is logical when the relevant parameters of the equation are evaluated. The asphalt content of the surface mixture is a relevant parameter of the SN(0)R. This is most likely a result of the presence of more asphalt on the pavement surface preventing the tire from contacting the aggregate asperities. There is a greater decrease in skid number with larger aggregates in the mixture. This is most likely a result of a lower level of microtexture in the pavement surface as a result of large aggregates being incorporated into the mixture. The total voids in the mixture also decrease the evaluated skid number, probably a result of the decreased amount of aggregate asperities that contact the tire as a result of more voids in the surface at the tire pavement interface.

4.6.9. Summary of Regression Analysis

The regression analysis performed indicated that there were many factors influential to each of the different parameters. Although not all of the equations fit the measured and calculated data with a high regression coefficient, many of them are still relevant to the characteristics of the mixtures and impact of properties. Regression equations established may be improved by incorporating a wider variety of mixture properties into the analysis. However, the analysis discussed previously in this chapter does indicate a number of relationships between the material properties studied and different parameters used to classify surface texture.

Chapter 5
Findings and Conclusions

To study the effects of material properties on pavement surface characteristic parameters, statistical analysis and visual comparison of measurements conducted at the Virginia Smart Road were performed. Seven different HMA mixtures were tested using a laser profilometer and a locked wheel skid trailer. Testing was conducted approximately every four months; weather permitting, over a one year time period. To manage data obtained from testing, a database containing information relevant to pavement surface characteristics was constructed. SAS statistical software was used to perform regression analysis and t-tests on the means to determine the influence of mixture properties.

Material properties studied included “as-built” volumetric properties and mixture specific characteristics. Additionally, parameters specific to testing were studied to determine their impact on measurements conducted. Test parameters were studied using a t-test on the means include lane, grade, and tire type used. Material properties were analyzed using parameters measured and calculated from testing including the skid number measured at 64 kilometers per hour using the ribbed and smooth tires, the mean profile depth, the International Friction Index, and the skid number at zero speed for both tires as calculated using the PSU(I) model. Material properties included in the study are asphalt content, maximum nominal size, the percent of material passing the #200 sieve, the type of binder used in the mixture, voids in the mixture, and the voids in the mineral aggregate.

5.1. Findings

This research produced multiple findings relevant to the influence of parameters on pavement surface characteristics and testing. They are as follows:

- Skid resistance measurements are highly dependent on the type of tire used for the measurements. For the finer mixtures (MNS 9.5 mm), the skid number determined using the ribbed tire is higher than those using the smooth tire.
  - Coarser mixtures appear to have lower SNR but comparable SNS after being subjected to research traffic for approximately 16 months. However, there seems to be a tendency of increased SNR with time, probably due to weathering of the asphalt film.
  - There is an increased difference between measurements conducted with the two tires with decrease in mean profile depth measured using the laser profilometer.

- Friction measurements conducted using the ribbed and smooth tires indicate a difference between the two lanes noted by the ribbed tire but not by the smooth tire for a majority of the sections. These differences may be due to production variability and / or degree of compaction.

- Both linear and exponential models can be used to depict the change of skid resistance with speed for the range of speeds used in this study.
  - The average slope for linear regressed equations was higher for measurements conducted using the smooth tire than the ribbed tire indicating a higher susceptibility to speed changes of the measurements using the smooth tire.
  - The dependence of the skid number on speed fluctuates with time. Smooth tire measurements dependence on speed increases with time while the ribbed tire speed dependence decreases, then increases with time for the year long test period. This could be due to changes in the surface characteristics with time. The increase of skid number dependence on speed could also be due to decreased testing temperature.

- The OGFC mixture has lower skid numbers at 32 and 64 kilometers per hour but has a lower dependency on speed than other mixtures placed at the Smart Road and comparable SNS.

- The IFI parameter F60 computed based on measurements conducted using the ribbed tire and the smooth tire is not consistent. It seems to be higher when it is computed using measurements conducted with the ribbed tire.
  - The F60 computed based on the SNR is similar for all the mixtures except for the OGFC, which exhibits higher skid numbers.
  - The F60 computed based on the SRS is more variable between mixtures and lanes, specifically in sections A and B. Sections A and D appear to have slightly lower skid resistance than the other sections when using this friction indicator.

- The statistical analysis indicated that there are no significant differences in the skid resistance measurements uphill and downhill. Although the individual analysis of some of the mixtures indicates statistically significant differences, these are very small and can be neglected for all practical purposes. Only measurements in the Non-instrumented Lane of Section A showed a large difference. However, this difference could be due to differences in the surface properties between wheel paths since the SN is measured in the opposite wheel path when traveling uphill and downhill.

- As expected, the coarser mixtures provide significantly higher texture than the finer mixtures. The OGFC has almost three times the texture of the 9.5 mm MNS mixtures.

- The regression analysis showed that macrotexture properties of the mixtures correlate well with some of the HMA design parameters. However, the skid characteristics measured with the smooth tire does not correlate well with the mixture properties. This is consistent with previous findings that indicate that the smooth tire measurements are more related with the microtexture properties, which are mostly controlled by the type of aggregate incorporated into the mixture.

- Several regression models were developed which allowed for the identification of the following relationships:
  - MPD can be closely predicted based on the MNS and VMA.
  - SN(64)S is mostly influenced by the percent passing sieve #200, VTM, and type of binder used. However, only a small percentage of the variability is explained by these parameters.
  - SN(64)R is mostly influenced by the MNS and VTM. The larger the maximum nominal size, the lower the ribbed tire skid number.

5.2. Conclusions

Based on the analysis performed, the following conclusions can be made:

- Friction measurements conducted using the ribbed and smooth tires measure different frictional properties of the pavement wearing surface. Measurements are dependent on the texture properties, age, and temperature of the surface. Furthermore, the dependence of speed on skid numbers measured varies with the type of tire used during testing.

- The evaluation of the frictional properties of the mixtures studied varies depending on the frictional parameter considered. However, in general all mixtures appear to be providing adequate friction.

- Although the OGFC mixture has slightly lower skid number measurements according to some of the evaluation parameters studied, the lower speed dependence of the SN makes it a consistent wearing surface in terms of providing skid resistance to the user at all speeds.

- HMA design properties do affect the friction of the pavement wearing surface. Different design properties affect different friction and texture property parameters. Appropriate models were established for MPD and SNR. However, to accurately predict SNS it may be necessary to consider other aggregate and mixture properties.

Chapter 6

Recommendations

These recommendations may improve the findings from this research and allow for a more comprehensive understanding of the influence of properties and test particulars to pavement surface characteristic measurements.

- The fluctuating difference between measurements conducted using the two tires needs to be studied over a longer time period to determine whether the difference between the two tires varies over the life of the pavement wearing surface. The results of this study indicate that the change of skid resistance with time measured using the smooth and treaded tires may follow different patterns. A detailed study of the long-term trends may provide a better understanding of the influence of the different surface properties on skid resistance, and may allow for the development of formulas to convert between skid numbers measured using the two tires.

- The effect of wearing surface and atmospheric temperature needs to be investigated to determine if there is a definite impact on skid resistance resulting from temperature variations. Both temperature and age of the pavement seem to affect skid resistance; however, no definite conclusions could be reached regarding the relative contribution of these parameters to the variations in pavement friction. A controlled study which tests the frictional properties of a selected number of pavement sections under variable temperature may allow for quantification of the effect of temperature fluctuation on skid properties. Findings from this study, may also lead to pavement skid resistance temperature adjustment factors.

- A wider variety of mixtures should be analyzed to determine more precisely which material properties affect skid resistance and texture measurements the most. The models developed for the different parameters should be tested for other in-service wearing surface mixtures. The study should include mixtures with wider ranges of the HMA design properties studied. Other HMA properties, in addition to those used in this research, may also be included in the analysis.

- The applicability of the International Friction Index coefficients to Virginia pavements should be further analyzed. This research found that the F60 parameter computed using the ribbed and smooth tire was not consistent for all sections. This may indicate that, at least for some of the mixes studied, the coefficient used for computing the IFI may not be appropriate. Therefore, a more detailed investigation of more in-service pavement surfaces may be warranted if the IFI is to be implemented in the Commonwealth.

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Appendix A: Raw Skid Resistance Data

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-ID-20-1	A	72	1.94	19.8	0.09	20
1B-ID-20-1	B	77	2.01	19.5	0.27	20
1B-ID-20-1	C	63	1.34	21	0.07	20
1B-ID-20-1	D	64	2.13	20.1	0.28	20
1B-ID-20-1	E	71	0.78	19.8	0.19	20
1B-ID-20-1	F	65	2.3	19.8	0.1	20
1B-ID-20-1	G	72	1.35	19.8	0.09	20
1B-ID-20-1	H	72	1.01	20	0.23	20
1B-ID-20-1	I	63	2.65	20.7	0.14	20
1B-ID-20-1	J	68	0.83	19.7	0.16	20
1B-ID-20-1	K	46	2.72	20.8	0.07	20
1B-ID-20-1	L	44	1.87	21.8	0.1	20
1B-ID-20-2	A	68	2.55	20.3	0.07	20
1B-ID-20-2	B	76	4.35	19.2	0.18	20
1B-ID-20-2	C	66	1.84	19.5	0.11	20
1B-ID-20-2	D	56	1.82	20	0.07	20
1B-ID-20-2	E	72	0.66	19.4	0.14	20
1B-ID-20-2	F	65	2	20	0.17	20
1B-ID-20-2	G	72	2.01	20.1	0.09	20
1B-ID-20-2	H	74	1.24	19.9	0.07	20
1B-ID-20-2	I	70	1.96	20.1	0.22	20
1B-ID-20-2	J	72	1.38	19.1	0.07	20
1B-ID-20-2	K	44	3.19	20.7	0.09	20
1B-ID-20-2	L	43	2.24	21.1	0.07	20
1B-ID-20-3	A	60	3.57	20.9	0.07	20
1B-ID-20-3	B	79	1.08	20.1	0.09	20
1B-ID-20-3	C	62	1.77	19.8	0.15	20
1B-ID-20-3	D	55	2.29	19.7	0.08	20
1B-ID-20-3	E	68	1.84	19.8	0.26	20
1B-ID-20-3	F	65	1.87	21	0.12	20
1B-ID-20-3	G	65	2.99	20.7	0.17	20
1B-ID-20-3	H	72	1.29	19.4	0.23	20
1B-ID-20-3	I	68	2.71	20.2	0.15	20
1B-ID-20-3	J	74	1.14	19.5	0.17	20
1B-ID-20-3	K	43	3.35	20.6	0.14	20
1B-ID-20-3	L	41	2.72	20.8	0.06	20
1B-ID-40-1	A	50	3.81	40.1	0.18	40
1B-ID-40-1	B	51	5.48	40	0.39	40
1B-ID-40-1	C	38	2.47	39.9	0.38	40
1B-ID-40-1	D	22	3.48	40.3	0.21	40
1B-ID-40-1	E	45	5.99	40.1	0.24	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-ID-40-1	F	38	3.35	40.5	0.28	40
1B-ID-40-1	G	52	2.56	40.1	0.25	40
1B-ID-40-1	H	58	2.22	39.6	0.59	40
1B-ID-40-1	I	48	4.67	40.7	0.3	40
1B-ID-40-1	J	54	1.9	38.9	0.1	40
1B-ID-40-1	K	45	3.21	39	0.15	40
1B-ID-40-1	L	34	2.69	38.9	0.11	40
1B-ID-40-2	A	43	3.9	39.6	0.18	40
1B-ID-40-2	B	43	5.11	39.8	0.33	40
1B-ID-40-2	C	33	3.19	40	0.36	40
1B-ID-40-2	D	21	2.16	40.4	0.26	40
1B-ID-40-2	E	43	3.72	39.9	0.21	40
1B-ID-40-2	F	34	3.05	40.5	0.33	40
1B-ID-40-2	G	43	3.01	40	0.29	40
1B-ID-40-2	H	52	1.62	39.9	0.31	40
1B-ID-40-2	I	54	3.96	40.2	0.23	40
1B-ID-40-2	J	47	2.05	40.1	0.29	40
1B-ID-40-2	K	37	3.59	40.2	0.2	40
1B-ID-40-2	L	27	2.4	41.1	0.15	40
1B-ID-40-3	A	44	2.73	39.6	0.25	40
1B-ID-40-3	B	44	3.66	39.8	0.42	40
1B-ID-40-3	C	30	2.98	40.1	0.44	40
1B-ID-40-3	D	19	2.18	40.3	0.21	40
1B-ID-40-3	E	40	3.67	40	0.23	40
1B-ID-40-3	F	33	2.68	40.6	0.27	40
1B-ID-40-3	G	41	4.79	40.2	0.44	40
1B-ID-40-3	H	51	1.84	37.3	0.32	40
1B-ID-40-3	I	45	2.63	38	0.33	40
1B-ID-40-3	J	56	1.49	39.3	0.06	40
1B-ID-40-3	K	35	5.1	39.6	0.22	40
1B-ID-40-3	L	33	2.32	38.8	0.21	40
1B-ID-60-1	A	41	4.83	60.2	0.62	60
1B-ID-60-1	B	33	4.03	61.9	0.14	60
1B-ID-60-1	C	29	6.29	61.1	0.27	60
1B-ID-60-1	D	20	2.8	59	0.22	60
1B-ID-60-1	E	34	2.75	57.3	0.42	60
1B-ID-60-1	F	37	4.73	55.8	0.32	60
1B-ID-60-1	G	45	4.16	55.4	0.57	60
1B-ID-60-1	H	44	3.98	55.9	0.22	60
1B-ID-60-1	I	44	3.61	55	0.48	60
1B-ID-60-1	J	48	2.03	54.3	0.17	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-ID-60-1	K	38	1.7	53.6	0.2	60
1B-ID-60-2	A	36	7.16	59.2	0.49	60
1B-ID-60-2	B	31	5.48	58.8	0.35	60
1B-ID-60-2	C	20	3.91	60.2	0.34	60
1B-ID-60-2	D	18	1.95	59.9	0.13	60
1B-ID-60-2	E	34	3.57	59	0.51	60
1B-ID-60-2	F	24	2.96	59.4	0.45	60
1B-ID-60-2	H	38	5.13	58.9	0.67	60
1B-ID-60-2	I	38	4.7	59.8	0.44	60
1B-ID-60-2	J	40	2.19	59.7	0.32	60
1B-ID-60-2	K	34	1.7	59.8	0.24	60
1B-ID-60-3	A	39	2.21	60.1	0.72	60
1B-ID-60-3	B	39	3.55	60.1	0.49	60
1B-ID-60-3	C	30	6.4	59.7	0.2	60
1B-ID-60-3	D	16	1.34	60.1	0.14	60
1B-ID-60-3	E	32	3.84	57.9	0.27	60
1B-ID-60-3	F	26	3.52	59.4	0.26	60
1B-ID-60-3	H	37	2.88	61	0.42	60
1B-ID-60-3	I	33	5.08	59.5	0.61	60
1B-ID-60-3	J	43	4.76	58	0.15	60
1B-ID-60-3	K	36	2.99	58.9	0.12	60
1B-ID-60-3	L	16	3.46	60.5	0.19	60
1B-IU-20-1	A	75	1.96	18.3	0.15	20
1B-IU-20-1	B	83	1.05	18.3	0.23	20
1B-IU-20-1	C	72	2.75	19.3	0.1	20
1B-IU-20-1	D	67	1.94	19.4	0.13	20
1B-IU-20-1	E	71	1.33	19.6	0.33	20
1B-IU-20-1	F	71	1.46	19.8	0.13	20
1B-IU-20-1	G	79	1.67	19.4	0.14	20
1B-IU-20-1	H	77	1.68	19.5	0.14	20
1B-IU-20-1	I	81	1.63	18.6	0.17	20
1B-IU-20-1	J	76	1.7	19.3	0.26	20
1B-IU-20-1	K	53	1.82	20	0.08	20
1B-IU-20-1	L	58	2.13	19.8	0.1	20
1B-IU-20-2	A	73	2.46	19	0.17	20
1B-IU-20-2	B	80	2.15	19.8	0.18	20
1B-IU-20-2	C	68	3.66	19.1	0.09	20
1B-IU-20-2	D	67	1.66	19	0.12	20
1B-IU-20-2	E	72	2.5	18.1	0.14	20
1B-IU-20-2	F	70	1.4	19.3	0.23	20
1B-IU-20-2	G	78	1.32	19.7	0.07	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-IU-20-2	H	73	2.35	19.9	0.16	20
1B-IU-20-2	I	81	1.67	19.2	0.29	20
1B-IU-20-2	J	71	1.73	20.1	0.15	20
1B-IU-20-2	K	49	2.89	20.7	0.16	20
1B-IU-20-2	L	52	2.12	20	0.25	20
1B-IU-20-3	A	72	2.77	18.3	0.13	20
1B-IU-20-3	B	77	3.44	19.2	0.12	20
1B-IU-20-3	C	67	2.97	19.7	0.11	20
1B-IU-20-3	D	69	1.54	18.1	0.11	20
1B-IU-20-3	E	73	3.49	19.2	0.21	20
1B-IU-20-3	F	67	1.68	19.8	0.17	20
1B-IU-20-3	G	78	3.06	18.1	0.25	20
1B-IU-20-3	H	72	1.69	19.1	0.18	20
1B-IU-20-3	I	76	3.35	19.6	0.14	20
1B-IU-20-3	J	69	1.45	18.8	0.23	20
1B-IU-20-3	K	46	3.02	19.8	0.14	20
1B-IU-20-3	L	48	1.77	20.3	0.09	20
1B-IU-40-1	A	53	3.06	39.4	0.27	40
1B-IU-40-1	B	57	6.01	39.1	0.23	40
1B-IU-40-1	C	46	1.76	40.5	0.11	40
1B-IU-40-1	D	48	2.91	39	0.11	40
1B-IU-40-1	E	43	6.92	39.6	0.14	40
1B-IU-40-1	F	37	5.12	40.5	0.2	40
1B-IU-40-1	G	54	5.18	38.9	0.18	40
1B-IU-40-1	H	47	4.09	39.4	0.25	40
1B-IU-40-1	I	50	6.14	39.7	0.2	40
1B-IU-40-1	J	46	2.58	39.5	0.12	40
1B-IU-40-1	K	38	2.99	39.6	0.12	40
1B-IU-40-1	L	35	5.09	39.5	0.18	40
1B-IU-40-2	A	46	3.04	39.3	0.16	40
1B-IU-40-2	B	51	4.83	39.1	0.26	40
1B-IU-40-2	C	44	3.04	39.2	0.16	40
1B-IU-40-2	D	42	2.23	39.5	0.12	40
1B-IU-40-2	E	43	8.88	39.4	0.18	40
1B-IU-40-2	F	32	2.32	39.5	0.1	40
1B-IU-40-2	G	44	4.88	39.4	0.23	40
1B-IU-40-2	H	41	3.32	39.9	0.21	40
1B-IU-40-2	I	48	5.45	39.3	0.27	40
1B-IU-40-2	J	42	4.14	37.2	0.15	40
1B-IU-40-2	K	38	2.79	35.2	0.06	40
1B-IU-40-2	L	32	2.31	35.9	0.27	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-IU-40-3	A	41	2.79	39.3	0.16	40
1B-IU-40-3	B	53	5.21	39.1	0.19	40
1B-IU-40-3	C	46	2.72	39.1	0.2	40
1B-IU-40-3	D	37	1.68	39.7	0.18	40
1B-IU-40-3	E	37	4.21	39.8	0.26	40
1B-IU-40-3	F	30	2.23	39.5	0.1	40
1B-IU-40-3	G	40	4.03	39.7	0.19	40
1B-IU-40-3	H	44	3.32	39.7	0.2	40
1B-IU-40-3	I	46	6.08	39.5	0.49	40
1B-IU-40-3	J	37	2.02	39.7	0.13	40
1B-IU-40-3	K	40	5.42	39.5	0.08	40
1B-IU-40-3	L	31	3.97	39.4	0.15	40
1B-IU-60-1	A	42	5.26	56.9	0.24	60
1B-IU-60-1	B	45	2.99	57.4	0.33	60
1B-IU-60-1	C	36	4.55	57.9	0.47	60
1B-IU-60-1	D	35	2.79	57.9	0.25	60
1B-IU-60-1	E	38	6.53	55.7	0.35	60
1B-IU-60-1	F	29	6.62	55.4	0.17	60
1B-IU-60-1	G	30	5.18	54.5	0.31	60
1B-IU-60-1	H	36	3.96	53.4	0.18	60
1B-IU-60-1	I	34	5.09	52	0.38	60
1B-IU-60-1	J	45	5.52	51.5	0.08	60
1B-IU-60-1	K	41	2.09	51.9	0.25	60
1B-IU-60-1	L	34	1.99	52.4	0.17	60
1B-IU-60-2	A	41	4.32	56.9	0.19	60
1B-IU-60-2	B	45	3.33	57.6	0.32	60
1B-IU-60-2	C	31	4.72	57.3	0.28	60
1B-IU-60-2	D	29	3.19	57.2	0.46	60
1B-IU-60-2	E	30	6.97	55.6	0.41	60
1B-IU-60-2	F	32	8.38	54.6	0.39	60
1B-IU-60-2	G	26	1.59	54	0.28	60
1B-IU-60-2	H	31	3.77	54	0.29	60
1B-IU-60-2	I	30	9.66	54	0.32	60
1B-IU-60-2	J	35	4.96	55	0.41	60
1B-IU-60-2	K	39	3.74	55.7	0.43	60
1B-IU-60-3	A	34	5.19	57.7	0.13	60
1B-IU-60-3	B	38	3.52	58.5	0.33	60
1B-IU-60-3	C	26	4.91	59	0.3	60
1B-IU-60-3	D	25	2.41	59.6	0.46	60
1B-IU-60-3	E	24	4.76	57	0.54	60
1B-IU-60-3	F	23	3.52	56	0.1	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-IU-60-3	G	27	4.3	55.5	0.23	60
1B-IU-60-3	H	28	3.68	55.4	0.27	60
1B-IU-60-3	I	24	6.49	54.8	0.35	60
1B-IU-60-3	J	35	2.43	55.7	0.29	60
1B-IU-60-3	L	34	4.01	55.7	0.35	60
1B-NID-20-1	A	54	3.25	21.5	0.11	20
1B-NID-20-1	B	62	2.35	22.1	0.34	20
1B-NID-20-1	C	62	2.84	20.8	0.25	20
1B-NID-20-1	D	56	2.63	19.4	0.3	20
1B-NID-20-1	E	67	2.51	19.6	0.32	20
1B-NID-20-1	F	67	1.68	20.2	0.24	20
1B-NID-20-1	G	66	2.76	20.2	0.15	20
1B-NID-20-1	H	71	1.81	20.3	0.06	20
1B-NID-20-1	I	74	1.69	20.5	0.23	20
1B-NID-20-1	J	67	1.39	21.7	0.32	20
1B-NID-20-1	K	46	4.66	22.4	0.15	20
1B-NID-20-1	L	44	2.08	23	0.1	20
1B-NID-20-2	A	59	3.24	20.1	0.35	20
1B-NID-20-2	B	65	3.78	19.6	0.32	20
1B-NID-20-2	C	70	1.68	19.7	0.16	20
1B-NID-20-2	D	61	2.02	18.5	0.15	20
1B-NID-20-2	E	66	3.15	19.9	0.23	20
1B-NID-20-2	F	66	1.99	19.8	0.21	20
1B-NID-20-2	G	64	1.55	20.8	0.18	20
1B-NID-20-2	H	62	1.83	20.8	0.25	20
1B-NID-20-2	I	68	1.67	20.9	0.16	20
1B-NID-20-2	J	70	1.19	20.7	0.19	20
1B-NID-20-2	K	40	2.34	22	0.1	20
1B-NID-20-2	L	46	1.84	20.7	0.06	20
1B-NID-20-3	A	66	3.09	20.1	0.31	20
1B-NID-20-3	B	66	3.16	19.4	0.19	20
1B-NID-20-3	C	64	1.73	20.2	0.07	20
1B-NID-20-3	D	60	4.64	19.1	0.26	20
1B-NID-20-3	E	64	2.68	20.4	0.29	20
1B-NID-20-3	F	67	1.74	20.7	0.25	20
1B-NID-20-3	G	69	1.86	20	0.2	20
1B-NID-20-3	H	75	2.8	19.8	0.23	20
1B-NID-20-3	I	69	1.57	20.1	0.29	20
1B-NID-20-3	J	76	1.16	20.5	0.27	20
1B-NID-20-3	K	44	9.71	21.5	0.16	20
1B-NID-20-3	L	40	2.03	20.6	0.1	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-NID-40-1	A	31	6.58	40.9	0.31	40
1B-NID-40-1	B	28	2.64	40.8	0.2	40
1B-NID-40-1	C	34	6.4	40.6	0.21	40
1B-NID-40-1	D	20	2.84	40.8	0.24	40
1B-NID-40-1	E	42	3.99	40.7	0.3	40
1B-NID-40-1	F	47	6.16	41.2	0.32	40
1B-NID-40-1	G	42	4.52	41.2	0.35	40
1B-NID-40-1	H	35	2.49	40.9	0.25	40
1B-NID-40-1	I	43	2.64	41	0.4	40
1B-NID-40-1	J	49	3.31	40.6	0.38	40
1B-NID-40-1	K	41	7.7	41.2	0.27	40
1B-NID-40-1	L	30	1.68	41.7	0.17	40
1B-NID-40-2	A	25	5.64	41.1	0.24	40
1B-NID-40-2	B	25	2.73	40.9	0.37	40
1B-NID-40-2	C	34	5.38	40.6	0.55	40
1B-NID-40-2	D	18	1.23	41.1	0.12	40
1B-NID-40-2	E	47	5.35	41	0.31	40
1B-NID-40-2	F	43	6.07	41.2	0.34	40
1B-NID-40-2	G	41	2.7	41.4	0.31	40
1B-NID-40-2	H	34	2.71	40.8	0.18	40
1B-NID-40-2	I	40	4.13	41	0.28	40
1B-NID-40-2	J	46	3.77	40.7	0.28	40
1B-NID-40-2	K	34	4.92	40.8	0.19	40
1B-NID-40-2	L	29	2	41.8	0.22	40
1B-NID-40-3	A	27	3.26	41.2	0.11	40
1B-NID-40-3	B	27	2.74	40.9	0.29	40
1B-NID-40-3	C	34	6.73	40.5	0.62	40
1B-NID-40-3	D	20	4.21	41.1	0.28	40
1B-NID-40-3	E	37	4.75	40.5	0.28	40
1B-NID-40-3	F	39	4.79	41.2	0.27	40
1B-NID-40-3	G	44	6.08	40.9	0.39	40
1B-NID-40-3	H	33	2.77	40.9	0.24	40
1B-NID-40-3	I	40	1.71	41	0.24	40
1B-NID-40-3	J	46	2.88	40.3	0.23	40
1B-NID-40-3	K	38	8.71	40.8	0.31	40
1B-NID-40-3	L	27	3.21	41.8	0.14	40
1B-NID-60-1	A	18	5.95	59.6	0.12	60
1B-NID-60-1	B	29	11.4	60	0.12	60
1B-NID-60-1	C	22	3.8	59.6	0.32	60
1B-NID-60-1	D	22	8.58	59	0.07	60
1B-NID-60-1	E	44	5.61	58.2	0.35	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-NID-60-1	F	48	3.54	58	0.46	60
1B-NID-60-1	G	45	5	57	0.25	60
1B-NID-60-1	H	43	4.79	56.3	0.23	60
1B-NID-60-1	I	51	7.49	57.8	0.46	60
1B-NID-60-1	J	54	5.06	58	0.29	60
1B-NID-60-1	K	41	2.67	57	0.28	60
1B-NID-60-1	L	32	2.65	57.2	0.45	60
1B-NID-60-2	A	25	6.39	58.6	0.55	60
1B-NID-60-2	B	24	8.82	58.6	0.32	60
1B-NID-60-2	C	25	4.86	58.6	0.5	60
1B-NID-60-2	D	15	2.17	58.5	0.12	60
1B-NID-60-2	E	40	4.18	58.7	0.44	60
1B-NID-60-2	G	43	5.87	56.5	0.34	60
1B-NID-60-2	H	37	2.79	56	0.38	60
1B-NID-60-2	I	46	3.69	56.7	0.29	60
1B-NID-60-2	J	48	2.86	56.8	0.3	60
1B-NID-60-2	K	35	2.09	56.7	0.5	60
1B-NID-60-2	L	33	2.04	55.8	0.12	60
1B-NID-60-3	A	23	4.93	55.2	0.09	60
1B-NID-60-3	B	29	7.23	55.6	0.2	60
1B-NID-60-3	C	26	3	56.6	0.57	60
1B-NID-60-3	D	14	4.08	57.1	0.08	60
1B-NID-60-3	E	41	4.27	55.6	0.17	60
1B-NID-60-3	F	37	3.64	54.4	0.37	60
1B-NID-60-3	G	34	6.32	55.4	0.27	60
1B-NID-60-3	H	31	2.84	54.7	0.4	60
1B-NID-60-3	I	42	4.78	54.7	0.28	60
1B-NID-60-3	J	43	2.54	53.8	0.5	60
1B-NID-60-3	K	40	6.78	54.4	0.16	60
1B-NID-60-3	L	27	2.03	55.1	0.29	60
1B-NIU-20-1	A	69	3.52	19.2	0.17	20
1B-NIU-20-1	B	73	1.88	18.6	0.27	20
1B-NIU-20-1	C	68	2.13	19.7	0.32	20
1B-NIU-20-1	D	65	2.6	19.8	0.33	20
1B-NIU-20-1	E	68	3.06	19.4	0.31	20
1B-NIU-20-1	F	59	1.52	20.7	0.25	20
1B-NIU-20-1	G	68	4.32	20.3	0.29	20
1B-NIU-20-1	H	67	1.81	20.8	0.19	20
1B-NIU-20-1	I	67	1.78	21	0.16	20
1B-NIU-20-1	J	72	1.97	19.4	0.24	20
1B-NIU-20-1	K	43	3.58	20.1	0.12	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-NIU-20-1	L	52	3.16	20.5	0.22	20
1B-NIU-20-2	A	58	4.65	20.3	0.09	20
1B-NIU-20-2	B	71	2.11	20	0.27	20
1B-NIU-20-2	C	68	2.86	20	0.22	20
1B-NIU-20-2	D	56	2.23	19	0.06	20
1B-NIU-20-2	E	68	5.37	19.3	0.27	20
1B-NIU-20-2	F	55	1.74	19.6	0.07	20
1B-NIU-20-2	G	61	1.37	21.4	0.18	20
1B-NIU-20-2	H	75	2.08	18.8	0.17	20
1B-NIU-20-2	I	74	1.45	18.7	0.1	20
1B-NIU-20-2	J	74	2.67	20.4	0.19	20
1B-NIU-20-2	K	40	1.89	21.2	0.08	20
1B-NIU-20-2	L	43	2.93	20.4	0.08	20
1B-NIU-20-3	A	60	1.87	19.6	0.22	20
1B-NIU-20-3	B	74	2.73	19.2	0.22	20
1B-NIU-20-3	C	71	2.35	20.1	0.06	20
1B-NIU-20-3	D	53	3.82	21.8	0.2	20
1B-NIU-20-3	E	65	2.09	19.3	0.08	20
1B-NIU-20-3	F	72	4.7	20.7	0.26	20
1B-NIU-20-3	G	67	2.09	19.8	0.17	20
1B-NIU-20-3	H	71	2.58	18.9	0.1	20
1B-NIU-20-3	I	70	1.59	20.3	0.16	20
1B-NIU-20-3	J	75	2.18	19.2	0.31	20
1B-NIU-20-3	K	39	2.87	21.2	0.08	20
1B-NIU-20-3	L	49	2.09	20.8	0.07	20
1B-NIU-40-1	A	26	7.23	40.6	0.12	40
1B-NIU-40-1	B	44	4.27	40.2	0.25	40
1B-NIU-40-1	C	41	6.75	39.8	0.13	40
1B-NIU-40-1	D	41	3.34	39.9	0.08	40
1B-NIU-40-1	E	36	7.96	40.5	0.21	40
1B-NIU-40-1	F	29	3.72	40.1	0.2	40
1B-NIU-40-1	G	36	4.67	40.2	0.23	40
1B-NIU-40-1	H	43	3.66	40.3	0.22	40
1B-NIU-40-1	I	51	4.63	40.1	0.23	40
1B-NIU-40-1	J	47	1.75	39.7	0.13	40
1B-NIU-40-1	K	39	3.04	40	0.21	40
1B-NIU-40-1	L	36	3.78	40.1	0.09	40
1B-NIU-40-2	A	32	6.41	40.5	0.15	40
1B-NIU-40-2	B	38	5.16	40.1	0.26	40
1B-NIU-40-2	C	38	3.88	39.8	0.09	40
1B-NIU-40-2	D	35	3.09	40.3	0.07	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-NIU-40-2	E	44	8.81	40.3	0.38	40
1B-NIU-40-2	F	28	3.31	40.3	0.18	40
1B-NIU-40-2	G	37	4.2	40.2	0.36	40
1B-NIU-40-2	H	37	2.42	40.2	0.34	40
1B-NIU-40-2	I	51	4.76	40.2	0.27	40
1B-NIU-40-2	J	44	3.38	39.7	0.37	40
1B-NIU-40-2	K	37	2.39	39.9	0.29	40
1B-NIU-40-2	L	31	2.29	40.2	0.23	40
1B-NIU-40-3	A	37	12.9	40	0.33	40
1B-NIU-40-3	B	46	6.33	39.8	0.18	40
1B-NIU-40-3	C	54	4.83	39.7	0.23	40
1B-NIU-40-3	D	42	6.3	39.9	0.09	40
1B-NIU-40-3	E	47	10.6	40	0.21	40
1B-NIU-40-3	F	30	3.56	39.7	0.08	40
1B-NIU-40-3	G	42	8.27	40.4	0.2	40
1B-NIU-40-3	H	53	3.97	40	0.26	40
1B-NIU-40-3	I	51	7.04	40.2	0.21	40
1B-NIU-40-3	J	51	8.23	39.8	0.24	40
1B-NIU-40-3	K	38	2.79	40	0.2	40
1B-NIU-40-3	L	32	3.09	40.3	0.1	40
1B-NIU-60-1	A	51	8.61	58.2	0.56	60
1B-NIU-60-1	B	50	5.1	57.7	0.38	60
1B-NIU-60-1	C	41	6.76	57.5	0.31	60
1B-NIU-60-1	D	38	4.11	57.5	0.4	60
1B-NIU-60-1	E	37	9.15	54.9	0.33	60
1B-NIU-60-1	F	45	4.71	54.6	0.09	60
1B-NIU-60-1	G	50	6.66	54.4	0.12	60
1B-NIU-60-1	H	48	3.47	53.4	0.08	60
1B-NIU-60-1	I	50	9.48	51.4	0.57	60
1B-NIU-60-1	J	50	2.41	51.4	0.29	60
1B-NIU-60-1	K	42	1.9	52.8	0.19	60
1B-NIU-60-1	L	33	1.97	53.3	0.37	60
1B-NIU-60-2	A	37	9.43	54.5	0.48	60
1B-NIU-60-2	B	40	4.05	55.3	0.36	60
1B-NIU-60-2	C	35	10.2	55.3	0.49	60
1B-NIU-60-2	D	34	2.89	54.8	0.47	60
1B-NIU-60-2	E	31	6.73	52.1	0.29	60
1B-NIU-60-2	F	34	3.43	52	0.09	60
1B-NIU-60-2	G	43	6.84	52.1	0.21	60
1B-NIU-60-2	H	43	2.81	51.4	0.22	60
1B-NIU-60-2	I	48	12.9	49.4	0.29	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
1B-NIU-60-2	J	51	3.55	48.5	0.3	60
1B-NIU-60-2	K	33	1.6	49.2	0.66	60
1B-NIU-60-2	L	28	2.91	50.6	0.17	60
1B-NIU-60-3	A	35	13.5	58.2	0.15	60
1B-NIU-60-3	B	37	5.53	58.2	0.48	60
1B-NIU-60-3	C	24	3.21	57.1	0.63	60
1B-NIU-60-3	D	26	2.48	56.2	0.72	60
1B-NIU-60-3	E	29	7.91	53.5	0.36	60
1B-NIU-60-3	F	27	3.01	52.7	0.08	60
1B-NIU-60-3	G	33	8.66	52.4	0.13	60
1B-NIU-60-3	H	36	4.63	52.5	0.32	60
1B-NIU-60-3	I	52	7.88	51.7	0.44	60
1B-NIU-60-3	J	49	4.35	50.9	0.29	60
1B-NIU-60-3	K	39	2.02	51.4	0.26	60
1B-NIU-60-3	L	28	4.75	52.4	0.37	60
2T-ID-20-1	A	59	0.92	21.1	0.39	20
2T-ID-20-1	B	67	2.33	19.6	0.15	20
2T-ID-20-1	C	64	1	20.3	0.19	20
2T-ID-20-1	D	60	1.14	20.2	0.08	20
2T-ID-20-1	E	63	0.76	21.5	0.25	20
2T-ID-20-1	F	62	0.95	20.8	0.22	20
2T-ID-20-1	G	67	0.8	20.5	0.11	20
2T-ID-20-1	H	68	0.91	20.2	0.21	20
2T-ID-20-1	I	65	1.41	21.3	0.2	20
2T-ID-20-1	J	65	1.02	20.8	0.11	20
2T-ID-20-1	K	38	1.51	21.5	0.12	20
2T-ID-20-1	L	53	1	21.2	0.13	20
2T-ID-20-2	A	66	20.4	18.7	0.26	20
2T-ID-20-2	B	70	2.54	18.8	0.08	20
2T-ID-20-2	C	66	0.94	19.9	0.07	20
2T-ID-20-2	D	63	1.46	19.1	0.29	20
2T-ID-20-2	E	65	0.92	20.1	0.07	20
2T-ID-20-2	F	65	0.86	20.2	0.09	20
2T-ID-20-2	G	65	0.94	21.1	0.22	20
2T-ID-20-2	H	66	0.78	20	0.8	20
2T-ID-20-2	I	65	0.87	20.5	0.14	20
2T-ID-20-2	J	67	0.8	21	0.1	20
2T-ID-20-2	K	44	2.53	21.1	0.6	20
2T-ID-20-2	L	50	1.36	23.1	0.1	20
2T-ID-20-3	A	63	3.2	20.5	0.07	20
2T-ID-20-3	B	70	3.36	19.8	0.1	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-ID-20-3	C	63	0.9	20.1	0.08	20
2T-ID-20-3	D	60	1.34	20.7	0.27	20
2T-ID-20-3	E	68	0.7	19.6	0.17	20
2T-ID-20-3	F	67	0.82	20	0.27	20
2T-ID-20-3	G	67	0.87	20.8	0.34	20
2T-ID-20-3	H	71	1.02	18.4	0.18	20
2T-ID-20-3	I	72	0.9	20.6	0.12	20
2T-ID-20-3	J	68	0.81	20.6	0.19	20
2T-ID-20-3	K	39	1.97	21.4	0.14	20
2T-ID-20-3	L	51	1.52	21	0.16	20
2T-ID-40-1	A	51	1.9	37.8	0.24	40
2T-ID-40-1	B	59	1.32	38.5	0.07	40
2T-ID-40-1	C	53	1.37	37.3	0.34	40
2T-ID-40-1	D	42	3.16	37.4	0.31	40
2T-ID-40-1	E	51	2.06	40.2	0.24	40
2T-ID-40-1	F	52	1.18	40.7	0.6	40
2T-ID-40-1	G	50	3.13	41.2	0.45	40
2T-ID-40-1	H	57	2.21	40.9	0.43	40
2T-ID-40-1	I	51	2.3	41.2	0.43	40
2T-ID-40-1	J	54	1.24	40.8	0.28	40
2T-ID-40-1	K	35	3.5	41.6	0.24	40
2T-ID-40-1	L	35	2.89	41.7	0.14	40
2T-ID-40-2	A	47	1.74	41	0.21	40
2T-ID-40-2	B	53	2.27	40.9	0.34	40
2T-ID-40-2	C	46	1.4	41	0.23	40
2T-ID-40-2	D	39	1.64	40.3	0.82	40
2T-ID-40-2	E	49	1.66	40.5	0.39	40
2T-ID-40-2	F	52	1.46	40.7	0.27	40
2T-ID-40-2	G	50	2.16	41.3	0.25	40
2T-ID-40-2	H	54	1.55	40.9	0.54	40
2T-ID-40-2	I	52	2.92	41.4	0.27	40
2T-ID-40-2	J	56	1.93	41.1	0.35	40
2T-ID-40-2	K	35	2.99	41.5	0.26	40
2T-ID-40-2	L	32	1.4	41.9	0.07	40
2T-ID-40-3	A	44	2.49	41.2	0.22	40
2T-ID-40-3	B	53	2.2	41	0.2	40
2T-ID-40-3	C	48	1.63	40.7	0.44	40
2T-ID-40-3	D	41	3.33	40.4	0.7	40
2T-ID-40-3	E	43	1.89	40.6	0.42	40
2T-ID-40-3	F	47	1.78	41.3	0.35	40
2T-ID-40-3	G	46	2.45	41	0.41	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-ID-40-3	H	56	1.52	41.1	0.41	40
2T-ID-40-3	I	54	1.52	41.4	0.24	40
2T-ID-40-3	J	56	1.4	41.1	0.3	40
2T-ID-40-3	K	34	3.29	41.6	0.17	40
2T-ID-40-3	L	30	1.44	42	0.07	40
2T-ID-60-1	A	39	2.2	51.1	0.26	60
2T-ID-60-1	B	51	1.67	49.8	0.61	60
2T-ID-60-1	C	40	2.22	50.9	0.24	60
2T-ID-60-1	D	35	4.41	50.8	0.51	60
2T-ID-60-1	E	43	1.8	50	0.33	60
2T-ID-60-1	F	44	1.98	51.1	0.58	60
2T-ID-60-1	G	42	2.9	51	0.5	60
2T-ID-60-1	H	47	2.17	51.2	0.28	60
2T-ID-60-1	I	50	4.06	50.9	0.74	60
2T-ID-60-1	J	48	1.88	50.9	0.69	60
2T-ID-60-1	K	32	3.46	51.4	0.12	60
2T-ID-60-1	L	27	1.25	51.3	0.55	60
2T-ID-60-2	A	40	2.48	50.7	0.28	60
2T-ID-60-2	B	47	1.36	50.7	0.91	60
2T-ID-60-2	C	39	2.83	50.8	0.5	60
2T-ID-60-2	D	33	3.66	50.4	0.49	60
2T-ID-60-2	E	49	1.23	48.5	2.87	60
2T-ID-60-2	F	40	1.7	51.6	0.37	60
2T-ID-60-2	G	41	1.97	50.9	0.38	60
2T-ID-60-2	H	45	2.17	51.3	0.26	60
2T-ID-60-2	I	44	2.73	51.1	0.35	60
2T-ID-60-2	J	44	2.47	50.4	0.94	60
2T-ID-60-2	K	31	2.7	51.6	0.16	60
2T-ID-60-2	L	25	0.95	50.9	0.73	60
2T-ID-60-3	A	37	1.68	49.4	0.35	60
2T-ID-60-3	B	48	1.55	50.5	0.23	60
2T-ID-60-3	C	39	1.68	51.1	0.28	60
2T-ID-60-3	D	31	1.75	50.7	0.1	60
2T-ID-60-3	E	43	1.56	50	0.71	60
2T-ID-60-3	F	40	1.7	51.2	0.17	60
2T-ID-60-3	G	40	2.59	50.6	0.54	60
2T-ID-60-3	H	42	2.52	51.2	0.3	60
2T-ID-60-3	I	42	2.97	51.1	0.21	60
2T-ID-60-3	J	44	2.53	51	0.16	60
2T-ID-60-3	K	31	2.41	51.3	0.24	60
2T-ID-60-3	L	24	1.14	51	0.45	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-IU-20-1	A	65	1.07	18.6	0.12	20
2T-IU-20-1	B	69	1.09	19.5	0.16	20
2T-IU-20-1	C	64	1.36	19.1	0.12	20
2T-IU-20-1	D	64	0.9	20.2	0.18	20
2T-IU-20-1	E	65	1.81	20.4	0.15	20
2T-IU-20-1	F	66	1.04	19.4	0.16	20
2T-IU-20-1	G	70	1.02	19.2	0.29	20
2T-IU-20-1	H	69	1.45	19.3	0.19	20
2T-IU-20-1	I	69	1.32	20.2	0.14	20
2T-IU-20-1	J	67	1.32	19.9	0.14	20
2T-IU-20-1	K	43	1.54	20.4	0.11	20
2T-IU-20-1	L	61	1.42	20.9	0.16	20
2T-IU-20-2	A	64	1.82	19.7	0.07	20
2T-IU-20-2	B	71	1.21	19.7	0.11	20
2T-IU-20-2	C	65	1.21	20.4	0.15	20
2T-IU-20-2	D	65	1.01	19.8	0.11	20
2T-IU-20-2	E	67	1.4	20.1	0.12	20
2T-IU-20-2	F	67	1.09	19.7	0.23	20
2T-IU-20-2	G	68	1.34	20.1	0.09	20
2T-IU-20-2	H	70	1.72	19.9	0.12	20
2T-IU-20-2	I	69	1.63	18.3	0.25	20
2T-IU-20-2	J	69	1.82	20.1	0.19	20
2T-IU-20-2	K	41	2.52	21.2	0.13	20
2T-IU-20-2	L	56	2.03	20.3	0.19	20
2T-IU-20-3	A	65	2.45	19.2	0.26	20
2T-IU-20-3	B	74	1.54	19.3	0.22	20
2T-IU-20-3	C	68	1.23	18.9	0.16	20
2T-IU-20-3	D	65	1.19	19.5	0.16	20
2T-IU-20-3	E	73	1.36	19.6	0.29	20
2T-IU-20-3	F	69	1.47	19.7	1.32	20
2T-IU-20-3	G	70	1.27	19.1	0.12	20
2T-IU-20-3	H	71	1.59	18.5	0.13	20
2T-IU-20-3	I	69	1.79	19.6	0.27	20
2T-IU-20-3	J	68	1.62	20.1	0.16	20
2T-IU-20-3	K	41	3.99	20.9	0.15	20
2T-IU-20-3	L	55	1.41	20	0.27	20
2T-IU-40-1	A	50	2.19	40.1	0.68	40
2T-IU-40-1	B	58	1.59	40	0.32	40
2T-IU-40-1	C	53	1.57	40.4	0.21	40
2T-IU-40-1	D	52	1.69	39.6	0.14	40
2T-IU-40-1	E	55	1.77	39	0.72	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-IU-40-1	F	54	1.47	38.9	0.35	40
2T-IU-40-1	G	56	2.61	39.2	0.27	40
2T-IU-40-1	H	58	2.61	39.7	0.21	40
2T-IU-40-1	I	57	2.44	40.7	0.45	40
2T-IU-40-1	J	56	2.21	40.9	0.22	40
2T-IU-40-1	K	36	3.46	39.6	0.15	40
2T-IU-40-1	L	46	2	37.9	0.2	40
2T-IU-40-2	A	48	2.93	40.3	0.12	40
2T-IU-40-2	B	55	2.83	40.4	0.19	40
2T-IU-40-2	C	51	1.86	40.7	0.16	40
2T-IU-40-2	D	47	1.4	40.2	0.16	40
2T-IU-40-2	E	55	2.27	39.2	0.18	40
2T-IU-40-2	F	53	1.42	38.9	0.21	40
2T-IU-40-2	G	52	2.42	39.5	0.45	40
2T-IU-40-2	H	48	1.71	40.6	0.15	40
2T-IU-40-2	I	51	3.37	41.2	0.09	40
2T-IU-40-2	J	55	2.64	38.7	0.18	40
2T-IU-40-2	K	34	3.29	39.3	0.14	40
2T-IU-40-2	L	33	1.51	39.8	0.3	40
2T-IU-40-3	A	49	2.54	40.3	0.2	40
2T-IU-40-3	B	56	2.58	40.3	0.32	40
2T-IU-40-3	C	48	1.82	40.4	0.1	40
2T-IU-40-3	D	47	1.3	40.8	0.13	40
2T-IU-40-3	E	50	1.94	41.4	0.16	40
2T-IU-40-3	F	49	2.22	41.9	0.15	40
2T-IU-40-3	G	46	2.1	40.7	0.32	40
2T-IU-40-3	H	54	2.57	39.2	0.14	40
2T-IU-40-3	I	54	2.31	39.8	0.2	40
2T-IU-40-3	J	52	2.74	39.7	0.15	40
2T-IU-40-3	K	34	4.15	40.7	0.11	40
2T-IU-40-3	L	32	1.47	41.1	0.1	40
2T-IU-60-1	A	43	2.57	49.6	0.42	60
2T-IU-60-1	B	51	2.39	50.2	0.61	60
2T-IU-60-1	C	44	1.83	50.5	0.64	60
2T-IU-60-1	D	44	3.23	50.6	0.23	60
2T-IU-60-1	E	50	2.33	49.7	0.25	60
2T-IU-60-1	F	46	2.44	49.5	0.27	60
2T-IU-60-1	G	44	3.37	49.5	0.47	60
2T-IU-60-1	H	45	3.3	50.1	0.1	60
2T-IU-60-1	I	51	4.63	50.1	0.96	60
2T-IU-60-1	J	49	1.58	49.7	0.07	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-IU-60-1	K	33	3.29	48.9	0.17	60
2T-IU-60-1	L	30	2.18	47.5	0.14	60
2T-IU-60-2	A	39	3.55	53.4	0.34	60
2T-IU-60-2	B	47	2.79	53.4	0.63	60
2T-IU-60-2	C	45	2.81	53.1	0.35	60
2T-IU-60-2	D	39	1.45	52.8	0.55	60
2T-IU-60-2	E	44	2.25	50.9	1.13	60
2T-IU-60-2	F	45	1.49	50.6	0.16	60
2T-IU-60-2	G	43	3.76	50.3	0.39	60
2T-IU-60-2	H	41	2.09	50.5	0.6	60
2T-IU-60-2	I	43	5.01	50.4	1.05	60
2T-IU-60-2	J	45	2.68	52	0.09	60
2T-IU-60-2	K	32	2.91	50.4	0.85	60
2T-IU-60-2	L	28	3.31	48.8	0.36	60
2T-IU-60-3	A	44	4.91	50.2	0.29	60
2T-IU-60-3	B	49	3.95	51.1	0.36	60
2T-IU-60-3	C	42	3.84	51.6	0.59	60
2T-IU-60-3	D	44	1.7	52.6	0.37	60
2T-IU-60-3	E	48	3.44	50.9	0.86	60
2T-IU-60-3	F	44	2.6	50.9	0.51	60
2T-IU-60-3	G	44	2.89	50.1	0.58	60
2T-IU-60-3	H	41	3.81	50.3	0.71	60
2T-IU-60-3	I	53	2.18	50.9	0.19	60
2T-IU-60-3	J	47	2.72	49.2	0.11	60
2T-IU-60-3	K	33	2.73	49.4	0.28	60
2T-IU-60-3	L	28	1.49	49.1	0.7	60
2T-NID-20-1	A	67	0.7	19.5	0.13	20
2T-NID-20-1	B	67	1.53	19.8	0.09	20
2T-NID-20-1	C	62	1.38	20.8	0.08	20
2T-NID-20-1	D	64	1.29	20.2	0.32	20
2T-NID-20-1	E	65	1.16	19.8	0.2	20
2T-NID-20-1	F	66	0.77	20.3	0.12	20
2T-NID-20-1	G	67	1.22	20.4	0.14	20
2T-NID-20-1	H	67	0.95	20.6	0.08	20
2T-NID-20-1	I	68	2.18	19.2	2.86	20
2T-NID-20-1	J	71	1.07	20.5	0.16	20
2T-NID-20-1	K	43	6.56	21.5	0.1	20
2T-NID-20-1	L	56	1.34	22	0.17	20
2T-NID-20-2	A	65	0.34	20.3	0.14	20
2T-NID-20-2	B	68	1.56	20.7	0.08	20
2T-NID-20-2	C	65	1.9	21.1	0.19	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-NID-20-2	D	60	1.73	19.8	0.27	20
2T-NID-20-2	E	66	1.01	19.3	0.25	20
2T-NID-20-2	F	64	1.35	20.3	0.18	20
2T-NID-20-2	G	68	1.49	19.5	0.25	20
2T-NID-20-2	H	71	1	20.2	0.22	20
2T-NID-20-2	I	73	0.77	20.6	0.23	20
2T-NID-20-2	J	72	0.88	21	0.22	20
2T-NID-20-2	K	40	1.8	21.3	0.08	20
2T-NID-20-2	L	54	2.03	21.2	0.07	20
2T-NID-20-3	A	70	1.57	19.5	0.15	20
2T-NID-20-3	B	71	1.59	20.2	0.3	20
2T-NID-20-3	C	67	1.18	19.1	0.08	20
2T-NID-20-3	D	66	1.4	19.8	0.31	20
2T-NID-20-3	E	70	1.24	19	0.34	20
2T-NID-20-3	F	67	1.27	20.1	0.24	20
2T-NID-20-3	G	70	1.1	19.8	0.26	20
2T-NID-20-3	H	70	1.68	19.7	0.24	20
2T-NID-20-3	I	75	1.01	19.8	0.32	20
2T-NID-20-3	J	69	0.9	20.8	0.31	20
2T-NID-20-3	K	37	2.78	21.7	0.13	20
2T-NID-20-3	L	47	1.99	20.4	0.07	20
2T-NID-40-1	A	49	1.97	41.1	0.13	40
2T-NID-40-1	B	54	1.06	41.6	0.25	40
2T-NID-40-1	C	50	3.43	41.1	0.29	40
2T-NID-40-1	D	47	1.6	40.8	0.5	40
2T-NID-40-1	E	55	2.14	41	0.38	40
2T-NID-40-1	F	53	1.74	41.3	0.27	40
2T-NID-40-1	G	55	3.34	41.5	0.27	40
2T-NID-40-1	H	56	2.1	40.9	0.76	40
2T-NID-40-1	I	59	2.25	41.3	0.37	40
2T-NID-40-1	J	60	0.81	40.8	0.83	40
2T-NID-40-1	K	36	6.71	41.9	0.32	40
2T-NID-40-1	L	37	1.65	41.9	0.2	40
2T-NID-40-2	A	55	1.58	41	0.12	40
2T-NID-40-2	B	54	1.48	40.8	0.21	40
2T-NID-40-2	C	45	2.59	40.6	0.32	40
2T-NID-40-2	D	45	1.79	40.9	0.21	40
2T-NID-40-2	E	55	1.71	40.2	1.19	40
2T-NID-40-2	F	52	1.18	40.8	0.18	40
2T-NID-40-2	G	50	2.77	40.7	0.43	40
2T-NID-40-2	H	50	1.84	40.6	1.49	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-NID-40-2	I	53	2.46	40.6	0.88	40
2T-NID-40-2	J	58	1.23	39.9	1.7	40
2T-NID-40-2	K	35	6.13	41.4	0.29	40
2T-NID-40-2	L	35	1.39	41.8	0.17	40
2T-NID-40-3	A	50	1.55	40.5	0.15	40
2T-NID-40-3	B	49	1.51	40.5	0.1	40
2T-NID-40-3	C	50	1.94	40.8	0.23	40
2T-NID-40-3	D	45	2.39	40.8	0.31	40
2T-NID-40-3	E	51	1.39	40.5	0.33	40
2T-NID-40-3	F	47	2.35	40.9	0.37	40
2T-NID-40-3	G	46	1.57	40.6	0.48	40
2T-NID-40-3	H	47	1.24	40.9	0.28	40
2T-NID-40-3	I	54	1.37	40.8	0.31	40
2T-NID-40-3	J	57	2.07	40.6	0.24	40
2T-NID-40-3	K	38	3.62	41.2	0.31	40
2T-NID-40-3	L	32	1.34	41.8	0.12	40
2T-NID-60-1	A	53	4.28	50.1	0.43	60
2T-NID-60-1	B	47	1.94	50.5	0.18	60
2T-NID-60-1	C	48	3.22	50.2	2.67	60
2T-NID-60-1	D	42	2.12	52.4	0.37	60
2T-NID-60-1	E	47	3.34	52.3	0.53	60
2T-NID-60-1	F	40	1.44	52.3	0.29	60
2T-NID-60-1	G	44	2.84	52.3	0.36	60
2T-NID-60-1	H	45	2.89	53.4	0.58	60
2T-NID-60-1	I	49	4.96	53.1	0.3	60
2T-NID-60-1	J	51	1.81	53.6	0.47	60
2T-NID-60-1	K	34	4.61	54.5	0.68	60
2T-NID-60-1	L	29	2.75	55.6	0.43	60
2T-NID-60-2	A	45	2.88	53.1	0.53	60
2T-NID-60-2	B	45	1.96	50.4	0.34	60
2T-NID-60-2	C	44	2.67	49.9	2.09	60
2T-NID-60-2	D	38	1.85	51	0.13	60
2T-NID-60-2	E	47	3.74	49.4	2.02	60
2T-NID-60-2	F	41	2.21	51.2	0.39	60
2T-NID-60-2	G	43	2.14	50.9	0.49	60
2T-NID-60-2	H	40	2.45	51	0.56	60
2T-NID-60-2	I	44	2.96	51.1	0.64	60
2T-NID-60-2	J	48	2.29	50.7	0.2	60
2T-NID-60-2	K	35	5.88	49.3	3.12	60
2T-NID-60-2	L	30	1.85	51.1	0.1	60
2T-NID-60-3	A	42	3.11	50.7	0.85	60

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-NID-60-3	B	42	2.65	50.9	0.47	60
2T-NID-60-3	C	46	1.88	49.8	1.49	60
2T-NID-60-3	D	38	2.34	51.2	0.22	60
2T-NID-60-3	E	45	1.81	49.8	0.69	60
2T-NID-60-3	F	39	2.73	51.3	0.51	60
2T-NID-60-3	G	39	2.68	50.9	0.64	60
2T-NID-60-3	H	41	1.46	50.7	0.88	60
2T-NID-60-3	I	42	1.95	51.1	0.23	60
2T-NID-60-3	J	47	2.76	50.5	0.75	60
2T-NID-60-3	K	35	6.62	51.4	0.17	60
2T-NID-60-3	L	26	1.37	51.2	0.41	60
2T-NIU-20-1	A	68	1.25	18.5	0.19	20
2T-NIU-20-1	B	70	1.74	19.4	0.12	20
2T-NIU-20-1	C	66	2.53	19.3	0.28	20
2T-NIU-20-1	D	63	1.37	19.3	0.16	20
2T-NIU-20-1	E	70	1.31	20.7	0.19	20
2T-NIU-20-1	F	65	0.79	21.2	0.17	20
2T-NIU-20-1	G	71	1.41	19.2	1.68	20
2T-NIU-20-1	H	71	1.07	20	0.21	20
2T-NIU-20-1	I	71	1.21	21.2	0.21	20
2T-NIU-20-1	J	68	0.77	21.2	0.16	20
2T-NIU-20-1	K	46	3.2	21	0.09	20
2T-NIU-20-1	L	61	1.48	18.3	0.21	20
2T-NIU-20-2	A	73	1.23	18.9	0.12	20
2T-NIU-20-2	B	70	1.62	19.6	0.21	20
2T-NIU-20-2	C	66	2.68	19.9	0.11	20
2T-NIU-20-2	D	63	1.98	18.6	0.22	20
2T-NIU-20-2	E	72	1.24	19.5	0.28	20
2T-NIU-20-2	F	69	1.32	20.1	0.11	20
2T-NIU-20-2	G	72	1.17	18.1	1.19	20
2T-NIU-20-2	H	71	1.13	19.5	0.12	20
2T-NIU-20-2	I	73	1.73	18.6	0.26	20
2T-NIU-20-2	J	71	0.77	20.4	0.2	20
2T-NIU-20-2	K	39	2.62	21.2	0.09	20
2T-NIU-20-2	L	55	2.77	20	0.15	20
2T-NIU-20-3	A	71	1.57	19.3	0.15	20
2T-NIU-20-3	B	69	3.88	18.6	0.27	20
2T-NIU-20-3	C	71	0.98	19.7	0.21	20
2T-NIU-20-3	D	63	1.98	19.2	0.21	20
2T-NIU-20-3	E	70	1.79	20.5	0.21	20
2T-NIU-20-3	F	71	1.71	20.1	0.21	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-NIU-20-3	G	72	1.69	19.9	0.49	20
2T-NIU-20-3	H	71	1.19	19.3	0.31	20
2T-NIU-20-3	I	73	1.66	19.3	0.25	20
2T-NIU-20-3	J	67	1.32	20.2	0.17	20
2T-NIU-20-3	K	37	2.65	20.6	0.1	20
2T-NIU-20-3	L	48	3.5	20.2	0.14	20
2T-NIU-40-1	A	55	3.63	40.1	0.12	40
2T-NIU-40-1	B	52	5.27	40.4	0.16	40
2T-NIU-40-1	C	51	3.66	39.8	0.7	40
2T-NIU-40-1	D	46	2.2	41.6	0.19	40
2T-NIU-40-1	E	57	3.92	39.7	0.3	40
2T-NIU-40-1	F	54	2.59	39.6	0.1	40
2T-NIU-40-1	G	61	2.15	40.2	0.24	40
2T-NIU-40-1	H	57	2.28	40.5	0.06	40
2T-NIU-40-1	I	59	1.99	39.1	0.21	40
2T-NIU-40-1	J	57	1.51	39.2	0.38	40
2T-NIU-40-1	K	39	2.41	40.8	0.57	40
2T-NIU-40-1	L	41	1.75	40.4	0.15	40
2T-NIU-40-2	A	56	3.35	40.2	0.28	40
2T-NIU-40-2	B	50	3.34	40.9	0.13	40
2T-NIU-40-2	C	51	3.15	40.9	0.11	40
2T-NIU-40-2	D	41	2.08	41.1	0.15	40
2T-NIU-40-2	E	55	2.25	39.8	0.26	40
2T-NIU-40-2	F	49	1.42	39.7	0.13	40
2T-NIU-40-2	G	56	2.03	40.2	0.66	40
2T-NIU-40-2	H	55	1.2	42.2	0.27	40
2T-NIU-40-2	I	52	1.84	43.2	0.55	40
2T-NIU-40-2	J	53	1.67	42.1	0.52	40
2T-NIU-40-2	K	39	2.06	41	0.37	40
2T-NIU-40-2	L	31	2.02	37.9	0.5	40
2T-NIU-40-3	A	58	2.21	40.3	0.17	40
2T-NIU-40-3	B	49	3.41	40.2	0.25	40
2T-NIU-40-3	C	52	3.34	40.4	0.2	40
2T-NIU-40-3	D	52	3.76	40.1	0.34	40
2T-NIU-40-3	E	50	1.85	41.3	0.92	40
2T-NIU-40-3	F	48	3.12	40.9	0.36	40
2T-NIU-40-3	G	58	1.91	38.6	0.35	40
2T-NIU-40-3	H	54	3.41	38.2	0.17	40
2T-NIU-40-3	I	63	2.1	38.5	0.29	40
2T-NIU-40-3	J	53	2.23	38.8	0.29	40
2T-NIU-40-3	K	37	2.5	39.9	0.12	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
2T-NIU-40-3	L	35	4.15	40.4	0.31	40
2T-NIU-60-1	A	49	4.88	54.3	1.11	60
2T-NIU-60-1	B	49	1.85	54.2	1.31	60
2T-NIU-60-1	C	46	3.06	54	0.32	60
2T-NIU-60-1	D	36	2.44	53.8	0.11	60
2T-NIU-60-1	E	47	2.69	51	0.2	60
2T-NIU-60-1	F	50	1.65	50.5	0.48	60
2T-NIU-60-1	G	51	1.86	50.8	0.17	60
2T-NIU-60-1	H	49	1.92	49.9	0.48	60
2T-NIU-60-1	I	51	4.12	50.4	0.2	60
2T-NIU-60-1	J	51	1.62	51	0.37	60
2T-NIU-60-1	K	35	2.24	50.5	0.28	60
2T-NIU-60-1	L	28	3.19	49.4	0.23	60
2T-NIU-60-2	A	42	4.2	55.9	0.27	60
2T-NIU-60-2	B	48	3.1	56.2	0.84	60
2T-NIU-60-2	C	43	3.17	56.2	1.19	60
2T-NIU-60-2	D	32	2.05	55.7	0.18	60
2T-NIU-60-2	E	42	2.23	53.6	0.64	60
2T-NIU-60-2	F	41	1.92	53	0.33	60
2T-NIU-60-2	G	45	1.94	52.6	0.43	60
2T-NIU-60-2	H	43	2.47	51.8	0.71	60
2T-NIU-60-2	I	51	2.42	50.1	0.35	60
2T-NIU-60-2	J	48	2.8	48	0.16	60
2T-NIU-60-2	K	34	2.57	49	0.22	60
2T-NIU-60-2	L	30	3.94	49.5	0.27	60
2T-NIU-60-3	A	50	3.91	51.4	0.42	60
2T-NIU-60-3	B	46	4.67	52.8	0.25	60
2T-NIU-60-3	C	53	3.87	54.6	1.27	60
2T-NIU-60-3	D	43	2.43	54.8	0.38	60
2T-NIU-60-3	E	52	2.29	52.5	0.76	60
2T-NIU-60-3	F	49	2.49	52.1	0.85	60
2T-NIU-60-3	G	53	2.75	52.4	0.85	60
2T-NIU-60-3	H	49	1.63	51.4	0.15	60
2T-NIU-60-3	I	59	1.85	49.4	0.33	60
2T-NIU-60-3	J	50	1.76	49.5	0.74	60
2T-NIU-60-3	K	36	2.31	50.4	0.2	60
2T-NIU-60-3	L	32	2.28	50.7	0.4	60
3T-ID-20-1	A	76	1.28	20.9	0.17	20
3T-ID-20-1	B	78	2.05	21.4	0.08	20
3T-ID-20-1	C	75	1.31	21.2	0.14	20
3T-ID-20-1	D	81	1.38	19.8	0.09	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-ID-20-1	E	81	1.49	20	0.14	20
3T-ID-20-1	F	79	1.59	20	0.15	20
3T-ID-20-1	G	79	1.27	20.7	0.28	20
3T-ID-20-1	H	79	1.53	19.5	1.16	20
3T-ID-20-1	I	76	1.34	20.2	0.22	20
3T-ID-20-1	J	78	1.41	19.7	0.13	20
3T-ID-20-1	K	65	1.63	19.3	0.16	20
3T-ID-20-1	L	71	1.6	19.3	0.12	20
3T-ID-20-2	A	78	1.52	20.4	0.1	20
3T-ID-20-2	B	75	3.26	19.9	0.11	20
3T-ID-20-2	C	78	1.34	19.4	0.13	20
3T-ID-20-2	D	80	2.11	21.1	0.36	20
3T-ID-20-2	E	80	1.13	20.5	0.26	20
3T-ID-20-2	F	80	1.13	21.1	0.12	20
3T-ID-20-2	G	82	1.03	20.5	0.09	20
3T-ID-20-2	H	79	1.29	19.2	2.77	20
3T-ID-20-2	I	80	1.63	19.9	0.11	20
3T-ID-20-2	J	78	1.39	21.1	0.17	20
3T-ID-20-2	K	63	1.86	21.4	0.26	20
3T-ID-20-2	L	70	1.89	20.7	0.19	20
3T-ID-20-3	A	79	1.45	20.3	0.07	20
3T-ID-20-3	B	76	4.65	20.5	0.07	20
3T-ID-20-3	C	80	1.38	20.4	0.12	20
3T-ID-20-3	D	80	2.05	19.6	0.25	20
3T-ID-20-3	E	80	0.82	20.1	0.14	20
3T-ID-20-3	F	80	1.38	20.8	0.31	20
3T-ID-20-3	G	80	1.1	20.3	0.11	20
3T-ID-20-3	H	78	1.49	19.7	0.76	20
3T-ID-20-3	I	78	1.91	21.8	0.07	20
3T-ID-20-3	J	75	0.93	20.6	0.09	20
3T-ID-20-3	K	59	1.56	21.2	0.06	20
3T-ID-20-3	L	68	1.62	20.7	0.24	20
3T-ID-40-1	A	75	6.78	38.4	0.16	40
3T-ID-40-1	B	72	1.19	37	0.15	40
3T-ID-40-1	C	70	1.2	38.5	0.26	40
3T-ID-40-1	D	68	1.94	38.4	0.1	40
3T-ID-40-1	E	71	1.97	38.7	0.08	40
3T-ID-40-1	F	70	1.35	38.2	0.19	40
3T-ID-40-1	G	71	2.44	38.8	0.12	40
3T-ID-40-1	H	71	1.03	38.5	0.26	40
3T-ID-40-1	I	67	1.93	38.7	0.95	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-ID-40-1	J	72	1.19	39.6	0.08	40
3T-ID-40-1	K	52	1.97	39.7	0.09	40
3T-ID-40-1	L	57	1.96	40.1	0.18	40
3T-ID-40-2	A	70	1.74	38.3	0.24	40
3T-ID-40-2	B	71	1.31	39.7	0.25	40
3T-ID-40-2	C	67	1.33	39.4	0.38	40
3T-ID-40-2	D	66	1.79	40.2	1.02	40
3T-ID-40-2	E	67	1.75	40.2	0.12	40
3T-ID-40-2	F	69	1.29	40.9	0.26	40
3T-ID-40-2	G	67	1.66	40.8	0.19	40
3T-ID-40-2	H	70	1.54	40	0.56	40
3T-ID-40-2	I	65	2.22	40.8	0.81	40
3T-ID-40-2	J	69	1.24	40.4	1.02	40
3T-ID-40-2	K	48	2.16	40	1.61	40
3T-ID-40-2	L	53	1.94	40.1	0.13	40
3T-ID-40-3	A	69	1.99	38.8	0.31	40
3T-ID-40-3	B	68	1.68	39.7	0.09	40
3T-ID-40-3	C	69	1.12	40.6	0.07	40
3T-ID-40-3	D	65	1.71	40.8	0.15	40
3T-ID-40-3	E	65	1.98	41	0.17	40
3T-ID-40-3	F	67	1.34	41.2	0.29	40
3T-ID-40-3	G	67	1.89	39.3	0.07	40
3T-ID-40-3	H	72	1.86	38.7	0.13	40
3T-ID-40-3	I	70	1.89	38.4	0.83	40
3T-ID-40-3	J	73	1.72	39.6	0.37	40
3T-ID-40-3	K	52	2.26	40.3	1.67	40
3T-ID-40-3	L	55	1.33	39.6	1.69	40
3T-ID-50-1	A	64	1.98	50.2	0.13	50
3T-ID-50-1	B	66	1.43	49.6	0.78	50
3T-ID-50-1	C	61	1.17	49.4	1.12	50
3T-ID-50-1	D	61	3.21	50.1	0.58	50
3T-ID-50-1	E	67	1.74	46.8	1.88	50
3T-ID-50-1	F	67	1.62	48.6	0.23	50
3T-ID-50-1	G	67	2.1	48.6	0.34	50
3T-ID-50-1	H	66	1.07	49	0.92	50
3T-ID-50-1	I	73	2.45	47.4	0.98	50
3T-ID-50-1	J	71	2.81	49.4	0.62	50
3T-ID-50-1	K	52	2.99	50.1	0.68	50
3T-ID-50-1	L	56	0.99	49.7	1.19	50
3T-ID-50-2	A	66	1.34	47.3	0.09	50
3T-ID-50-2	B	68	1.29	49	0.46	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-ID-50-2	C	61	1.28	48.9	1.42	50
3T-ID-50-2	D	60	2.42	49.3	0.91	50
3T-ID-50-2	E	66	2.19	48.7	1.43	50
3T-ID-50-2	F	66	1.99	50.2	0.17	50
3T-ID-50-2	I	70	1.96	49.2	0.72	50
3T-ID-50-2	J	69	2.42	49	0.45	50
3T-ID-50-2	K	49	2.7	49.1	0.88	50
3T-ID-50-2	L	52	1.76	48.1	1.64	50
3T-ID-50-3	A	70	3.37	45.7	1.96	50
3T-ID-50-3	B	71	1.57	45.6	0.27	50
3T-ID-50-3	C	72	1.68	46.1	0.31	50
3T-ID-50-3	D	68	2.35	47.3	0.79	50
3T-ID-50-3	E	71	2.25	48.3	0.36	50
3T-ID-50-3	F	72	2.16	48.1	0.23	50
3T-ID-50-3	H	69	3.85	47.9	0.43	50
3T-ID-50-3	I	76	3.04	46.7	1.04	50
3T-ID-50-3	J	82	4.52	45.8	1.49	50
3T-ID-50-3	K	53	2.1	48	0.28	50
3T-ID-50-3	L	58	4.21	47.4	1.5	50
3T-IU-20-1	A	80	1.38	18.1	0.21	20
3T-IU-20-1	B	83	1.38	20.6	0.16	20
3T-IU-20-1	C	76	1.74	21	0.11	20
3T-IU-20-1	D	79	1.58	20.4	0.18	20
3T-IU-20-1	E	80	1.32	20.3	0.26	20
3T-IU-20-1	F	80	1.21	20.2	1	20
3T-IU-20-1	G	81	1.65	20.7	0.11	20
3T-IU-20-1	H	79	1.85	21	0.15	20
3T-IU-20-1	I	77	1.4	20.9	0.35	20
3T-IU-20-1	J	80	1.31	20.6	0.38	20
3T-IU-20-1	K	68	1.66	21.1	0.19	20
3T-IU-20-1	L	72	1.46	21.7	0.44	20
3T-IU-20-2	A	78	2.01	19.4	0.11	20
3T-IU-20-2	B	83	1.18	19.1	0.22	20
3T-IU-20-2	C	78	1.55	19.8	0.01	20
3T-IU-20-2	D	78	1.23	19.7	0.08	20
3T-IU-20-2	E	80	1.91	20	0.08	20
3T-IU-20-2	F	79	1.52	19.3	0.26	20
3T-IU-20-2	G	82	1.3	19.3	0.14	20
3T-IU-20-2	H	79	1.51	20.1	0.14	20
3T-IU-20-2	I	79	1.2	20.3	0.08	20
3T-IU-20-2	J	79	1.78	21.3	0.08	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-IU-20-2	K	62	1.41	22.3	0.07	20
3T-IU-20-2	L	73	1.5	18.9	0.34	20
3T-IU-20-3	A	78	2.21	19.7	0.1	20
3T-IU-20-3	B	81	1.36	20.2	0.12	20
3T-IU-20-3	C	77	1.71	20	0.15	20
3T-IU-20-3	D	78	1.66	20.3	0.23	20
3T-IU-20-3	E	80	1.77	20.8	0.07	20
3T-IU-20-3	F	79	1.78	20.6	0.36	20
3T-IU-20-3	G	80	1.4	20.5	0.11	20
3T-IU-20-3	H	79	1.7	19	0.09	20
3T-IU-20-3	I	81	1.31	20	0.12	20
3T-IU-20-3	J	75	1.7	20.6	0.13	20
3T-IU-20-3	K	60	4.84	21.2	0.1	20
3T-IU-20-3	L	68	1.82	22.5	0.18	20
3T-IU-40-1	A	71	2.42	35.6	0.12	40
3T-IU-40-1	B	74	1.83	36.1	0.67	40
3T-IU-40-1	C	70	1.95	36	1.68	40
3T-IU-40-1	D	71	1.83	36.8	0.4	40
3T-IU-40-1	E	71	1.45	38.6	0.97	40
3T-IU-40-1	F	68	1.47	38.9	0.57	40
3T-IU-40-1	G	71	2.04	39.3	0.54	40
3T-IU-40-1	H	69	3.08	40.3	0.09	40
3T-IU-40-1	I	70	2.24	40.1	0.16	40
3T-IU-40-1	J	72	1.68	40.7	0.12	40
3T-IU-40-1	K	53	2.13	40.1	0.13	40
3T-IU-40-1	L	59	2.1	39.7	0.14	40
3T-IU-40-2	A	68	2.52	39.1	0.11	40
3T-IU-40-2	B	71	1.73	39.7	0.54	40
3T-IU-40-2	C	70	2	39.3	0.61	40
3T-IU-40-2	D	66	1.44	38.5	1.23	40
3T-IU-40-2	E	68	2.12	38.2	2.03	40
3T-IU-40-2	F	71	1.4	39.5	0.57	40
3T-IU-40-2	G	70	1.65	40	0.21	40
3T-IU-40-2	H	70	2.18	40.6	0.1	40
3T-IU-40-2	I	71	1.89	40	0.15	40
3T-IU-40-2	J	70	2.13	40.3	0.18	40
3T-IU-40-2	K	52	1.89	40.7	0.1	40
3T-IU-40-2	L	57	2.07	38.4	0.08	40
3T-IU-40-3	A	66	2.13	39.2	0.11	40
3T-IU-40-3	B	71	1.63	38.9	0.53	40
3T-IU-40-3	C	67	1.7	38.6	1.15	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-IU-40-3	D	69	1.68	38.7	0.24	40
3T-IU-40-3	E	70	2.17	39.6	0.31	40
3T-IU-40-3	F	72	1.65	38.4	1.89	40
3T-IU-40-3	G	68	2.21	38.3	0.33	40
3T-IU-40-3	H	70	2.1	39.4	0.14	40
3T-IU-40-3	I	66	2.13	41.6	0.07	40
3T-IU-40-3	J	66	1.95	40.5	0.08	40
3T-IU-40-3	K	53	2.01	39.4	0.13	40
3T-IU-40-3	L	58	1.91	37.8	0.22	40
3T-IU-50-1	A	69	1.41	48.3	0.16	50
3T-IU-50-1	B	68	2.17	49.5	0.36	50
3T-IU-50-1	C	63	1.92	49.9	0.56	50
3T-IU-50-1	D	65	1.41	49.8	0.47	50
3T-IU-50-1	E	67	6.14	49.1	0.42	50
3T-IU-50-1	F	71	1.59	50.3	0.27	50
3T-IU-50-1	G	68	1.61	49.9	1.21	50
3T-IU-50-1	H	66	2.06	50.7	0.28	50
3T-IU-50-1	I	66	2.01	49.8	0.97	50
3T-IU-50-1	J	71	1.55	50.3	0.15	50
3T-IU-50-1	K	52	2.82	50.1	0.2	50
3T-IU-50-1	L	54	1.76	49.8	0.25	50
3T-IU-50-2	A	69	2.22	38.3	13.75	50
3T-IU-50-2	B	67	2.86	48.9	0.85	50
3T-IU-50-2	C	62	1.85	49.7	0.35	50
3T-IU-50-2	D	69	1.69	49.5	0.49	50
3T-IU-50-2	E	66	2.16	49.4	0.1	50
3T-IU-50-2	F	68	1.18	49.2	0.76	50
3T-IU-50-2	G	66	1.98	49.3	0.64	50
3T-IU-50-2	H	65	1.66	50.4	0.12	50
3T-IU-50-2	I	64	1.92	48.9	1.9	50
3T-IU-50-2	J	66	1.44	49.5	0.08	50
3T-IU-50-2	K	51	2.35	47.7	0.71	50
3T-IU-50-2	L	53	2.5	48.6	0.11	50
3T-IU-50-3	A	72	7.52	45	0.1	50
3T-IU-50-3	B	70	4.19	47.7	0.41	50
3T-IU-50-3	C	70	3.6	48	0.14	50
3T-IU-50-3	D	68	1.27	48.1	0.14	50
3T-IU-50-3	E	70	1.74	47.3	0.53	50
3T-IU-50-3	F	71	2	48.2	0.68	50
3T-IU-50-3	G	66	2.03	48.5	0.53	50
3T-IU-50-3	I	67	1.73	48.6	0.12	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-IU-50-3	J	71	2.44	49.1	0.31	50
3T-IU-50-3	K	51	3.32	49.3	0.58	50
3T-IU-50-3	L	53	2.38	49.7	0.32	50
3T-NID-20-1	A	78	1.45	19.8	0.13	20
3T-NID-20-1	B	75	1.95	21.1	0.14	20
3T-NID-20-1	C	76	0.89	20.5	0.16	20
3T-NID-20-1	D	74	1.43	20	0.17	20
3T-NID-20-1	E	79	1.64	19.9	0.11	20
3T-NID-20-1	F	78	1.33	20	0.14	20
3T-NID-20-1	G	76	1.35	20.8	0.22	20
3T-NID-20-1	H	77	1.16	20.6	0.15	20
3T-NID-20-1	I	76	1.37	20.6	0.1	20
3T-NID-20-1	J	76	1.79	20.8	0.23	20
3T-NID-20-1	K	57	1.88	20.8	0.16	20
3T-NID-20-1	L	66	1.45	20.6	0.08	20
3T-NID-20-2	A	76	1.59	19.4	0.25	20
3T-NID-20-2	B	76	2.08	19.8	0.15	20
3T-NID-20-2	C	78	1.56	19.6	0.1	20
3T-NID-20-2	D	79	1.43	20.4	0.14	20
3T-NID-20-2	E	77	1.47	20.5	0.25	20
3T-NID-20-2	F	77	0.93	20.1	0.4	20
3T-NID-20-2	G	78	1.05	20.9	0.34	20
3T-NID-20-2	H	77	1.3	20.6	0.19	20
3T-NID-20-2	I	77	1.35	20.5	0.13	20
3T-NID-20-2	J	76	1.26	19.9	0.22	20
3T-NID-20-2	K	56	5.45	21.2	0.1	20
3T-NID-20-2	L	64	1.42	21.4	0.2	20
3T-NID-20-3	A	79	2.69	19.6	0.08	20
3T-NID-20-3	B	75	1.88	19.9	0.1	20
3T-NID-20-3	C	75	1.49	21.2	0.14	20
3T-NID-20-3	D	80	1.36	19.8	0.36	20
3T-NID-20-3	E	75	1.32	20.6	0.12	20
3T-NID-20-3	F	78	1.33	20.5	0.13	20
3T-NID-20-3	G	78	1.16	20.3	0.12	20
3T-NID-20-3	H	78	1.11	21.1	0.27	20
3T-NID-20-3	I	78	1.41	20.9	0.11	20
3T-NID-20-3	J	78	1.13	21	0.09	20
3T-NID-20-3	K	54	4.69	21	0.09	20
3T-NID-20-3	L	65	1.02	21.5	0.07	20
3T-NID-40-1	A	65	1.76	38.2	0.32	40
3T-NID-40-1	B	67	2.21	38.9	0.19	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-NID-40-1	C	64	1.81	39.8	0.4	40
3T-NID-40-1	D	64	1.34	39.3	0.17	40
3T-NID-40-1	E	71	1.27	38.9	0.11	40
3T-NID-40-1	F	67	1.48	39.6	0.18	40
3T-NID-40-1	G	71	2.16	39.9	0.16	40
3T-NID-40-1	H	67	1.41	39.1	0.68	40
3T-NID-40-1	I	67	1.51	39.2	1.15	40
3T-NID-40-1	J	68	2.6	38.9	0.14	40
3T-NID-40-1	K	48	3.71	41.8	0.13	40
3T-NID-40-1	L	53	2.4	40.9	0.22	40
3T-NID-40-2	A	65	1.47	39.6	0.13	40
3T-NID-40-2	B	66	2.36	40.2	0.34	40
3T-NID-40-2	C	64	1.46	40.5	0.09	40
3T-NID-40-2	D	64	1.89	39.6	0.16	40
3T-NID-40-2	E	66	2.15	40.8	0.14	40
3T-NID-40-2	F	65	1.58	39.7	0.12	40
3T-NID-40-2	G	68	2.39	40.2	0.16	40
3T-NID-40-2	H	66	1.31	36.4	4.39	40
3T-NID-40-2	I	68	1.78	39.5	0.65	40
3T-NID-40-2	J	70	1.79	40.8	0.23	40
3T-NID-40-2	K	53	4.18	40.1	0.29	40
3T-NID-40-2	L	55	1.46	40.3	0.18	40
3T-NID-40-3	A	66	1.36	40.2	0.17	40
3T-NID-40-3	B	62	1.73	39.5	0.09	40
3T-NID-40-3	C	64	1.05	39.6	0.11	40
3T-NID-40-3	D	66	1.75	39.4	0.29	40
3T-NID-40-3	E	67	1.57	39	0.33	40
3T-NID-40-3	F	66	1.52	39.8	0.11	40
3T-NID-40-3	G	69	1.2	39.5	0.14	40
3T-NID-40-3	H	64	1.29	39.1	0.83	40
3T-NID-40-3	I	67	1.51	39.4	0.19	40
3T-NID-40-3	J	71	1.76	38.1	1.57	40
3T-NID-40-3	K	49	2.78	39.6	0.16	40
3T-NID-40-3	L	54	1.39	40.4	0.12	40
3T-NID-50-1	A	61	1.21	48.2	0.12	50
3T-NID-50-1	B	63	1.96	46	2.03	50
3T-NID-50-1	C	61	2.32	48.3	1.43	50
3T-NID-50-1	D	60	1.41	49.2	1.59	50
3T-NID-50-1	E	64	2.16	49	1.9	50
3T-NID-50-1	F	63	1.15	50.8	0.18	50
3T-NID-50-1	G	65	1.5	50.8	0.16	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-NID-50-1	H	66	1.34	50	0.6	50
3T-NID-50-1	I	69	1.9	48.9	1.38	50
3T-NID-50-1	J	70	2.25	48.8	1.83	50
3T-NID-50-1	K	48	1.87	49.9	0.56	50
3T-NID-50-1	L	47	1.56	51.1	0.27	50
3T-NID-50-2	A	65	1.9	48.3	0.32	50
3T-NID-50-2	B	60	2.01	48.3	0.97	50
3T-NID-50-2	C	58	2.67	48.9	1.01	50
3T-NID-50-2	D	57	1.63	48.9	0.93	50
3T-NID-50-2	E	65	1.51	47.2	0.95	50
3T-NID-50-2	F	63	1.25	48.3	0.86	50
3T-NID-50-2	G	60	1.36	48.8	0.62	50
3T-NID-50-2	H	61	1.09	49.3	1.2	50
3T-NID-50-2	I	67	1.98	48.6	1.31	50
3T-NID-50-2	J	66	1.2	49.5	1.23	50
3T-NID-50-2	K	46	2.6	50.6	0.85	50
3T-NID-50-2	L	46	2.67	51.1	0.67	50
3T-NID-50-3	A	65	1.54	49.8	0.35	50
3T-NID-50-3	B	61	1.72	49.9	0.98	50
3T-NID-50-3	C	61	1.83	48.2	1.52	50
3T-NID-50-3	D	61	2.05	48.2	0.83	50
3T-NID-50-3	E	65	1.37	49.1	0.35	50
3T-NID-50-3	G	64	1.37	50.2	0.17	50
3T-NID-50-3	H	62	1.91	51.2	0.26	50
3T-NID-50-3	I	67	1.66	50.4	0.82	50
3T-NID-50-3	J	67	2.14	49.1	1.15	50
3T-NID-50-3	K	45	1.66	49.5	0.81	50
3T-NID-50-3	L	55	8.1	47.9	2.83	50
3T-NIU-20-1	A	78	1.71	19.2	0.13	20
3T-NIU-20-1	B	79	1.56	19.5	0.16	20
3T-NIU-20-1	C	72	1.54	19.2	0.17	20
3T-NIU-20-1	D	75	0.14	20.1	0.16	20
3T-NIU-20-1	E	79	1.54	20.1	0.15	20
3T-NIU-20-1	F	75	0.83	20.8	0.18	20
3T-NIU-20-1	G	78	1.28	19.8	0.16	20
3T-NIU-20-1	H	75	1.16	19.2	0.15	20
3T-NIU-20-1	I	78	1.47	19.8	0.17	20
3T-NIU-20-1	J	75	1.14	19.8	0.14	20
3T-NIU-20-1	K	61	1.82	21.1	0.36	20
3T-NIU-20-1	L	64	1.05	20.8	0.08	20
3T-NIU-20-2	A	75	1.63	19.3	0.21	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-NIU-20-2	B	78	1.76	19.7	0.22	20
3T-NIU-20-2	C	74	1.28	20	0.33	20
3T-NIU-20-2	D	77	2.04	20.4	0.15	20
3T-NIU-20-2	E	77	1.97	20.1	0.09	20
3T-NIU-20-2	F	77	1.46	18	4.34	20
3T-NIU-20-2	G	78	1.32	19.8	0.08	20
3T-NIU-20-2	H	75	1.26	20.7	0.22	20
3T-NIU-20-2	I	75	1.53	20.2	0.14	20
3T-NIU-20-2	J	78	1.3	19.8	0.19	20
3T-NIU-20-2	K	57	2.2	21.1	0.14	20
3T-NIU-20-2	L	65	1.01	21	0.13	20
3T-NIU-20-3	A	80	1.45	20.1	0.12	20
3T-NIU-20-3	B	78	2.06	20.1	0.1	20
3T-NIU-20-3	C	75	1.22	18.9	0.1	20
3T-NIU-20-3	D	76	1.91	19.8	0.16	20
3T-NIU-20-3	E	78	1.93	18.8	0.17	20
3T-NIU-20-3	F	79	0.93	19.6	0.12	20
3T-NIU-20-3	G	81	1.26	20	0.24	20
3T-NIU-20-3	H	76	1.12	20.2	0.3	20
3T-NIU-20-3	I	80	1.16	19.9	0.33	20
3T-NIU-20-3	J	77	1.45	20.8	0.26	20
3T-NIU-20-3	K	55	1.6	20.9	0.11	20
3T-NIU-20-3	L	66	1.29	19.7	0.23	20
3T-NIU-40-1	A	67	2.76	37.8	0.41	40
3T-NIU-40-1	B	67	1.48	38.5	0.9	40
3T-NIU-40-1	C	68	3.35	35.1	6.36	40
3T-NIU-40-1	D	63	2.03	39.4	0.12	40
3T-NIU-40-1	E	70	1.86	39.8	1.01	40
3T-NIU-40-1	F	69	1.3	39.8	1.37	40
3T-NIU-40-1	G	68	1.35	39.3	0.44	40
3T-NIU-40-1	H	68	1.68	39.7	0.1	40
3T-NIU-40-1	I	66	1.46	40	0.17	40
3T-NIU-40-1	J	70	1.62	40.4	0.16	40
3T-NIU-40-1	K	47	1.91	41.1	0.17	40
3T-NIU-40-1	L	55	1.88	40	0.07	40
3T-NIU-40-2	A	67	4.14	38.6	0.17	40
3T-NIU-40-2	B	70	2.05	39.2	0.55	40
3T-NIU-40-2	C	63	4.03	38.6	1.61	40
3T-NIU-40-2	D	63	2.26	38.7	0.49	40
3T-NIU-40-2	E	68	2.19	38.1	3.09	40
3T-NIU-40-2	F	67	1.06	39.5	2.19	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-NIU-40-2	G	69	1.34	40.1	0.66	40
3T-NIU-40-2	H	65	1.75	41.3	0.08	40
3T-NIU-40-2	I	67	0.91	40.5	0.24	40
3T-NIU-40-2	J	68	0.93	39.6	0.08	40
3T-NIU-40-2	K	47	1.67	38.7	1.27	40
3T-NIU-40-2	L	52	1.24	40.1	0.22	40
3T-NIU-40-3	A	64	2.58	38.5	0.23	40
3T-NIU-40-3	B	67	1.89	39.4	1.14	40
3T-NIU-40-3	C	61	3.15	40	0.52	40
3T-NIU-40-3	D	63	1.62	40.3	0.11	40
3T-NIU-40-3	E	66	2.76	38.7	0.75	40
3T-NIU-40-3	F	66	1.34	38.2	0.66	40
3T-NIU-40-3	G	67	1.65	39.5	0.15	40
3T-NIU-40-3	H	64	1.9	39.3	0.15	40
3T-NIU-40-3	I	66	1.79	40.3	0.39	40
3T-NIU-40-3	J	70	1.29	40.3	0.11	40
3T-NIU-40-3	K	47	2.07	39.9	1.38	40
3T-NIU-40-3	L	58	1.1	39.7	0.12	40
3T-NIU-50-1	A	65	2.42	44.6	0.75	50
3T-NIU-50-1	B	59	4.63	48.8	1.09	50
3T-NIU-50-1	C	58	2.04	49.6	0.22	50
3T-NIU-50-1	D	57	1.83	50.7	0.71	50
3T-NIU-50-1	E	59	2	48.7	1.2	50
3T-NIU-50-1	F	62	1.04	48.5	1.13	50
3T-NIU-50-1	G	60	1.61	50.7	0.65	50
3T-NIU-50-1	H	60	1.88	51	1.64	50
3T-NIU-50-1	I	68	2.92	50.4	0.62	50
3T-NIU-50-1	J	68	1.27	49.6	0.61	50
3T-NIU-50-1	K	44	1.61	48.4	0.53	50
3T-NIU-50-1	L	51	1.84	48	0.75	50
3T-NIU-50-2	B	66	2.07	49.8	0.17	50
3T-NIU-50-2	C	62	4.97	48.8	3.93	50
3T-NIU-50-2	D	59	1.93	50.3	1.1	50
3T-NIU-50-2	E	62	2.1	50.6	0.85	50
3T-NIU-50-2	F	63	0.97	50.5	0.96	50
3T-NIU-50-2	G	63	1.64	50.2	0.2	50
3T-NIU-50-2	H	62	1.85	51.2	0.11	50
3T-NIU-50-2	I	62	1.64	50.4	0.74	50
3T-NIU-50-2	J	65	1.17	48.9	1.93	50
3T-NIU-50-2	K	47	1.79	49	0.85	50
3T-NIU-50-2	L	51	1.19	48.6	0.94	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
3T-NIU-50-3	A	64	2.31	48.9	0.75	50
3T-NIU-50-3	B	62	2.18	49.5	1.46	50
3T-NIU-50-3	C	59	3.35	49.5	1.16	50
3T-NIU-50-3	D	61	3.07	48.3	0.91	50
3T-NIU-50-3	E	60	6.91	49.8	0.39	50
3T-NIU-50-3	F	62	0.91	48.1	0.83	50
3T-NIU-50-3	G	63	1.33	47.9	0.86	50
3T-NIU-50-3	H	67	1.5	47.1	1.12	50
3T-NIU-50-3	I	59	1.74	47.1	0.07	50
3T-NIU-50-3	J	70	1.88	46.8	0.15	50
3T-NIU-50-3	K	46	2.13	43.7	2.14	50
3T-NIU-50-3	L	57	2.17	46.2	0.39	50
4B-ID-20-1	A	78	0.92	19.9	0.27	20
4B-ID-20-1	B	74	1.94	20.4	0.1	20
4B-ID-20-1	C	70	1.89	20.9	0.25	20
4B-ID-20-1	D	64	1.25	20.9	0.27	20
4B-ID-20-1	E	73	0.93	20.4	0.17	20
4B-ID-20-1	F	73	1.76	21.1	0.36	20
4B-ID-20-1	G	77	1.27	20	0.32	20
4B-ID-20-1	H	75	0.88	16.5	3.67	20
4B-ID-20-1	I	74	1.9	19.7	0.25	20
4B-ID-20-1	J	75	1.1	20.3	0.14	20
4B-ID-20-1	K	59	2.06	20.6	0.14	20
4B-ID-20-1	L	67	1.46	20.5	0.13	20
4B-ID-20-2	A	76	1.24	20.3	0.43	20
4B-ID-20-2	B	68	1.84	20.5	0.25	20
4B-ID-20-2	C	66	0.84	20.4	0.28	20
4B-ID-20-2	D	66	1.37	20.6	0.15	20
4B-ID-20-2	E	75	2.3	19.9	0.33	20
4B-ID-20-2	F	69	2.05	21	0.15	20
4B-ID-20-2	G	76	1.53	22.3	0.31	20
4B-ID-20-2	H	75	1.06	20	0.11	20
4B-ID-20-2	I	75	1.69	20.5	0.11	20
4B-ID-20-2	J	75	1.27	20.2	0.11	20
4B-ID-20-2	K	56	1.6	21.3	0.18	20
4B-ID-20-2	L	65	1.73	19.8	0.1	20
4B-ID-20-3	A	74	1.19	21.9	0.16	20
4B-ID-20-3	B	64	1.91	20.7	0.16	20
4B-ID-20-3	C	71	2.03	20.2	0.14	20
4B-ID-20-3	D	63	1.76	20.6	0.28	20
4B-ID-20-3	E	77	1.18	19.4	0.33	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-ID-20-3	F	71	2.77	20.4	0.1	20
4B-ID-20-3	G	76	2.08	20.9	0.19	20
4B-ID-20-3	H	79	0.99	18.6	1.07	20
4B-ID-20-3	I	74	1.23	19.9	0.15	20
4B-ID-20-3	J	72	1.07	20.1	0.15	20
4B-ID-20-3	K	55	1.54	21.1	0.1	20
4B-ID-20-3	L	61	1.79	21	0.09	20
4B-ID-40-1	A	65	2.05	36.8	3.84	40
4B-ID-40-1	B	58	3.91	39.8	0.15	40
4B-ID-40-1	C	52	2.69	39.4	0.5	40
4B-ID-40-1	D	34	3.82	40.7	0.12	40
4B-ID-40-1	E	57	2.46	39.5	0.59	40
4B-ID-40-1	F	58	1.87	39.9	0.12	40
4B-ID-40-1	G	58	2.62	40.7	0.22	40
4B-ID-40-1	H	61	3.65	39.3	1.04	40
4B-ID-40-1	I	58	3.54	40.5	0.31	40
4B-ID-40-1	J	67	1.17	39.1	0.11	40
4B-ID-40-1	K	49	2.66	40.2	0.11	40
4B-ID-40-1	L	50	3.3	38.4	2.86	40
4B-ID-40-2	A	61	1.51	38.4	2.56	40
4B-ID-40-2	B	50	4.44	39.5	0.32	40
4B-ID-40-2	C	44	2.23	39.9	0.12	40
4B-ID-40-2	D	39	4.24	38.8	0.62	40
4B-ID-40-2	E	58	2.33	38	1.97	40
4B-ID-40-2	F	58	2.48	39.7	0.1	40
4B-ID-40-2	G	62	2.11	40.3	0.37	40
4B-ID-40-2	H	64	1.5	39.2	0.16	40
4B-ID-40-2	I	56	2.09	38.2	1.54	40
4B-ID-40-2	J	64	2.2	39.2	0.11	40
4B-ID-40-2	K	45	1.8	39.3	0.18	40
4B-ID-40-2	L	47	1.32	39.9	0.12	40
4B-ID-40-3	A	61	2.16	39.2	0.67	40
4B-ID-40-3	B	48	3.91	40.4	0.19	40
4B-ID-40-3	C	43	3.16	40.1	0.57	40
4B-ID-40-3	D	44	4.26	38.9	0.83	40
4B-ID-40-3	E	56	3.51	38.9	0.55	40
4B-ID-40-3	F	50	3.31	40.2	0.15	40
4B-ID-40-3	G	56	2.59	38.9	0.73	40
4B-ID-40-3	H	65	2.54	36.4	3.15	40
4B-ID-40-3	I	60	4.39	38.9	0.1	40
4B-ID-40-3	J	71	2.35	38.9	0.15	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-ID-40-3	K	46	1.54	39.8	0.28	40
4B-ID-40-3	L	52	1.4	40.5	0.16	40
4B-ID-50-1	A	57	2.19	47.9	1.16	50
4B-ID-50-1	B	47	3.8	49	0.6	50
4B-ID-50-1	C	45	2.62	47.9	0.57	50
4B-ID-50-1	D	30	3.76	50.1	0.22	50
4B-ID-50-1	E	54	2.63	49	0.83	50
4B-ID-50-1	F	51	3.1	47.9	1.85	50
4B-ID-50-1	G	57	3.9	47.4	0.81	50
4B-ID-50-1	H	57	1.88	49.5	0.83	50
4B-ID-50-1	I	55	4.17	50	0.19	50
4B-ID-50-1	J	60	2.4	48.9	0.15	50
4B-ID-50-1	K	45	1.75	49.6	0.14	50
4B-ID-50-1	L	42	1.56	50	0.84	50
4B-ID-50-2	A	52	2.8	48.8	1.59	50
4B-ID-50-2	B	38	3.63	49.3	0.93	50
4B-ID-50-2	C	36	3.23	50.4	0.86	50
4B-ID-50-2	D	31	4.27	48.9	1.03	50
4B-ID-50-2	E	48	2.32	47.8	0.73	50
4B-ID-50-2	F	44	2.7	47.9	1.32	50
4B-ID-50-2	G	52	2.81	51.1	0.36	50
4B-ID-50-2	H	58	2.26	48.3	1.61	50
4B-ID-50-2	I	49	2.72	48.9	0.77	50
4B-ID-50-2	J	59	2.05	49.3	0.23	50
4B-ID-50-2	K	43	1.58	50.2	1.22	50
4B-ID-50-2	L	39	1.49	50.9	0.47	50
4B-ID-50-3	A	54	1.83	36.6	16.66	50
4B-ID-50-3	B	40	3.43	48.9	0.72	50
4B-ID-50-3	C	36	2.31	49.7	0.58	50
4B-ID-50-3	D	33	4.52	51.7	0.31	50
4B-ID-50-3	E	43	2.92	48.4	0.15	50
4B-ID-50-3	F	40	2.63	50.5	1.14	50
4B-ID-50-3	G	45	2.89	48.3	1.27	50
4B-ID-50-3	H	53	2.02	48.4	0.21	50
4B-ID-50-3	I	45	4.33	47.2	2.55	50
4B-ID-50-3	J	56	3.58	50.1	0.29	50
4B-ID-50-3	K	44	1.89	50.2	0.99	50
4B-ID-50-3	L	44	1.59	50.2	0.54	50
4B-IU-20-1	A	74	1.98	21.9	0.16	20
4B-IU-20-1	B	80	1.57	19.9	0.21	20
4B-IU-20-1	C	74	1.37	19.4	0.13	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-IU-20-1	D	76	1.47	19.9	0.21	20
4B-IU-20-1	E	78	1.49	18.3	1.62	20
4B-IU-20-1	F	69	1.04	20.1	0.13	20
4B-IU-20-1	G	79	1.29	19.5	0.2	20
4B-IU-20-1	H	74	1.23	19.8	0.54	20
4B-IU-20-1	I	73	1.77	23.3	0.22	20
4B-IU-20-1	J	72	1.39	21	0.12	20
4B-IU-20-1	K	64	1.69	21.1	0.11	20
4B-IU-20-1	L	70	1.58	20.7	0.23	20
4B-IU-20-2	A	77	1.75	19.4	0.19	20
4B-IU-20-2	B	80	2.73	19.6	0.23	20
4B-IU-20-2	C	73	1.71	19.3	0.15	20
4B-IU-20-2	D	75	2.91	19.3	0.22	20
4B-IU-20-2	E	71	2.28	19.5	0.16	20
4B-IU-20-2	F	75	1.38	19.4	0.42	20
4B-IU-20-2	G	79	2.22	19.5	0.25	20
4B-IU-20-2	H	74	1.78	20.4	0.45	20
4B-IU-20-2	I	73	1.84	19.8	0.24	20
4B-IU-20-2	J	72	2.41	20.9	0.38	20
4B-IU-20-2	K	61	2.6	20.4	0.23	20
4B-IU-20-2	L	65	1.43	20.4	0.27	20
4B-IU-20-3	A	74	1.84	19.6	0.23	20
4B-IU-20-3	B	80	2.03	19.3	0.16	20
4B-IU-20-3	C	77	2.42	19.2	0.37	20
4B-IU-20-3	D	76	1.69	19.2	0.39	20
4B-IU-20-3	E	70	2.04	16.7	4.29	20
4B-IU-20-3	F	70	1.68	19.2	0.12	20
4B-IU-20-3	G	77	2.21	19.3	0.26	20
4B-IU-20-3	H	75	1.58	20	0.22	20
4B-IU-20-3	I	71	1.15	19.9	0.31	20
4B-IU-20-3	J	75	2.3	19.2	0.25	20
4B-IU-20-3	K	60	1.97	20.9	0.35	20
4B-IU-20-3	L	66	1.64	19.3	0.42	20
4B-IU-40-1	A	61	3.24	36.4	0.1	40
4B-IU-40-1	B	62	4.56	36.9	0.19	40
4B-IU-40-1	C	55	3.43	38.1	0.85	40
4B-IU-40-1	D	58	1.35	37.9	0.17	40
4B-IU-40-1	E	50	5.43	37.6	1.18	40
4B-IU-40-1	F	44	2.63	38.5	0.09	40
4B-IU-40-1	G	62	2.97	38.7	1.41	40
4B-IU-40-1	H	54	3.99	40.3	0.41	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-IU-40-1	I	53	4.39	42.3	0.13	40
4B-IU-40-1	J	53	2.99	40.9	0.16	40
4B-IU-40-1	K	49	1.57	40.7	0.15	40
4B-IU-40-1	L	52	1.87	39.4	0.12	40
4B-IU-40-2	A	63	4.14	38.8	0.14	40
4B-IU-40-2	B	57	4.09	39.5	0.13	40
4B-IU-40-2	C	58	3.65	38.5	1.32	40
4B-IU-40-2	D	60	1.72	37.1	0.68	40
4B-IU-40-2	E	48	3.29	39.2	0.12	40
4B-IU-40-2	F	45	3.56	39	0.11	40
4B-IU-40-2	G	57	2.36	38.2	1.24	40
4B-IU-40-2	H	53	2.95	40.1	0.12	40
4B-IU-40-2	I	55	2.11	41.7	0.23	40
4B-IU-40-2	J	53	2.93	40.5	0.17	40
4B-IU-40-2	K	50	2.26	40	0.16	40
4B-IU-40-2	L	50	1.38	39.5	0.13	40
4B-IU-40-3	A	60	4.36	39.1	0.13	40
4B-IU-40-3	B	55	4.16	40	1.17	40
4B-IU-40-3	C	52	4.05	39	0.3	40
4B-IU-40-3	D	55	1.77	39	0.2	40
4B-IU-40-3	E	51	3.9	39.3	0.44	40
4B-IU-40-3	F	42	3.45	38.8	0.09	40
4B-IU-40-3	G	56	2.35	40.3	0.43	40
4B-IU-40-3	H	50	4.24	40.5	0.34	40
4B-IU-40-3	I	51	5.25	41.3	0.43	40
4B-IU-40-3	J	48	2.28	41.3	0.12	40
4B-IU-40-3	K	48	1.75	40.7	0.11	40
4B-IU-40-3	L	48	1.63	39.5	0.15	40
4B-IU-50-1	A	56	3.75	49.2	0.44	50
4B-IU-50-1	B	57	3.88	46.9	2.08	50
4B-IU-50-1	C	45	6.84	47.5	1.54	50
4B-IU-50-1	D	44	2.72	48.1	0.26	50
4B-IU-50-1	E	37	4.9	49	0.83	50
4B-IU-50-1	F	28	1.67	49	0.13	50
4B-IU-50-1	G	47	3.16	49.8	0.66	50
4B-IU-50-1	H	45	2.37	51.2	0.32	50
4B-IU-50-1	I	49	7.66	49.6	0.98	50
4B-IU-50-1	J	43	3.8	50.9	0.2	50
4B-IU-50-1	K	46	2.05	50.8	0.2	50
4B-IU-50-1	L	39	1.07	50.5	0.88	50
4B-IU-50-2	A	54	3.64	48.9	0.44	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-IU-50-2	B	54	3.68	50.4	0.75	50
4B-IU-50-2	C	48	3.71	50	1	50
4B-IU-50-2	D	47	2.74	49.9	0.36	50
4B-IU-50-2	E	44	3.99	49.9	0.6	50
4B-IU-50-2	F	42	2.87	48.9	0.11	50
4B-IU-50-2	G	49	2.37	49.3	0.78	50
4B-IU-50-2	H	48	2.74	49.5	0.23	50
4B-IU-50-2	I	49	3.65	50.5	0.46	50
4B-IU-50-2	J	51	3.28	50.6	0.11	50
4B-IU-50-2	K	50	1.98	49.2	0.18	50
4B-IU-50-2	L	45	1.17	49.3	0.12	50
4B-IU-50-3	A	54	3.68	47.6	0.2	50
4B-IU-50-3	B	51	3.41	49.1	0.87	50
4B-IU-50-3	C	43	4.71	49.3	0.85	50
4B-IU-50-3	D	43	3.07	48.9	0.38	50
4B-IU-50-3	E	37	4.77	49.5	1.25	50
4B-IU-50-3	F	34	2.91	49.9	0.71	50
4B-IU-50-3	G	45	2.78	48.7	1.65	50
4B-IU-50-3	H	43	3.57	50.3	0.2	50
4B-IU-50-3	I	40	3.4	48.5	1.57	50
4B-IU-50-3	J	46	4.08	49.5	0.14	50
4B-IU-50-3	K	47	1.73	47.6	1.84	50
4B-IU-50-3	L	48	1.47	49.4	0.19	50
4B-NID-20-1	A	65	1.6	20.3	0.26	20
4B-NID-20-1	B	66	1.47	20.5	0.27	20
4B-NID-20-1	C	70	1.03	20.3	0.17	20
4B-NID-20-1	D	67	2.45	20.4	0.21	20
4B-NID-20-1	E	65	2.21	20.3	0.19	20
4B-NID-20-1	F	71	2.08	20.6	0.27	20
4B-NID-20-1	G	75	1.49	20.7	0.28	20
4B-NID-20-1	H	71	1.38	20.2	0.32	20
4B-NID-20-1	I	67	1.35	20.2	0.11	20
4B-NID-20-1	J	74	1.43	20.6	0.25	20
4B-NID-20-1	K	57	4.28	20.9	0.1	20
4B-NID-20-1	L	57	1.63	20.9	0.13	20
4B-NID-20-2	A	63	1.76	21.5	0.13	20
4B-NID-20-2	B	65	2.07	20	0.12	20
4B-NID-20-2	C	72	1.07	20.6	0.14	20
4B-NID-20-2	D	67	2.65	21	0.4	20
4B-NID-20-2	E	65	1.84	20.2	0.3	20
4B-NID-20-2	F	72	1.75	20.5	0.2	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-NID-20-2	G	73	1.52	20.7	0.34	20
4B-NID-20-2	H	71	2.44	20.1	0.17	20
4B-NID-20-2	I	65	1.59	20.8	0.19	20
4B-NID-20-2	J	75	1.2	20.4	0.21	20
4B-NID-20-2	K	54	3.55	21.5	0.11	20
4B-NID-20-2	L	59	1.38	20.7	0.22	20
4B-NID-20-3	A	64	2.18	20.5	0.17	20
4B-NID-20-3	B	68	2.05	20.2	0.12	20
4B-NID-20-3	C	72	1.74	20.1	0.36	20
4B-NID-20-3	D	66	3.83	20.7	0.3	20
4B-NID-20-3	E	72	3.35	19.9	0.2	20
4B-NID-20-3	F	69	1.47	20.2	0.12	20
4B-NID-20-3	G	72	1.42	20.2	0.2	20
4B-NID-20-3	H	71	1.9	20.3	0.14	20
4B-NID-20-3	I	65	1.19	20.4	0.12	20
4B-NID-20-3	J	73	1.02	20.9	0.15	20
4B-NID-20-3	K	54	4.74	21.3	0.22	20
4B-NID-20-3	L	61	1.71	19.9	0.11	20
4B-NID-40-1	A	42	3.26	38.3	0.15	40
4B-NID-40-1	B	42	3.28	39.7	0.22	40
4B-NID-40-1	C	54	2.29	40.1	0.19	40
4B-NID-40-1	D	36	4.81	39.5	0.21	40
4B-NID-40-1	E	56	5.13	39.5	0.14	40
4B-NID-40-1	F	54	2.37	40.6	0.16	40
4B-NID-40-1	G	55	2.3	40	0.13	40
4B-NID-40-1	H	54	1.83	40.3	0.35	40
4B-NID-40-1	I	54	3.51	39.6	0.2	40
4B-NID-40-1	J	60	1.51	39.6	0.19	40
4B-NID-40-1	K	48	3.86	39.7	0.18	40
4B-NID-40-1	L	46	2.29	38.7	2.38	40
4B-NID-40-2	A	34	2.89	39.2	0.24	40
4B-NID-40-2	B	37	2.65	39.1	0.14	40
4B-NID-40-2	C	51	1.74	40.1	0.11	40
4B-NID-40-2	D	40	5.11	40.2	0.2	40
4B-NID-40-2	E	44	4.05	38.8	1.53	40
4B-NID-40-2	F	49	3.15	40.1	0.4	40
4B-NID-40-2	G	51	3.04	40.1	0.11	40
4B-NID-40-2	H	50	2.12	39.4	0.26	40
4B-NID-40-2	I	50	4.06	39	0.19	40
4B-NID-40-2	J	60	2.9	39.3	0.13	40
4B-NID-40-2	K	47	3.45	39.7	0.14	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-NID-40-2	L	47	3.3	39.7	0.15	40
4B-NID-40-3	A	32	2.1	40	0.64	40
4B-NID-40-3	B	33	3.51	40.1	0.89	40
4B-NID-40-3	C	52	1.5	40	0.1	40
4B-NID-40-3	D	38	5.86	39.5	0.34	40
4B-NID-40-3	E	50	4.13	39.4	0.68	40
4B-NID-40-3	F	46	3.1	40.3	0.31	40
4B-NID-40-3	G	45	2.7	41.4	0.13	40
4B-NID-40-3	H	56	6.76	39.6	0.17	40
4B-NID-40-3	I	51	6.39	38.1	2.75	40
4B-NID-40-3	J	60	1.25	39.2	0.11	40
4B-NID-40-3	K	48	3.38	39.5	0.12	40
4B-NID-40-3	L	45	2.16	39.7	0.16	40
4B-NID-50-1	A	29	4.22	49.3	0.98	50
4B-NID-50-1	B	36	3.66	49.1	0.2	50
4B-NID-50-1	C	42	5.17	48.9	0.55	50
4B-NID-50-1	D	29	6.39	49.3	0.15	50
4B-NID-50-1	E	51	3.93	48.7	1.38	50
4B-NID-50-1	F	49	2.85	50.6	0.94	50
4B-NID-50-1	G	51	5.51	49.8	0.82	50
4B-NID-50-1	H	50	2.08	49.1	0.59	50
4B-NID-50-1	I	55	5.92	49.9	0.85	50
4B-NID-50-1	J	54	1.37	48.4	0.93	50
4B-NID-50-1	K	46	4.26	48.1	0.79	50
4B-NID-50-1	L	45	1.53	49.5	0.17	50
4B-NID-50-2	A	23	2.31	47.4	1.29	50
4B-NID-50-2	B	28	3.68	49.1	0.24	50
4B-NID-50-2	C	39	8.21	49	0.88	50
4B-NID-50-2	D	27	6.88	49.4	0.35	50
4B-NID-50-2	E	44	3.32	48.9	0.78	50
4B-NID-50-2	F	42	4.14	50	0.64	50
4B-NID-50-2	G	41	2.91	48.4	0.64	50
4B-NID-50-2	H	44	2.49	47.7	0.14	50
4B-NID-50-2	I	40	3.91	48.4	1.34	50
4B-NID-50-2	J	48	2.22	49.5	1.39	50
4B-NID-50-2	K	44	3.99	48.8	0.85	50
4B-NID-50-2	L	40	1.66	49.7	0.34	50
4B-NID-50-3	A	21	1.98	49.6	0.72	50
4B-NID-50-3	B	33	3.78	49	0.79	50
4B-NID-50-3	C	45	7.04	48.7	0.68	50
4B-NID-50-3	D	25	6.31	50.2	0.16	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-NID-50-3	E	39	4.26	49.5	1.26	50
4B-NID-50-3	F	41	4.25	50.2	0.78	50
4B-NID-50-3	G	38	3.43	50.6	0.44	50
4B-NID-50-3	H	39	2.54	49.4	0.79	50
4B-NID-50-3	I	38	5.41	50.1	0.92	50
4B-NID-50-3	J	46	2.21	49.9	0.72	50
4B-NID-50-3	K	43	3.47	49	0.57	50
4B-NID-50-3	L	37	1.44	49.6	1.62	50
4B-NIU-20-1	A	61	2.31	20	0.12	20
4B-NIU-20-1	B	75	3.1	19.8	0.23	20
4B-NIU-20-1	C	70	1.95	19.6	0.14	20
4B-NIU-20-1	D	71	1.74	20.1	0.27	20
4B-NIU-20-1	E	71	2.83	22	0.39	20
4B-NIU-20-1	F	67	1.06	21.5	0.15	20
4B-NIU-20-1	G	67	1.07	20.6	0.26	20
4B-NIU-20-1	H	65	1.41	21.6	0.22	20
4B-NIU-20-1	I	70	1.11	21	0.16	20
4B-NIU-20-1	J	71	0.76	20.9	0.16	20
4B-NIU-20-1	K	55	1.38	21.9	0.16	20
4B-NIU-20-1	L	65	2.05	20.6	0.29	20
4B-NIU-20-2	A	63	2.02	19.5	0.17	20
4B-NIU-20-2	B	76	2.97	19.2	0.12	20
4B-NIU-20-2	C	68	1.62	19.9	0.42	20
4B-NIU-20-2	D	71	1.49	20.5	0.2	20
4B-NIU-20-2	E	69	1.18	19.3	0.17	20
4B-NIU-20-2	F	66	1.24	19.2	0.26	20
4B-NIU-20-2	G	72	0.87	19.2	0.23	20
4B-NIU-20-2	H	73	0.84	19.5	0.25	20
4B-NIU-20-2	I	70	1.29	20.8	0.15	20
4B-NIU-20-2	J	70	1.62	20.4	0.24	20
4B-NIU-20-2	K	56	1.34	19.1	0.16	20
4B-NIU-20-2	L	67	2	21	0.21	20
4B-NIU-20-3	A	64	2.09	19.2	0.2	20
4B-NIU-20-3	B	74	3.08	19.8	0.25	20
4B-NIU-20-3	C	72	1.99	19.4	0.22	20
4B-NIU-20-3	D	71	1.34	19.6	0.13	20
4B-NIU-20-3	E	72	1.4	19.7	0.15	20
4B-NIU-20-3	F	68	1.33	18.9	0.28	20
4B-NIU-20-3	G	71	1.12	20.9	0.3	20
4B-NIU-20-3	H	68	1.12	20	0.23	20
4B-NIU-20-3	I	68	1.48	19.9	0.28	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-NIU-20-3	J	74	1.45	19.9	0.16	20
4B-NIU-20-3	K	52	1.7	21.2	0.13	20
4B-NIU-20-3	L	67	2.12	20.3	0.31	20
4B-NIU-40-1	A	34	3.06	39.3	0.14	40
4B-NIU-40-1	B	54	3.18	40.2	0.12	40
4B-NIU-40-1	C	51	1.68	39.4	0.09	40
4B-NIU-40-1	D	50	2.88	38	0.12	40
4B-NIU-40-1	E	45	3.48	39.6	0.1	40
4B-NIU-40-1	F	46	2.37	39.2	0.11	40
4B-NIU-40-1	G	48	5.29	39.2	0.49	40
4B-NIU-40-1	H	53	2.1	39.5	0.6	40
4B-NIU-40-1	I	50	3.17	40.2	0.57	40
4B-NIU-40-1	J	55	3.72	39.8	0.12	40
4B-NIU-40-1	K	47	2.52	39.6	0.97	40
4B-NIU-40-1	L	51	1.97	38.8	1.47	40
4B-NIU-40-2	A	38	4.24	38.3	0.12	40
4B-NIU-40-2	B	58	2.81	38.6	0.16	40
4B-NIU-40-2	C	50	4.45	38.2	0.1	40
4B-NIU-40-2	D	53	3.15	38.1	0.1	40
4B-NIU-40-2	E	48	4.54	39	0.1	40
4B-NIU-40-2	F	48	2.15	38.6	0.09	40
4B-NIU-40-2	G	52	3.71	39.8	0.57	40
4B-NIU-40-2	H	54	1.24	41.2	0.22	40
4B-NIU-40-2	I	53	1.58	40.3	0.49	40
4B-NIU-40-2	J	54	2.49	40.6	0.48	40
4B-NIU-40-2	K	47	2.17	40.7	0.7	40
4B-NIU-40-2	L	51	2.25	39.8	0.13	40
4B-NIU-40-3	A	33	3.9	38.8	0.14	40
4B-NIU-40-3	B	53	2.93	39.3	0.1	40
4B-NIU-40-3	C	50	1.52	38.2	0.79	40
4B-NIU-40-3	D	47	2.37	39.3	0.1	40
4B-NIU-40-3	E	50	3.01	39.2	0.1	40
4B-NIU-40-3	F	52	2.92	39.6	0.29	40
4B-NIU-40-3	G	45	1.43	37.3	2.31	40
4B-NIU-40-3	H	51	2.11	39.5	0.1	40
4B-NIU-40-3	I	48	1.83	41.5	0.42	40
4B-NIU-40-3	J	55	4.57	41.2	0.14	40
4B-NIU-40-3	K	44	1.23	39.4	0.66	40
4B-NIU-40-3	L	46	2.37	39.7	0.11	40
4B-NIU-50-1	A	23	6.69	49.8	0.1	50
4B-NIU-50-1	B	41	2.11	49.1	0.56	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
4B-NIU-50-1	C	42	4.47	49.4	0.13	50
4B-NIU-50-1	D	38	2.98	49.5	0.99	50
4B-NIU-50-1	E	38	3.93	48.2	1.43	50
4B-NIU-50-1	F	40	4.07	48.5	0.16	50
4B-NIU-50-1	G	35	2.6	48.9	0.14	50
4B-NIU-50-1	H	41	2.36	49.1	1.64	50
4B-NIU-50-1	I	38	6.55	50	0.66	50
4B-NIU-50-1	J	44	3.93	48.5	0.81	50
4B-NIU-50-1	K	49	1.82	47.2	0.96	50
4B-NIU-50-1	L	43	1.39	47.3	0.53	50
4B-NIU-50-2	A	30	11.9	47.5	0.16	50
4B-NIU-50-2	B	50	3.34	47.2	1.06	50
4B-NIU-50-2	C	48	5.88	48.5	1.25	50
4B-NIU-50-2	D	45	2.94	49.8	0.88	50
4B-NIU-50-2	E	41	4.84	49.7	0.41	50
4B-NIU-50-2	F	45	2.38	49.1	1.42	50
4B-NIU-50-2	G	46	3.21	49.2	0.14	50
4B-NIU-50-2	H	48	1.87	49.9	1.35	50
4B-NIU-50-2	I	53	3.92	49.8	0.72	50
4B-NIU-50-2	J	50	1.95	48.8	0.73	50
4B-NIU-50-2	K	47	1.72	49	0.75	50
4B-NIU-50-2	L	46	1.9	48.7	0.74	50
4B-NIU-50-3	A	20	4.12	49.1	0.17	50
4B-NIU-50-3	B	43	2.04	49.8	0.77	50
4B-NIU-50-3	C	41	2.96	49.2	0.44	50
4B-NIU-50-3	D	38	3.42	48.1	0.99	50
4B-NIU-50-3	E	36	6.24	49	0.17	50
4B-NIU-50-3	F	39	3.91	48.5	0.16	50
4B-NIU-50-3	G	42	3.86	47.9	0.17	50
4B-NIU-50-3	H	42	2.78	52	0.27	50
4B-NIU-50-3	I	40	5.72	50.2	0.66	50
4B-NIU-50-3	J	43	3.79	49.7	0.54	50
4B-NIU-50-3	K	45	1.46	49.1	1.08	50
4B-NIU-50-3	L	44	3.24	49.1	0.87	50
5B-ID-20-1	A	81	1.22	21.6	0.11	20
5B-ID-20-1	B	74	3.5	20	0.27	20
5B-ID-20-1	C	71	1.75	20.4	0.11	20
5B-ID-20-1	D	67	1.41	20.2	0.23	20
5B-ID-20-1	E	78	1.38	20.1	0.19	20
5B-ID-20-1	F	71	1.6	21.1	0.23	20
5B-ID-20-1	G	78	1.54	21.1	0.27	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-ID-20-1	H	75	1.22	20.7	0.2	20
5B-ID-20-1	I	72	1.68	20.9	0.08	20
5B-ID-20-1	J	78	1.28	21.1	0.23	20
5B-ID-20-1	K	62	1.65	21.6	0.15	20
5B-ID-20-1	L	63	1.63	21.2	0.15	20
5B-ID-20-2	A	78	2.33	19.9	0.39	20
5B-ID-20-2	B	73	2.94	21.3	0.15	20
5B-ID-20-2	C	71	1.42	20.3	0.16	20
5B-ID-20-2	D	69	1.31	20.5	0.12	20
5B-ID-20-2	E	78	1.52	19.8	0.14	20
5B-ID-20-2	F	74	2.09	21.1	0.26	20
5B-ID-20-2	G	79	1.11	20.6	0.12	20
5B-ID-20-2	H	73	1.13	20.3	0.13	20
5B-ID-20-2	I	72	1.3	21.7	0.15	20
5B-ID-20-2	J	78	1.75	20.4	0.24	20
5B-ID-20-2	K	61	1.91	20.9	0.04	20
5B-ID-20-2	L	64	2.03	21.1	0.06	20
5B-ID-20-3	A	75	1.35	19.6	0.33	20
5B-ID-20-3	B	77	2.36	19.5	0.05	20
5B-ID-20-3	C	72	2.19	20	0.22	20
5B-ID-20-3	D	68	1.45	20.2	0.28	20
5B-ID-20-3	E	80	1.51	19.4	0.08	20
5B-ID-20-3	F	74	2.2	20.1	0.23	20
5B-ID-20-3	G	76	2.76	20.2	0.2	20
5B-ID-20-3	H	75	2.95	19.8	0.03	20
5B-ID-20-3	I	70	1.3	21.2	0.13	20
5B-ID-20-3	J	78	2.03	20.5	0.22	20
5B-ID-20-3	K	62	1.42	21.5	0.11	20
5B-ID-20-3	L	65	1.94	20.9	0.04	20
5B-ID-40-1	A	55	4.79	39.5	0.22	40
5B-ID-40-1	B	47	5.63	40.7	0.17	40
5B-ID-40-1	C	41	3.06	40.1	0.03	40
5B-ID-40-1	D	32	3.04	40.8	0.05	40
5B-ID-40-1	E	50	2.85	39.7	0.14	40
5B-ID-40-1	F	49	3.63	39.2	0.18	40
5B-ID-40-1	G	55	1.7	39.5	0.19	40
5B-ID-40-1	H	55	2.74	39.8	0.19	40
5B-ID-40-1	I	41	3.91	40.3	0.08	40
5B-ID-40-1	J	58	2.78	40	0.24	40
5B-ID-40-1	K	52	3.71	39.8	0.12	40
5B-ID-40-1	L	46	2.61	40.6	0.06	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-ID-40-2	A	55	4.09	38.9	0.1	40
5B-ID-40-2	B	45	3.87	39.1	0.18	40
5B-ID-40-2	C	45	2.09	40.7	0.04	40
5B-ID-40-2	D	31	4.2	40.5	0.06	40
5B-ID-40-2	E	52	2	39.8	0.08	40
5B-ID-40-2	F	42	2.21	40.3	0.16	40
5B-ID-40-2	G	56	2.27	40.1	0.1	40
5B-ID-40-2	H	51	3.34	40.9	0.1	40
5B-ID-40-2	I	37	3.06	41.4	0.11	40
5B-ID-40-2	J	54	1.81	41.6	0.09	40
5B-ID-40-2	K	51	1.65	41.2	0.13	40
5B-ID-40-2	L	43	2.54	41.2	0.1	40
5B-ID-40-3	A	56	4.62	40	0.17	40
5B-ID-40-3	B	43	4.22	40.2	0.13	40
5B-ID-40-3	C	39	1.98	40.6	0.18	40
5B-ID-40-3	D	33	3.39	40.6	0.13	40
5B-ID-40-3	E	46	4.3	40.2	0.1	40
5B-ID-40-3	F	40	2.23	41	0.15	40
5B-ID-40-3	G	49	2.32	41.1	0.16	40
5B-ID-40-3	H	53	2.6	40.9	0.23	40
5B-ID-40-3	I	38	2.86	41.5	0.12	40
5B-ID-40-3	J	53	1.81	41.1	0.18	40
5B-ID-40-3	K	49	2.24	40.8	0.14	40
5B-ID-40-3	L	41	2.47	41.3	0.12	40
5B-ID-50-1	A	48	5.79	49.5	0.11	50
5B-ID-50-1	B	34	4.87	50.6	0.14	50
5B-ID-50-1	C	30	2.47	50	0.06	50
5B-ID-50-1	D	25	4.78	50.5	0.04	50
5B-ID-50-1	E	48	3.28	49.2	0.26	50
5B-ID-50-1	F	36	2.69	50	0.11	50
5B-ID-50-1	G	40	3.79	50.2	0.2	50
5B-ID-50-1	H	49	2.35	50.4	0.19	50
5B-ID-50-1	I	31	4.49	50.6	0.05	50
5B-ID-50-1	J	47	2.31	50	0.15	50
5B-ID-50-1	K	47	1.85	50.2	0.16	50
5B-ID-50-1	L	37	1.99	50.7	0.09	50
5B-ID-50-2	A	46	5.08	50	0.2	50
5B-ID-50-2	B	32	4.88	50.5	0.07	50
5B-ID-50-2	C	27	2.1	50.1	0.09	50
5B-ID-50-2	D	27	2.98	50.2	0.04	50
5B-ID-50-2	E	35	2.72	50.7	0.04	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-ID-50-2	F	34	2.48	50.2	0.07	50
5B-ID-50-2	G	40	2.9	50.5	0.07	50
5B-ID-50-2	H	46	2.17	50.8	0.12	50
5B-ID-50-2	I	25	3.21	51.1	0.11	50
5B-ID-50-2	J	46	2.86	51.6	0.06	50
5B-ID-50-2	K	49	1.73	51.8	0.06	50
5B-ID-50-2	L	35	3.41	52	0.08	50
5B-ID-50-3	A	44	4.36	49.6	0.16	50
5B-ID-50-3	B	33	4.2	49.9	0.13	50
5B-ID-50-3	C	25	2.4	49.9	0.04	50
5B-ID-50-3	D	32	2.5	49.8	0.09	50
5B-ID-50-3	E	37	2.83	50.1	0.12	50
5B-ID-50-3	F	29	2.45	50.2	0.07	50
5B-ID-50-3	G	38	2.1	50.5	0.08	50
5B-ID-50-3	H	45	4.43	50.5	0.13	50
5B-ID-50-3	I	29	3.06	50.7	0.05	50
5B-ID-50-3	J	48	3.5	51.2	0.09	50
5B-ID-50-3	K	48	1.31	51.1	0.08	50
5B-ID-50-3	L	33	2.28	51.4	0.06	50
5B-IU-20-1	A	84	1.91	19.6	0.23	20
5B-IU-20-1	B	81	1.56	19.9	0.18	20
5B-IU-20-1	C	76	1.7	19.9	0.18	20
5B-IU-20-1	D	77	2.12	20.5	0.15	20
5B-IU-20-1	E	76	2.47	20.7	0.19	20
5B-IU-20-1	F	77	1.19	20	0.14	20
5B-IU-20-1	G	73	1.52	19.4	0.27	20
5B-IU-20-1	H	69	3.65	20	0.2	20
5B-IU-20-1	I	72	2.68	20.7	0.17	20
5B-IU-20-1	J	70	2.25	20.9	0.15	20
5B-IU-20-1	K	68	1.71	20.7	0.2	20
5B-IU-20-1	L	61	1.78	21.6	0.36	20
5B-IU-20-2	A	84	2.15	19.6	0.25	20
5B-IU-20-2	B	81	2.19	20.5	0.05	20
5B-IU-20-2	C	79	3.12	19.7	0.04	20
5B-IU-20-2	D	79	1.91	19.8	0.2	20
5B-IU-20-2	E	73	1.79	20.4	0.43	20
5B-IU-20-2	F	70	1.27	19.9	0.03	20
5B-IU-20-2	G	75	1.92	18.8	0.1	20
5B-IU-20-2	H	76	1.84	18.9	0.17	20
5B-IU-20-2	I	73	2.1	20.4	0.19	20
5B-IU-20-2	J	72	1.62	20.5	0.06	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-IU-20-2	K	65	1.77	20.5	0.2	20
5B-IU-20-2	L	68	1.73	20.4	0.23	20
5B-IU-20-3	A	82	1.9	18.7	0.12	20
5B-IU-20-3	B	78	2.38	19.4	0.06	20
5B-IU-20-3	C	79	1.68	19	0.2	20
5B-IU-20-3	D	77	1.88	19.6	0.2	20
5B-IU-20-3	E	74	1.61	19.6	0.17	20
5B-IU-20-3	F	72	1.67	19.5	0.25	20
5B-IU-20-3	G	72	1.51	20.2	0.25	20
5B-IU-20-3	H	73	1.72	20.1	0.1	20
5B-IU-20-3	I	73	2.14	19.3	0.05	20
5B-IU-20-3	J	75	1.83	19.7	0.25	20
5B-IU-20-3	K	66	3.38	19.7	0.23	20
5B-IU-20-3	L	66	1.3	20.5	0.15	20
5B-IU-40-1	A	51	4	39.8	0.24	40
5B-IU-40-1	B	49	3.68	39.5	0.06	40
5B-IU-40-1	C	44	4.76	39.7	0.09	40
5B-IU-40-1	D	49	1.72	39.4	0.09	40
5B-IU-40-1	E	39	3.7	40.7	0.14	40
5B-IU-40-1	F	37	1.91	40.3	0.09	40
5B-IU-40-1	G	46	4.57	40.1	0.1	40
5B-IU-40-1	H	46	3.57	39.7	0.08	40
5B-IU-40-1	I	42	4.42	40.5	0.15	40
5B-IU-40-1	J	43	3	40.6	0.1	40
5B-IU-40-1	K	53	2.19	40.4	0.18	40
5B-IU-40-1	L	51	2.18	39.2	0.06	40
5B-IU-40-2	A	53	5.65	40.4	0.14	40
5B-IU-40-2	B	51	5	39.1	0.09	40
5B-IU-40-2	C	47	5.76	40.3	0.04	40
5B-IU-40-2	D	48	2.15	38.4	0.05	40
5B-IU-40-2	E	38	3.48	41	0.13	40
5B-IU-40-2	F	35	2.08	41.4	0.03	40
5B-IU-40-2	G	44	3.7	40.6	0.12	40
5B-IU-40-2	H	48	2.36	38.5	0.25	40
5B-IU-40-2	I	50	3.6	39.7	0.21	40
5B-IU-40-2	J	43	2.43	40.7	0.11	40
5B-IU-40-2	K	51	2.08	40.4	0.17	40
5B-IU-40-2	L	48	3.12	39.5	0.08	40
5B-IU-40-3	A	47	6.16	40.5	0.12	40
5B-IU-40-3	B	49	5.06	40.1	0.11	40
5B-IU-40-3	C	43	5.03	40.2	0.11	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-IU-40-3	D	45	1.83	40.2	0.07	40
5B-IU-40-3	E	40	3.97	41	0.2	40
5B-IU-40-3	F	30	1.62	41.5	0.04	40
5B-IU-40-3	G	41	2.69	40.9	0.1	40
5B-IU-40-3	H	41	1.89	41	0.1	40
5B-IU-40-3	I	41	4.5	41.5	0.12	40
5B-IU-40-3	J	40	2.23	40.5	0.08	40
5B-IU-40-3	K	54	2.68	39.8	0.13	40
5B-IU-40-3	L	47	3.28	39.9	0.08	40
5B-IU-50-1	A	42	5.55	49.6	0.15	50
5B-IU-50-1	B	41	5.04	50.1	0.05	50
5B-IU-50-1	C	34	6.9	50.4	0.07	50
5B-IU-50-1	D	39	1.8	49.9	0.1	50
5B-IU-50-1	E	30	5.16	50.9	0.08	50
5B-IU-50-1	F	25	2.17	50.3	0.06	50
5B-IU-50-1	G	37	4.37	50.1	0.22	50
5B-IU-50-1	H	33	2.26	50.8	0.11	50
5B-IU-50-1	I	34	6.05	51.4	0.03	50
5B-IU-50-1	J	36	3.83	50.9	0.04	50
5B-IU-50-1	K	51	2.61	50.2	0.07	50
5B-IU-50-1	L	40	3.02	49.5	0.12	50
5B-IU-50-2	A	39	4.66	48.9	0.19	50
5B-IU-50-2	B	35	5.3	49.5	0.05	50
5B-IU-50-2	C	33	5.56	51	0.14	50
5B-IU-50-2	D	35	2.54	50.7	0.07	50
5B-IU-50-2	E	27	5.3	48.7	0.05	50
5B-IU-50-2	F	26	1.45	48.5	0.03	50
5B-IU-50-2	G	37	4.28	48.5	0.15	50
5B-IU-50-2	H	29	2.42	49.1	0.2	50
5B-IU-50-2	I	32	5.53	50.6	0.13	50
5B-IU-50-2	J	33	2.62	50.6	0.05	50
5B-IU-50-2	K	51	1.99	49.1	0.07	50
5B-IU-50-2	L	40	2.95	47.2	0.14	50
5B-IU-50-3	A	42	5.69	48.8	0.28	50
5B-IU-50-3	B	38	4.85	49.5	0.05	50
5B-IU-50-3	C	36	5.72	50.2	0.09	50
5B-IU-50-3	D	31	3.54	50.4	0.12	50
5B-IU-50-3	E	29	5.04	49.3	0.11	50
5B-IU-50-3	F	24	1.5	49.5	0.05	50
5B-IU-50-3	G	32	3.58	50.2	0.07	50
5B-IU-50-3	H	34	2.1	50.1	0.13	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-IU-50-3	I	34	4.27	50.8	0.1	50
5B-IU-50-3	J	32	3.32	51.1	0.08	50
5B-IU-50-3	K	50	2.41	49.7	0.04	50
5B-IU-50-3	L	41	2.35	47.1	0.16	50
5B-NID-20-1	A	65	1.26	21.5	0.21	20
5B-NID-20-1	B	67	2.37	21	0.29	20
5B-NID-20-1	C	77	1.23	20.2	0.09	20
5B-NID-20-1	D	58	1.88	20.8	0.16	20
5B-NID-20-1	E	67	1.33	21.3	0.26	20
5B-NID-20-1	F	67	1.95	20.9	0.27	20
5B-NID-20-1	G	65	2.13	20.4	0.13	20
5B-NID-20-1	H	68	1.1	20.7	0.1	20
5B-NID-20-1	I	69	1.44	21.4	0.03	20
5B-NID-20-1	J	74	1.5	20.9	0.18	20
5B-NID-20-1	K	61	2.28	22.6	0.16	20
5B-NID-20-1	L	61	2.77	21.9	0.05	20
5B-NID-20-2	A	64	1.57	19.5	0.26	20
5B-NID-20-2	B	66	3.98	20.5	0.25	20
5B-NID-20-2	C	72	1.36	20.8	0.25	20
5B-NID-20-2	D	64	2.27	19.4	0.32	20
5B-NID-20-2	E	71	1.77	20.9	0.19	20
5B-NID-20-2	F	71	2.34	21	0.28	20
5B-NID-20-2	G	72	2.42	20.5	0.07	20
5B-NID-20-2	H	67	1.91	21.8	0.27	20
5B-NID-20-2	I	65	1.23	21.2	0.18	20
5B-NID-20-2	J	75	1.24	21	0.21	20
5B-NID-20-2	K	63	3.36	20.8	0.19	20
5B-NID-20-2	L	64	2.03	22.1	0.18	20
5B-NID-20-3	A	65	2.23	19.4	0.28	20
5B-NID-20-3	B	65	4.41	21.3	0.26	20
5B-NID-20-3	C	76	0.98	20.5	0.08	20
5B-NID-20-3	D	60	2.06	20.2	0.22	20
5B-NID-20-3	E	74	2.2	19.1	0.16	20
5B-NID-20-3	F	70	1.58	20.6	0.05	20
5B-NID-20-3	G	71	2.4	20.5	0.07	20
5B-NID-20-3	H	70	1.4	20.4	0.14	20
5B-NID-20-3	I	69	1.39	21	0.04	20
5B-NID-20-3	J	73	1.12	21.2	0.11	20
5B-NID-20-3	K	61	3.39	22.1	0.21	20
5B-NID-20-3	L	68	2.28	21.2	0.18	20
5B-NID-40-1	A	25	2.94	39.3	0.05	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-NID-40-1	B	28	3.08	39.6	0.1	40
5B-NID-40-1	C	47	2.71	39.4	0.17	40
5B-NID-40-1	D	28	5.4	39.8	0.11	40
5B-NID-40-1	E	42	2.77	39.6	0.14	40
5B-NID-40-1	F	41	3.58	40.1	0.16	40
5B-NID-40-1	G	43	3.03	40.3	0.12	40
5B-NID-40-1	H	41	2.29	40.4	0.1	40
5B-NID-40-1	I	38	3.02	40.3	0.15	40
5B-NID-40-1	J	56	2.28	40.2	0.16	40
5B-NID-40-1	K	58	1.81	40.3	0.14	40
5B-NID-40-1	L	46	2.79	40.1	0.11	40
5B-NID-40-2	A	22	2.84	40.4	0.04	40
5B-NID-40-2	B	29	2.62	40.2	0.13	40
5B-NID-40-2	C	45	3.48	39.9	0.18	40
5B-NID-40-2	D	38	7.52	40.3	0.19	40
5B-NID-40-2	E	37	5.05	39.6	0.06	40
5B-NID-40-2	F	43	4.59	40.2	0.15	40
5B-NID-40-2	G	39	2.66	40.3	0.14	40
5B-NID-40-2	H	40	2.72	40.2	0.15	40
5B-NID-40-2	I	39	2.56	40.3	0.14	40
5B-NID-40-2	J	50	2.07	40.3	0.16	40
5B-NID-40-2	K	54	1.56	40.1	0.19	40
5B-NID-40-2	L	44	2.77	40	0.08	40
5B-NID-40-3	A	22	3.19	41.5	0.06	40
5B-NID-40-3	B	28	5.63	40.3	0.1	40
5B-NID-40-3	C	38	2.61	40	0.14	40
5B-NID-40-3	D	35	5.82	40.6	0.56	40
5B-NID-40-3	E	36	4.47	39.6	0.11	40
5B-NID-40-3	F	37	4.76	40.3	0.19	40
5B-NID-40-3	G	40	2.41	40.3	0.2	40
5B-NID-40-3	H	41	2.6	40.2	0.14	40
5B-NID-40-3	I	39	3.25	40.3	0.14	40
5B-NID-40-3	J	51	2.42	40	0.18	40
5B-NID-40-3	K	58	3.07	40	0.18	40
5B-NID-40-3	L	43	2.89	40.5	0.1	40
5B-NID-50-1	A	18	3.1	51	0.03	50
5B-NID-50-1	B	15	1.38	51.2	0.06	50
5B-NID-50-1	C	29	5.78	51.1	0.12	50
5B-NID-50-1	D	22	5.86	51.3	0.13	50
5B-NID-50-1	E	31	5.77	51	0.04	50
5B-NID-50-1	F	34	5.06	51.3	0.19	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-NID-50-1	G	26	3.01	51.4	0.12	50
5B-NID-50-1	H	30	3.23	51.2	0.11	50
5B-NID-50-1	I	33	2.18	51.4	0.11	50
5B-NID-50-1	J	41	2.77	50.9	0.11	50
5B-NID-50-1	K	52	3.55	50.7	0.17	50
5B-NID-50-1	L	39	2.14	51.5	0.17	50
5B-NID-50-2	A	15	1.65	52.5	0.1	50
5B-NID-50-2	B	17	2.13	51.7	0.06	50
5B-NID-50-2	C	35	8.83	51.1	0.11	50
5B-NID-50-2	D	24	7.24	51.3	0.17	50
5B-NID-50-2	E	31	4.87	49.9	0.05	50
5B-NID-50-2	F	35	5	50.5	0.13	50
5B-NID-50-2	G	35	4.79	50.5	0.16	50
5B-NID-50-2	H	34	2.81	50.2	0.05	50
5B-NID-50-2	I	41	1.94	50.4	0.16	50
5B-NID-50-2	J	41	2.34	50.2	0.18	50
5B-NID-50-2	K	53	3.15	50	0.27	50
5B-NID-50-2	L	39	2.04	50.6	0.16	50
5B-NID-50-3	A	17	2.37	49.5	0.09	50
5B-NID-50-3	B	17	1.48	49.8	0.07	50
5B-NID-50-3	C	30	3.73	49.6	0.13	50
5B-NID-50-3	D	24	6.92	50	0.15	50
5B-NID-50-3	E	30	4.75	49.6	0.06	50
5B-NID-50-3	F	30	4.39	50.2	0.12	50
5B-NID-50-3	G	28	4.62	50.2	0.17	50
5B-NID-50-3	H	31	2.87	50.1	0.1	50
5B-NID-50-3	I	27	3.09	50.3	0.12	50
5B-NID-50-3	J	39	2.68	50	0.16	50
5B-NID-50-3	K	52	3.7	49.7	0.26	50
5B-NID-50-3	L	37	1.95	50.3	0.11	50
5B-NIU-20-1	A	66	3.07	19.9	0.21	20
5B-NIU-20-1	B	83	1.12	19.6	0.32	20
5B-NIU-20-1	C	72	2.89	19.8	0.12	20
5B-NIU-20-1	D	69	2.72	19.5	0.16	20
5B-NIU-20-1	E	73	1.62	19.6	0.12	20
5B-NIU-20-1	F	76	1.5	19.1	0.22	20
5B-NIU-20-1	G	74	1.27	20.4	0.32	20
5B-NIU-20-1	H	71	1.53	20.3	0.2	20
5B-NIU-20-1	I	71	2.29	20.4	0.17	20
5B-NIU-20-1	J	71	1.42	20	0.18	20
5B-NIU-20-1	K	60	2.42	20.3	0.12	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-NIU-20-1	L	62	2.78	19.6	0.25	20
5B-NIU-20-2	A	69	2.24	19.5	0.16	20
5B-NIU-20-2	B	81	1.58	19.5	0.05	20
5B-NIU-20-2	C	73	1.43	19.8	0.08	20
5B-NIU-20-2	D	74	1.51	19.8	0.12	20
5B-NIU-20-2	E	70	1.9	19.9	0.15	20
5B-NIU-20-2	F	71	1.23	20.4	0.2	20
5B-NIU-20-2	G	77	1.86	19.6	0.3	20
5B-NIU-20-2	H	72	0.89	20.5	0.13	20
5B-NIU-20-2	I	72	1.04	20	0.08	20
5B-NIU-20-2	J	72	3.4	19.1	0.11	20
5B-NIU-20-2	K	56	2.23	20.7	0.14	20
5B-NIU-20-2	L	62	1.09	19.8	0.3	20
5B-NIU-20-3	A	73	2.52	19	0.29	20
5B-NIU-20-3	B	77	1.56	20.9	0.07	20
5B-NIU-20-3	C	79	1.19	19.3	0.14	20
5B-NIU-20-3	D	80	1.38	19.7	0.15	20
5B-NIU-20-3	E	73	1.89	20.6	0.23	20
5B-NIU-20-3	F	76	1.87	20.3	0.1	20
5B-NIU-20-3	G	74	2.02	20.3	0.27	20
5B-NIU-20-3	H	72	1.43	20.6	0.16	20
5B-NIU-20-3	I	71	1.29	21	0.18	20
5B-NIU-20-3	J	72	2.04	19.9	0.23	20
5B-NIU-20-3	K	57	3.86	20.6	0.11	20
5B-NIU-20-3	L	62	2.23	20.7	0.12	20
5B-NIU-40-1	A	26	3.08	39.9	0.14	40
5B-NIU-40-1	B	46	4.23	39.4	0.11	40
5B-NIU-40-1	C	46	2.03	39.5	0.14	40
5B-NIU-40-1	D	40	2.77	39.8	0.1	40
5B-NIU-40-1	E	40	5.88	39.4	0.16	40
5B-NIU-40-1	F	43	2.57	39.3	0.06	40
5B-NIU-40-1	G	40	4.71	39.6	0.05	40
5B-NIU-40-1	H	46	3.4	39.9	0.08	40
5B-NIU-40-1	I	39	4.16	41.1	0.14	40
5B-NIU-40-1	J	41	2.29	40.8	0.07	40
5B-NIU-40-1	K	56	2.75	39.8	0.19	40
5B-NIU-40-1	L	42	2.28	38.9	0.07	40
5B-NIU-40-2	A	23	2.21	41.1	0.08	40
5B-NIU-40-2	B	46	3.36	40.6	0.11	40
5B-NIU-40-2	C	44	3.08	40.7	0.09	40
5B-NIU-40-2	D	45	2.28	40.6	0.11	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-NIU-40-2	E	42	4.15	40.9	0.16	40
5B-NIU-40-2	F	40	2.67	40.5	0.15	40
5B-NIU-40-2	G	41	3.38	40.6	0.1	40
5B-NIU-40-2	H	40	3.68	40.6	0.11	40
5B-NIU-40-2	I	37	2.15	40.9	0.11	40
5B-NIU-40-2	J	46	6.11	40.1	0.14	40
5B-NIU-40-2	K	53	3.22	40.5	0.14	40
5B-NIU-40-2	L	43	1.83	40.3	0.13	40
5B-NIU-40-3	A	25	2.68	39.2	0.1	40
5B-NIU-40-3	B	47	2.79	39.6	0.09	40
5B-NIU-40-3	C	46	2.42	39.7	0.04	40
5B-NIU-40-3	D	43	3.19	39	0.09	40
5B-NIU-40-3	E	38	6.52	39.6	0.09	40
5B-NIU-40-3	F	41	3.28	39	0.05	40
5B-NIU-40-3	G	36	4.05	39.5	0.11	40
5B-NIU-40-3	H	43	2.54	40.5	0.15	40
5B-NIU-40-3	I	36	2.34	40.2	0.06	40
5B-NIU-40-3	J	52	2.79	40	0.19	40
5B-NIU-40-3	K	52	2.64	39.6	0.1	40
5B-NIU-40-3	L	42	1.57	39.7	0.12	40
5B-NIU-50-1	A	18	4.73	50.9	0.07	50
5B-NIU-50-1	B	39	7.85	50.4	0.07	50
5B-NIU-50-1	C	39	4.19	50.7	0.1	50
5B-NIU-50-1	D	34	4.19	50.7	0.07	50
5B-NIU-50-1	E	26	5.97	50.6	0.04	50
5B-NIU-50-1	F	31	3.66	50	0.06	50
5B-NIU-50-1	G	30	3.78	49.9	0.07	50
5B-NIU-50-1	H	28	2.83	50.5	0.43	50
5B-NIU-50-1	I	27	6.45	52.5	0.09	50
5B-NIU-50-1	J	35	7.18	51.2	0.09	50
5B-NIU-50-1	K	49	2.05	50.6	0.1	50
5B-NIU-50-1	L	41	1.95	49.6	0.08	50
5B-NIU-50-2	A	15	2	50.2	0.05	50
5B-NIU-50-2	B	35	5.12	49.8	0.07	50
5B-NIU-50-2	C	36	2.46	49.6	0.06	50
5B-NIU-50-2	D	34	3.68	50	0.09	50
5B-NIU-50-2	E	29	6.5	50	0.07	50
5B-NIU-50-2	F	28	2.13	50.1	0.07	50
5B-NIU-50-2	G	25	3.12	50.2	0.08	50
5B-NIU-50-2	H	32	3.19	51.3	0.19	50
5B-NIU-50-2	I	27	4.18	51.5	0.07	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5B-NIU-50-2	J	31	4.24	51	0.08	50
5B-NIU-50-2	K	49	1.75	50.7	0.08	50
5B-NIU-50-2	L	37	2.08	49.5	0.09	50
5B-NIU-50-3	A	14	1.53	49.9	0.24	50
5B-NIU-50-3	B	34	5.76	50.6	0.12	50
5B-NIU-50-3	C	30	3.5	51.5	0.09	50
5B-NIU-50-3	D	33	4	50.9	0.06	50
5B-NIU-50-3	E	26	6.58	50.1	0.04	50
5B-NIU-50-3	F	28	2.4	50.1	0.06	50
5B-NIU-50-3	G	25	3.13	49.5	0.07	50
5B-NIU-50-3	H	34	3.16	49.6	0.08	50
5B-NIU-50-3	I	34	5.42	50.7	0.12	50
5B-NIU-50-3	J	31	5.95	50.4	0.06	50
5B-NIU-50-3	K	51	1.79	49.7	0.11	50
5B-NIU-50-3	L	37	1.79	47.5	0.13	50
5T-ID-20-1	A	81	1.5	20.4	0.14	20
5T-ID-20-1	B	78	1.86	21	0.24	20
5T-ID-20-1	C	80	0.86	20.2	0.26	20
5T-ID-20-1	D	80	1.93	20.4	0.33	20
5T-ID-20-1	E	80	1.69	19.1	0.24	20
5T-ID-20-1	F	79	0.97	20.9	0.28	20
5T-ID-20-1	G	81	1.24	20.4	0.17	20
5T-ID-20-1	H	79	0.95	21.1	0.23	20
5T-ID-20-1	I	76	1.34	21	0.18	20
5T-ID-20-1	J	78	0.76	21.7	0.2	20
5T-ID-20-1	K	59	1.55	20.7	0.1	20
5T-ID-20-1	L	65	1.66	23.2	0.09	20
5T-ID-20-2	A	83	1.33	18.7	0.11	20
5T-ID-20-2	B	80	1.76	20.6	0.14	20
5T-ID-20-2	C	81	1.17	20.4	0.11	20
5T-ID-20-2	D	86	1.89	19.5	0.21	20
5T-ID-20-2	E	79	0.99	20.3	0.23	20
5T-ID-20-2	F	80	1.47	21.8	0.12	20
5T-ID-20-2	G	81	1.38	21	0.22	20
5T-ID-20-2	H	79	1.32	22.5	0.21	20
5T-ID-20-2	I	79	1.3	20.7	0.08	20
5T-ID-20-2	J	82	1.7	20.6	0.18	20
5T-ID-20-2	K	58	1.77	21.3	0.09	20
5T-ID-20-2	L	66	1.52	22.1	0.05	20
5T-ID-20-3	A	81	1.19	20.4	0.06	20
5T-ID-20-3	B	79	2.08	20.6	0.34	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-ID-20-3	C	79	1.71	20.9	0.28	20
5T-ID-20-3	D	84	1.3	19.9	0.1	20
5T-ID-20-3	E	81	1.26	21.1	0.17	20
5T-ID-20-3	F	80	1.32	21.6	0.27	20
5T-ID-20-3	G	80	2.01	21.1	0.18	20
5T-ID-20-3	H	85	1.15	19.8	0.13	20
5T-ID-20-3	I	78	1.73	23.1	0.18	20
5T-ID-20-3	J	80	0.87	21.3	0.22	20
5T-ID-20-3	K	57	1.53	21.4	0.11	20
5T-ID-20-3	L	70	1.48	21.4	0.13	20
5T-ID-40-1	A	66	1.55	39.1	0.48	40
5T-ID-40-1	B	69	1.77	38.6	0.24	40
5T-ID-40-1	C	64	1.12	38.6	0.23	40
5T-ID-40-1	D	63	1.3	38.5	0.19	40
5T-ID-40-1	E	66	0.73	38.7	0.18	40
5T-ID-40-1	F	67	1.14	39	0.23	40
5T-ID-40-1	G	64	1.16	39.3	0.23	40
5T-ID-40-1	H	63	1.98	39.6	0.14	40
5T-ID-40-1	I	62	1.3	39.3	0.19	40
5T-ID-40-1	J	65	0.88	39.6	0.24	40
5T-ID-40-1	K	55	2.52	39.3	0.17	40
5T-ID-40-1	L	53	1	40.1	0.09	40
5T-ID-40-2	A	63	1.59	39.6	0.19	40
5T-ID-40-2	B	64	2.25	39.7	0.19	40
5T-ID-40-2	C	66	1.04	39.6	0.17	40
5T-ID-40-2	D	64	1.47	39.6	0.18	40
5T-ID-40-2	E	66	0.82	39.5	0.04	40
5T-ID-40-2	F	65	1.52	40.1	0.27	40
5T-ID-40-2	G	65	0.95	40.1	0.22	40
5T-ID-40-2	H	60	0.94	40.4	0.2	40
5T-ID-40-2	I	59	1.04	40.5	0.17	40
5T-ID-40-2	J	63	1.11	40.6	0.19	40
5T-ID-40-2	K	49	1.51	40.4	0.15	40
5T-ID-40-2	L	50	1.42	40.8	0.16	40
5T-ID-40-3	A	63	1.97	39.3	0.1	40
5T-ID-40-3	B	62	1.39	39.4	0.09	40
5T-ID-40-3	C	62	1.25	39.6	0.19	40
5T-ID-40-3	D	60	1.31	39.6	0.2	40
5T-ID-40-3	E	66	1.35	39.5	0.1	40
5T-ID-40-3	F	63	1.69	40	0.28	40
5T-ID-40-3	G	64	0.97	40	0.22	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-ID-40-3	H	63	1.7	40.5	0.25	40
5T-ID-40-3	I	65	1.04	40.1	0.26	40
5T-ID-40-3	J	63	1.29	40.5	0.22	40
5T-ID-40-3	K	52	2.4	40.6	0.16	40
5T-ID-40-3	L	47	1.64	40.6	0.14	40
5T-ID-50-1	A	57	1.79	50.2	0.06	50
5T-ID-50-1	B	55	2.13	50.3	0.1	50
5T-ID-50-1	C	54	1.7	50.5	0.07	50
5T-ID-50-1	D	50	1.13	50.4	0.13	50
5T-ID-50-1	E	59	1.43	50.2	0.05	50
5T-ID-50-1	F	56	1.4	50.7	0.18	50
5T-ID-50-1	G	58	1.07	50.7	0.16	50
5T-ID-50-1	H	63	1.53	50.7	0.23	50
5T-ID-50-1	I	56	2.05	50.8	0.18	50
5T-ID-50-1	J	60	1.4	50.7	0.2	50
5T-ID-50-1	K	51	1.37	50.9	0.19	50
5T-ID-50-1	L	43	1.15	51.1	0.18	50
5T-ID-50-2	A	57	1.54	49.8	0.05	50
5T-ID-50-2	B	52	2.08	50.2	0.09	50
5T-ID-50-2	C	56	1.06	50.2	0.21	50
5T-ID-50-2	D	51	1.63	50.1	0.15	50
5T-ID-50-2	E	57	1.53	50	0.06	50
5T-ID-50-2	F	57	2.03	50.4	0.13	50
5T-ID-50-2	G	55	1.69	50.7	0.17	50
5T-ID-50-2	H	60	1.02	50.3	0.09	50
5T-ID-50-2	I	60	1.58	50.6	0.22	50
5T-ID-50-2	J	59	2.15	50.3	0.13	50
5T-ID-50-2	K	51	1.63	50.8	0.13	50
5T-ID-50-2	L	42	1	51.1	0.05	50
5T-ID-50-3	A	56	1.22	49.7	0.13	50
5T-ID-50-3	B	52	2.13	49.9	0.08	50
5T-ID-50-3	C	51	1.18	50	0.19	50
5T-ID-50-3	D	50	1.14	50.1	0.14	50
5T-ID-50-3	E	55	1.27	49.9	0.22	50
5T-ID-50-3	F	54	2.18	50.3	0.07	50
5T-ID-50-3	G	53	1.1	50.5	0.13	50
5T-ID-50-3	H	57	1.32	50.5	0.24	50
5T-ID-50-3	I	54	1.7	50.6	0.22	50
5T-ID-50-3	J	57	1.42	50.5	0.23	50
5T-ID-50-3	K	49	2.09	50.6	0.12	50
5T-ID-50-3	L	41	1.7	51.1	0.15	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-IU-20-1	A	80	2.22	20.4	0.44	20
5T-IU-20-1	B	83	1.86	19.2	0.24	20
5T-IU-20-1	C	78	2.33	19.6	0.14	20
5T-IU-20-1	D	85	1.56	19	0.25	20
5T-IU-20-1	E	81	1.31	19.7	0.17	20
5T-IU-20-1	F	81	1.15	19.2	0.24	20
5T-IU-20-1	G	86	1	18.4	0.12	20
5T-IU-20-1	H	88	0.91	18	0.07	20
5T-IU-20-1	I	85	1.48	19.5	0.17	20
5T-IU-20-1	J	83	1.28	19.8	0.1	20
5T-IU-20-1	K	65	1.71	20.1	0.11	20
5T-IU-20-1	L	74	1.61	20.7	0.24	20
5T-IU-20-2	A	84	1.93	19.7	0.13	20
5T-IU-20-2	B	83	1.87	20.6	0.2	20
5T-IU-20-2	C	81	2.69	20.2	0.22	20
5T-IU-20-2	D	85	1.2	19.6	0.18	20
5T-IU-20-2	E	82	1.58	20.7	0.12	20
5T-IU-20-2	F	82	1.58	20.4	0.24	20
5T-IU-20-2	G	85	1.42	19.8	0.24	20
5T-IU-20-2	H	85	1.39	19.9	0.23	20
5T-IU-20-2	I	86	1.88	20.1	0.18	20
5T-IU-20-2	J	85	1.26	19.9	0.34	20
5T-IU-20-2	K	63	1.56	21.2	0.16	20
5T-IU-20-2	L	73	2	20.9	0.2	20
5T-IU-20-3	A	82	1.91	19.8	0.38	20
5T-IU-20-3	B	84	1.37	20.9	0.33	20
5T-IU-20-3	C	82	1.12	20.2	0.09	20
5T-IU-20-3	D	84	1.16	19.5	0.15	20
5T-IU-20-3	E	87	1.86	17.6	0.12	20
5T-IU-20-3	F	87	1.37	18	0.22	20
5T-IU-20-3	G	85	1.24	19.3	0.07	20
5T-IU-20-3	H	86	1.17	19.2	0.28	20
5T-IU-20-3	I	83	1.66	20.3	0.28	20
5T-IU-20-3	J	86	1.63	20	0.2	20
5T-IU-20-3	K	64	2.23	20.8	0.15	20
5T-IU-20-3	L	70	2.1	20.9	0.47	20
5T-IU-40-1	A	67	2.28	39.5	0.12	40
5T-IU-40-1	B	66	2.22	39.5	0.1	40
5T-IU-40-1	C	63	2.2	39.4	0.18	40
5T-IU-40-1	D	65	1.65	39.2	0.09	40
5T-IU-40-1	E	65	1.4	39.2	0.15	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-IU-40-1	F	64	2.06	39.3	0.16	40
5T-IU-40-1	G	59	1.96	39.8	0.26	40
5T-IU-40-1	H	60	1.22	40.7	0.27	40
5T-IU-40-1	I	63	1.88	40.7	0.22	40
5T-IU-40-1	J	62	1.64	40	0.22	40
5T-IU-40-1	K	51	1.51	39.5	0.13	40
5T-IU-40-1	L	51	1.57	39.9	0.23	40
5T-IU-40-2	A	66	2.39	38	0.29	40
5T-IU-40-2	B	65	3.11	40.2	0.08	40
5T-IU-40-2	C	68	1.49	37.5	0.13	40
5T-IU-40-2	D	67	1.12	37.7	0.09	40
5T-IU-40-2	E	66	2.2	38.4	0.11	40
5T-IU-40-2	F	68	1.54	39.3	0.25	40
5T-IU-40-2	G	63	1.6	39.8	0.2	40
5T-IU-40-2	H	66	1.4	40.2	0.26	40
5T-IU-40-2	I	63	1.27	40.7	0.21	40
5T-IU-40-2	J	60	1.33	40.3	0.13	40
5T-IU-40-2	K	52	1.66	39.6	0.06	40
5T-IU-40-2	L	54	1.73	39.4	0.2	40
5T-IU-40-3	A	65	2.36	38.9	0.23	40
5T-IU-40-3	B	65	2.26	39.9	0.35	40
5T-IU-40-3	C	64	1.94	41.7	0.04	40
5T-IU-40-3	D	65	1.67	38.2	0.07	40
5T-IU-40-3	E	65	1.98	40.3	0.13	40
5T-IU-40-3	F	61	1.64	40.8	0.17	40
5T-IU-40-3	G	62	1.52	41.1	0.22	40
5T-IU-40-3	H	62	1.71	41.4	0.2	40
5T-IU-40-3	I	62	1.6	41.4	0.12	40
5T-IU-40-3	J	66	1.65	40.7	0.14	40
5T-IU-40-3	K	53	2.15	40.4	0.18	40
5T-IU-40-3	L	54	1.79	39.5	0.08	40
5T-IU-50-1	A	61	2.39	48.4	0.06	50
5T-IU-50-1	B	60	2.87	48.7	0.13	50
5T-IU-50-1	C	56	2.45	49.1	0.18	50
5T-IU-50-1	D	56	1.76	51.3	0.3	50
5T-IU-50-1	E	58	1.24	52.5	0.06	50
5T-IU-50-1	F	56	2.5	52.8	0.07	50
5T-IU-50-1	G	56	2.42	51.7	0.05	50
5T-IU-50-1	H	56	1.49	51.3	0.08	50
5T-IU-50-1	I	57	1.97	50.9	0.1	50
5T-IU-50-1	J	59	1.7	50.4	0.06	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-IU-50-1	K	51	2.05	49.7	0.05	50
5T-IU-50-1	L	46	2.29	48.5	0.05	50
5T-IU-50-2	A	56	2.26	47.7	0.15	50
5T-IU-50-2	B	58	2.93	48.5	0.16	50
5T-IU-50-2	C	54	1.93	49.3	0.1	50
5T-IU-50-2	D	59	2.46	48.5	0.29	50
5T-IU-50-2	E	55	1.45	48.6	0.15	50
5T-IU-50-2	F	57	1.37	48.5	0.08	50
5T-IU-50-2	G	60	1.61	48.7	0.2	50
5T-IU-50-2	H	61	2.41	49.9	0.22	50
5T-IU-50-2	I	60	2.13	49.4	0.08	50
5T-IU-50-2	J	56	1.74	48.7	0.07	50
5T-IU-50-2	K	52	1.81	48.8	0.06	50
5T-IU-50-2	L	48	2.74	47.8	0.1	50
5T-IU-50-3	A	53	2.28	48.8	0.13	50
5T-IU-50-3	B	58	2.38	49	0.06	50
5T-IU-50-3	C	56	2.32	49.1	0.08	50
5T-IU-50-3	D	57	1.88	48.5	0.23	50
5T-IU-50-3	E	58	1.44	48	0.07	50
5T-IU-50-3	F	53	2.13	48.2	0.09	50
5T-IU-50-3	G	55	1.43	48.4	0.15	50
5T-IU-50-3	H	57	1.7	48.2	0.14	50
5T-IU-50-3	I	59	2.32	48	0.18	50
5T-IU-50-3	J	62	2.11	49.7	0.28	50
5T-IU-50-3	K	51	1.79	49.1	0.11	50
5T-IU-50-3	L	48	2.01	48.4	0.11	50
5T-NID-20-1	A	83	1.22	20.1	0.28	20
5T-NID-20-1	B	82	1.65	20.5	0.28	20
5T-NID-20-1	C	80	0.68	19.9	0.08	20
5T-NID-20-1	D	82	1.37	19.6	0.3	20
5T-NID-20-1	E	81	1.11	20.4	0.28	20
5T-NID-20-1	F	81	0.9	21.1	0.29	20
5T-NID-20-1	G	81	1.28	20.8	0.17	20
5T-NID-20-1	H	79	1.06	20.3	0.06	20
5T-NID-20-1	I	75	0.82	19.9	0.17	20
5T-NID-20-1	J	80	0.75	20	0.19	20
5T-NID-20-1	K	72	3.34	22.2	0.22	20
5T-NID-20-1	L	71	2.05	21.2	0.17	20
5T-NID-20-2	A	88	1.62	19.9	0.24	20
5T-NID-20-2	B	89	2	20.2	0.22	20
5T-NID-20-2	C	81	0.76	21.1	0.29	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-NID-20-2	D	81	1.34	21.2	0.37	20
5T-NID-20-2	E	80	0.98	21	0.06	20
5T-NID-20-2	F	80	1.01	21.2	0.21	20
5T-NID-20-2	G	90	1.77	20.8	0.24	20
5T-NID-20-2	H	83	0.9	19.5	0.21	20
5T-NID-20-2	I	78	1.27	21.7	0.2	20
5T-NID-20-2	J	82	1.05	19.9	0.27	20
5T-NID-20-2	K	65	2	21.2	0.16	20
5T-NID-20-2	L	72	1.93	21.8	0.15	20
5T-NID-20-3	A	86	1.12	19.9	0.25	20
5T-NID-20-3	B	86	1.77	20.2	0.1	20
5T-NID-20-3	C	85	0.83	20.7	0.34	20
5T-NID-20-3	D	80	1.28	20.4	0.24	20
5T-NID-20-3	E	81	1.04	20.4	0.28	20
5T-NID-20-3	F	82	0.97	20.9	0.31	20
5T-NID-20-3	G	86	1.09	20.4	0.31	20
5T-NID-20-3	H	80	1.09	20.2	0.1	20
5T-NID-20-3	I	83	1.14	19.8	0.23	20
5T-NID-20-3	J	82	1.03	21.7	0.03	20
5T-NID-20-3	K	67	2.78	21.5	0.18	20
5T-NID-20-3	L	70	2.59	21.2	0.14	20
5T-NID-40-1	A	66	1.48	39.9	0.12	40
5T-NID-40-1	B	61	0.15	39.9	0.12	40
5T-NID-40-1	C	61	2.43	39.9	0.08	40
5T-NID-40-1	D	59	1.45	40	0.19	40
5T-NID-40-1	E	63	1.18	39.7	0.08	40
5T-NID-40-1	F	65	1.32	40.1	0.21	40
5T-NID-40-1	G	62	1.69	40	0.16	40
5T-NID-40-1	H	61	1.42	40.2	0.26	40
5T-NID-40-1	I	61	1.36	40.4	0.24	40
5T-NID-40-1	J	63	0.92	40	0.27	40
5T-NID-40-1	K	58	4.32	40.5	0.23	40
5T-NID-40-1	L	49	1.66	40.7	0.1	40
5T-NID-40-2	A	67	1.2	39.5	0.11	40
5T-NID-40-2	B	65	1.4	39.6	0.13	40
5T-NID-40-2	C	61	2.05	39.6	0.13	40
5T-NID-40-2	D	60	1.78	39.7	0.13	40
5T-NID-40-2	E	64	1.02	39.6	0.04	40
5T-NID-40-2	F	65	1.9	39.9	0.21	40
5T-NID-40-2	G	63	1.24	40	0.23	40
5T-NID-40-2	H	61	1.07	40.2	0.19	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-NID-40-2	I	61	1.08	40.1	0.16	40
5T-NID-40-2	J	61	1.09	40.3	0.23	40
5T-NID-40-2	K	63	4.2	40.4	0.18	40
5T-NID-40-2	L	50	1.29	40.6	0.16	40
5T-NID-40-3	A	63	1.23	39.9	0.06	40
5T-NID-40-3	B	62	1.44	40.1	0.12	40
5T-NID-40-3	C	63	1.45	39.9	0.15	40
5T-NID-40-3	D	62	1.36	40	0.15	40
5T-NID-40-3	E	63	1.06	39.8	0.14	40
5T-NID-40-3	F	65	1.22	40.1	0.23	40
5T-NID-40-3	G	61	1.48	40.2	0.26	40
5T-NID-40-3	H	62	1.12	40.3	0.23	40
5T-NID-40-3	I	63	1.22	39.6	0.08	40
5T-NID-40-3	J	62	0.81	40.3	0.21	40
5T-NID-40-3	K	61	4.83	40.8	0.28	40
5T-NID-40-3	L	47	1.69	40.5	0.12	40
5T-NID-50-1	A	63	1.55	48.9	0.12	50
5T-NID-50-1	B	57	1.88	49.6	0.06	50
5T-NID-50-1	C	55	3.16	49.8	0.07	50
5T-NID-50-1	D	55	0.19	50	0.22	50
5T-NID-50-1	E	60	1.7	49.9	0.07	50
5T-NID-50-1	F	58	1.43	50.3	0.15	50
5T-NID-50-1	G	58	1.6	50.3	0.14	50
5T-NID-50-1	H	60	1.59	50.6	0.2	50
5T-NID-50-1	I	58	1.06	50.7	0.14	50
5T-NID-50-1	J	60	0.85	50.5	0.19	50
5T-NID-50-1	K	66	4.85	50.7	0.29	50
5T-NID-50-1	L	47	1.55	51	0.13	50
5T-NID-50-2	A	60	1.9	50.4	0.18	50
5T-NID-50-2	B	58	2.51	50.5	0.18	50
5T-NID-50-2	C	55	1.64	50.6	0.2	50
5T-NID-50-2	D	50	2.76	50.8	0.12	50
5T-NID-50-2	E	57	1.11	49.5	0.21	50
5T-NID-50-2	F	55	1.19	50.1	0.17	50
5T-NID-50-2	G	57	1.37	50.3	0.21	50
5T-NID-50-2	H	55	1.08	50.3	0.17	50
5T-NID-50-2	I	57	1.17	50.6	0.21	50
5T-NID-50-2	J	59	1	50.3	0.2	50
5T-NID-50-2	K	61	6.95	50.3	0.21	50
5T-NID-50-2	L	43	1.54	50.9	0.12	50
5T-NID-50-3	A	56	1.21	51.1	0.15	50

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-NID-50-3	B	53	1.81	51.1	0.18	50
5T-NID-50-3	C	56	3.34	50.9	0.2	50
5T-NID-50-3	D	53	2.01	51.1	0.21	50
5T-NID-50-3	E	53	1.12	51.2	0.13	50
5T-NID-50-3	F	55	1.11	50.5	0.08	50
5T-NID-50-3	G	54	0.93	50.9	0.16	50
5T-NID-50-3	H	56	1.01	51	0.11	50
5T-NID-50-3	I	53	1.36	50.9	0.1	50
5T-NID-50-3	J	56	1.26	51	0.25	50
5T-NID-50-3	K	60	7.97	50.6	0.18	50
5T-NID-50-3	L	45	1.38	51.4	0.04	50
5T-NIU-20-1	A	78	1.54	19.7	0.19	20
5T-NIU-20-1	B	83	2.35	20.1	0.23	20
5T-NIU-20-1	C	80	1.18	20.6	0.25	20
5T-NIU-20-1	D	81	1.44	19.8	0.07	20
5T-NIU-20-1	E	81	1.52	20.5	0.14	20
5T-NIU-20-1	F	80	1.16	19.7	0.24	20
5T-NIU-20-1	G	81	1.41	19.5	0.2	20
5T-NIU-20-1	H	83	0.86	19.6	0.11	20
5T-NIU-20-1	I	84	1.14	19.8	0.18	20
5T-NIU-20-1	J	84	1.57	19.8	0.26	20
5T-NIU-20-1	K	58	1.19	20.1	0.1	20
5T-NIU-20-1	L	66	1.23	21.6	0.4	20
5T-NIU-20-2	A	83	1.21	19	0.18	20
5T-NIU-20-2	B	86	2.16	20.6	0.37	20
5T-NIU-20-2	C	81	1.11	21.2	0.33	20
5T-NIU-20-2	D	80	1.77	21.2	0.27	20
5T-NIU-20-2	E	85	1.3	20.1	0.32	20
5T-NIU-20-2	F	86	1.59	20.3	0.2	20
5T-NIU-20-2	G	85	1.44	19.8	0.32	20
5T-NIU-20-2	H	85	1.36	20.2	0.2	20
5T-NIU-20-2	I	86	1.42	19.9	0.17	20
5T-NIU-20-2	J	86	1.04	18.3	0.26	20
5T-NIU-20-2	K	60	1.93	19.3	0.1	20
5T-NIU-20-2	L	71	1.44	21.3	0.21	20
5T-NIU-20-3	A	89	2.09	18.6	0.32	20
5T-NIU-20-3	B	85	2	20.3	0.12	20
5T-NIU-20-3	C	84	1.12	20.4	0.09	20
5T-NIU-20-3	D	84	1.34	20.4	0.27	20
5T-NIU-20-3	E	82	1.72	20.6	0.11	20
5T-NIU-20-3	F	83	1.83	21.3	0.22	20

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-NIU-20-3	G	82	1.34	20.4	0.15	20
5T-NIU-20-3	H	86	1.02	18.9	0.25	20
5T-NIU-20-3	I	87	1.18	20.4	0.13	20
5T-NIU-20-3	J	84	1.33	20.1	0.27	20
5T-NIU-20-3	K	63	2	21.3	0.05	20
5T-NIU-20-3	L	66	1.31	21.1	0.12	20
5T-NIU-40-1	A	65	2.23	39.7	0.21	40
5T-NIU-40-1	B	66	1.08	40.6	0.12	40
5T-NIU-40-1	C	61	1.61	38.8	0.13	40
5T-NIU-40-1	D	65	1.36	39.9	0.24	40
5T-NIU-40-1	E	66	1.98	39.2	0.15	40
5T-NIU-40-1	F	66	1.97	39.2	0.12	40
5T-NIU-40-1	G	68	0.88	40.1	0.18	40
5T-NIU-40-1	H	66	1.06	39.8	0.23	40
5T-NIU-40-1	I	66	1.6	40.3	0.21	40
5T-NIU-40-1	J	65	0.93	40.4	0.19	40
5T-NIU-40-1	K	50	2.3	40.9	0.12	40
5T-NIU-40-1	L	48	2.39	39.1	0.08	40
5T-NIU-40-2	A	65	2.61	39	0.18	40
5T-NIU-40-2	B	65	1.46	39	0.21	40
5T-NIU-40-2	C	64	1.49	39.5	0.1	40
5T-NIU-40-2	D	63	2.34	39.5	0.16	40
5T-NIU-40-2	E	63	1.56	39.8	0.14	40
5T-NIU-40-2	F	64	1.04	39.5	0.06	40
5T-NIU-40-2	G	63	1.4	40.3	0.13	40
5T-NIU-40-2	H	65	0.76	41.3	0.18	40
5T-NIU-40-2	I	64	1.31	41.1	0.18	40
5T-NIU-40-2	J	65	1.43	40.7	0.17	40
5T-NIU-40-2	K	51	2.68	39.9	0.08	40
5T-NIU-40-2	L	49	1.05	38.7	0.06	40
5T-NIU-40-3	A	62	2.92	39.5	0.1	40
5T-NIU-40-3	B	65	2.28	39.4	0.18	40
5T-NIU-40-3	C	60	1.7	39.5	0.09	40
5T-NIU-40-3	D	61	3.37	40	0.09	40
5T-NIU-40-3	E	64	2.28	40.4	0.07	40
5T-NIU-40-3	F	65	1.47	39.2	0.15	40
5T-NIU-40-3	G	66	1.04	39.8	0.15	40
5T-NIU-40-3	H	61	0.88	39.9	0.3	40
5T-NIU-40-3	I	66	0.92	41.4	0.27	40
5T-NIU-40-3	J	65	1.55	40.8	0.13	40
5T-NIU-40-3	K	50	2.77	40.5	0.06	40

Test ID	Section	SN	SD SN	Speed MPH	SD Speed	Target Speed
5T-NIU-40-3	L	47	1.12	38.3	0.04	40
5T-NIU-50-1	A	59	3.45	48.5	0.06	50
5T-NIU-50-1	B	60	2.48	48.8	0.17	50
5T-NIU-50-1	C	58	2.28	49.3	0.15	50
5T-NIU-50-1	D	60	1.51	49.6	0.18	50
5T-NIU-50-1	E	59	1.63	48.8	0.11	50
5T-NIU-50-1	F	60	1.19	49.1	0.14	50
5T-NIU-50-1	G	57	1.03	49.5	0.09	50
5T-NIU-50-1	H	58	1.35	49.4	0.12	50
5T-NIU-50-1	I	61	1.88	49	0.22	50
5T-NIU-50-1	J	64	0.9	49	0.05	50
5T-NIU-50-1	K	50	1.94	48.6	0.07	50
5T-NIU-50-1	L	47	1.76	47.2	0.09	50
5T-NIU-50-2	A	60	2.54	48.2	0.33	50
5T-NIU-50-2	B	61	1.45	49.4	0.11	50
5T-NIU-50-2	C	57	1.95	50.1	0.13	50
5T-NIU-50-2	D	55	1.82	50.8	0.18	50
5T-NIU-50-2	E	58	1.84	50	0.18	50
5T-NIU-50-2	F	57	1.15	50.1	0.11	50
5T-NIU-50-2	G	58	0.97	50.5	0.14	50
5T-NIU-50-2	H	59	1.18	50	0.09	50
5T-NIU-50-2	I	63	1.66	48.7	0.09	50
5T-NIU-50-2	J	63	1.36	47.8	0.09	50
5T-NIU-50-2	K	50	1.95	47.1	0.04	50
5T-NIU-50-2	L	48	1.38	46	0.09	50
5T-NIU-50-3	A	57	2.82	49.5	0.12	50
5T-NIU-50-3	B	56	1.47	49.5	0.11	50
5T-NIU-50-3	C	56	3.05	49.9	0.16	50
5T-NIU-50-3	D	53	1.58	49.9	0.21	50
5T-NIU-50-3	E	56	1.61	49.7	0.09	50
5T-NIU-50-3	F	53	1.31	49.5	0.09	50
5T-NIU-50-3	G	52	1.27	50.1	0.26	50
5T-NIU-50-3	H	53	1.18	50.9	0.14	50
5T-NIU-50-3	I	59	1.56	50.6	0.11	50
5T-NIU-50-3	J	60	2.13	50.5	0.19	50
5T-NIU-50-3	K	51	2.06	50.9	0.09	50
5T-NIU-50-3	L	42	1.86	50	0.08	50

Appendix B: Raw Texture Data

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q1-ID-1	A	0.06	0.151	99	97	98	2.028	2.18
Q1-ID-1	B	-0.02	0.022	98	114	106	0.926	0.994
Q1-ID-1	C	-0.02	0.03	96	98	97	0.985	1.032
Q1-ID-1	D	-0.02	0.027	85	92	88	1.152	1.212
Q1-ID-1	E	0.01	0.025	121	142	131	1.307	1.454
Q1-ID-1	F	0	0.024	105	75	90	1.544	1.207
Q1-ID-1	G	0	0.035	93	102	97	1.358	1.387
Q1-ID-1	H	-0.03	0.03	84	102	93	1.295	1.423
Q1-ID-1	I	0.04	0.027	124	126	125	1.181	1.214
Q1-ID-1	J	0.02	0.025	85	76	81	1.38	1.533
Q1-ID-1	K	0	0.039	108	134	121	3.401	3.574
Q1-ID-1	L	-0.01	0.044	157	147	152	2.077	2.344
Q1-ID-2	A	0.07	0.156	99	99	99	2.38	2.478
Q1-ID-2	B	-0.02	0.025	101	114	108	0.96	1.012
Q1-ID-2	C	-0.03	0.028	97	97	97	1.024	1.03
Q1-ID-2	D	-0.02	0.025	86	90	88	1.156	1.233
Q1-ID-2	E	-0.01	0.024	117	138	127	1.363	1.432
Q1-ID-2	F	0	0.024	105	75	90	1.377	1.286
Q1-ID-2	G	0	0.031	94	104	99	1.365	1.447
Q1-ID-2	H	-0.04	0.029	83	104	94	1.335	1.374
Q1-ID-2	I	0.04	0.028	122	125	124	1.13	1.111
Q1-ID-2	J	0.02	0.025	83	76	79	1.638	1.337
Q1-ID-2	K	0	0.032	108	132	120	3.258	3.548
Q1-ID-2	L	-0.01	0.045	159	145	152	2.022	2.344
Q1-ID-3	A	0.08	0.141	98	97	97	2.243	2.414
Q1-ID-3	B	-0.02	0.022	100	115	108	0.89	1
Q1-ID-3	C	-0.02	0.029	96	97	97	0.981	1.024
Q1-ID-3	D	0.02	0.029	90	86	88	1.207	1.294
Q1-ID-3	E	0	0.025	120	139	130	1.381	1.459
Q1-ID-3	F	0	0.023	106	75	91	1.326	1.277
Q1-ID-3	G	0	0.033	91	103	97	1.355	1.425
Q1-ID-3	H	-0.02	0.025	86	98	92	1.36	1.406
Q1-ID-3	I	0.04	0.027	121	127	124	1.18	1.168
Q1-ID-3	J	0.02	0.025	81	78	79	1.613	1.457
Q1-ID-3	K	0	0.032	109	132	120	3.072	3.688
Q1-ID-3	L	0.01	0.046	163	145	154	1.946	2.145
Q1-IU-1	A	0.07	0.15	101	110	105	1.298	1.315

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q1-IU-1	B	-0.02	0.028	122	105	114	1.099	1.061
Q1-IU-1	C	0.01	0.038	92	120	106	1.121	1.213
Q1-IU-1	D	-0.02	0.026	128	123	126	1.493	1.461
Q1-IU-1	E	-0.02	0.018	78	78	78	1.256	1.204
Q1-IU-1	F	0	0.021	81	97	89	1.24	1.17
Q1-IU-1	G	0	0.027	96	92	94	1.271	1.382
Q1-IU-1	H	-0.04	0.032	120	101	110	1.556	1.358
Q1-IU-1	I	0.03	0.027	106	117	112	1.102	1.107
Q1-IU-1	J	0	0.03	103	96	100	1.255	1.48
Q1-IU-1	K	-0.03	0.037	135	123	129	3.251	3.097
Q1-IU-1	L	0	0.048	131	152	142	1.797	1.906
Q1-IU-2	B	0.04	0.131	106	105	105	1.316	1.337
Q1-IU-2	C	-0.03	0.03	92	108	100	1.101	1.16
Q1-IU-2	D	-0.02	0.025	129	124	126	1.473	1.478
Q1-IU-2	E	-0.02	0.019	78	78	78	1.284	1.231
Q1-IU-2	F	0	0.019	82	96	89	1.188	1.255
Q1-IU-2	G	0	0.034	93	93	93	1.356	1.461
Q1-IU-2	H	-0.04	0.03	119	100	110	1.255	1.226
Q1-IU-2	I	0.03	0.03	108	126	117	1.051	1.107
Q1-IU-2	J	0	0.028	103	95	99	1.287	1.35
Q1-IU-2	K	-0.02	0.033	133	117	125	3.215	3.252
Q1-IU-2	L	0	0.047	130	153	142	1.75	1.885
Q1-IU-3	A	0.06	0.156	102	109	105	1.309	1.367
Q1-IU-3	B	-0.02	0.029	118	108	113	1.069	1.069
Q1-IU-3	C	-0.02	0.028	91	112	102	1.154	1.136
Q1-IU-3	D	-0.02	0.026	127	123	125	1.488	1.499
Q1-IU-3	E	-0.02	0.019	77	79	78	1.231	1.272
Q1-IU-3	F	0	0.02	82	97	90	1.207	1.253
Q1-IU-3	G	0	0.036	92	92	92	1.354	1.456
Q1-IU-3	H	-0.04	0.031	119	102	111	1.211	1.161
Q1-IU-3	I	0.03	0.026	105	118	112	1.034	1.071
Q1-IU-3	J	0	0.026	102	96	99	1.261	1.311
Q1-IU-3	K	-0.02	0.032	132	121	126	3.12	3.312
Q1-IU-3	L	-0.01	0.045	132	153	143	1.832	1.931
Q1-NID-1	A	0.03	0.015	75	95	85	1.838	1.983
Q1-NID-1	B	0.05	0.022	82	82	82	0.755	0.819
Q1-NID-1	C	0.09	0.027	84	94	89	0.96	1.004
Q1-NID-1	D	0.08	0.028	85	84	85	0.916	1.08
Q1-NID-1	E	0.03	0.034	99	98	99	1.059	1.087

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q1-NID-1	F	0.01	0.028	75	98	86	1.243	1.172
Q1-NID-1	G	-0.03	0.03	72	73	73	1.076	1.092
Q1-NID-1	H	0.01	0.031	87	79	83	1.167	1.272
Q1-NID-1	I	0.07	0.031	95	91	93	0.97	1.058
Q1-NID-1	J	0.05	0.023	77	63	70	1.156	1.366
Q1-NID-1	K	0	0.034	104	121	113	3.24	3.41
Q1-NID-1	L	-0.01	0.028	106	106	106	1.927	1.964
Q1-NID-2	A	0.03	0.017	76	90	83	1.866	1.836
Q1-NID-2	B	0.05	0.025	83	81	82	0.746	0.845
Q1-NID-2	C	0.09	0.027	84	92	88	0.933	0.992
Q1-NID-2	D	0.08	0.03	86	85	86	0.869	1.096
Q1-NID-2	E	0.02	0.037	101	100	100	1.055	1.047
Q1-NID-2	F	0	0.022	73	97	85	1.118	1.163
Q1-NID-2	G	-0.04	0.03	71	72	71	1.086	1.142
Q1-NID-2	H	0.01	0.034	86	77	81	1.207	1.318
Q1-NID-2	I	0.07	0.03	96	90	93	1.003	1.012
Q1-NID-2	J	0.04	0.021	76	61	68	1.033	1.126
Q1-NID-2	K	0.01	0.033	108	128	118	3.324	3.527
Q1-NID-2	L	-0.01	0.028	107	103	105	1.913	1.957
Q1-NID-3	A	0.03	0.016	76	92	84	1.992	2.023
Q1-NID-3	B	0.05	0.025	84	83	83	0.739	0.823
Q1-NID-3	C	0.09	0.029	89	91	90	0.968	0.961
Q1-NID-3	D	0.07	0.027	84	86	85	0.906	1.127
Q1-NID-3	E	0.02	0.032	102	97	99	1.046	1.091
Q1-NID-3	F	0	0.023	76	98	87	1.2	1.123
Q1-NID-3	G	-0.03	0.029	72	74	73	1.097	1.126
Q1-NID-3	H	0	0.032	87	78	82	1.23	1.278
Q1-NID-3	I	0.07	0.03	96	90	93	0.986	1.01
Q1-NID-3	J	0.04	0.019	72	65	69	1.042	1.1
Q1-NID-3	K	0.01	0.032	105	125	115	3.249	3.468
Q1-NID-3	L	-0.01	0.031	103	108	106	1.82	2.045
Q1-NIU-1	A	0.04	0.023	81	73	77	0.776	0.821
Q1-NIU-1	B	0.05	0.02	92	87	89	0.929	0.927
Q1-NIU-1	C	0.09	0.025	78	78	78	1.097	0.994
Q1-NIU-1	D	0.07	0.021	128	108	118	1.148	1.189
Q1-NIU-1	E	0.02	0.026	79	84	82	0.895	0.976
Q1-NIU-1	F	0.01	0.033	98	77	87	0.98	1.023
Q1-NIU-1	G	-0.03	0.028	65	69	67	0.903	0.901
Q1-NIU-1	H	0.01	0.029	83	94	88	1.177	1.112

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q1-NIU-1	I	0.06	0.03	91	91	91	1.144	1.049
Q1-NIU-1	J	0.04	0.021	76	86	81	1.035	1.075
Q1-NIU-1	K	-0.01	0.035	98	99	98	3.12	2.923
Q1-NIU-1	L	-0.02	0.03	112	124	118	1.582	1.671
Q1-NIU-2	A	0.04	0.024	77	76	76	0.766	0.804
Q1-NIU-2	B	0.05	0.02	90	89	89	0.931	0.861
Q1-NIU-2	C	0.09	0.026	78	79	79	1.03	0.996
Q1-NIU-2	D	0.07	0.022	126	107	117	1.174	1.181
Q1-NIU-2	E	0.02	0.035	82	86	84	0.896	0.951
Q1-NIU-2	F	0.01	0.029	97	76	87	1	0.987
Q1-NIU-2	G	-0.03	0.028	66	67	66	0.927	0.895
Q1-NIU-2	H	0.01	0.032	80	94	87	1.126	1.113
Q1-NIU-2	I	0.06	0.032	93	91	92	0.955	1.076
Q1-NIU-2	J	0.03	0.02	75	83	79	1.05	1.024
Q1-NIU-2	K	-0.03	0.038	99	104	101	3.09	3.003
Q1-NIU-2	L	0	0.032	111	129	120	1.83	1.788
Q1-NIU-3	A	0.04	0.023	78	75	77	0.774	0.792
Q1-NIU-3	B	0.05	0.021	91	89	90	0.922	0.874
Q1-NIU-3	C	0.09	0.026	80	77	79	1.098	1.014
Q1-NIU-3	D	0.07	0.021	127	107	117	1.183	1.157
Q1-NIU-3	E	0.02	0.023	80	85	82	0.876	0.987
Q1-NIU-3	F	0.01	0.031	97	77	87	1.051	1.019
Q1-NIU-3	G	-0.03	0.03	65	67	66	0.913	0.883
Q1-NIU-3	H	0	0.029	82	96	89	1.173	1.16
Q1-NIU-3	I	0.06	0.033	90	91	91	0.974	1.067
Q1-NIU-3	J	0.03	0.019	77	89	83	1.074	1.146
Q1-NIU-3	K	-0.03	0.037	99	99	99	3.017	3.023
Q1-NIU-3	L	-0.01	0.03	112	126	119	1.589	1.669
Q2-IU-1	A	0.07	0.157	94	100	97	1.367	1.361
Q2-IU-1	B	-0.01	0.027	119	101	110	1.11	1.118
Q2-IU-1	C	-0.01	0.034	96	101	98	1.137	1.163
Q2-IU-1	D	-0.02	0.022	133	130	132	1.334	1.319
Q2-IU-1	E	0	0.025	103	90	96	1.178	1.183
Q2-IU-1	F	0.01	0.02	81	91	86	1.097	1.057
Q2-IU-1	G	0.02	0.024	94	88	91	1.152	1.16
Q2-IU-1	H	-0.03	0.031	119	97	108	1.105	1.107
Q2-IU-1	I	0.04	0.026	108	118	113	0.975	0.979
Q2-IU-1	J	0.01	0.027	108	92	100	1.195	1.206
Q2-IU-1	K	-0.04	0.042	122	115	119	3.41	3.513

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q2-IU-1	L	-0.02	0.04	132	148	140	1.729	1.866
Q2-IU-2	A	0.07	0.157	93	99	96	1.328	1.439
Q2-IU-2	B	-0.02	0.029	118	102	110	1.066	1.117
Q2-IU-2	C	-0.02	0.033	94	103	99	1.124	1.155
Q2-IU-2	D	-0.02	0.024	132	130	131	1.289	1.309
Q2-IU-2	E	0.01	0.024	102	91	96	1.129	1.188
Q2-IU-2	F	0.02	0.029	81	89	85	1.022	1.087
Q2-IU-2	G	0	0.026	93	92	92	1.148	1.274
Q2-IU-2	H	-0.04	0.033	118	97	108	1.146	1.125
Q2-IU-2	I	0.04	0.027	106	122	114	0.946	0.965
Q2-IU-2	J	0.01	0.025	108	91	99	1.177	1.235
Q2-IU-2	K	-0.03	0.041	125	118	121	3.318	3.401
Q2-IU-2	L	-0.01	0.038	130	146	138	1.725	1.89
Q2-IU-3	A	0.08	0.161	95	100	97	1.376	1.398
Q2-IU-3	B	-0.03	0.03	118	103	110	1.094	1.108
Q2-IU-3	C	-0.02	0.032	94	105	100	1.141	1.117
Q2-IU-3	D	-0.02	0.024	131	128	130	1.478	1.305
Q2-IU-3	E	0	0.024	103	91	97	1.141	1.183
Q2-IU-3	F	0.02	0.024	82	90	86	1.005	1.092
Q2-IU-3	G	0.01	0.026	95	92	93	1.145	1.157
Q2-IU-3	H	-0.03	0.029	118	100	109	1.126	1.105
Q2-IU-3	I	0.04	0.027	106	118	112	0.952	1.046
Q2-IU-3	J	0.01	0.026	106	93	100	1.2	1.276
Q2-IU-3	K	-0.04	0.041	125	121	123	3.281	3.484
Q2-IU-3	L	-0.01	0.039	132	145	138	1.719	1.887
Q2-NID-1	A	0.04	0.022	75	80	78	1.566	1.624
Q2-NID-1	B	0.06	0.025	82	88	85	0.796	0.893
Q2-NID-1	C	0.09	0.026	88	91	89	0.974	1.039
Q2-NID-1	D	0.09	0.029	97	101	99	0.96	1.058
Q2-NID-1	E	0.05	0.035	104	110	107	1.026	1.101
Q2-NID-1	F	0.01	0.036	75	98	87	1.06	1.18
Q2-NID-1	G	-0.03	0.025	69	66	68	1.016	1.038
Q2-NID-1	H	0.02	0.041	86	87	86	1.151	1.255
Q2-NID-1	I	0.07	0.026	100	91	95	0.891	0.932
Q2-NID-1	J	0.04	0.025	79	70	74	1.141	1.193
Q2-NID-1	K	0.01	0.038	129	116	123	3.774	4.071
Q2-NID-1	L	-0.01	0.029	88	99	94	1.956	2.069
Q2-NID-2	A	0.04	0.024	77	74	75	1.632	1.665
Q2-NID-2	B	0.07	0.023	86	81	83	0.813	0.812

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q2-NID-2	C	0.09	0.024	88	90	89	1.006	1.091
Q2-NID-2	D	0.07	0.023	96	105	101	0.957	1.162
Q2-NID-2	E	0.05	0.036	105	110	108	1.016	1.021
Q2-NID-2	F	0.01	0.033	77	98	87	1.12	1.165
Q2-NID-2	G	-0.03	0.029	68	67	68	1.054	1.103
Q2-NID-2	H	0.02	0.036	84	87	85	1.196	1.316
Q2-NID-2	I	0.07	0.026	100	90	95	0.947	0.929
Q2-NID-2	J	0.04	0.039	79	69	74	1.108	1.19
Q2-NID-2	K	0.02	0.037	129	123	126	3.871	4.138
Q2-NID-2	L	-0.01	0.03	88	101	95	1.912	2.088
Q2-NID-3	A	0.04	0.026	76	77	77	1.594	1.623
Q2-NID-3	B	0.05	0.021	81	86	84	0.807	0.918
Q2-NID-3	C	0.09	0.028	87	93	90	0.983	1.131
Q2-NID-3	D	0.07	0.024	96	104	100	0.949	1.157
Q2-NID-3	E	0.05	0.037	105	112	109	1.017	1.036
Q2-NID-3	F	0.01	0.034	76	99	87	1.064	1.153
Q2-NID-3	G	-0.03	0.028	68	67	67	0.991	1.139
Q2-NID-3	H	0.02	0.039	83	88	86	1.157	1.309
Q2-NID-3	I	0.07	0.028	101	90	96	0.926	0.926
Q2-NID-3	J	0.04	0.029	79	70	75	1.131	1.181
Q2-NID-3	K	0.01	0.039	141	120	130	3.808	4.217
Q2-NID-3	L	-0.01	0.029	88	100	94	1.949	2.126
Q3-IU-1	A	0.11	0.153	93	107	100	1.27	1.311
Q3-IU-1	B	-0.02	0.027	107	97	102	1.086	1.073
Q3-IU-1	C	-0.02	0.03	83	101	92	1.129	1.117
Q3-IU-1	D	0.01	0.023	118	112	115	1.063	1.152
Q3-IU-1	E	-0.02	0.027	71	81	76	1.044	1.321
Q3-IU-1	F	0.03	0.02	74	89	82	0.882	1.246
Q3-IU-1	G	0.03	0.038	86	92	89	1.052	1.355
Q3-IU-1	H	-0.02	0.032	109	91	100	0.98	1.126
Q3-IU-1	I	0.05	0.026	96	112	104	0.88	0.965
Q3-IU-1	J	0.04	0.018	79	70	75	0.979	1.191
Q3-IU-1	K	-0.01	0.039	105	130	118	2.98	3.648
Q3-IU-1	L	0.02	0.058	112	161	137	1.711	2.13
Q3-IU-2	A	0.1	0.152	97	108	102	1.266	1.288
Q3-IU-2	B	-0.01	0.023	112	93	103	1.075	1.085
Q3-IU-2	C	-0.02	0.03	84	98	91	1.166	1.081
Q3-IU-2	D	0.01	0.019	118	112	115	1.124	1.133
Q3-IU-2	E	0.01	0.022	70	91	80	1.067	1.225

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q3-IU-2	F	0.04	0.024	74	84	79	0.926	1.141
Q3-IU-2	G	0.04	0.03	85	93	89	1.042	1.281
Q3-IU-2	H	-0.02	0.034	110	90	100	1.038	1.188
Q3-IU-2	I	0.05	0.026	94	112	103	0.882	0.925
Q3-IU-2	J	0.04	0.018	78	71	75	1.093	1.193
Q3-IU-2	K	-0.01	0.035	104	122	113	2.999	3.762
Q3-IU-2	L	0.01	0.03	112	134	123	1.773	2.134
Q3-IU-3	A	0.1	0.152	92	109	100	1.236	1.313
Q3-IU-3	B	-0.01	0.021	112	90	101	1.084	1.183
Q3-IU-3	C	-0.02	0.021	84	91	88	1.024	1.181
Q3-IU-3	D	0.01	0.026	111	112	112	1.081	1.174
Q3-IU-3	E	0	0.024	69	86	78	1.011	1.38
Q3-IU-3	F	0.03	0.021	75	88	81	0.909	1.191
Q3-IU-3	G	0.03	0.032	85	92	88	1.058	1.305
Q3-IU-3	H	-0.03	0.032	109	90	100	1.027	1.203
Q3-IU-3	I	0.05	0.029	98	128	113	0.898	0.993
Q3-IU-3	J	0.04	0.017	77	71	74	0.936	1.188
Q3-IU-3	K	-0.01	0.03	100	104	102	3.073	3.674
Q3-IU-3	L	0	0.028	109	129	119	1.826	2.094
Q3-NID-1	A	0.05	0.02	58	70	64	0.674	0.814
Q3-NID-1	B	0.08	0.02	72	70	71	0.813	0.97
Q3-NID-1	C	0.12	0.022	72	73	73	1.003	1.178
Q3-NID-1	D	0.09	0.024	80	80	80	0.841	1.296
Q3-NID-1	E	0.04	0.025	88	92	90	0.978	1.055
Q3-NID-1	F	0.02	0.019	74	90	82	1.05	1.029
Q3-NID-1	G	-0.01	0.023	61	67	64	0.912	1.06
Q3-NID-1	H	0.02	0.023	82	75	78	1.01	1.149
Q3-NID-1	I	0.06	0.024	91	82	86	0.851	0.904
Q3-NID-1	J	0.03	0.013	71	45	58	1.013	0.986
Q3-NID-1	K	0	0.039	120	105	112	3.621	3.797
Q3-NID-1	L	0	0.025	82	89	86	1.736	2.142
Q3-NID-2	A	0.05	0.018	59	67	63	0.694	0.846
Q3-NID-2	B	0.08	0.021	75	72	74	0.833	0.935
Q3-NID-2	C	0.11	0.022	72	75	73	1.026	1.183
Q3-NID-2	D	0.1	0.022	80	80	80	0.842	1.222
Q3-NID-2	E	0.05	0.031	82	96	89	0.941	1.048
Q3-NID-2	F	0.04	0.024	73	92	83	1	1.051
Q3-NID-2	G	-0.01	0.027	62	69	65	0.898	1.021
Q3-NID-2	H	0.04	0.022	81	75	78	1.023	1.231

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q3-NID-2	I	0.09	0.027	90	85	88	0.879	0.944
Q3-NID-2	J	0.06	0.017	64	47	55	0.876	1.064
Q3-NID-2	K	0.01	0.041	117	108	113	3.604	3.892
Q3-NID-2	L	0.01	0.025	80	87	83	1.749	2.129
Q3-NID-3	A	0.05	0.017	60	70	65	0.697	0.776
Q3-NID-3	B	0.07	0.02	73	75	74	0.777	0.916
Q3-NID-3	C	0.11	0.019	72	74	73	0.987	1.112
Q3-NID-3	D	0.08	0.02	78	85	81	0.871	1.238
Q3-NID-3	E	0.05	0.03	81	94	88	0.965	1.02
Q3-NID-3	F	0.04	0.02	75	93	84	1.054	1.134
Q3-NID-3	G	-0.01	0.029	64	72	68	0.928	1
Q3-NID-3	H	0.04	0.019	80	76	78	1.002	1.176
Q3-NID-3	I	0.08	0.024	88	82	85	0.877	0.922
Q3-NID-3	J	0.07	0.016	62	47	55	0.911	1.033
Q3-NID-3	K	0.02	0.039	116	104	110	3.442	3.926
Q3-NID-3	L	0	0.027	85	87	86	1.79	2.166
Q4-IU-1	A	0.13	0.154	95	106	100	1.216	1.299
Q4-IU-1	B	0	0.022	111	96	103	1.076	1.097
Q4-IU-1	C	0	0.022	86	89	88	1.084	1.095
Q4-IU-1	D	0.02	0.023	119	114	116	1.083	1.081
Q4-IU-1	E	0.01	0.017	71	67	69	1.006	1.138
Q4-IU-1	F	0.02	0.021	78	97	88	0.957	1.213
Q4-IU-1	G	0.04	0.033	84	92	88	1.03	1.253
Q4-IU-1	H	-0.02	0.03	110	93	101	1.029	1.179
Q4-IU-1	I	0.06	0.025	98	112	105	0.891	0.989
Q4-IU-1	J	0.04	0.018	76	68	72	1.001	1.2
Q4-IU-1	K	0	0.031	99	99	99	2.93	3.6
Q4-IU-1	L	0.01	0.028	111	131	121	1.724	2.07
Q4-IU-2	A	0.11	0.152	95	107	101	1.252	1.313
Q4-IU-2	B	0	0.024	108	96	102	1.082	1.09
Q4-IU-2	C	-0.01	0.02	83	92	87	1.047	1.138
Q4-IU-2	D	0.02	0.025	118	117	118	1.047	1.102
Q4-IU-2	E	0.01	0.02	69	66	68	0.993	1.131
Q4-IU-2	F	0.02	0.018	79	93	86	0.941	1.16
Q4-IU-2	G	0.03	0.037	85	91	88	1.039	1.259
Q4-IU-2	H	-0.01	0.035	110	91	101	0.975	1.179
Q4-IU-2	I	0.06	0.024	99	114	106	0.895	0.979
Q4-IU-2	J	0.04	0.017	75	69	72	0.979	1.239
Q4-IU-2	K	0	0.03	101	96	99	2.912	3.619

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q4-IU-2	L	0.01	0.029	110	136	123	1.682	2.121
Q4-IU-3	A	0.12	0.152	91	109	100	1.224	1.279
Q4-IU-3	B	0	0.022	113	96	104	1.053	1.093
Q4-IU-3	C	0	0.022	86	90	88	1.073	1.059
Q4-IU-3	D	0.02	0.024	117	116	116	1.037	1.088
Q4-IU-3	E	0.01	0.02	69	68	68	1.003	1.141
Q4-IU-3	F	0.03	0.022	77	91	84	0.921	1.187
Q4-IU-3	G	0.04	0.035	84	91	88	1.065	1.295
Q4-IU-3	H	-0.02	0.027	110	93	101	1.007	1.189
Q4-IU-3	I	0.06	0.027	98	113	106	0.901	0.936
Q4-IU-3	J	0.05	0.017	76	70	73	0.971	1.196
Q4-IU-3	K	0.01	0.028	97	97	97	3.034	3.532
Q4-IU-3	L	0.01	0.029	112	134	123	1.644	2.136
Q4-NID-1	A	0.07	0.015	60	75	67	0.696	0.744
Q4-NID-1	B	0.08	0.019	74	74	74	0.774	0.935
Q4-NID-1	C	0.13	0.019	74	69	72	0.921	1.094
Q4-NID-1	D	0.12	0.024	81	80	81	0.786	1.118
Q4-NID-1	E	0.04	0.026	89	91	90	0.941	0.93
Q4-NID-1	F	0.03	0.02	78	93	86	1.003	0.988
Q4-NID-1	G	0	0.021	62	68	65	0.885	0.969
Q4-NID-1	H	0.05	0.027	81	77	79	0.952	1.107
Q4-NID-1	I	0.1	0.025	88	83	85	0.83	0.858
Q4-NID-1	J	0.07	0.018	61	47	54	0.897	1.004
Q4-NID-1	K	0.03	0.039	120	111	115	3.378	3.85
Q4-NID-1	L	0.02	0.025	79	91	85	1.63	2.16
Q4-NID-2	A	0.07	0.019	61	70	66	0.645	0.761
Q4-NID-2	B	0.08	0.02	74	74	74	0.767	0.891
Q4-NID-2	C	0.13	0.02	73	69	71	0.933	1.094
Q4-NID-2	D	0.13	0.028	80	80	80	0.814	1.055
Q4-NID-2	E	0.06	0.032	86	95	90	0.886	0.983
Q4-NID-2	F	0.05	0.02	76	94	85	0.981	0.997
Q4-NID-2	G	0.01	0.026	62	70	66	0.885	0.996
Q4-NID-2	H	0.05	0.023	82	78	80	0.978	1.173
Q4-NID-2	I	0.1	0.026	89	83	86	0.826	0.869
Q4-NID-2	J	0.08	0.016	60	50	55	0.88	0.991
Q4-NID-2	K	0.07	0.043	115	113	114	3.306	3.713
Q4-NID-2	L	0.03	0.023	73	96	84	1.655	2.312
Q4-NID-3	A	0.06	0.019	59	69	64	0.662	0.779
Q4-NID-3	B	0.08	0.02	76	72	74	0.762	0.895

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q4-NID-3	C	0.12	0.019	73	68	71	0.955	1.064
Q4-NID-3	D	0.13	0.029	81	80	80	0.82	1.051
Q4-NID-3	E	0.05	0.027	87	92	90	0.9	0.933
Q4-NID-3	F	0.04	0.02	77	93	85	1.014	0.998
Q4-NID-3	G	0	0.024	63	68	65	0.884	0.976
Q4-NID-3	H	0.04	0.021	83	77	80	0.946	1.14
Q4-NID-3	I	0.08	0.026	90	83	87	0.87	0.909
Q4-NID-3	J	0.08	0.015	63	47	55	0.878	1.003
Q4-NID-3	K	0.1	0.048	124	121	123	3.425	3.759
Q4-NID-3	L	0.03	0.022	73	95	84	1.671	2.292
Q5-IU-1	A	0.09	0.152	98	107	103	1.247	1.301
Q5-IU-1	B	-0.03	0.026	110	97	103	1.142	1.131
Q5-IU-1	C	-0.03	0.023	87	91	89	1.067	1.095
Q5-IU-1	D	-0.01	0.023	126	123	124	1.083	1.139
Q5-IU-1	E	-0.02	0.022	71	67	69	1.039	1.175
Q5-IU-1	F	0	0.018	79	95	87	1.023	1.232
Q5-IU-1	G	0	0.04	87	90	89	1.093	1.268
Q5-IU-1	H	-0.04	0.033	112	94	103	1.063	1.194
Q5-IU-1	I	0.03	0.026	99	113	106	0.966	1.059
Q5-IU-1	J	0.01	0.02	76	69	73	1.075	1.297
Q5-IU-1	K	-0.04	0.035	103	99	101	2.732	3.459
Q5-IU-1	L	-0.01	0.031	116	139	127	1.769	2.011
Q5-IU-2	A	0.09	0.158	96	109	103	1.241	1.289
Q5-IU-2	B	-0.02	0.021	117	92	105	1.087	1.105
Q5-IU-2	C	-0.03	0.022	87	91	89	1.093	1.144
Q5-IU-2	D	-0.01	0.022	127	120	123	1.055	1.139
Q5-IU-2	E	0	0.024	74	61	68	1.031	1.078
Q5-IU-2	F	0.01	0.021	80	93	87	0.973	1.184
Q5-IU-2	G	0	0.042	85	92	89	1.037	1.279
Q5-IU-2	H	-0.04	0.031	113	95	104	1.054	1.211
Q5-IU-2	I	0.03	0.025	101	114	107	0.995	1.058
Q5-IU-2	J	0.02	0.019	77	70	73	1.038	1.247
Q5-IU-2	K	-0.04	0.038	102	104	103	2.719	3.522
Q5-IU-2	L	-0.02	0.031	116	137	127	1.699	2.103
Q5-IU-3	A	0.09	0.153	98	108	103	1.27	1.3
Q5-IU-3	B	-0.02	0.022	114	96	105	1.114	1.144
Q5-IU-3	C	-0.02	0.022	86	90	88	1.103	1.109
Q5-IU-3	D	0	0.024	126	121	123	1.057	1.108
Q5-IU-3	E	-0.02	0.022	69	66	68	1.042	1.189

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q5-IU-3	F	0.01	0.019	79	95	87	0.965	1.166
Q5-IU-3	G	0.01	0.038	88	87	87	1.086	1.231
Q5-IU-3	H	-0.04	0.027	111	95	103	1.059	1.254
Q5-IU-3	I	0.03	0.026	99	114	107	0.978	1.059
Q5-IU-3	J	0.01	0.019	76	72	74	1.039	1.274
Q5-IU-3	K	-0.04	0.035	102	105	104	2.801	3.444
Q5-IU-3	L	-0.01	0.031	115	138	126	1.796	2.081
Q5-NID-1	A	0.03	0.017	60	72	66	0.733	0.807
Q5-NID-1	B	0.06	0.02	76	71	73	0.846	0.924
Q5-NID-1	C	0.09	0.021	75	69	72	0.979	1.15
Q5-NID-1	D	0.1	0.027	82	81	82	0.873	1.12
Q5-NID-1	E	0.03	0.033	86	93	90	1.039	1.04
Q5-NID-1	F	0	0.019	79	94	86	1.052	1.097
Q5-NID-1	G	-0.03	0.022	64	71	67	0.971	1.049
Q5-NID-1	H	0.02	0.024	83	77	80	1.073	1.214
Q5-NID-1	I	0.07	0.027	90	84	87	0.947	0.961
Q5-NID-1	J	0.04	0.015	64	47	56	0.947	1.063
Q5-NID-1	K	0.05	0.061	127	117	122	3.247	3.745
Q5-NID-1	L	0	0.025	77	95	86	1.666	2.201
Q5-NID-2	A	0.03	0.018	60	71	66	0.733	0.833
Q5-NID-2	B	0.05	0.022	76	70	73	0.837	0.937
Q5-NID-2	C	0.09	0.02	75	70	73	0.981	1.122
Q5-NID-2	D	0.09	0.032	83	82	83	0.884	1.164
Q5-NID-2	E	0.03	0.035	84	95	90	1.002	1.028
Q5-NID-2	F	0.01	0.021	77	94	86	1.055	1.054
Q5-NID-2	G	-0.02	0.028	66	72	69	0.984	1.046
Q5-NID-2	H	0.03	0.023	82	80	81	1.089	1.193
Q5-NID-2	I	0.07	0.027	90	83	87	0.952	0.99
Q5-NID-2	J	0.05	0.017	62	49	56	0.958	1.134
Q5-NID-2	K	0.01	0.057	140	108	124	3.258	3.588
Q5-NID-2	L	-0.01	0.027	85	91	88	1.676	1.986
Q5-NID-3	A	0.03	0.019	60	68	64	0.727	0.821
Q5-NID-3	B	0.05	0.021	76	72	74	0.852	0.931
Q5-NID-3	C	0.09	0.02	75	69	72	0.973	1.156
Q5-NID-3	D	0.09	0.024	82	82	82	0.872	1.152
Q5-NID-3	E	0.02	0.029	86	92	89	1.008	1.018
Q5-NID-3	F	0.01	0.02	78	95	87	1.022	1.063
Q5-NID-3	G	-0.02	0.028	66	71	69	0.974	1.024
Q5-NID-3	H	0.03	0.022	84	78	81	1.111	1.157

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
Q5-NID-3	I	0.07	0.026	91	84	88	0.968	0.989
Q5-NID-3	J	0.05	0.015	63	47	55	0.967	1.086
Q5-NID-3	K	0.05	0.062	124	120	122	3.156	3.583
Q5-NID-3	L	0	0.025	74	96	85	1.673	2.229
R1-ID-1	A			98.1	98.98	98.5		
R1-ID-1	B			90.1	114.1	102		
R1-ID-1	C			82.9	83.61	83.2		
R1-ID-1	D			72	80.66	76.3		
R1-ID-1	E			81.1	98.36	89.7		
R1-ID-1	F			107	67.94	87.4		
R1-ID-1	G			89.9	91.24	90.6		
R1-ID-1	H			89.4	95.53	92.5		
R1-ID-1	I			114	111.9	113		
R1-ID-1	J			66.3	66.47	66.4		
R1-ID-1	K			84.9	112.5	98.7		
R1-ID-1	L			134	128.9	131		
R1-ID-2	A			96.8	100.9	98.9		
R1-ID-2	B			93.3	114.2	104		
R1-ID-2	C			84.8	83.86	84.3		
R1-ID-2	D			72.6	79.19	75.9		
R1-ID-2	E			80.1	97.82	89		
R1-ID-2	F			107	68.82	87.7		
R1-ID-2	G			92.2	93.01	92.6		
R1-ID-2	H			87.8	95.21	91.5		
R1-ID-2	I			113	111	112		
R1-ID-2	J			63.6	65.73	64.7		
R1-ID-2	K			84.9	109.3	97.1		
R1-ID-2	L			136	127.4	132		
R1-ID-3	A			94.9	98.99	96.9		
R1-ID-3	B			92	115.6	104		
R1-ID-3	C			83.9	83.49	83.7		
R1-ID-3	D			78.8	74.47	76.7		
R1-ID-3	E			82.2	97.35	89.8		
R1-ID-3	F			107	69.5	88.4		
R1-ID-3	G			89.4	92.45	90.9		
R1-ID-3	H			90.8	91.88	91.4		
R1-ID-3	I			112	112	112		
R1-ID-3	J			63.2	68.75	66		
R1-ID-3	K			85.3	110.2	97.7		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R1-ID-3	L			143	126.8	135		
R1-NID-1	A			56.7	82.3	69.5		
R1-NID-1	B			72.9	74.25	73.6		
R1-NID-1	C			71.9	71.98	71.9		
R1-NID-1	D			79.8	82.05	80.9		
R1-NID-1	E			88.8	91.46	90.1		
R1-NID-1	F			76.5	97.39	86.9		
R1-NID-1	G			68.7	75.15	72		
R1-NID-1	H			79.3	75.55	77.4		
R1-NID-1	I			91.8	83.98	87.9		
R1-NID-1	J			62.7	48.07	55.4		
R1-NID-1	K			78.9	107.9	93.4		
R1-NID-1	L			85.5	91	88.3		
R1-NID-2	A			56.6	78.02	67.3		
R1-NID-2	B			73.2	73.52	73.4		
R1-NID-2	C			72.1	70.42	71.3		
R1-NID-2	D			80.2	84.04	82.1		
R1-NID-2	E			91.5	82.98	87.2		
R1-NID-2	F			73.2	96.74	85		
R1-NID-2	G			66.2	73.61	69.9		
R1-NID-2	H			78.9	72.99	76		
R1-NID-2	I			91.1	84.02	87.6		
R1-NID-2	J			61.3	45.01	53.2		
R1-NID-2	K			85.7	114.9	100		
R1-NID-2	L			84.5	89.19	86.8		
R1-NID-3	A			57.5	80.13	68.8		
R1-NID-3	B			73	74.58	73.8		
R1-NID-3	C			75.3	70.77	73.1		
R1-NID-3	D			78.4	84.03	81.2		
R1-NID-3	E			90.3	89.7	90		
R1-NID-3	F			75.9	98.43	87.2		
R1-NID-3	G			67.6	76.5	72		
R1-NID-3	H			79	74.1	76.6		
R1-NID-3	I			92.5	83.96	88.2		
R1-NID-3	J			58.5	50.01	54.3		
R1-NID-3	K			82	111.9	96.9		
R1-NID-3	L			81.8	93.75	87.8		
R2-IU-1	A			95.9	106.1	101		
R2-IU-1	B			107	87.47	97.2		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R2-IU-1	C			85.2	84.77	85		
R2-IU-1	D			111	109.9	110		
R2-IU-1	E			71.3	62.23	66.8		
R2-IU-1	F			77.7	86.92	82.3		
R2-IU-1	G			88.5	88.03	88.3		
R2-IU-1	H			110	90.02	99.9		
R2-IU-1	I			99.3	109.3	104		
R2-IU-1	J			75.8	70.02	72.9		
R2-IU-1	K			97.2	91.37	94.3		
R2-IU-1	L			110	130.8	120		
R2-IU-2	A			95.1	104.7	99.9		
R2-IU-2	B			107	86.7	96.7		
R2-IU-2	C			84.1	89.93	87		
R2-IU-2	D			112	109.6	111		
R2-IU-2	E			71.4	61.66	66.5		
R2-IU-2	F			77.5	84.86	81.2		
R2-IU-2	G			87.3	90.96	89.1		
R2-IU-2	H			109	90.1	99.4		
R2-IU-2	I			96.9	112.2	105		
R2-IU-2	J			76.3	71.16	73.8		
R2-IU-2	K			101	95.5	98.2		
R2-IU-2	L			109	130	119		
R2-IU-3	A			96	105.6	101		
R2-IU-3	B			106	88.5	97.5		
R2-IU-3	C			84.1	90.59	87.3		
R2-IU-3	D			110	108.8	109		
R2-IU-3	E			71.9	63.65	67.8		
R2-IU-3	F			77.9	86.1	82		
R2-IU-3	G			88.8	91.78	90.3		
R2-IU-3	H			109	92.15	101		
R2-IU-3	I			96.6	108.6	103		
R2-IU-3	J			75	71.42	73.2		
R2-IU-3	K			99.5	98.76	99.2		
R2-IU-3	L			111	128.5	120		
R2-NID-1	A			58.5	72.31	65.4		
R2-NID-1	B			72.7	73.63	73.2		
R2-NID-1	C			72.4	69.9	71.2		
R2-NID-1	D			77.8	80.2	79		
R2-NID-1	E			80.4	97.23	88.8		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R2-NID-1	F			73.9	98.35	86.1		
R2-NID-1	G			64.5	69.92	67.2		
R2-NID-1	H			78.1	72.63	75.4		
R2-NID-1	I			88.2	81.91	85		
R2-NID-1	J			58	46.18	52.1		
R2-NID-1	K			113	109.3	111		
R2-NID-1	L			78.7	92.2	85.5		
R2-NID-2	A			59	68.2	63.6		
R2-NID-2	B			75.7	70.57	73.1		
R2-NID-2	C			72.2	69.36	70.8		
R2-NID-2	D			78	83.12	80.6		
R2-NID-2	E			81.5	96.04	88.8		
R2-NID-2	F			75.2	97.92	86.6		
R2-NID-2	G			65	70.96	68		
R2-NID-2	H			76.1	72.28	74.2		
R2-NID-2	I			88.8	80.99	84.9		
R2-NID-2	J			59.1	46.16	52.6		
R2-NID-2	K			112	116.6	114		
R2-NID-2	L			78.8	94.32	86.6		
R2-NID-3	A			59	70.16	64.6		
R2-NID-3	B			72.1	72.86	72.5		
R2-NID-3	C			71.2	70.34	70.8		
R2-NID-3	D			77.5	81.36	79.4		
R2-NID-3	E			80.8	99.01	89.9		
R2-NID-3	F			74	99.14	86.6		
R2-NID-3	G			64.7	70.68	67.7		
R2-NID-3	H			76.1	73.6	74.9		
R2-NID-3	I			89.3	81.27	85.3		
R2-NID-3	J			58.4	44.77	51.6		
R2-NID-3	K			129	110.8	120		
R2-NID-3	L			80.2	93.09	86.6		
R3-IU-1	A			96.6	106.2	101		
R3-IU-1	B			103	93.15	97.9		
R3-IU-1	C			84.4	103.4	93.9		
R3-IU-1	D			116	112.8	115		
R3-IU-1	E			70	84.23	77.1		
R3-IU-1	F			75.9	86.93	81.4		
R3-IU-1	G			85.8	93.15	89.5		
R3-IU-1	H			109	91.06	100		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R3-IU-1	I			97.3	110.3	104		
R3-IU-1	J			76.7	68.83	72.8		
R3-IU-1	K			105	128	117		
R3-IU-1	L			112	162.1	137		
R3-IU-2	A			99	105.9	102		
R3-IU-2	B			108	87.93	98		
R3-IU-2	C			85.4	99.8	92.6		
R3-IU-2	D			116	112.5	114		
R3-IU-2	E			69.3	95.7	82.5		
R3-IU-2	F			75.6	81.62	78.6		
R3-IU-2	G			85.4	94.28	89.8		
R3-IU-2	H			110	89.8	99.9		
R3-IU-2	I			94.8	110.8	103		
R3-IU-2	J			76.8	69.92	73.3		
R3-IU-2	K			103	120.2	112		
R3-IU-2	L			111	134.5	123		
R3-IU-3	A			95.8	108.1	102		
R3-IU-3	B			108	86.23	97.3		
R3-IU-3	C			85.6	92.17	88.9		
R3-IU-3	D			109	113.4	111		
R3-IU-3	E			68.3	90.62	79.4		
R3-IU-3	F			76.9	85.87	81.4		
R3-IU-3	G			85.3	93.03	89.2		
R3-IU-3	H			109	89.91	99.2		
R3-IU-3	I			98.2	127	113		
R3-IU-3	J			75.1	69.16	72.1		
R3-IU-3	K			94.5	101.1	97.8		
R3-IU-3	L			109	130.1	120		
R3-NID-1	A			57.3	70.73	64		
R3-NID-1	B			74.1	67.57	70.8		
R3-NID-1	C			71.1	71.1	71.1		
R3-NID-1	D			78.7	80.13	79.4		
R3-NID-1	E			87.6	85.58	86.6		
R3-NID-1	F			75.3	93.3	84.3		
R3-NID-1	G			63.2	68.19	65.7		
R3-NID-1	H			80.3	75.53	77.9		
R3-NID-1	I			94	82.5	88.3		
R3-NID-1	J			65.8	45.38	55.6		
R3-NID-1	K			121	103.9	113		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R3-NID-1	L			82.4	89.01	85.7		
R3-NID-2	A			58.6	67.95	63.3		
R3-NID-2	B			76.6	70.54	73.6		
R3-NID-2	C			71.5	72.68	72.1		
R3-NID-2	D			78.3	80.04	79.2		
R3-NID-2	E			80.8	89.26	85		
R3-NID-2	F			74.8	95.55	85.2		
R3-NID-2	G			64.3	69.94	67.1		
R3-NID-2	H			80.1	75.21	77.7		
R3-NID-2	I			92.6	84.29	88.4		
R3-NID-2	J			59.6	47.52	53.6		
R3-NID-2	K			117	108.3	113		
R3-NID-2	L			79.5	86.57	83		
R3-NID-3	A			58.8	70.27	64.6		
R3-NID-3	B			73.8	73.51	73.7		
R3-NID-3	C			71.9	72.95	72.4		
R3-NID-3	D			76.9	85.08	81		
R3-NID-3	E			80.9	87.79	84.4		
R3-NID-3	F			74.9	97.32	86.1		
R3-NID-3	G			66.5	72.19	69.4		
R3-NID-3	H			80.3	73.77	77		
R3-NID-3	I			91	82.31	86.7		
R3-NID-3	J			58.5	46.12	52.3		
R3-NID-3	K			117	104.6	111		
R3-NID-3	L			84.6	86.99	85.8		
R4-IU-1	A			94.7	109.9	102		
R4-IU-1	B			109	90.4	99.6		
R4-IU-1	C			86.3	92.3	89.3		
R4-IU-1	D			117	114.3	115		
R4-IU-1	E			67.7	71.63	69.7		
R4-IU-1	F			78.6	89.23	83.9		
R4-IU-1	G			85.3	94.97	90.1		
R4-IU-1	H			109	92	100		
R4-IU-1	I			95.9	112.3	104		
R4-IU-1	J			76	71.48	73.7		
R4-IU-1	K			97.5	97.37	97.4		
R4-IU-1	L			111	134.4	123		
R4-IU-2	A			97.6	107.6	103		
R4-IU-2	B			107	90.25	98.7		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R4-IU-2	C			86	90.25	88.1		
R4-IU-2	D			118	114	116		
R4-IU-2	E			70	71.93	71		
R4-IU-2	F			79.4	94.67	87.1		
R4-IU-2	G			86	95.39	90.7		
R4-IU-2	H			108	91.95	100		
R4-IU-2	I			96.4	112	104		
R4-IU-2	J			75.9	69.33	72.6		
R4-IU-2	K			98.7	99.62	99.2		
R4-IU-2	L			110	131.3	121		
R4-IU-3	A			97.5	108	103		
R4-IU-3	B			106	90.7	98.2		
R4-IU-3	C			83.8	94.2	89		
R4-IU-3	D			118	115.5	117		
R4-IU-3	E			67.6	69.77	68.7		
R4-IU-3	F			80.8	91.8	86.3		
R4-IU-3	G			86.1	95.28	90.7		
R4-IU-3	H			108	91.04	99.6		
R4-IU-3	I			96.3	112.9	105		
R4-IU-3	J			74.8	70.63	72.7		
R4-IU-3	K			102	96.61	99.1		
R4-IU-3	L			109	135.9	122		
R4-NID-1	A			60.6	75.37	68		
R4-NID-1	B			74	74.46	74.3		
R4-NID-1	C			74.1	70.59	72.4		
R4-NID-1	D			80.1	81.18	80.6		
R4-NID-1	E			89.5	85.61	87.6		
R4-NID-1	F			77.4	99.48	88.5		
R4-NID-1	G			65	69.02	67		
R4-NID-1	H			79.7	70.49	75.1		
R4-NID-1	I			86.7	79.78	83.2		
R4-NID-1	J			55.7	46.24	51		
R4-NID-1	K			107	94.08	101		
R4-NID-1	L			83.4	93.61	88.5		
R4-NID-2	A			60.6	75.37	68		
R4-NID-2	B			74	74.46	74.3		
R4-NID-2	C			74.1	70.59	72.4		
R4-NID-2	D			80.1	81.18	80.6		
R4-NID-2	E			89.5	85.61	87.6		

Test ID	Section	Rut Avg (In)	Rut Std (In)	IRI 1 (In / Mi)	IRI 2 (In / Mi)	IRI Ave (In / Mi)	Texture 1 (mm)	Texture 2 (mm)
R4-NID-2	F			77.4	99.48	88.5		
R4-NID-2	G			65	69.02	67		
R4-NID-2	H			79.7	70.49	75.1		
R4-NID-2	I			86.7	79.78	83.2		
R4-NID-2	J			55.7	46.24	51		
R4-NID-2	K			107	94.08	101		
R4-NID-2	L			83.4	93.61	88.5		
R4-NID-3	A			59.9	69.75	64.8		
R4-NID-3	B			76.2	72.43	74.3		
R4-NID-3	C			73.3	69.98	71.7		
R4-NID-3	D			80.9	80.33	80.6		
R4-NID-3	E			87.7	88.34	88		
R4-NID-3	F			75.2	100.3	87.7		
R4-NID-3	G			65.1	67.54	66.3		
R4-NID-3	H			82.3	72.58	77.5		
R4-NID-3	I			85.8	78.31	82.1		
R4-NID-3	J			57.5	47.39	52.4		
R4-NID-3	K			111	99.81	106		
R4-NID-3	L			81.7	102	91.9		

Appendix C: PSU and Linear Regression Parameters

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
1B-ID	A	1.37	84.545	0.8792	-0.7056	78.564	0.8492
1B-ID	B	1.99	109.39	0.926	-1.0447	94.228	0.9067
1B-ID	C	2.25	93.366	0.8501	-0.9291	78.319	0.941
1B-ID	D	3	92.041	0.8277	-1.0288	73.43	0.7912
1B-ID	E	1.94	99.315	0.9632	-0.9613	86.471	0.9343
1B-ID	F	2.24	97.534	0.8774	-0.9722	81.63	0.8713
1B-ID	G	1.58	92.369	0.7653	-0.8876	85.692	0.7828
1B-ID	H	1.57	98.688	0.9654	-0.8458	88.205	0.9629
1B-ID	I	1.5	90.464	0.9026	-0.7638	81.616	0.9066
1B-ID	J	1.33	91.268	0.9333	-0.7438	84.608	0.9274
1B-ID	K	0.6	50.09	0.6928	-0.2402	49.181	0.6916
1B-ID	L	2.3	71.657	0.9273	-0.6559	56.555	0.9551
1B-IU	A	1.65	95.749	0.8793	-0.8904	86.964	0.8827
1B-IU	B	1.64	106.91	0.948	-0.9709	96.276	0.9337
1B-IU	C	2.11	104.14	0.956	-0.9909	86.978	0.9664
1B-IU	D	2.14	100.29	0.9274	-0.9725	84.298	0.936
1B-IU	E	2.39	110.76	0.9064	-1.1339	91.12	0.92
1B-IU	F	2.63	109.06	0.8847	-1.1955	89.193	0.8712
1B-IU	G	2.91	138.65	0.9653	-1.4296	104.58	0.9698
1B-IU	H	2.46	118.79	0.9719	-1.2308	96.55	0.9642
1B-IU	I	2.92	142.91	0.9626	-1.4723	107.29	0.988
1B-IU	J	1.91	98.705	0.8468	-1.0056	88.155	0.8395
1B-IU	K	0.7	54.439	0.5868	-0.3121	53.842	0.5882
1B-IU	L	1.38	64.229	0.6488	-0.5941	61.491	0.659
1B-NID	A	2.77	98.995	0.9112	-1.0368	77.71	0.8745
1B-NID	B	2.34	90.894	0.7611	-1.0012	79.127	0.7735
1B-NID	C	2.63	107.49	0.9757	-1.1955	84.757	0.9305
1B-NID	D	3.28	97.445	0.8443	-1.0972	75.02	0.8319
1B-NID	E	1.26	79.523	0.756	-0.662	75.751	0.7752
1B-NID	F	1.36	83.602	0.7244	-0.7251	78.653	0.7526
1B-NID	G	1.42	84.33	0.7844	-0.9554	83.796	0.7017
1B-NID	H	1.88	91.29	0.6685	-0.7388	78.7	0.8023
1B-NID	I	1.22	82.204	0.5754	-0.6931	79.672	0.6214
1B-NID	J	1.12	84.353	0.6485	-0.6596	81.289	0.6689

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
1B-NID	K	0.38	46.215	0.3227	-0.1539	46.045	0.3386
1B-NID	L	1.08	51.764	0.6345	-0.3932	49.973	0.6602
1B-NIU	A	1.22	68.55	0.3561	-0.594	67.939	0.4276
1B-NIU	B	1.48	89.797	0.724	-0.8161	84.177	0.7467
1B-NIU	C	2.07	102.58	0.7891	-0.9792	86.759	0.8447
1B-NIU	D	1.63	78.442	0.8003	-0.711	70.842	0.8141
1B-NIU	E	2.15	100.77	0.9062	-1.024	85.737	0.9284
1B-NIU	F	1.9	80.8	0.5341	-0.8666	74.754	0.5695
1B-NIU	G	1.48	82.029	0.5803	-0.7575	77.173	0.6308
1B-NIU	H	1.65	93.768	0.7409	-0.9047	86.251	0.7841
1B-NIU	I	1.19	87.536	0.8769	-0.713	83.516	0.8733
1B-NIU	J	1.38	92.68	0.779	-0.8397	87.752	0.8039
1B-NIU	K	0.23	42.487	0.1744	-0.0892	42.35	0.1729
1B-NIU	L	1.55	64.527	0.8355	-0.5967	59.383	0.8251
2T-ID	A	1.59	87.124	0.9585	-0.8021	79.099	0.9649
2T-ID	B	1.12	85.76	0.9513	-0.6552	81.606	0.9559
2T-ID	C	1.6	89.712	0.978	-0.8181	81.055	0.9868
2T-ID	D	2.03	91.073	0.9807	-0.9332	79.073	0.9763
2T-ID	E	1.34	84.702	0.8792	-0.7298	79.319	0.8942
2T-ID	F	1.43	87.765	0.9462	-0.7562	80.531	0.9616
2T-ID	G	1.58	92.119	0.9766	-0.8403	83.573	0.9798
2T-ID	H	1.31	89.656	0.9189	-0.7334	83.282	0.9464
2T-ID	I	1.3	88.413	0.9071	-0.7264	82.432	0.9196
2T-ID	J	1.23	87.273	0.9213	-0.6883	81.45	0.945
2T-ID	K	0.83	47.953	0.8747	-0.2973	46.496	0.8575
2T-ID	L	2.42	87.577	0.9719	-0.9066	71.05	0.9799
2T-IU	A	1.37	84.413	0.9868	-0.7219	78.482	0.9914
2T-IU	B	1.17	89.502	0.974	-0.6971	84.674	0.9728
2T-IU	C	1.26	83.842	0.9559	-0.6851	78.788	0.9579
2T-IU	D	1.34	83.91	0.9513	-0.7069	78.054	0.9597
2T-IU	E	1.21	86.457	0.9254	-0.6936	81.654	0.9241
2T-IU	F	1.32	87.43	0.9901	-0.7381	81.667	0.9899
2T-IU	G	1.5	92.807	0.9544	-0.8408	85.336	0.9615
2T-IU	H	1.58	96.296	0.9361	-0.8819	87.451	0.9555
2T-IU	I	1.12	85.303	0.8521	-0.6494	81.086	0.8895

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
2T-IU	J	1.22	86.991	0.9611	-0.6983	81.94	0.9698
2T-IU	K	0.83	49.039	0.956	-0.3084	47.668	0.9514
2T-IU	L	2.48	96.015	0.9181	-1.0388	78.635	0.9227
2T-NID	A	1.2	85.015	0.8616	-0.674	80.316	0.8787
2T-NID	B	1.43	92.396	0.9494	-0.8048	85.236	0.9599
2T-NID	C	1.23	82.419	0.906	-0.6778	78.007	0.9116
2T-NID	D	1.51	85.309	0.9629	-0.7685	78.29	0.9598
2T-NID	E	1.17	84.365	0.9499	-0.6612	79.916	0.9539
2T-NID	F	1.54	91.086	0.946	-0.8058	82.508	0.9648
2T-NID	G	1.53	92.583	0.9175	-0.8331	84.647	0.9333
2T-NID	H	1.57	95.203	0.9284	-0.8641	86.541	0.9398
2T-NID	I	1.43	96	0.8963	-0.829	88.285	0.9136
2T-NID	J	1.18	91.25	0.936	-0.7044	85.652	0.9536
2T-NID	K	0.46	43.795	0.6554	-0.1734	43.465	0.6374
2T-NID	L	1.92	77.78	0.9127	-0.7626	67.857	0.8994
2T-NIU	A	1.17	88.537	0.9429	-0.675	83.329	0.9603
2T-NIU	B	1.11	83.879	0.8999	-0.6444	80.354	0.8938
2T-NIU	C	1.04	81.637	0.8674	-0.5907	78.074	0.8688
2T-NIU	D	1.53	84.982	0.8693	-0.7398	76.993	0.9055
2T-NIU	E	1.3	91.81	0.9099	-0.753	85.464	0.9308
2T-NIU	F	1.3	87.981	0.876	-0.7298	82.388	0.8873
2T-NIU	G	1.1	88.578	0.9078	-0.6581	84.021	0.9355
2T-NIU	H	1.32	92.583	0.9468	-0.7706	86.238	0.9659
2T-NIU	I	1.04	88.849	0.8774	-0.6459	85.07	0.8968
2T-NIU	J	1.12	86.242	0.9489	-0.6668	82.112	0.9451
2T-NIU	K	0.48	44.81	0.4659	-0.1845	44.553	0.4534
2T-NIU	L	1.96	78.769	0.8681	-0.8238	69.991	0.8589
3T-ID	A	0.57	87.785	0.8494	-0.4116	86.403	0.8579
3T-ID	B	0.42	83.325	0.8228	-0.3059	82.637	0.8275
3T-ID	C	0.68	89.474	0.7971	-0.4784	87.55	0.8125
3T-ID	D	0.87	95.112	0.9267	-0.6166	92.253	0.933
3T-ID	E	0.67	91.26	0.8276	-0.4926	89.74	0.8391
3T-ID	F	0.59	89.247	0.8327	-0.432	87.976	0.8393
3T-ID	G	0.73	92.784	0.915	-0.5403	90.961	0.916
3T-ID	H	0.53	87.18	0.9642	-0.3893	86.137	0.9686

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
3T-ID	I	0.37	82.6	0.3863	-0.2708	82.25	0.4024
3T-ID	J	0.24	80.7	0.2539	-0.1775	80.403	0.2393
3T-ID	K	0.77	72.002	0.7683	-0.443	70.559	0.7787
3T-ID	L	0.88	81.777	0.8097	-0.5434	79.621	0.8243
3T-IU	A	0.54	86.578	0.7746	-0.3954	85.755	0.7864
3T-IU	B	0.66	93.556	0.9631	-0.4981	91.884	0.9606
3T-IU	C	0.61	87.077	0.8526	-0.4282	85.555	0.8668
3T-IU	D	0.54	86.247	0.8524	-0.3893	85.254	0.859
3T-IU	E	0.81	91.474	0.9403	-0.4382	88.141	0.9229
3T-IU	F	0.47	86.478	0.8128	-0.3517	85.762	0.8203
3T-IU	G	0.68	92.2	0.9371	-0.5029	90.493	0.9369
3T-IU	H	0.62	89.274	0.9942	-0.4503	87.808	0.9925
3T-IU	I	0.66	90.282	0.9193	-0.4793	88.606	0.9246
3T-IU	J	0.42	83.944	0.6422	-0.3059	83.391	0.6553
3T-IU	K	0.81	74.939	0.8729	-0.4694	73.111	0.8524
3T-IU	L	1.02	87.624	0.9746	-0.6364	84.018	0.967
3T-NID	A	0.69	87.962	0.9046	-0.4882	86.415	0.9045
3T-NID	B	0.74	87.23	0.9538	-0.5058	85.251	0.9579
3T-NID	C	0.87	90.908	0.9832	-0.5911	88.13	0.9835
3T-NID	D	0.94	93.682	0.9448	-0.6444	90.4	0.9439
3T-NID	E	0.63	87.357	0.9404	-0.4444	85.925	0.9391
3T-NID	F	0.72	89.249	0.9741	-0.5087	87.404	0.9707
3T-NID	G	0.67	88.821	0.8772	-0.4684	86.904	0.8973
3T-NID	H	0.7	88.27	0.8816	-0.4904	86.485	0.8832
3T-NID	I	0.49	84.25	0.8202	-0.3538	83.516	0.8223
3T-NID	J	0.45	83.827	0.8721	-0.3254	83.062	0.8781
3T-NID	K	0.63	64.039	0.8503	-0.3247	62.846	0.8523
3T-NID	L	0.99	80.575	0.8919	-0.5589	77.014	0.9109
3T-NIU	A	0.72	88.623	0.8948	-0.514	87.042	0.8854
3T-NIU	B	0.77	91.167	0.9006	-0.5376	88.874	0.9153
3T-NIU	C	0.73	84.915	0.9205	-0.4864	83.057	0.9225
3T-NIU	D	0.86	89.77	0.9684	-0.5787	87.156	0.965
3T-NIU	E	0.81	91.474	0.9403	-0.5602	88.866	0.9498
3T-NIU	F	0.72	88.773	0.949	-0.5033	86.874	0.9499
3T-NIU	G	0.81	93.002	0.9702	-0.5708	90.412	0.9738

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
3T-NIU	H	0.62	85.346	0.8949	-0.4288	83.896	0.9025
3T-NIU	I	0.72	89.601	0.8168	-0.5089	87.703	0.8324
3T-NIU	J	0.45	83.77	0.8545	-0.3251	83.043	0.8612
3T-NIU	K	0.92	69.333	0.9095	-0.4733	67.188	0.8982
3T-NIU	L	0.78	76.18	0.8353	-0.4567	74.28	0.8509
4B-ID	A	1.18	97.141	0.9649	-0.772	91.825	0.9733
4B-ID	B	1.7	98.656	0.8669	-0.9311	88.242	0.8869
4B-ID	C	2.04	104.73	0.9249	-1.0674	90.418	0.941
4B-ID	D	2.48	106.08	0.9592	-1.1409	86.73	0.9575
4B-ID	E	1.52	101.3	0.9132	-0.9235	92.89	0.94
4B-ID	F	1.65	102	0.8735	-0.9379	91.266	0.9108
4B-ID	G	1.39	101.88	0.872	-0.8768	94.262	0.9057
4B-ID	H	1.01	92.14	0.9423	-0.6654	88.623	0.9515
4B-ID	I	1.38	98.275	0.887	-0.8524	91.313	0.9165
4B-ID	J	0.77	86.99	0.8419	-0.5051	84.5	0.8531
4B-ID	K	0.89	67.666	0.9189	-0.4484	65.523	0.9091
4B-ID	L	1.48	87.809	0.9558	-0.7783	80.454	0.9617
4B-IU	A	1.12	93.689	0.9756	-0.7206	89.204	0.9741
4B-IU	B	1.41	104.14	0.9531	-0.9319	97.165	0.9515
4B-IU	C	1.66	103.01	0.9551	-0.9857	93.359	0.9642
4B-IU	D	1.74	107.94	0.9595	-1.0375	96.307	0.9806
4B-IU	E	1.98	105.24	0.9467	-1.0927	92.774	0.9512
4B-IU	F	2.48	115.3	0.9154	-1.2575	94.936	0.9416
4B-IU	G	1.68	109.2	0.9674	-1.0422	98.593	0.9772
4B-IU	H	1.66	103.36	0.9712	-0.9792	93.544	0.9732
4B-IU	I	1.54	99.53	0.8855	-0.9035	90.875	0.9201
4B-IU	J	1.54	99.171	0.9335	-0.9121	90.943	0.9414
4B-IU	K	0.95	74.329	0.9071	-0.5178	71.821	0.9023
4B-IU	L	1.47	89.763	0.9196	-0.8014	82.617	0.9347
4B-NID	A	3.46	133.52	0.9322	-1.4368	93.582	0.9645
4B-NID	B	2.58	109.64	0.9176	-1.2253	89.802	0.9298
4B-NID	C	1.83	105.04	0.9611	-1.0294	92.728	0.981
4B-NID	D	3.09	127.11	0.985	-1.3806	94.529	0.9878
4B-NID	E	1.46	89.985	0.7977	-0.8064	83.194	0.8245
4B-NID	F	1.63	97.687	0.9149	-0.918	88.655	0.927

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
4B-NID	G	1.85	106.9	0.8765	-1.0507	94.347	0.9081
4B-NID	H	1.61	98.78	0.8927	-0.9158	89.405	0.9292
4B-NID	I	1.35	86.315	0.7332	-0.7186	79.881	0.7751
4B-NID	J	1.37	99.192	0.9257	-0.8366	91.447	0.9568
4B-NID	K	0.81	65.347	0.9576	-0.4011	63.463	0.961
4B-NID	L	1.31	77.271	0.9198	-0.6477	72.179	0.9337
4B-NIU	A	3.27	120.66	0.952	-1.3338	88.347	0.9781
4B-NIU	B	1.78	107.62	0.9538	-1.0475	95.827	0.9759
4B-NIU	C	1.63	95.79	0.9634	-0.9135	87.339	0.9619
4B-NIU	D	1.96	105.42	0.9505	-1.0712	92.135	0.9633
4B-NIU	E	2.12	108.56	0.9638	-1.131	93.139	0.9704
4B-NIU	F	1.68	93.669	0.936	-0.901	84.733	0.9496
4B-NIU	G	1.92	102.65	0.8861	-1.0414	90.41	0.9129
4B-NIU	H	1.5	93.654	0.9307	-0.8365	85.698	0.9417
4B-NIU	I	1.63	96.883	0.847	-0.8921	87.366	0.8846
4B-NIU	J	1.54	98.96	0.9396	-0.8964	90.104	0.9641
4B-NIU	K	0.59	60.79	0.7087	-0.2995	60.075	0.7209
4B-NIU	L	1.42	87.842	0.95	-0.7819	81.601	0.9511
5B-ID	A	1.78	111.88	0.9759	-1.0919	99.701	0.9709
5B-ID	B	2.72	130.57	0.9878	-1.4134	102.91	0.9873
5B-ID	C	3.14	137.58	0.9622	-1.475	101.2	0.9881
5B-ID	D	3.12	124	0.9486	-1.4082	94.66	0.9401
5B-ID	E	2.28	123.38	0.9434	-1.3073	103.79	0.9606
5B-ID	F	2.71	128.07	0.9684	-1.3769	100.69	0.9771
5B-ID	G	2.25	125.49	0.9745	-1.2874	104.44	0.9882
5B-ID	H	1.56	101.74	0.9831	-0.9384	92.947	0.9786
5B-ID	I	3.14	139.58	0.983	-1.4868	102.15	0.9849
5B-ID	J	1.7	110.88	0.9909	-1.0532	99.45	0.9864
5B-ID	K	0.84	72.954	0.9487	-0.458	70.812	0.9463
5B-ID	L	1.98	97.127	0.982	-0.9627	83.823	0.9841
5B-IU	A	2.4	132.13	0.9832	-1.4516	110.63	0.9824
5B-IU	B	2.49	131.51	0.9798	-1.4227	107.6	0.9826
5B-IU	C	2.65	130.18	0.9925	-1.43	104.71	0.9843
5B-IU	D	2.6	130.44	0.973	-1.4076	104.66	0.9807
5B-IU	E	3.19	141.85	0.9855	-1.5719	105.46	0.9838

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
5B-IU	F	3.62	149.62	0.9879	-1.666	105.26	0.9786
5B-IU	G	2.44	117.78	0.9816	-1.2895	97.8	0.9828
5B-IU	H	2.62	122.81	0.9674	-1.329	98.399	0.9816
5B-IU	I	2.52	121.05	0.9773	-1.2889	97.961	0.982
5B-IU	J	2.51	119.49	0.9879	-1.2899	97.451	0.9772
5B-IU	K	0.96	79.71	0.9382	-0.5575	77.017	0.9338
5B-IU	L	1.71	93.06	0.9708	-0.8971	83.584	0.9703
5B-NID	A	4.52	156.46	0.9853	-1.6272	95.351	0.9502
5B-NID	B	4.68	178.01	0.9942	-1.6961	100.01	0.9824
5B-NID	C	2.88	135.52	0.9603	-1.4654	104.12	0.9662
5B-NID	D	3.07	112.86	0.9588	-1.2258	84.662	0.9636
5B-NID	E	2.86	124.59	0.9763	-1.3914	97.676	0.9587
5B-NID	F	2.54	115.92	0.9657	-1.2515	94.107	0.9592
5B-NID	G	2.81	123.67	0.9518	-1.3263	95.768	0.9646
5B-NID	H	2.62	118.06	0.9914	-1.2685	94.235	0.9831
5B-NID	I	2.48	111.72	0.8893	-1.1996	91.455	0.9067
5B-NID	J	2.05	115.43	0.9714	-1.1561	98.528	0.9817
5B-NID	K	0.56	69.735	0.8874	-0.3196	68.654	0.8909
5B-NID	L	1.8	94.105	0.9732	-0.9141	83.349	0.9584
5B-NIU	A	4.84	175.49	0.9825	-1.79	102.01	0.9631
5B-NIU	B	2.68	136.95	0.9887	-1.5058	109.52	0.9789
5B-NIU	C	2.46	120.91	0.9682	-1.2985	99.311	0.9717
5B-NIU	D	2.58	122.46	0.9759	-1.3531	99.936	0.9524
5B-NIU	E	3.17	137.34	0.9839	-1.4937	101.29	0.9863
5B-NIU	F	3.12	139.37	0.989	-1.5307	104.04	0.9867
5B-NIU	G	3.45	150.89	0.9766	-1.6503	107.27	0.9795
5B-NIU	H	2.76	127.63	0.9763	-1.3692	99.483	0.9864
5B-NIU	I	2.9	127.14	0.9697	-1.3826	98.047	0.9623
5B-NIU	J	2.53	120.54	0.9539	-1.2717	97.081	0.9768
5B-NIU	K	0.49	64.198	0.7951	-0.2662	63.436	0.7909
5B-NIU	L	1.68	85.796	0.9494	-0.8385	78.046	0.9475
5T-ID	A	1.23	104.03	0.9921	-0.8455	98.116	0.9896
5T-ID	B	1.32	104.99	0.9455	-0.8642	97.338	0.9612
5T-ID	C	1.32	105.33	0.9624	-0.8728	97.902	0.9772
5T-ID	D	1.66	117.33	0.9849	-1.1034	105.63	0.9873

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
5T-ID	E	1.12	100.62	0.976	-0.7627	95.433	0.9831
5T-ID	F	1.25	104.92	0.9781	-0.8392	97.997	0.9858
5T-ID	G	1.28	105.64	0.9729	-0.8602	98.571	0.9827
5T-ID	H	1.07	99.807	0.8924	-0.7491	95.582	0.8907
5T-ID	I	1.12	98.622	0.9321	-0.7494	93.481	0.9358
5T-ID	J	1.08	99.937	0.9753	-0.7483	95.218	0.9701
5T-ID	K	0.5	64.161	0.8099	-0.2683	63.463	0.8183
5T-ID	L	1.6	95.313	0.9652	-0.8637	85.749	0.9647
5T-IU	A	1.26	105.82	0.9325	-0.8703	99.293	0.9521
5T-IU	B	1.22	106.48	0.9929	-0.8645	100.5	0.9925
5T-IU	C	1.26	104.2	0.9735	-0.852	97.736	0.9803
5T-IU	D	1.28	107.91	0.9938	-0.903	101.37	0.9919
5T-IU	E	1.23	105.39	0.9666	-0.8622	99.622	0.9655
5T-IU	F	1.32	107.25	0.9508	-0.9101	100.57	0.9553
5T-IU	G	1.37	109.73	0.9581	-0.9674	102.87	0.9558
5T-IU	H	1.33	110.29	0.9615	-0.9545	103.72	0.9607
5T-IU	I	1.27	108.12	0.9823	-0.9045	101.96	0.9759
5T-IU	J	1.26	107.35	0.932	-0.896	101.43	0.9344
5T-IU	K	0.83	75.402	0.9047	-0.481	73.472	0.9046
5T-IU	L	1.6	100.72	0.9848	-0.9491	91.825	0.9792
5T-NID	A	1.24	109.02	0.9633	-0.8942	102.86	0.9595
5T-NID	B	1.43	113.31	0.9629	-1.0036	105.08	0.9539
5T-NID	C	1.31	106.17	0.9763	-0.896	99.357	0.9652
5T-NID	D	1.43	107.93	0.9836	-0.949	99.647	0.9815
5T-NID	E	1.21	103.26	0.9703	-0.8237	97.273	0.9748
5T-NID	F	1.23	104.92	0.9835	-0.8392	98.295	0.9899
5T-NID	G	1.44	113.99	0.9609	-1.0155	105.59	0.9454
5T-NID	H	1.18	100.86	0.9566	-0.8031	95.778	0.9516
5T-NID	I	1.13	98.432	0.9504	-0.7583	93.537	0.9419
5T-NID	J	1.15	101.76	0.9543	-0.795	96.758	0.9479
5T-NID	K	0.34	72.324	0.4447	-0.2233	72.08	0.4486
5T-NID	L	1.58	97.182	0.97182	-0.9028	88.704	0.9353
5T-NIU	A	1.22	104.74	0.9525	-0.865	99.498	0.9369
5T-NIU	B	1.26	109.05	0.9781	-0.9012	102.55	0.97776
5T-NIU	C	1.27	105.03	0.9597	-0.8766	98.84	0.9514

Test ID	Section	PNG (PSU I)	PSU SN (0 Speed)	PSU R^2	Linear Slope	Linear SN (0 Speed)	Linear R^2
5T-NIU	D	1.29	106.19	0.9529	-0.8825	99.367	0.9587
5T-NIU	E	1.24	105.91	0.9844	-0.8664	99.804	0.9794
5T-NIU	F	1.32	108.97	0.9482	-0.9166	101.61	0.9563
5T-NIU	G	1.31	107.74	0.9454	-0.8953	100.52	0.9607
5T-NIU	H	1.33	109.68	0.9667	-0.9321	102.63	0.9708
5T-NIU	I	1.19	107.86	0.9701	-0.865	102.36	0.9659
5T-NIU	J	1.06	103.09	0.9723	-0.7784	98.984	0.968
5T-NIU	K	0.66	67.756	0.839	-0.3617	66.749	0.829
5T-NIU	L	1.55	92.016	0.9168	-0.8628	84.661	0.9087

Appendix D: International Friction Index Parameters

Section	Sp	Test ID	F60	Test ID	F60
A	128.4	1B-ID-20-1	0.5777	2T-ID-20-1	0.3956
B	112.87	1B-ID-20-1	0.5949	2T-ID-20-1	0.3999
C	112.9	1B-ID-20-1	0.5048	2T-ID-20-1	0.3903
D	112.6	1B-ID-20-1	0.5103	2T-ID-20-1	0.3717
E	113.94	1B-ID-20-1	0.5544	2T-ID-20-1	0.3895
F	109.96	1B-ID-20-1	0.5077	2T-ID-20-1	0.3787
G	118.99	1B-ID-20-1	0.5737	2T-ID-20-1	0.4175
H	113.64	1B-ID-20-1	0.5628	2T-ID-20-1	0.4088
I	100.16	1B-ID-20-1	0.4936	2T-ID-20-1	0.378
J	114.55	1B-ID-20-1	0.5363	2T-ID-20-1	0.3982
K	305.43	1B-ID-20-1	0.4334	2T-ID-20-1	0.5074
L	186.15	1B-ID-20-1	0.397	2T-ID-20-1	0.4453
A	128.4	1B-ID-20-2	0.5527	2T-ID-20-2	0.4201
B	112.87	1B-ID-20-2	0.5889	2T-ID-20-2	0.4113
C	112.9	1B-ID-20-2	0.5202	2T-ID-20-2	0.3961
D	112.6	1B-ID-20-2	0.4504	2T-ID-20-2	0.3775
E	113.94	1B-ID-20-2	0.5595	2T-ID-20-2	0.396
F	109.96	1B-ID-20-2	0.5133	2T-ID-20-2	0.3889
G	118.99	1B-ID-20-2	0.5736	2T-ID-20-2	0.407
H	113.64	1B-ID-20-2	0.5765	2T-ID-20-2	0.3979
I	100.16	1B-ID-20-2	0.5356	2T-ID-20-2	0.3731
J	114.55	1B-ID-20-2	0.5637	2T-ID-20-2	0.4082
K	305.43	1B-ID-20-2	0.4196	2T-ID-20-2	0.5376
L	186.15	1B-ID-20-2	0.3876	2T-ID-20-2	0.4344
A	128.4	1B-ID-20-3	0.4992	2T-ID-20-3	0.4116
B	112.87	1B-ID-20-3	0.6133	2T-ID-20-3	0.4155
C	112.9	1B-ID-20-3	0.4898	2T-ID-20-3	0.3856
D	112.6	1B-ID-20-3	0.4421	2T-ID-20-3	0.3738
E	113.94	1B-ID-20-3	0.5356	2T-ID-20-3	0.4051
F	109.96	1B-ID-20-3	0.5217	2T-ID-20-3	0.3984
G	118.99	1B-ID-20-3	0.5247	2T-ID-20-3	0.415
H	113.64	1B-ID-20-3	0.5642	2T-ID-20-3	0.416
I	100.16	1B-ID-20-3	0.5244	2T-ID-20-3	0.4029
J	114.55	1B-ID-20-3	0.5746	2T-ID-20-3	0.4146
K	305.43	1B-ID-20-3	0.4118	2T-ID-20-3	0.5101
L	186.15	1B-ID-20-3	0.3715	2T-ID-20-3	0.4359
A	128.4	1B-ID-40-1	0.526	2T-ID-40-1	0.4121
B	112.87	1B-ID-40-1	0.5363	2T-ID-40-1	0.4511
C	112.9	1B-ID-40-1	0.4089	2T-ID-40-1	0.4066
D	112.6	1B-ID-40-1	0.2526	2T-ID-40-1	0.3405
E	113.94	1B-ID-40-1	0.4791	2T-ID-40-1	0.4067

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	1B-ID-40-1	0.4173	2T-ID-40-1	0.4115
G	118.99	1B-ID-40-1	0.5466	2T-ID-40-1	0.4141
H	113.64	1B-ID-40-1	0.5946	2T-ID-40-1	0.4479
I	100.16	1B-ID-40-1	0.515	2T-ID-40-1	0.4032
J	114.55	1B-ID-40-1	0.5579	2T-ID-40-1	0.4278
K	305.43	1B-ID-40-1	0.4604	2T-ID-40-1	0.5107
L	186.15	1B-ID-40-1	0.3639	2T-ID-40-1	0.3837
A	128.4	1B-ID-40-2	0.4545	2T-ID-40-2	0.4013
B	112.87	1B-ID-40-2	0.4611	2T-ID-40-2	0.4242
C	112.9	1B-ID-40-2	0.3623	2T-ID-40-2	0.378
D	112.6	1B-ID-40-2	0.2462	2T-ID-40-2	0.3285
E	113.94	1B-ID-40-2	0.4616	2T-ID-40-2	0.3966
F	109.96	1B-ID-40-2	0.3718	2T-ID-40-2	0.4147
G	118.99	1B-ID-40-2	0.4557	2T-ID-40-2	0.4107
H	113.64	1B-ID-40-2	0.5451	2T-ID-40-2	0.4319
I	100.16	1B-ID-40-2	0.5704	2T-ID-40-2	0.4049
J	114.55	1B-ID-40-2	0.4992	2T-ID-40-2	0.4446
K	305.43	1B-ID-40-2	0.3944	2T-ID-40-2	0.5149
L	186.15	1B-ID-40-2	0.3012	2T-ID-40-2	0.3683
A	128.4	1B-ID-40-3	0.464	2T-ID-40-3	0.3797
B	112.87	1B-ID-40-3	0.4659	2T-ID-40-3	0.4208
C	112.9	1B-ID-40-3	0.3291	2T-ID-40-3	0.3882
D	112.6	1B-ID-40-3	0.2275	2T-ID-40-3	0.3415
E	113.94	1B-ID-40-3	0.4304	2T-ID-40-3	0.3589
F	109.96	1B-ID-40-3	0.3674	2T-ID-40-3	0.3868
G	118.99	1B-ID-40-3	0.4395	2T-ID-40-3	0.3819
H	113.64	1B-ID-40-3	0.5159	2T-ID-40-3	0.4412
I	100.16	1B-ID-40-3	0.4661	2T-ID-40-3	0.4211
J	114.55	1B-ID-40-3	0.5807	2T-ID-40-3	0.4446
K	305.43	1B-ID-40-3	0.3765	2T-ID-40-3	0.5038
L	186.15	1B-ID-40-3	0.3515	2T-ID-40-3	0.3545
A	128.4	1B-ID-60-1	0.5443	2T-ID-60-1	0.3854
B	112.87	1B-ID-60-1	0.4799	2T-ID-60-1	0.4578
C	112.9	1B-ID-60-1	0.4204	2T-ID-60-1	0.3782
D	112.6	1B-ID-60-1	0.3011	2T-ID-60-1	0.3444
E	113.94	1B-ID-60-1	0.4647	2T-ID-60-1	0.3976
F	109.96	1B-ID-60-1	0.4974	2T-ID-60-1	0.4086
G	118.99	1B-ID-60-1	0.5733	2T-ID-60-1	0.3969
H	113.64	1B-ID-60-1	0.5736	2T-ID-60-1	0.4301
I	100.16	1B-ID-60-1	0.5885	2T-ID-60-1	0.4509
J	114.55	1B-ID-60-1	0.6054	2T-ID-60-1	0.4387
K	305.43	1B-ID-60-1	0.423	2T-ID-60-1	0.5012

Section	Sp	Test ID	F60	Test ID	F60
L	186.15			2T-ID-60-1	0.3526
A	128.4	1B-ID-60-2	0.4881	2T-ID-60-2	0.3876
B	112.87	1B-ID-60-2	0.4335	2T-ID-60-2	0.4324
C	112.9	1B-ID-60-2	0.2976	2T-ID-60-2	0.3682
D	112.6	1B-ID-60-2	0.2725	2T-ID-60-2	0.3254
E	113.94	1B-ID-60-2	0.4724	2T-ID-60-2	0.4366
F	109.96	1B-ID-60-2	0.348	2T-ID-60-2	0.3803
G	118.99			2T-ID-60-2	0.3921
H	113.64	1B-ID-60-2	0.5211	2T-ID-60-2	0.4151
I	100.16	1B-ID-60-2	0.5457	2T-ID-60-2	0.4074
J	114.55	1B-ID-60-2	0.552	2T-ID-60-2	0.4063
K	305.43	1B-ID-60-2	0.397	2T-ID-60-2	0.4968
L	186.15			2T-ID-60-2	0.3328
A	128.4	1B-ID-60-3	0.5276	2T-ID-60-3	0.3625
B	112.87	1B-ID-60-3	0.547	2T-ID-60-3	0.438
C	112.9	1B-ID-60-3	0.4219	2T-ID-60-3	0.3746
D	112.6	1B-ID-60-3	0.2475	2T-ID-60-3	0.3125
E	113.94	1B-ID-60-3	0.4398	2T-ID-60-3	0.3947
F	109.96	1B-ID-60-3	0.3787	2T-ID-60-3	0.3778
G	118.99			2T-ID-60-3	0.3851
H	113.64	1B-ID-60-3	0.5213	2T-ID-60-3	0.3932
I	100.16	1B-ID-60-3	0.4865	2T-ID-60-3	0.3877
J	114.55	1B-ID-60-3	0.5759	2T-ID-60-3	0.4105
K	305.43	1B-ID-60-3	0.4192	2T-ID-60-3	0.4945
L	186.15	1B-ID-60-3	0.2282	2T-ID-60-3	0.3282
A	128.4	1B-IU-20-1	0.5882	2T-IU-20-1	0.4154
B	112.87	1B-IU-20-1	0.6286	2T-IU-20-1	0.4098
C	112.9	1B-IU-20-1	0.559	2T-IU-20-1	0.3851
D	112.6	1B-IU-20-1	0.5235	2T-IU-20-1	0.3874
E	113.94	1B-IU-20-1	0.5552	2T-IU-20-1	0.3944
F	109.96	1B-IU-20-1	0.5564	2T-IU-20-1	0.39
G	118.99	1B-IU-20-1	0.6188	2T-IU-20-1	0.4218
H	113.64	1B-IU-20-1	0.5973	2T-IU-20-1	0.4103
I	100.16	1B-IU-20-1	0.6027	2T-IU-20-1	0.3878
J	114.55	1B-IU-20-1	0.5918	2T-IU-20-1	0.4057
K	305.43	1B-IU-20-1	0.4943	2T-IU-20-1	0.5318
L	186.15	1B-IU-20-1	0.5062	2T-IU-20-1	0.4862
A	128.4	1B-IU-20-2	0.5798	2T-IU-20-2	0.4134
B	112.87	1B-IU-20-2	0.621	2T-IU-20-2	0.4193
C	112.9	1B-IU-20-2	0.5311	2T-IU-20-2	0.3936
D	112.6	1B-IU-20-2	0.5215	2T-IU-20-2	0.3904
E	113.94	1B-IU-20-2	0.5501	2T-IU-20-2	0.4045

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	1B-IU-20-2	0.5455	2T-IU-20-2	0.3979
G	118.99	1B-IU-20-2	0.6145	2T-IU-20-2	0.4162
H	113.64	1B-IU-20-2	0.5751	2T-IU-20-2	0.4188
I	100.16	1B-IU-20-2	0.606	2T-IU-20-2	0.3792
J	114.55	1B-IU-20-2	0.5609	2T-IU-20-2	0.4133
K	305.43	1B-IU-20-2	0.4569	2T-IU-20-2	0.5249
L	186.15	1B-IU-20-2	0.4584	2T-IU-20-2	0.4578
A	128.4	1B-IU-20-3	0.5663	2T-IU-20-3	0.4163
B	112.87	1B-IU-20-3	0.5968	2T-IU-20-3	0.4315
C	112.9	1B-IU-20-3	0.5252	2T-IU-20-3	0.4038
D	112.6	1B-IU-20-3	0.5309	2T-IU-20-3	0.3896
E	113.94	1B-IU-20-3	0.5695	2T-IU-20-3	0.4288
F	109.96	1B-IU-20-3	0.522	2T-IU-20-3	0.4031
G	118.99	1B-IU-20-3	0.5988	2T-IU-20-3	0.4242
H	113.64	1B-IU-20-3	0.5584	2T-IU-20-3	0.4169
I	100.16	1B-IU-20-3	0.5762	2T-IU-20-3	0.3843
J	114.55	1B-IU-20-3	0.5344	2T-IU-20-3	0.4123
K	305.43	1B-IU-20-3	0.4331	2T-IU-20-3	0.5212
L	186.15	1B-IU-20-3	0.4284	2T-IU-20-3	0.4539
A	128.4	1B-IU-40-1	0.5446	2T-IU-40-1	0.4174
B	112.87	1B-IU-40-1	0.587	2T-IU-40-1	0.4533
C	112.9	1B-IU-40-1	0.4885	2T-IU-40-1	0.4199
D	112.6	1B-IU-40-1	0.4981	2T-IU-40-1	0.4095
E	113.94	1B-IU-40-1	0.4589	2T-IU-40-1	0.4286
F	109.96	1B-IU-40-1	0.3999	2T-IU-40-1	0.4154
G	118.99	1B-IU-40-1	0.5565	2T-IU-40-1	0.4416
H	113.64	1B-IU-40-1	0.4968	2T-IU-40-1	0.4487
I	100.16	1B-IU-40-1	0.521	2T-IU-40-1	0.4345
J	114.55	1B-IU-40-1	0.4801	2T-IU-40-1	0.4449
K	305.43	1B-IU-40-1	0.398	2T-IU-40-1	0.5152
L	186.15	1B-IU-40-1	0.3703	2T-IU-40-1	0.4474
A	128.4	1B-IU-40-2	0.4804	2T-IU-40-2	0.4031
B	112.87	1B-IU-40-2	0.5272	2T-IU-40-2	0.4313
C	112.9	1B-IU-40-2	0.4671	2T-IU-40-2	0.4079
D	112.6	1B-IU-40-2	0.4489	2T-IU-40-2	0.3826
E	113.94	1B-IU-40-2	0.4529	2T-IU-40-2	0.4265
F	109.96	1B-IU-40-2	0.3536	2T-IU-40-2	0.4092
G	118.99	1B-IU-40-2	0.4657	2T-IU-40-2	0.4155
H	113.64	1B-IU-40-2	0.4376	2T-IU-40-2	0.3929
I	100.16	1B-IU-40-2	0.5036	2T-IU-40-2	0.4019
J	114.55	1B-IU-40-2	0.4294	2T-IU-40-2	0.4247
K	305.43	1B-IU-40-2	0.3881	2T-IU-40-2	0.5044

Section	Sp	Test ID	F60	Test ID	F60
L	186.15	1B-IU-40-2	0.3357	2T-IU-40-2	0.369
A	128.4	1B-IU-40-3	0.4368	2T-IU-40-3	0.4094
B	112.87	1B-IU-40-3	0.5491	2T-IU-40-3	0.4365
C	112.9	1B-IU-40-3	0.4826	2T-IU-40-3	0.3882
D	112.6	1B-IU-40-3	0.4012	2T-IU-40-3	0.382
E	113.94	1B-IU-40-3	0.3987	2T-IU-40-3	0.4064
F	109.96	1B-IU-40-3	0.3307	2T-IU-40-3	0.3999
G	118.99	1B-IU-40-3	0.4311	2T-IU-40-3	0.3858
H	113.64	1B-IU-40-3	0.47	2T-IU-40-3	0.42
I	100.16	1B-IU-40-3	0.484	2T-IU-40-3	0.4148
J	114.55	1B-IU-40-3	0.4029	2T-IU-40-3	0.4132
K	305.43	1B-IU-40-3	0.4194	2T-IU-40-3	0.5059
L	186.15	1B-IU-40-3	0.3352	2T-IU-40-3	0.365
A	128.4	1B-IU-60-1	0.5418	2T-IU-60-1	0.4078
B	112.87	1B-IU-60-1	0.5958	2T-IU-60-1	0.4599
C	112.9	1B-IU-60-1	0.4856	2T-IU-60-1	0.4066
D	112.6	1B-IU-60-1	0.4822	2T-IU-60-1	0.4061
E	113.94	1B-IU-60-1	0.4997	2T-IU-60-1	0.4469
F	109.96	1B-IU-60-1	0.3911	2T-IU-60-1	0.4126
G	118.99	1B-IU-60-1	0.3906	2T-IU-60-1	0.4058
H	113.64	1B-IU-60-1	0.4634	2T-IU-60-1	0.4161
I	100.16	1B-IU-60-1	0.4399	2T-IU-60-1	0.4483
J	114.55	1B-IU-60-1	0.5488	2T-IU-60-1	0.4415
K	305.43	1B-IU-60-1	0.4536	2T-IU-60-1	0.5107
L	186.15	1B-IU-60-1	0.4076	2T-IU-60-1	0.3651
A	128.4	1B-IU-60-2	0.5347	2T-IU-60-2	0.3915
B	112.87	1B-IU-60-2	0.5999	2T-IU-60-2	0.4446
C	112.9	1B-IU-60-2	0.4203	2T-IU-60-2	0.4293
D	112.6	1B-IU-60-2	0.4016	2T-IU-60-2	0.3762
E	113.94	1B-IU-60-2	0.4008	2T-IU-60-2	0.409
F	109.96	1B-IU-60-2	0.424	2T-IU-60-2	0.4136
G	118.99	1B-IU-60-2	0.3454	2T-IU-60-2	0.4013
H	113.64	1B-IU-60-2	0.4095	2T-IU-60-2	0.3857
I	100.16	1B-IU-60-2	0.4116	2T-IU-60-2	0.3894
J	114.55	1B-IU-60-2	0.4555	2T-IU-60-2	0.424
K	305.43	1B-IU-60-2	0.4395	2T-IU-60-2	0.504
L	186.15			2T-IU-60-2	0.3519
A	128.4	1B-IU-60-3	0.4452	2T-IU-60-3	0.4144
B	112.87	1B-IU-60-3	0.5219	2T-IU-60-3	0.4448
C	112.9	1B-IU-60-3	0.3728	2T-IU-60-3	0.3967
D	112.6	1B-IU-60-3	0.358	2T-IU-60-3	0.4162
E	113.94	1B-IU-60-3	0.3359	2T-IU-60-3	0.4413

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	1B-IU-60-3	0.3284	2T-IU-60-3	0.4069
G	118.99	1B-IU-60-3	0.3693	2T-IU-60-3	0.412
H	113.64	1B-IU-60-3	0.3845	2T-IU-60-3	0.3864
I	100.16	1B-IU-60-3	0.3367	2T-IU-60-3	0.4721
J	114.55	1B-IU-60-3	0.4668	2T-IU-60-3	0.4261
K	305.43			2T-IU-60-3	0.5093
L	186.15	1B-IU-60-3	0.4181	2T-IU-60-3	0.3551
A	81.19	1B-NID-20-1	0.409	2T-NID-20-1	0.3344
B	91.92	1B-NID-20-1	0.4825	2T-NID-20-1	0.3631
C	108.44	1B-NID-20-1	0.4955	2T-NID-20-1	0.3761
D	104	1B-NID-20-1	0.4364	2T-NID-20-1	0.3715
E	102.48	1B-NID-20-1	0.5117	2T-NID-20-1	0.3719
F	107.1	1B-NID-20-1	0.5237	2T-NID-20-1	0.3875
G	101.22	1B-NID-20-1	0.5131	2T-NID-20-1	0.3807
H	112.49	1B-NID-20-1	0.5572	2T-NID-20-1	0.4047
I	95.66	1B-NID-20-1	0.5604	2T-NID-20-1	0.3696
J	102.36	1B-NID-20-1	0.533	2T-NID-20-1	0.4048
K	334.58	1B-NID-20-1	0.4437	2T-NID-20-1	0.5695
L	187.93	1B-NID-20-1	0.406	2T-NID-20-1	0.4661
A	81.19	1B-NID-20-2	0.4352	2T-NID-20-2	0.3328
B	91.92	1B-NID-20-2	0.4848	2T-NID-20-2	0.372
C	108.44	1B-NID-20-2	0.5417	2T-NID-20-2	0.3912
D	104	1B-NID-20-2	0.4669	2T-NID-20-2	0.3548
E	102.48	1B-NID-20-2	0.5118	2T-NID-20-2	0.3773
F	107.1	1B-NID-20-2	0.5123	2T-NID-20-2	0.3809
G	101.22	1B-NID-20-2	0.5019	2T-NID-20-2	0.3836
H	112.49	1B-NID-20-2	0.4988	2T-NID-20-2	0.421
I	95.66	1B-NID-20-2	0.5197	2T-NID-20-2	0.3998
J	102.36	1B-NID-20-2	0.5446	2T-NID-20-2	0.4121
K	334.58	1B-NID-20-2	0.3879	2T-NID-20-2	0.5491
L	187.93	1B-NID-20-2	0.415	2T-NID-20-2	0.4529
A	81.19	1B-NID-20-3	0.4766	2T-NID-20-3	0.3506
B	91.92	1B-NID-20-3	0.4894	2T-NID-20-3	0.3828
C	108.44	1B-NID-20-3	0.5073	2T-NID-20-3	0.3914
D	104	1B-NID-20-3	0.4618	2T-NID-20-3	0.3812
E	102.48	1B-NID-20-3	0.4991	2T-NID-20-3	0.3923
F	107.1	1B-NID-20-3	0.5295	2T-NID-20-3	0.3936
G	101.22	1B-NID-20-3	0.5264	2T-NID-20-3	0.3948
H	112.49	1B-NID-20-3	0.5831	2T-NID-20-3	0.4162
I	95.66	1B-NID-20-3	0.5209	2T-NID-20-3	0.4034
J	102.36	1B-NID-20-3	0.5835	2T-NID-20-3	0.397
K	334.58	1B-NID-20-3	0.424	2T-NID-20-3	0.5326

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	1B-NID-20-3	0.369	2T-NID-20-3	0.4126
A	81.19	1B-NID-40-1	0.357	2T-NID-40-1	0.3723
B	91.92	1B-NID-40-1	0.3175	2T-NID-40-1	0.4148
C	108.44	1B-NID-40-1	0.3763	2T-NID-40-1	0.3979
D	104	1B-NID-40-1	0.2443	2T-NID-40-1	0.3783
E	102.48	1B-NID-40-1	0.453	2T-NID-40-1	0.4293
F	107.1	1B-NID-40-1	0.5041	2T-NID-40-1	0.4215
G	101.22	1B-NID-40-1	0.4535	2T-NID-40-1	0.4278
H	112.49	1B-NID-40-1	0.3811	2T-NID-40-1	0.4411
I	95.66	1B-NID-40-1	0.4694	2T-NID-40-1	0.4511
J	102.36	1B-NID-40-1	0.5254	2T-NID-40-1	0.455
K	334.58	1B-NID-40-1	0.4334	2T-NID-40-1	0.5523
L	187.93	1B-NID-40-1	0.3361	2T-NID-40-1	0.4005
A	81.19	1B-NID-40-2	0.2974	2T-NID-40-2	0.4115
B	91.92	1B-NID-40-2	0.2953	2T-NID-40-2	0.4073
C	108.44	1B-NID-40-2	0.3754	2T-NID-40-2	0.3643
D	104	1B-NID-40-2	0.2236	2T-NID-40-2	0.3653
E	102.48	1B-NID-40-2	0.5029	2T-NID-40-2	0.4198
F	107.1	1B-NID-40-2	0.4678	2T-NID-40-2	0.4119
G	101.22	1B-NID-40-2	0.4479	2T-NID-40-2	0.3944
H	112.49	1B-NID-40-2	0.3728	2T-NID-40-2	0.3995
I	95.66	1B-NID-40-2	0.4389	2T-NID-40-2	0.403
J	102.36	1B-NID-40-2	0.494	2T-NID-40-2	0.4421
K	334.58	1B-NID-40-2	0.3677	2T-NID-40-2	0.545
L	187.93	1B-NID-40-2	0.3277	2T-NID-40-2	0.3857
A	81.19	1B-NID-40-3	0.3179	2T-NID-40-3	0.3711
B	91.92	1B-NID-40-3	0.3081	2T-NID-40-3	0.3779
C	108.44	1B-NID-40-3	0.3778	2T-NID-40-3	0.4016
D	104	1B-NID-40-3	0.2413	2T-NID-40-3	0.3642
E	102.48	1B-NID-40-3	0.4089	2T-NID-40-3	0.3965
F	107.1	1B-NID-40-3	0.4306	2T-NID-40-3	0.3823
G	101.22	1B-NID-40-3	0.4751	2T-NID-40-3	0.3632
H	112.49	1B-NID-40-3	0.3616	2T-NID-40-3	0.3868
I	95.66	1B-NID-40-3	0.434	2T-NID-40-3	0.4112
J	102.36	1B-NID-40-3	0.4863	2T-NID-40-3	0.4372
K	334.58	1B-NID-40-3	0.4053	2T-NID-40-3	0.5596
L	187.93	1B-NID-40-3	0.3056	2T-NID-40-3	0.3712
A	81.19	1B-NID-60-1	0.3041	2T-NID-60-1	0.4642
B	91.92	1B-NID-60-1	0.4402	2T-NID-60-1	0.4222
C	108.44	1B-NID-60-1	0.3284	2T-NID-60-1	0.4314
D	104	1B-NID-60-1	0.3298	2T-NID-60-1	0.3949
E	102.48	1B-NID-60-1	0.6051	2T-NID-60-1	0.4338

Section	Sp	Test ID	F60	Test ID	F60
F	107.1	1B-NID-60-1	0.6511	2T-NID-60-1	0.3835
G	101.22	1B-NID-60-1	0.6094	2T-NID-60-1	0.4119
H	112.49	1B-NID-60-1	0.5683	2T-NID-60-1	0.4268
I	95.66	1B-NID-60-1	0.706	2T-NID-60-1	0.4501
J	102.36	1B-NID-60-1	0.7381	2T-NID-60-1	0.4711
K	334.58	1B-NID-60-1	0.4579	2T-NID-60-1	0.5512
L	187.93	1B-NID-60-1	0.3993	2T-NID-60-1	0.3749
A	81.19	1B-NID-60-2	0.3936	2T-NID-60-2	0.4231
B	91.92	1B-NID-60-2	0.3634	2T-NID-60-2	0.4033
C	108.44	1B-NID-60-2	0.3598	2T-NID-60-2	0.3984
D	104	1B-NID-60-2	0.2325	2T-NID-60-2	0.3633
E	102.48	1B-NID-60-2	0.5616	2T-NID-60-2	0.4156
F	107.1			2T-NID-60-2	0.3845
G	101.22	1B-NID-60-2	0.5861	2T-NID-60-2	0.3954
H	112.49	1B-NID-60-2	0.4948	2T-NID-60-2	0.382
I	95.66	1B-NID-60-2	0.6362	2T-NID-60-2	0.4007
J	102.36	1B-NID-60-2	0.6485	2T-NID-60-2	0.4346
K	334.58	1B-NID-60-2	0.3974	2T-NID-60-2	0.5502
L	187.93	1B-NID-60-2	0.3973	2T-NID-60-2	0.3684
A	81.19	1B-NID-60-3	0.3419	2T-NID-60-3	0.386
B	91.92	1B-NID-60-3	0.4198	2T-NID-60-3	0.3839
C	108.44	1B-NID-60-3	0.3653	2T-NID-60-3	0.414
D	104	1B-NID-60-3	0.226	2T-NID-60-3	0.3604
E	102.48	1B-NID-60-3	0.5469	2T-NID-60-3	0.4074
F	107.1	1B-NID-60-3	0.4888	2T-NID-60-3	0.37
G	101.22	1B-NID-60-3	0.467	2T-NID-60-3	0.366
H	112.49	1B-NID-60-3	0.4117	2T-NID-60-3	0.3859
I	95.66	1B-NID-60-3	0.5707	2T-NID-60-3	0.3869
J	102.36	1B-NID-60-3	0.5547	2T-NID-60-3	0.4215
K	334.58	1B-NID-60-3	0.4468	2T-NID-60-3	0.5518
L	187.93	1B-NID-60-3	0.3348	2T-NID-60-3	0.3453
A	81.19	1B-NIU-20-1	0.4891	2T-NIU-20-1	0.3359
B	91.92	1B-NIU-20-1	0.5319	2T-NIU-20-1	0.3744
C	108.44	1B-NIU-20-1	0.5302	2T-NIU-20-1	0.3863
D	104	1B-NIU-20-1	0.5037	2T-NIU-20-1	0.3642
E	102.48	1B-NIU-20-1	0.5207	2T-NIU-20-1	0.4023
F	107.1	1B-NIU-20-1	0.4704	2T-NIU-20-1	0.3874
G	101.22	1B-NIU-20-1	0.5223	2T-NIU-20-1	0.3931
H	112.49	1B-NIU-20-1	0.5324	2T-NIU-20-1	0.4224
I	95.66	1B-NIU-20-1	0.5184	2T-NIU-20-1	0.3943
J	102.36	1B-NIU-20-1	0.5478	2T-NIU-20-1	0.3953
K	334.58	1B-NIU-20-1	0.4129	2T-NIU-20-1	0.583

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	1B-NIU-20-1	0.464	2T-NIU-20-1	0.482
A	81.19	1B-NIU-20-2	0.4249	2T-NIU-20-2	0.3563
B	91.92	1B-NIU-20-2	0.5289	2T-NIU-20-2	0.3723
C	108.44	1B-NIU-20-2	0.5303	2T-NIU-20-2	0.389
D	104	1B-NIU-20-2	0.4319	2T-NIU-20-2	0.3629
E	102.48	1B-NIU-20-2	0.5158	2T-NIU-20-2	0.4036
F	107.1	1B-NIU-20-2	0.4322	2T-NIU-20-2	0.4011
G	101.22	1B-NIU-20-2	0.4826	2T-NIU-20-2	0.3933
H	112.49	1B-NIU-20-2	0.5754	2T-NIU-20-2	0.4195
I	95.66	1B-NIU-20-2	0.5484	2T-NIU-20-2	0.3909
J	102.36	1B-NIU-20-2	0.5671	2T-NIU-20-2	0.4052
K	334.58	1B-NIU-20-2	0.3909	2T-NIU-20-2	0.5467
L	187.93	1B-NIU-20-2	0.3876	2T-NIU-20-2	0.4537
A	81.19	1B-NIU-20-3	0.4326	2T-NIU-20-3	0.3502
B	91.92	1B-NIU-20-3	0.5404	2T-NIU-20-3	0.3635
C	108.44	1B-NIU-20-3	0.5525	2T-NIU-20-3	0.4119
D	104	1B-NIU-20-3	0.4323	2T-NIU-20-3	0.3619
E	102.48	1B-NIU-20-3	0.4976	2T-NIU-20-3	0.398
F	107.1	1B-NIU-20-3	0.5634	2T-NIU-20-3	0.4128
G	101.22	1B-NIU-20-3	0.513	2T-NIU-20-3	0.4022
H	112.49	1B-NIU-20-3	0.5485	2T-NIU-20-3	0.4176
I	95.66	1B-NIU-20-3	0.533	2T-NIU-20-3	0.3943
J	102.36	1B-NIU-20-3	0.5692	2T-NIU-20-3	0.3842
K	334.58	1B-NIU-20-3	0.3798	2T-NIU-20-3	0.5321
L	187.93	1B-NIU-20-3	0.441	2T-NIU-20-3	0.418
A	81.19	1B-NIU-40-1	0.3028	2T-NIU-40-1	0.4039
B	91.92	1B-NIU-40-1	0.4704	2T-NIU-40-1	0.3927
C	108.44	1B-NIU-40-1	0.4396	2T-NIU-40-1	0.4038
D	104	1B-NIU-40-1	0.4361	2T-NIU-40-1	0.373
E	102.48	1B-NIU-40-1	0.3962	2T-NIU-40-1	0.4297
F	107.1	1B-NIU-40-1	0.3268	2T-NIU-40-1	0.4192
G	101.22	1B-NIU-40-1	0.3919	2T-NIU-40-1	0.458
H	112.49	1B-NIU-40-1	0.4574	2T-NIU-40-1	0.4441
I	95.66	1B-NIU-40-1	0.5348	2T-NIU-40-1	0.4334
J	102.36	1B-NIU-40-1	0.4976	2T-NIU-40-1	0.4274
K	334.58	1B-NIU-40-1	0.4124	2T-NIU-40-1	0.5672
L	187.93	1B-NIU-40-1	0.3823	2T-NIU-40-1	0.4212
A	81.19	1B-NIU-40-2	0.3575	2T-NIU-40-2	0.4071
B	91.92	1B-NIU-40-2	0.4172	2T-NIU-40-2	0.3878
C	108.44	1B-NIU-40-2	0.4118	2T-NIU-40-2	0.404
D	104	1B-NIU-40-2	0.3813	2T-NIU-40-2	0.3417
E	102.48	1B-NIU-40-2	0.4747	2T-NIU-40-2	0.4208

Section	Sp	Test ID	F60	Test ID	F60
F	107.1	1B-NIU-40-2	0.318	2T-NIU-40-2	0.3888
G	101.22	1B-NIU-40-2	0.3987	2T-NIU-40-2	0.4281
H	112.49	1B-NIU-40-2	0.4018	2T-NIU-40-2	0.4432
I	95.66	1B-NIU-40-2	0.5444	2T-NIU-40-2	0.4167
J	102.36	1B-NIU-40-2	0.4716	2T-NIU-40-2	0.4171
K	334.58	1B-NIU-40-2	0.3935	2T-NIU-40-2	0.5649
L	187.93	1B-NIU-40-2	0.3409	2T-NIU-40-2	0.3578
A	81.19	1B-NIU-40-3	0.4023	2T-NIU-40-3	0.4233
B	91.92	1B-NIU-40-3	0.4935	2T-NIU-40-3	0.3724
C	108.44	1B-NIU-40-3	0.558	2T-NIU-40-3	0.4118
D	104	1B-NIU-40-3	0.4534	2T-NIU-40-3	0.4074
E	102.48	1B-NIU-40-3	0.4987	2T-NIU-40-3	0.398
F	107.1	1B-NIU-40-3	0.3308	2T-NIU-40-3	0.3861
G	101.22	1B-NIU-40-3	0.4562	2T-NIU-40-3	0.4328
H	112.49	1B-NIU-40-3	0.5528	2T-NIU-40-3	0.4171
I	95.66	1B-NIU-40-3	0.5395	2T-NIU-40-3	0.4545
J	102.36	1B-NIU-40-3	0.5358	2T-NIU-40-3	0.4053
K	334.58	1B-NIU-40-3	0.4002	2T-NIU-40-3	0.5526
L	187.93	1B-NIU-40-3	0.3497	2T-NIU-40-3	0.3838
A	81.19	1B-NIU-60-1	0.7577	2T-NIU-60-1	0.4661
B	91.92	1B-NIU-60-1	0.7115	2T-NIU-60-1	0.4594
C	108.44	1B-NIU-60-1	0.5607	2T-NIU-60-1	0.4409
D	104	1B-NIU-60-1	0.5231	2T-NIU-60-1	0.3534
E	102.48	1B-NIU-60-1	0.4963	2T-NIU-60-1	0.4296
F	107.1	1B-NIU-60-1	0.5826	2T-NIU-60-1	0.445
G	101.22	1B-NIU-60-1	0.6497	2T-NIU-60-1	0.4551
H	112.49	1B-NIU-60-1	0.6041	2T-NIU-60-1	0.4399
I	95.66	1B-NIU-60-1	0.6268	2T-NIU-60-1	0.4528
J	102.36	1B-NIU-60-1	0.6259	2T-NIU-60-1	0.4574
K	334.58	1B-NIU-60-1	0.4646	2T-NIU-60-1	0.5528
L	187.93	1B-NIU-60-1	0.3983	2T-NIU-60-1	0.3567
A	81.19	1B-NIU-60-2	0.5291	2T-NIU-60-2	0.4198
B	91.92	1B-NIU-60-2	0.5459	2T-NIU-60-2	0.4702
C	108.44	1B-NIU-60-2	0.4644	2T-NIU-60-2	0.424
D	104	1B-NIU-60-2	0.4586	2T-NIU-60-2	0.331
E	102.48	1B-NIU-60-2	0.4022	2T-NIU-60-2	0.3997
F	107.1	1B-NIU-60-2	0.4339	2T-NIU-60-2	0.3906
G	101.22	1B-NIU-60-2	0.5531	2T-NIU-60-2	0.4182
H	112.49	1B-NIU-60-2	0.5329	2T-NIU-60-2	0.4027
I	95.66	1B-NIU-60-2	0.5837	2T-NIU-60-2	0.4531
J	102.36	1B-NIU-60-2	0.6088	2T-NIU-60-2	0.421
K	334.58	1B-NIU-60-2	0.3722	2T-NIU-60-2	0.5422

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	1B-NIU-60-2	0.3301	2T-NIU-60-2	0.369
A	81.19	1B-NIU-60-3	0.5309	2T-NIU-60-3	0.4533
B	91.92	1B-NIU-60-3	0.54	2T-NIU-60-3	0.4283
C	108.44	1B-NIU-60-3	0.3379	2T-NIU-60-3	0.4944
D	104	1B-NIU-60-3	0.3673	2T-NIU-60-3	0.415
E	102.48	1B-NIU-60-3	0.3875	2T-NIU-60-3	0.4728
F	107.1	1B-NIU-60-3	0.3552	2T-NIU-60-3	0.4493
G	101.22	1B-NIU-60-3	0.4332	2T-NIU-60-3	0.4827
H	112.49	1B-NIU-60-3	0.4613	2T-NIU-60-3	0.4476
I	95.66	1B-NIU-60-3	0.6627	2T-NIU-60-3	0.5051
J	102.36	1B-NIU-60-3	0.603	2T-NIU-60-3	0.4426
K	334.58	1B-NIU-60-3	0.4281	2T-NIU-60-3	0.5565
L	187.93	1B-NIU-60-3	0.343	2T-NIU-60-3	0.3833
A	128.4	4B-ID-20-1	0.6215	3T-ID-20-1	0.4779
B	112.87	4B-ID-20-1	0.5794	3T-ID-20-1	0.4618
C	112.9	4B-ID-20-1	0.5569	3T-ID-20-1	0.4483
D	112.6	4B-ID-20-1	0.5127	3T-ID-20-1	0.4651
E	113.94	4B-ID-20-1	0.5733	3T-ID-20-1	0.4711
F	109.96	4B-ID-20-1	0.5808	3T-ID-20-1	0.4535
G	118.99	4B-ID-20-1	0.6051	3T-ID-20-1	0.4752
H	113.64	4B-ID-20-1	0.5639	3T-ID-20-1	0.457
I	100.16	4B-ID-20-1	0.5596	3T-ID-20-1	0.4229
J	114.55	4B-ID-20-1	0.5878	3T-ID-20-1	0.4565
K	305.43	4B-ID-20-1	0.5482	3T-ID-20-1	0.6546
L	186.15	4B-ID-20-1	0.5803	3T-ID-20-1	0.5348
A	128.4	4B-ID-20-2	0.611	3T-ID-20-2	0.4835
B	112.87	4B-ID-20-2	0.5431	3T-ID-20-2	0.4401
C	112.9	4B-ID-20-2	0.5264	3T-ID-20-2	0.4508
D	112.6	4B-ID-20-2	0.5223	3T-ID-20-2	0.4689
E	113.94	4B-ID-20-2	0.5863	3T-ID-20-2	0.4691
F	109.96	4B-ID-20-2	0.5487	3T-ID-20-2	0.4667
G	118.99	4B-ID-20-2	0.6206	3T-ID-20-2	0.4867
H	113.64	4B-ID-20-2	0.5881	3T-ID-20-2	0.4564
I	100.16	4B-ID-20-2	0.5762	3T-ID-20-2	0.4368
J	114.55	4B-ID-20-2	0.5871	3T-ID-20-2	0.4648
K	305.43	4B-ID-20-2	0.5169	3T-ID-20-2	0.6463
L	186.15	4B-ID-20-2	0.5651	3T-ID-20-2	0.5309
A	128.4	4B-ID-20-3	0.6102	3T-ID-20-3	0.4898
B	112.87	4B-ID-20-3	0.5145	3T-ID-20-3	0.4494
C	112.9	4B-ID-20-3	0.5562	3T-ID-20-3	0.4651
D	112.6	4B-ID-20-3	0.5019	3T-ID-20-3	0.4631
E	113.94	4B-ID-20-3	0.5947	3T-ID-20-3	0.4688

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	4B-ID-20-3	0.5573	3T-ID-20-3	0.4612
G	118.99	4B-ID-20-3	0.6053	3T-ID-20-3	0.4774
H	113.64	4B-ID-20-3	0.6052	3T-ID-20-3	0.4547
I	100.16	4B-ID-20-3	0.5655	3T-ID-20-3	0.4377
J	114.55	4B-ID-20-3	0.5645	3T-ID-20-3	0.4468
K	305.43	4B-ID-20-3	0.5079	3T-ID-20-3	0.6259
L	186.15	4B-ID-20-3	0.5384	3T-ID-20-3	0.522
A	128.4	4B-ID-40-1	0.6454	3T-ID-40-1	0.5604
B	112.87	4B-ID-40-1	0.604	3T-ID-40-1	0.5225
C	112.9	4B-ID-40-1	0.5388	3T-ID-40-1	0.5147
D	112.6	4B-ID-40-1	0.3782	3T-ID-40-1	0.5008
E	113.94	4B-ID-40-1	0.59	3T-ID-40-1	0.5226
F	109.96	4B-ID-40-1	0.6034	3T-ID-40-1	0.5104
G	118.99	4B-ID-40-1	0.604	3T-ID-40-1	0.5302
H	113.64	4B-ID-40-1	0.6294	3T-ID-40-1	0.5247
I	100.16	4B-ID-40-1	0.608	3T-ID-40-1	0.4882
J	114.55	4B-ID-40-1	0.677	3T-ID-40-1	0.5381
K	305.43	4B-ID-40-1	0.5034	3T-ID-40-1	0.613
L	186.15	4B-ID-40-1	0.5111	3T-ID-40-1	0.52
A	128.4	4B-ID-40-2	0.6172	3T-ID-40-2	0.5297
B	112.87	4B-ID-40-2	0.5252	3T-ID-40-2	0.5277
C	112.9	4B-ID-40-2	0.4713	3T-ID-40-2	0.5046
D	112.6	4B-ID-40-2	0.4165	3T-ID-40-2	0.5003
E	113.94	4B-ID-40-2	0.587	3T-ID-40-2	0.5104
F	109.96	4B-ID-40-2	0.6008	3T-ID-40-2	0.5251
G	118.99	4B-ID-40-2	0.6405	3T-ID-40-2	0.5174
H	113.64	4B-ID-40-2	0.6523	3T-ID-40-2	0.5241
I	100.16	4B-ID-40-2	0.5698	3T-ID-40-2	0.4858
J	114.55	4B-ID-40-2	0.6484	3T-ID-40-2	0.5255
K	305.43	4B-ID-40-2	0.4676	3T-ID-40-2	0.5901
L	186.15	4B-ID-40-2	0.4925	3T-ID-40-2	0.4926
A	128.4	4B-ID-40-3	0.6211	3T-ID-40-3	0.5299
B	112.87	4B-ID-40-3	0.5082	3T-ID-40-3	0.5102
C	112.9	4B-ID-40-3	0.4619	3T-ID-40-3	0.5259
D	112.6	4B-ID-40-3	0.4615	3T-ID-40-3	0.5013
E	113.94	4B-ID-40-3	0.5712	3T-ID-40-3	0.5024
F	109.96	4B-ID-40-3	0.5257	3T-ID-40-3	0.5117
G	118.99	4B-ID-40-3	0.5782	3T-ID-40-3	0.51
H	113.64	4B-ID-40-3	0.636	3T-ID-40-3	0.5322
I	100.16	4B-ID-40-3	0.6156	3T-ID-40-3	0.5041
J	114.55	4B-ID-40-3	0.714	3T-ID-40-3	0.5413
K	305.43	4B-ID-40-3	0.4762	3T-ID-40-3	0.6165

Section	Sp	Test ID	F60	Test ID	F60
L	186.15	4B-ID-40-3	0.5348	3T-ID-40-3	0.5024
A	128.4	4B-ID-50-1	0.6484	3T-ID-50-1	0.5557
B	112.87	4B-ID-50-1	0.5588	3T-ID-50-1	0.5652
C	112.9	4B-ID-50-1	0.5314	3T-ID-50-1	0.5264
D	112.6	4B-ID-50-1	0.3727	3T-ID-50-1	0.5321
E	113.94	4B-ID-50-1	0.6311	3T-ID-50-1	0.5484
F	109.96	4B-ID-50-1	0.5939	3T-ID-50-1	0.5594
G	118.99	4B-ID-50-1	0.6517	3T-ID-50-1	0.5683
H	113.64	4B-ID-50-1	0.6762	3T-ID-50-1	0.5579
I	100.16	4B-ID-50-1	0.6634	3T-ID-50-1	0.5901
J	114.55	4B-ID-50-1	0.6929	3T-ID-50-1	0.594
K	305.43	4B-ID-50-1	0.4842	3T-ID-50-1	0.6296
L	186.15	4B-ID-50-1	0.4745	3T-ID-50-1	0.5447
A	128.4	4B-ID-50-2	0.6028	3T-ID-50-2	0.5567
B	112.87	4B-ID-50-2	0.4666	3T-ID-50-2	0.569
C	112.9	4B-ID-50-2	0.4442	3T-ID-50-2	0.5247
D	112.6	4B-ID-50-2	0.3835	3T-ID-50-2	0.5191
E	113.94	4B-ID-50-2	0.558	3T-ID-50-2	0.5567
F	109.96	4B-ID-50-2	0.515	3T-ID-50-2	0.5634
G	118.99	4B-ID-50-2	0.6293		
H	113.64	4B-ID-50-2	0.6688		
I	100.16	4B-ID-50-2	0.5913	3T-ID-50-2	0.584
J	114.55	4B-ID-50-2	0.6911	3T-ID-50-2	0.5797
K	305.43	4B-ID-50-2	0.4718	3T-ID-50-2	0.6091
L	186.15	4B-ID-50-2	0.4487	3T-ID-50-2	0.5128
A	128.4	4B-ID-50-3	0.5375	3T-ID-50-3	0.5733
B	112.87	4B-ID-50-3	0.4838	3T-ID-50-3	0.5728
C	112.9	4B-ID-50-3	0.4381	3T-ID-50-3	0.5776
D	112.6	4B-ID-50-3	0.4144	3T-ID-50-3	0.5615
E	113.94	4B-ID-50-3	0.5136	3T-ID-50-3	0.5909
F	109.96	4B-ID-50-3	0.4895	3T-ID-50-3	0.5965
G	118.99	4B-ID-50-3	0.5314		
H	113.64	4B-ID-50-3	0.6178	3T-ID-50-3	0.571
I	100.16	4B-ID-50-3	0.5342	3T-ID-50-3	0.6062
J	114.55	4B-ID-50-3	0.6652	3T-ID-50-3	0.6449
K	305.43	4B-ID-50-3	0.4777	3T-ID-50-3	0.6375
L	186.15	4B-ID-50-3	0.4949	3T-ID-50-3	0.5504
A	128.4	4B-IU-20-1	0.6095	3T-IU-20-1	0.4855
B	112.87	4B-IU-20-1	0.6211	3T-IU-20-1	0.482
C	112.9	4B-IU-20-1	0.5719	3T-IU-20-1	0.452
D	112.6	4B-IU-20-1	0.5926	3T-IU-20-1	0.4593
E	113.94	4B-IU-20-1	0.5996	3T-IU-20-1	0.4661

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	4B-IU-20-1	0.5428	3T-IU-20-1	0.4617
G	118.99	4B-IU-20-1	0.6203	3T-IU-20-1	0.4853
H	113.64	4B-IU-20-1	0.5808	3T-IU-20-1	0.4655
I	100.16	4B-IU-20-1	0.5807	3T-IU-20-1	0.4315
J	114.55	4B-IU-20-1	0.5756	3T-IU-20-1	0.4693
K	305.43	4B-IU-20-1	0.5895	3T-IU-20-1	0.6742
L	186.15	4B-IU-20-1	0.602	3T-IU-20-1	0.5458
A	128.4	4B-IU-20-2	0.6105	3T-IU-20-2	0.4792
B	112.87	4B-IU-20-2	0.6194	3T-IU-20-2	0.474
C	112.9	4B-IU-20-2	0.5704	3T-IU-20-2	0.452
D	112.6	4B-IU-20-2	0.5837	3T-IU-20-2	0.4504
E	113.94	4B-IU-20-2	0.5588	3T-IU-20-2	0.4654
F	109.96	4B-IU-20-2	0.5769	3T-IU-20-2	0.4502
G	118.99	4B-IU-20-2	0.621	3T-IU-20-2	0.4794
H	113.64	4B-IU-20-2	0.5839	3T-IU-20-2	0.4602
I	100.16	4B-IU-20-2	0.5563	3T-IU-20-2	0.435
J	114.55	4B-IU-20-2	0.5741	3T-IU-20-2	0.4673
K	305.43	4B-IU-20-2	0.5621	3T-IU-20-2	0.6452
L	186.15	4B-IU-20-2	0.5654	3T-IU-20-2	0.5434
A	128.4	4B-IU-20-3	0.5949	3T-IU-20-3	0.483
B	112.87	4B-IU-20-3	0.6162	3T-IU-20-3	0.4688
C	112.9	4B-IU-20-3	0.5933	3T-IU-20-3	0.4492
D	112.6	4B-IU-20-3	0.5872	3T-IU-20-3	0.4559
E	113.94	4B-IU-20-3	0.5312	3T-IU-20-3	0.4697
F	109.96	4B-IU-20-3	0.5391	3T-IU-20-3	0.4573
G	118.99	4B-IU-20-3	0.602	3T-IU-20-3	0.478
H	113.64	4B-IU-20-3	0.5889	3T-IU-20-3	0.4572
I	100.16	4B-IU-20-3	0.5424	3T-IU-20-3	0.442
J	114.55	4B-IU-20-3	0.5838	3T-IU-20-3	0.4444
K	305.43	4B-IU-20-3	0.5524	3T-IU-20-3	0.6315
L	186.15	4B-IU-20-3	0.5676	3T-IU-20-3	0.5302
A	128.4	4B-IU-40-1	0.5985	3T-IU-40-1	0.5255
B	112.87	4B-IU-40-1	0.6135	3T-IU-40-1	0.5247
C	112.9	4B-IU-40-1	0.5569	3T-IU-40-1	0.5038
D	112.6	4B-IU-40-1	0.5881	3T-IU-40-1	0.5137
E	113.94	4B-IU-40-1	0.5086	3T-IU-40-1	0.5226
F	109.96	4B-IU-40-1	0.4574	3T-IU-40-1	0.5018
G	118.99	4B-IU-40-1	0.6249	3T-IU-40-1	0.5344
H	113.64	4B-IU-40-1	0.5702	3T-IU-40-1	0.5202
I	100.16	4B-IU-40-1	0.5734	3T-IU-40-1	0.5123
J	114.55	4B-IU-40-1	0.5628	3T-IU-40-1	0.5452
K	305.43	4B-IU-40-1	0.5046	3T-IU-40-1	0.6205

Section	Sp	Test ID	F60	Test ID	F60
L	186.15	4B-IU-40-1	0.5302	3T-IU-40-1	0.5312
A	128.4	4B-IU-40-2	0.6389	3T-IU-40-2	0.5222
B	112.87	4B-IU-40-2	0.5911	3T-IU-40-2	0.5303
C	112.9	4B-IU-40-2	0.5947	3T-IU-40-2	0.5215
D	112.6	4B-IU-40-2	0.6013	3T-IU-40-2	0.4922
E	113.94	4B-IU-40-2	0.5031	3T-IU-40-2	0.5047
F	109.96	4B-IU-40-2	0.4756	3T-IU-40-2	0.5243
G	118.99	4B-IU-40-2	0.5742	3T-IU-40-2	0.5304
H	113.64	4B-IU-40-2	0.5562	3T-IU-40-2	0.5278
I	100.16	4B-IU-40-2	0.5892	3T-IU-40-2	0.5198
J	114.55	4B-IU-40-2	0.557	3T-IU-40-2	0.5318
K	305.43	4B-IU-40-2	0.5123	3T-IU-40-2	0.6178
L	186.15	4B-IU-40-2	0.5146	3T-IU-40-2	0.5167
A	128.4	4B-IU-40-3	0.6099	3T-IU-40-3	0.5121
B	112.87	4B-IU-40-3	0.5758	3T-IU-40-3	0.5246
C	112.9	4B-IU-40-3	0.5351	3T-IU-40-3	0.498
D	112.6	4B-IU-40-3	0.5673	3T-IU-40-3	0.5119
E	113.94	4B-IU-40-3	0.5266	3T-IU-40-3	0.5256
F	109.96	4B-IU-40-3	0.4441	3T-IU-40-3	0.524
G	118.99	4B-IU-40-3	0.5807	3T-IU-40-3	0.5075
H	113.64	4B-IU-40-3	0.5262	3T-IU-40-3	0.5229
I	100.16	4B-IU-40-3	0.5433	3T-IU-40-3	0.4971
J	114.55	4B-IU-40-3	0.5138	3T-IU-40-3	0.5039
K	305.43	4B-IU-40-3	0.498	3T-IU-40-3	0.6193
L	186.15	4B-IU-40-3	0.4985	3T-IU-40-3	0.5191
A	128.4	4B-IU-50-1	0.6411	3T-IU-50-1	0.5791
B	112.87	4B-IU-50-1	0.6466	3T-IU-50-1	0.5747
C	112.9	4B-IU-50-1	0.5297	3T-IU-50-1	0.5433
D	112.6	4B-IU-50-1	0.5211	3T-IU-50-1	0.5563
E	113.94	4B-IU-50-1	0.4456	3T-IU-50-1	0.5687
F	109.96	4B-IU-50-1	0.3568	3T-IU-50-1	0.5994
G	118.99	4B-IU-50-1	0.5643	3T-IU-50-1	0.581
H	113.64	4B-IU-50-1	0.5542	3T-IU-50-1	0.5679
I	100.16	4B-IU-50-1	0.6008	3T-IU-50-1	0.5586
J	114.55	4B-IU-50-1	0.5311	3T-IU-50-1	0.6004
K	305.43	4B-IU-50-1	0.5009	3T-IU-50-1	0.6296
L	186.15	4B-IU-50-1	0.4442	3T-IU-50-1	0.5308
A	128.4	4B-IU-50-2	0.6207	3T-IU-50-2	0.5278
B	112.87	4B-IU-50-2	0.6439	3T-IU-50-2	0.5648
C	112.9	4B-IU-50-2	0.5784	3T-IU-50-2	0.5311
D	112.6	4B-IU-50-2	0.5679	3T-IU-50-2	0.5811
E	113.94	4B-IU-50-2	0.527	3T-IU-50-2	0.5635

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	4B-IU-50-2	0.5	3T-IU-50-2	0.573
G	118.99	4B-IU-50-2	0.5826	3T-IU-50-2	0.56
H	113.64	4B-IU-50-2	0.5773	3T-IU-50-2	0.5622
I	100.16	4B-IU-50-2	0.6066	3T-IU-50-2	0.5355
J	114.55	4B-IU-50-2	0.6138	3T-IU-50-2	0.5644
K	305.43	4B-IU-50-2	0.5365	3T-IU-50-2	0.6222
L	186.15	4B-IU-50-2	0.5027	3T-IU-50-2	0.521
A	128.4	4B-IU-50-3	0.6177	3T-IU-50-3	0.5798
B	112.87	4B-IU-50-3	0.6	3T-IU-50-3	0.5791
C	112.9	4B-IU-50-3	0.5138	3T-IU-50-3	0.577
D	112.6	4B-IU-50-3	0.5135	3T-IU-50-3	0.5663
E	113.94	4B-IU-50-3	0.455	3T-IU-50-3	0.5754
F	109.96	4B-IU-50-3	0.4199	3T-IU-50-3	0.5865
G	118.99	4B-IU-50-3	0.5297	3T-IU-50-3	0.5584
H	113.64	4B-IU-50-3	0.5188		
I	100.16	4B-IU-50-3	0.4914	3T-IU-50-3	0.5616
J	114.55	4B-IU-50-3	0.5447	3T-IU-50-3	0.5969
K	305.43	4B-IU-50-3	0.507	3T-IU-50-3	0.6263
L	186.15	4B-IU-50-3	0.5339	3T-IU-50-3	0.5217
A	81.19	4B-NID-20-1	0.4751	3T-NID-20-1	0.3858
B	91.92	4B-NID-20-1	0.498	3T-NID-20-1	0.4044
C	108.44	4B-NID-20-1	0.549	3T-NID-20-1	0.4391
D	104	4B-NID-20-1	0.5251	3T-NID-20-1	0.4189
E	102.48	4B-NID-20-1	0.5076	3T-NID-20-1	0.438
F	107.1	4B-NID-20-1	0.5554	3T-NID-20-1	0.4441
G	101.22	4B-NID-20-1	0.5744	3T-NID-20-1	0.4261
H	112.49	4B-NID-20-1	0.5565	3T-NID-20-1	0.4516
I	95.66	4B-NID-20-1	0.5113	3T-NID-20-1	0.413
J	102.36	4B-NID-20-1	0.5687	3T-NID-20-1	0.4298
K	334.58	4B-NID-20-1	0.528	3T-NID-20-1	0.6489
L	187.93	4B-NID-20-1	0.5065	3T-NID-20-1	0.5162
A	81.19	4B-NID-20-2	0.4732	3T-NID-20-2	0.3725
B	91.92	4B-NID-20-2	0.4899	3T-NID-20-2	0.4002
C	108.44	4B-NID-20-2	0.5664	3T-NID-20-2	0.4432
D	104	4B-NID-20-2	0.5238	3T-NID-20-2	0.4444
E	102.48	4B-NID-20-2	0.5069	3T-NID-20-2	0.4307
F	107.1	4B-NID-20-2	0.5604	3T-NID-20-2	0.4386
G	101.22	4B-NID-20-2	0.5652	3T-NID-20-2	0.4346
H	112.49	4B-NID-20-2	0.5579	3T-NID-20-2	0.4516
I	95.66	4B-NID-20-2	0.4985	3T-NID-20-2	0.4202
J	102.36	4B-NID-20-2	0.5742	3T-NID-20-2	0.4252
K	334.58	4B-NID-20-2	0.5097	3T-NID-20-2	0.6439

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	4B-NID-20-2	0.5193	3T-NID-20-2	0.5059
A	81.19	4B-NID-20-3	0.4695	3T-NID-20-3	0.3862
B	91.92	4B-NID-20-3	0.5114	3T-NID-20-3	0.3968
C	108.44	4B-NID-20-3	0.564	3T-NID-20-3	0.4371
D	104	4B-NID-20-3	0.5138	3T-NID-20-3	0.4442
E	102.48	4B-NID-20-3	0.5512	3T-NID-20-3	0.4257
F	107.1	4B-NID-20-3	0.5402	3T-NID-20-3	0.4441
G	101.22	4B-NID-20-3	0.5519	3T-NID-20-3	0.4316
H	112.49	4B-NID-20-3	0.5601	3T-NID-20-3	0.4595
I	95.66	4B-NID-20-3	0.4948	3T-NID-20-3	0.4259
J	102.36	4B-NID-20-3	0.5641	3T-NID-20-3	0.4375
K	334.58	4B-NID-20-3	0.5075	3T-NID-20-3	0.6296
L	187.93	4B-NID-20-3	0.5312	3T-NID-20-3	0.511
A	81.19	4B-NID-40-1	0.4433	3T-NID-40-1	0.452
B	91.92	4B-NID-40-1	0.4522	3T-NID-40-1	0.4772
C	108.44	4B-NID-40-1	0.5639	3T-NID-40-1	0.4857
D	104	4B-NID-40-1	0.3906	3T-NID-40-1	0.4765
E	102.48	4B-NID-40-1	0.5766	3T-NID-40-1	0.5136
F	107.1	4B-NID-40-1	0.5671	3T-NID-40-1	0.5015
G	101.22	4B-NID-40-1	0.5791	3T-NID-40-1	0.5201
H	112.49	4B-NID-40-1	0.5646	3T-NID-40-1	0.5043
I	95.66	4B-NID-40-1	0.5595	3T-NID-40-1	0.4873
J	102.36	4B-NID-40-1	0.6196	3T-NID-40-1	0.4948
K	334.58	4B-NID-40-1	0.4961	3T-NID-40-1	0.626
L	187.93	4B-NID-40-1	0.4766	3T-NID-40-1	0.4955
A	81.19	4B-NID-40-2	0.3736	3T-NID-40-2	0.4658
B	91.92	4B-NID-40-2	0.4002	3T-NID-40-2	0.481
C	108.44	4B-NID-40-2	0.5388	3T-NID-40-2	0.4881
D	104	4B-NID-40-2	0.435	3T-NID-40-2	0.4784
E	102.48	4B-NID-40-2	0.4637	3T-NID-40-2	0.4968
F	107.1	4B-NID-40-2	0.5169	3T-NID-40-2	0.4889
G	101.22	4B-NID-40-2	0.5345	3T-NID-40-2	0.5051
H	112.49	4B-NID-40-2	0.5236	3T-NID-40-2	0.4776
I	95.66	4B-NID-40-2	0.5192	3T-NID-40-2	0.4919
J	102.36	4B-NID-40-2	0.6188	3T-NID-40-2	0.523
K	334.58	4B-NID-40-2	0.4839	3T-NID-40-2	0.6544
L	187.93	4B-NID-40-2	0.487	3T-NID-40-2	0.5113
A	81.19	4B-NID-40-3	0.3584	3T-NID-40-3	0.4727
B	91.92	4B-NID-40-3	0.3628	3T-NID-40-3	0.4557
C	108.44	4B-NID-40-3	0.5419	3T-NID-40-3	0.4814
D	104	4B-NID-40-3	0.4078	3T-NID-40-3	0.4878
E	102.48	4B-NID-40-3	0.5231	3T-NID-40-3	0.4925

Section	Sp	Test ID	F60	Test ID	F60
F	107.1	4B-NID-40-3	0.4941	3T-NID-40-3	0.4965
G	101.22	4B-NID-40-3	0.4894	3T-NID-40-3	0.504
H	112.49	4B-NID-40-3	0.5795	3T-NID-40-3	0.4843
I	95.66	4B-NID-40-3	0.5195	3T-NID-40-3	0.4843
J	102.36	4B-NID-40-3	0.617	3T-NID-40-3	0.5105
K	334.58	4B-NID-40-3	0.4919	3T-NID-40-3	0.626
L	187.93	4B-NID-40-3	0.4671	3T-NID-40-3	0.5053
A	81.19	4B-NID-50-1	0.3889	3T-NID-50-1	0.5129
B	91.92	4B-NID-50-1	0.4523	3T-NID-50-1	0.5067
C	108.44	4B-NID-50-1	0.5022	3T-NID-50-1	0.5139
D	104	4B-NID-50-1	0.3681	3T-NID-50-1	0.5116
E	102.48	4B-NID-50-1	0.6138	3T-NID-50-1	0.5397
F	107.1	4B-NID-50-1	0.5941	3T-NID-50-1	0.5493
G	101.22	4B-NID-50-1	0.6206	3T-NID-50-1	0.5635
H	112.49	4B-NID-50-1	0.5971	3T-NID-50-1	0.5664
I	95.66	4B-NID-50-1	0.6763	3T-NID-50-1	0.5745
J	102.36	4B-NID-50-1	0.6421	3T-NID-50-1	0.5818
K	334.58	4B-NID-50-1	0.4884	3T-NID-50-1	0.6353
L	187.93	4B-NID-50-1	0.5061	3T-NID-50-1	0.4873
A	81.19	4B-NID-50-2	0.3005	3T-NID-50-2	0.5418
B	91.92	4B-NID-50-2	0.3647	3T-NID-50-2	0.5006
C	108.44	4B-NID-50-2	0.4754	3T-NID-50-2	0.4975
D	104	4B-NID-50-2	0.3474	3T-NID-50-2	0.4863
E	102.48	4B-NID-50-2	0.5312	3T-NID-50-2	0.5345
F	107.1	4B-NID-50-2	0.5131	3T-NID-50-2	0.529
G	101.22	4B-NID-50-2	0.4965	3T-NID-50-2	0.5065
H	112.49	4B-NID-50-2	0.5163	3T-NID-50-2	0.5248
I	95.66	4B-NID-50-2	0.4956	3T-NID-50-2	0.5602
J	102.36	4B-NID-50-2	0.5864	3T-NID-50-2	0.5558
K	334.58	4B-NID-50-2	0.4732	3T-NID-50-2	0.6247
L	187.93	4B-NID-50-2	0.4514	3T-NID-50-2	0.4818
A	81.19	4B-NID-50-3	0.2918	3T-NID-50-3	0.5551
B	91.92	4B-NID-50-3	0.4198	3T-NID-50-3	0.5252
C	108.44	4B-NID-50-3	0.5392	3T-NID-50-3	0.5132
D	104	4B-NID-50-3	0.3274	3T-NID-50-3	0.515
E	102.48	4B-NID-50-3	0.4832	3T-NID-50-3	0.5499
F	107.1	4B-NID-50-3	0.5044		
G	101.22	4B-NID-50-3	0.4794	3T-NID-50-3	0.5454
H	112.49	4B-NID-50-3	0.4773	3T-NID-50-3	0.5422
I	95.66	4B-NID-50-3	0.4845	3T-NID-50-3	0.5723
J	102.36	4B-NID-50-3	0.5582	3T-NID-50-3	0.563
K	334.58	4B-NID-50-3	0.4609	3T-NID-50-3	0.6193

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L	187.93	4B-NID-50-3	0.4294	3T-NID-50-3	0.5351
A	81.19	4B-NIU-20-1	0.4436	3T-NIU-20-1	0.3789
B	91.92	4B-NIU-20-1	0.5524	3T-NIU-20-1	0.4123
C	108.44	4B-NIU-20-1	0.5395	3T-NIU-20-1	0.4132
D	104	4B-NIU-20-1	0.5513	3T-NIU-20-1	0.425
E	102.48	4B-NIU-20-1	0.5624	3T-NIU-20-1	0.4377
F	107.1	4B-NIU-20-1	0.5339	3T-NIU-20-1	0.4329
G	101.22	4B-NIU-20-1	0.5225	3T-NIU-20-1	0.4316
H	112.49	4B-NIU-20-1	0.5225	3T-NIU-20-1	0.4368
I	95.66	4B-NIU-20-1	0.5345	3T-NIU-20-1	0.4206
J	102.36	4B-NIU-20-1	0.5512	3T-NIU-20-1	0.4196
K	334.58	4B-NIU-20-1	0.5183	3T-NIU-20-1	0.6673
L	187.93	4B-NIU-20-1	0.563	3T-NIU-20-1	0.5036
A	81.19	4B-NIU-20-2	0.4553	3T-NIU-20-2	0.3672
B	91.92	4B-NIU-20-2	0.5592	3T-NIU-20-2	0.4108
C	108.44	4B-NIU-20-2	0.5324	3T-NIU-20-2	0.4294
D	104	4B-NIU-20-2	0.5523	3T-NIU-20-2	0.4327
E	102.48	4B-NIU-20-2	0.5269	3T-NIU-20-2	0.4289
F	107.1	4B-NIU-20-2	0.5131	3T-NIU-20-2	0.4301
G	101.22	4B-NIU-20-2	0.5446	3T-NIU-20-2	0.4325
H	112.49	4B-NIU-20-2	0.5686	3T-NIU-20-2	0.443
I	95.66	4B-NIU-20-2	0.5364	3T-NIU-20-2	0.4094
J	102.36	4B-NIU-20-2	0.543	3T-NIU-20-2	0.4321
K	334.58	4B-NIU-20-2	0.523	3T-NIU-20-2	0.6482
L	187.93	4B-NIU-20-2	0.5801	3T-NIU-20-2	0.5116
A	81.19	4B-NIU-20-3	0.46	3T-NIU-20-3	0.3973
B	91.92	4B-NIU-20-3	0.5511	3T-NIU-20-3	0.4119
C	108.44	4B-NIU-20-3	0.5586	3T-NIU-20-3	0.4265
D	104	4B-NIU-20-3	0.5438	3T-NIU-20-3	0.4289
E	102.48	4B-NIU-20-3	0.5475	3T-NIU-20-3	0.4267
F	107.1	4B-NIU-20-3	0.5236	3T-NIU-20-3	0.4461
G	101.22	4B-NIU-20-3	0.5511	3T-NIU-20-3	0.4438
H	112.49	4B-NIU-20-3	0.5377	3T-NIU-20-3	0.4476
I	95.66	4B-NIU-20-3	0.5159	3T-NIU-20-3	0.4285
J	102.36	4B-NIU-20-3	0.5623	3T-NIU-20-3	0.4349
K	334.58	4B-NIU-20-3	0.4902	3T-NIU-20-3	0.6361
L	187.93	4B-NIU-20-3	0.5809	3T-NIU-20-3	0.5109
A	81.19	4B-NIU-40-1	0.3694	3T-NIU-40-1	0.4617
B	91.92	4B-NIU-40-1	0.5736	3T-NIU-40-1	0.4761
C	108.44	4B-NIU-40-1	0.5347	3T-NIU-40-1	0.4802
D	104	4B-NIU-40-1	0.508	3T-NIU-40-1	0.4671
E	102.48	4B-NIU-40-1	0.4748	3T-NIU-40-1	0.513

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F	107.1	4B-NIU-40-1	0.482	3T-NIU-40-1	0.5141
G	101.22	4B-NIU-40-1	0.5047	3T-NIU-40-1	0.4958
H	112.49	4B-NIU-40-1	0.5491	3T-NIU-40-1	0.511
I	95.66	4B-NIU-40-1	0.5259	3T-NIU-40-1	0.4873
J	102.36	4B-NIU-40-1	0.5762	3T-NIU-40-1	0.517
K	334.58	4B-NIU-40-1	0.4874	3T-NIU-40-1	0.6188
L	187.93	4B-NIU-40-1	0.5201	3T-NIU-40-1	0.5104
A	81.19	4B-NIU-40-2	0.4046	3T-NIU-40-2	0.4645
B	91.92	4B-NIU-40-2	0.5969	3T-NIU-40-2	0.5032
C	108.44	4B-NIU-40-2	0.512	3T-NIU-40-2	0.4693
D	104	4B-NIU-40-2	0.5368	3T-NIU-40-2	0.4641
E	102.48	4B-NIU-40-2	0.504	3T-NIU-40-2	0.4897
F	107.1	4B-NIU-40-2	0.4998	3T-NIU-40-2	0.499
G	101.22	4B-NIU-40-2	0.5418	3T-NIU-40-2	0.5101
H	112.49	4B-NIU-40-2	0.5684	3T-NIU-40-2	0.5016
I	95.66	4B-NIU-40-2	0.5618	3T-NIU-40-2	0.4972
J	102.36	4B-NIU-40-2	0.5693	3T-NIU-40-2	0.5033
K	334.58	4B-NIU-40-2	0.4832	3T-NIU-40-2	0.6155
L	187.93	4B-NIU-40-2	0.5251	3T-NIU-40-2	0.4902
A	81.19	4B-NIU-40-3	0.3634	3T-NIU-40-3	0.4494
B	91.92	4B-NIU-40-3	0.549	3T-NIU-40-3	0.4808
C	108.44	4B-NIU-40-3	0.511	3T-NIU-40-3	0.4648
D	104	4B-NIU-40-3	0.4954	3T-NIU-40-3	0.4771
E	102.48	4B-NIU-40-3	0.5216	3T-NIU-40-3	0.4825
F	107.1	4B-NIU-40-3	0.5411	3T-NIU-40-3	0.4847
G	101.22	4B-NIU-40-3	0.4614	3T-NIU-40-3	0.4921
H	112.49	4B-NIU-40-3	0.5291	3T-NIU-40-3	0.4867
I	95.66	4B-NIU-40-3	0.5187	3T-NIU-40-3	0.4875
J	102.36	4B-NIU-40-3	0.59	3T-NIU-40-3	0.5176
K	334.58	4B-NIU-40-3	0.4552	3T-NIU-40-3	0.6184
L	187.93	4B-NIU-40-3	0.4794	3T-NIU-40-3	0.5287
A	81.19	4B-NIU-50-1	0.3141	3T-NIU-50-1	0.5056
B	91.92	4B-NIU-50-1	0.516	3T-NIU-50-1	0.5015
C	108.44	4B-NIU-50-1	0.5134	3T-NIU-50-1	0.5055
D	104	4B-NIU-50-1	0.4708	3T-NIU-50-1	0.5039
E	102.48	4B-NIU-50-1	0.4589	3T-NIU-50-1	0.5034
F	107.1	4B-NIU-50-1	0.4796	3T-NIU-50-1	0.5218
G	101.22	4B-NIU-50-1	0.4311	3T-NIU-50-1	0.5214
H	112.49	4B-NIU-50-1	0.493	3T-NIU-50-1	0.5305
I	95.66	4B-NIU-50-1	0.4838	3T-NIU-50-1	0.5807
J	102.36	4B-NIU-50-1	0.5261	3T-NIU-50-1	0.5765
K	334.58	4B-NIU-50-1	0.5185	3T-NIU-50-1	0.6094

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L	187.93	4B-NIU-50-1	0.4804	3T-NIU-50-1	0.5088
A	81.19	4B-NIU-50-2	0.3859		
B	91.92	4B-NIU-50-2	0.593	3T-NIU-50-2	0.5599
C	108.44	4B-NIU-50-2	0.564	3T-NIU-50-2	0.5264
D	104	4B-NIU-50-2	0.5457	3T-NIU-50-2	0.5154
E	102.48	4B-NIU-50-2	0.5082	3T-NIU-50-2	0.5403
F	107.1	4B-NIU-50-2	0.5454	3T-NIU-50-2	0.5434
G	101.22	4B-NIU-50-2	0.5559	3T-NIU-50-2	0.5424
H	112.49	4B-NIU-50-2	0.5746	3T-NIU-50-2	0.5451
I	95.66	4B-NIU-50-2	0.6456	3T-NIU-50-2	0.533
J	102.36	4B-NIU-50-2	0.5982	3T-NIU-50-2	0.5462
K	334.58	4B-NIU-50-2	0.5069	3T-NIU-50-2	0.6269
L	187.93	4B-NIU-50-2	0.5183	3T-NIU-50-2	0.5072
A	81.19	4B-NIU-50-3	0.2823	3T-NIU-50-3	0.5385
B	91.92	4B-NIU-50-3	0.5356	3T-NIU-50-3	0.5265
C	108.44	4B-NIU-50-3	0.502	3T-NIU-50-3	0.5056
D	104	4B-NIU-50-3	0.4595	3T-NIU-50-3	0.5171
E	102.48	4B-NIU-50-3	0.4464	3T-NIU-50-3	0.5168
F	107.1	4B-NIU-50-3	0.472	3T-NIU-50-3	0.5177
G	101.22	4B-NIU-50-3	0.5028	3T-NIU-50-3	0.5277
H	112.49	4B-NIU-50-3	0.5223	3T-NIU-50-3	0.5552
I	95.66	4B-NIU-50-3	0.4991	3T-NIU-50-3	0.4884
J	102.36	4B-NIU-50-3	0.5274	3T-NIU-50-3	0.5696
K	334.58	4B-NIU-50-3	0.4876	3T-NIU-50-3	0.6144
L	187.93	4B-NIU-50-3	0.4994	3T-NIU-50-3	0.5429
A	128.4	5B-ID-20-1	0.6575	5T-ID-20-1	0.4992
B	112.87	5B-ID-20-1	0.5829	5T-ID-20-1	0.4587
C	112.9	5B-ID-20-1	0.5598	5T-ID-20-1	0.4645
D	112.6	5B-ID-20-1	0.529	5T-ID-20-1	0.467
E	113.94	5B-ID-20-1	0.6118	5T-ID-20-1	0.4592
F	109.96	5B-ID-20-1	0.5603	5T-ID-20-1	0.4608
G	118.99	5B-ID-20-1	0.6247	5T-ID-20-1	0.4804
H	113.64	5B-ID-20-1	0.5957	5T-ID-20-1	0.465
I	100.16	5B-ID-20-1	0.5583	5T-ID-20-1	0.4279
J	114.55	5B-ID-20-1	0.6227	5T-ID-20-1	0.468
K	305.43	5B-ID-20-1	0.5747	5T-ID-20-1	0.6256
L	186.15	5B-ID-20-1	0.5497	5T-ID-20-1	0.5126
A	128.4	5B-ID-20-2	0.6267	5T-ID-20-2	0.4999
B	112.87	5B-ID-20-2	0.5812	5T-ID-20-2	0.4662
C	112.9	5B-ID-20-2	0.562	5T-ID-20-2	0.4694
D	112.6	5B-ID-20-2	0.5464	5T-ID-20-2	0.4913
E	113.94	5B-ID-20-2	0.6094	5T-ID-20-2	0.4642

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F	109.96	5B-ID-20-2	0.5815	5T-ID-20-2	0.4688
G	118.99	5B-ID-20-2	0.6267	5T-ID-20-2	0.4865
H	113.64	5B-ID-20-2	0.5774	5T-ID-20-2	0.4761
I	100.16	5B-ID-20-2	0.5599	5T-ID-20-2	0.4401
J	114.55	5B-ID-20-2	0.6156	5T-ID-20-2	0.4794
K	305.43	5B-ID-20-2	0.5609	5T-ID-20-2	0.616
L	186.15	5B-ID-20-2	0.5605	5T-ID-20-2	0.5146
A	128.4	5B-ID-20-3	0.6023	5T-ID-20-3	0.5011
B	112.87	5B-ID-20-3	0.5999	5T-ID-20-3	0.4633
C	112.9	5B-ID-20-3	0.5663	5T-ID-20-3	0.4645
D	112.6	5B-ID-20-3	0.537	5T-ID-20-3	0.4832
E	113.94	5B-ID-20-3	0.6177	5T-ID-20-3	0.4781
F	109.96	5B-ID-20-3	0.5752	5T-ID-20-3	0.4691
G	118.99	5B-ID-20-3	0.6052	5T-ID-20-3	0.4836
H	113.64	5B-ID-20-3	0.5866	5T-ID-20-3	0.487
I	100.16	5B-ID-20-3	0.5465	5T-ID-20-3	0.4464
J	114.55	5B-ID-20-3	0.615	5T-ID-20-3	0.4731
K	305.43	5B-ID-20-3	0.5693	5T-ID-20-3	0.6145
L	186.15	5B-ID-20-3	0.5652	5T-ID-20-3	0.5347
A	128.4	5B-ID-40-1	0.569	5T-ID-40-1	0.5116
B	112.87	5B-ID-40-1	0.5044	5T-ID-40-1	0.511
C	112.9	5B-ID-40-1	0.4398	5T-ID-40-1	0.4831
D	112.6	5B-ID-40-1	0.3514	5T-ID-40-1	0.4718
E	113.94	5B-ID-40-1	0.5236	5T-ID-40-1	0.4941
F	109.96	5B-ID-40-1	0.5092	5T-ID-40-1	0.4993
G	118.99	5B-ID-40-1	0.5645	5T-ID-40-1	0.4907
H	113.64	5B-ID-40-1	0.576	5T-ID-40-1	0.4814
I	100.16	5B-ID-40-1	0.4421	5T-ID-40-1	0.459
J	114.55	5B-ID-40-1	0.6005	5T-ID-40-1	0.4917
K	305.43	5B-ID-40-1	0.5315	5T-ID-40-1	0.6301
L	186.15	5B-ID-40-1	0.4829	5T-ID-40-1	0.4964
A	128.4	5B-ID-40-2	0.5613	5T-ID-40-2	0.4973
B	112.87	5B-ID-40-2	0.4674	5T-ID-40-2	0.4882
C	112.9	5B-ID-40-2	0.4811	5T-ID-40-2	0.4983
D	112.6	5B-ID-40-2	0.3462	5T-ID-40-2	0.4861
E	113.94	5B-ID-40-2	0.5386	5T-ID-40-2	0.4981
F	109.96	5B-ID-40-2	0.4539	5T-ID-40-2	0.4915
G	118.99	5B-ID-40-2	0.5831	5T-ID-40-2	0.5014
H	113.64	5B-ID-40-2	0.5454	5T-ID-40-2	0.4688
I	100.16	5B-ID-40-2	0.4116	5T-ID-40-2	0.448
J	114.55	5B-ID-40-2	0.5738	5T-ID-40-2	0.4892
K	305.43	5B-ID-40-2	0.5304	5T-ID-40-2	0.5994

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L	186.15	5B-ID-40-2	0.4545	5T-ID-40-2	0.4796
A	128.4	5B-ID-40-3	0.5838	5T-ID-40-3	0.4909
B	112.87	5B-ID-40-3	0.4558	5T-ID-40-3	0.4708
C	112.9	5B-ID-40-3	0.4203	5T-ID-40-3	0.4763
D	112.6	5B-ID-40-3	0.3622	5T-ID-40-3	0.4635
E	113.94	5B-ID-40-3	0.4913	5T-ID-40-3	0.4987
F	109.96	5B-ID-40-3	0.4347	5T-ID-40-3	0.4796
G	118.99	5B-ID-40-3	0.5193	5T-ID-40-3	0.4945
H	113.64	5B-ID-40-3	0.5571	5T-ID-40-3	0.4865
I	100.16	5B-ID-40-3	0.4211	5T-ID-40-3	0.4863
J	114.55	5B-ID-40-3	0.5593	5T-ID-40-3	0.4842
K	305.43	5B-ID-40-3	0.5105	5T-ID-40-3	0.6158
L	186.15	5B-ID-40-3	0.4386	5T-ID-40-3	0.4553
A	128.4	5B-ID-50-1	0.5636	5T-ID-50-1	0.5064
B	112.87	5B-ID-50-1	0.4241	5T-ID-50-1	0.4875
C	112.9	5B-ID-50-1	0.3788	5T-ID-50-1	0.482
D	112.6	5B-ID-50-1	0.3232	5T-ID-50-1	0.4521
E	113.94	5B-ID-50-1	0.5649	5T-ID-50-1	0.5129
F	109.96	5B-ID-50-1	0.4417	5T-ID-50-1	0.4975
G	118.99	5B-ID-50-1	0.49	5T-ID-50-1	0.5129
H	113.64	5B-ID-50-1	0.5863	5T-ID-50-1	0.551
I	100.16	5B-ID-50-1	0.4002	5T-ID-50-1	0.4918
J	114.55	5B-ID-50-1	0.5692	5T-ID-50-1	0.5264
K	305.43	5B-ID-50-1	0.5124	5T-ID-50-1	0.6278
L	186.15	5B-ID-50-1	0.4273	5T-ID-50-1	0.4604
A	128.4	5B-ID-50-2	0.5462	5T-ID-50-2	0.5051
B	112.87	5B-ID-50-2	0.4013	5T-ID-50-2	0.4628
C	112.9	5B-ID-50-2	0.3481	5T-ID-50-2	0.4935
D	112.6	5B-ID-50-2	0.3432	5T-ID-50-2	0.4563
E	113.94	5B-ID-50-2	0.4408	5T-ID-50-2	0.5022
F	109.96	5B-ID-50-2	0.4205	5T-ID-50-2	0.4972
G	118.99	5B-ID-50-2	0.4819	5T-ID-50-2	0.4889
H	113.64	5B-ID-50-2	0.5625	5T-ID-50-2	0.5214
I	100.16	5B-ID-50-2	0.3337	5T-ID-50-2	0.5182
J	114.55	5B-ID-50-2	0.563	5T-ID-50-2	0.5152
K	305.43	5B-ID-50-2	0.5363	5T-ID-50-2	0.6296
L	186.15	5B-ID-50-2	0.4158	5T-ID-50-2	0.4549
A	128.4	5B-ID-50-3	0.521	5T-ID-50-3	0.4996
B	112.87	5B-ID-50-3	0.4049	5T-ID-50-3	0.4656
C	112.9	5B-ID-50-3	0.3207	5T-ID-50-3	0.4545
D	112.6	5B-ID-50-3	0.399	5T-ID-50-3	0.4454
E	113.94	5B-ID-50-3	0.4596	5T-ID-50-3	0.4857

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	5B-ID-50-3	0.3735	5T-ID-50-3	0.4753
G	118.99	5B-ID-50-3	0.4653	5T-ID-50-3	0.4725
H	113.64	5B-ID-50-3	0.5503	5T-ID-50-3	0.5007
I	100.16	5B-ID-50-3	0.3755	5T-ID-50-3	0.4761
J	114.55	5B-ID-50-3	0.5793	5T-ID-50-3	0.501
K	305.43	5B-ID-50-3	0.5265	5T-ID-50-3	0.6129
L	186.15	5B-ID-50-3	0.3909	5T-ID-50-3	0.4439
A	128.4	5B-IU-20-1	0.6638	5T-IU-20-1	0.4938
B	112.87	5B-IU-20-1	0.6305	5T-IU-20-1	0.4732
C	112.9	5B-IU-20-1	0.5915	5T-IU-20-1	0.4537
D	112.6	5B-IU-20-1	0.6024	5T-IU-20-1	0.4795
E	113.94	5B-IU-20-1	0.6005	5T-IU-20-1	0.4676
F	109.96	5B-IU-20-1	0.5966	5T-IU-20-1	0.4585
G	118.99	5B-IU-20-1	0.5781	5T-IU-20-1	0.4949
H	113.64	5B-IU-20-1	0.544	5T-IU-20-1	0.4926
I	100.16	5B-IU-20-1	0.5531	5T-IU-20-1	0.4568
J	114.55	5B-IU-20-1	0.5594	5T-IU-20-1	0.4817
K	305.43	5B-IU-20-1	0.6205	5T-IU-20-1	0.6578
L	186.15	5B-IU-20-1	0.5337	5T-IU-20-1	0.5556
A	128.4	5B-IU-20-2	0.669	5T-IU-20-2	0.5093
B	112.87	5B-IU-20-2	0.6341	5T-IU-20-2	0.4834
C	112.9	5B-IU-20-2	0.6116	5T-IU-20-2	0.4721
D	112.6	5B-IU-20-2	0.6106	5T-IU-20-2	0.4834
E	113.94	5B-IU-20-2	0.5784	5T-IU-20-2	0.4788
F	109.96	5B-IU-20-2	0.5492	5T-IU-20-2	0.4699
G	118.99	5B-IU-20-2	0.5824	5T-IU-20-2	0.4983
H	113.64	5B-IU-20-2	0.584	5T-IU-20-2	0.4881
I	100.16	5B-IU-20-2	0.5577	5T-IU-20-2	0.4656
J	114.55	5B-IU-20-2	0.5689	5T-IU-20-2	0.4898
K	305.43	5B-IU-20-2	0.5928	5T-IU-20-2	0.6482
L	186.15	5B-IU-20-2	0.5846	5T-IU-20-2	0.5479
A	128.4	5B-IU-20-3	0.6459	5T-IU-20-3	0.5001
B	112.87	5B-IU-20-3	0.6005	5T-IU-20-3	0.4861
C	112.9	5B-IU-20-3	0.6053	5T-IU-20-3	0.4736
D	112.6	5B-IU-20-3	0.5968	5T-IU-20-3	0.4781
E	113.94	5B-IU-20-3	0.5797	5T-IU-20-3	0.4877
F	109.96	5B-IU-20-3	0.5605	5T-IU-20-3	0.4803
G	118.99	5B-IU-20-3	0.5729	5T-IU-20-3	0.4965
H	113.64	5B-IU-20-3	0.573	5T-IU-20-3	0.4893
I	100.16	5B-IU-20-3	0.5494	5T-IU-20-3	0.4558
J	114.55	5B-IU-20-3	0.5847	5T-IU-20-3	0.4937
K	305.43	5B-IU-20-3	0.6049	5T-IU-20-3	0.6519

Section	Sp	Test ID	F60	Test ID	F60
L	186.15	5B-IU-20-3	0.5754	5T-IU-20-3	0.5358
A	128.4	5B-IU-40-1	0.5347	5T-IU-40-1	0.5224
B	112.87	5B-IU-40-1	0.5109	5T-IU-40-1	0.5002
C	112.9	5B-IU-40-1	0.4663	5T-IU-40-1	0.4802
D	112.6	5B-IU-40-1	0.5131	5T-IU-40-1	0.4906
E	113.94	5B-IU-40-1	0.4207	5T-IU-40-1	0.4882
F	109.96	5B-IU-40-1	0.3998	5T-IU-40-1	0.4811
G	118.99	5B-IU-40-1	0.4841	5T-IU-40-1	0.4595
H	113.64	5B-IU-40-1	0.4872	5T-IU-40-1	0.4673
I	100.16	5B-IU-40-1	0.4551	5T-IU-40-1	0.4775
J	114.55	5B-IU-40-1	0.4608	5T-IU-40-1	0.4757
K	305.43	5B-IU-40-1	0.5471	5T-IU-40-1	0.6059
L	186.15	5B-IU-40-1	0.5218	5T-IU-40-1	0.4797
A	128.4	5B-IU-40-2	0.5538	5T-IU-40-2	0.5072
B	112.87	5B-IU-40-2	0.532	5T-IU-40-2	0.4961
C	112.9	5B-IU-40-2	0.4998	5T-IU-40-2	0.4977
D	112.6	5B-IU-40-2	0.4933	5T-IU-40-2	0.493
E	113.94	5B-IU-40-2	0.4155	5T-IU-40-2	0.4917
F	109.96	5B-IU-40-2	0.3859	5T-IU-40-2	0.5043
G	118.99	5B-IU-40-2	0.4697	5T-IU-40-2	0.4865
H	113.64	5B-IU-40-2	0.493	5T-IU-40-2	0.5
I	100.16	5B-IU-40-2	0.5258	5T-IU-40-2	0.4762
J	114.55	5B-IU-40-2	0.4662	5T-IU-40-2	0.4672
K	305.43	5B-IU-40-2	0.5208	5T-IU-40-2	0.6159
L	186.15	5B-IU-40-2	0.4976	5T-IU-40-2	0.4993
A	128.4	5B-IU-40-3	0.4928	5T-IU-40-3	0.5019
B	112.87	5B-IU-40-3	0.5168	5T-IU-40-3	0.495
C	112.9	5B-IU-40-3	0.4616	5T-IU-40-3	0.496
D	112.6	5B-IU-40-3	0.477	5T-IU-40-3	0.4867
E	113.94	5B-IU-40-3	0.4349	5T-IU-40-3	0.499
F	109.96	5B-IU-40-3	0.3421	5T-IU-40-3	0.4689
G	118.99	5B-IU-40-3	0.4394	5T-IU-40-3	0.4871
H	113.64	5B-IU-40-3	0.4487	5T-IU-40-3	0.4839
I	100.16	5B-IU-40-3	0.4518	5T-IU-40-3	0.4704
J	114.55	5B-IU-40-3	0.435	5T-IU-40-3	0.507
K	305.43	5B-IU-40-3	0.5502	5T-IU-40-3	0.6241
L	186.15	5B-IU-40-3	0.485	5T-IU-40-3	0.4977
A	128.4	5B-IU-50-1	0.493	5T-IU-50-1	0.5302
B	112.87	5B-IU-50-1	0.497	5T-IU-50-1	0.5141
C	112.9	5B-IU-50-1	0.4264	5T-IU-50-1	0.4857
D	112.6	5B-IU-50-1	0.4793	5T-IU-50-1	0.5006
E	113.94	5B-IU-50-1	0.3847	5T-IU-50-1	0.5255

Section	Sp	Test ID	F60	Test ID	F60
F	109.96	5B-IU-50-1	0.3293	5T-IU-50-1	0.5097
G	118.99	5B-IU-50-1	0.4487	5T-IU-50-1	0.5031
H	113.64	5B-IU-50-1	0.4158	5T-IU-50-1	0.5032
I	100.16	5B-IU-50-1	0.4384	5T-IU-50-1	0.5038
J	114.55	5B-IU-50-1	0.4449	5T-IU-50-1	0.5143
K	305.43	5B-IU-50-1	0.545	5T-IU-50-1	0.625
L	186.15	5B-IU-50-1	0.4552	5T-IU-50-1	0.4718
A	128.4	5B-IU-50-2	0.4602	5T-IU-50-2	0.4919
B	112.87	5B-IU-50-2	0.4315	5T-IU-50-2	0.4993
C	112.9	5B-IU-50-2	0.4128	5T-IU-50-2	0.4753
D	112.6	5B-IU-50-2	0.4383	5T-IU-50-2	0.507
E	113.94	5B-IU-50-2	0.3395	5T-IU-50-2	0.4791
F	109.96	5B-IU-50-2	0.3251	5T-IU-50-2	0.4879
G	118.99	5B-IU-50-2	0.4476	5T-IU-50-2	0.513
H	113.64	5B-IU-50-2	0.3665	5T-IU-50-2	0.5247
I	100.16	5B-IU-50-2	0.407	5T-IU-50-2	0.5119
J	114.55	5B-IU-50-2	0.4153	5T-IU-50-2	0.4871
K	305.43	5B-IU-50-2	0.55	5T-IU-50-2	0.6312
L	186.15	5B-IU-50-2	0.4491	5T-IU-50-2	0.4806
A	128.4	5B-IU-50-3	0.4928	5T-IU-50-3	0.4727
B	112.87	5B-IU-50-3	0.4623	5T-IU-50-3	0.5002
C	112.9	5B-IU-50-3	0.442	5T-IU-50-3	0.4864
D	112.6	5B-IU-50-3	0.3931	5T-IU-50-3	0.4871
E	113.94	5B-IU-50-3	0.3673	5T-IU-50-3	0.492
F	109.96	5B-IU-50-3	0.3105	5T-IU-50-3	0.4591
G	118.99	5B-IU-50-3	0.3975	5T-IU-50-3	0.4795
H	113.64	5B-IU-50-3	0.4265	5T-IU-50-3	0.4866
I	100.16	5B-IU-50-3	0.4369	5T-IU-50-3	0.4985
J	114.55	5B-IU-50-3	0.4089	5T-IU-50-3	0.5311
K	305.43	5B-IU-50-3	0.5408	5T-IU-50-3	0.6246
L	186.15	5B-IU-50-3	0.4609	5T-IU-50-3	0.4829
A	81.19	5B-NID-20-1	0.4847	5T-NID-20-1	0.4103
B	91.92	5B-NID-20-1	0.5082	5T-NID-20-1	0.4316
C	108.44	5B-NID-20-1	0.5985	5T-NID-20-1	0.4537
D	104	5B-NID-20-1	0.4622	5T-NID-20-1	0.4523
E	102.48	5B-NID-20-1	0.5286	5T-NID-20-1	0.4488
F	107.1	5B-NID-20-1	0.5273	5T-NID-20-1	0.4626
G	101.22	5B-NID-20-1	0.5054	5T-NID-20-1	0.4509
H	112.49	5B-NID-20-1	0.5404	5T-NID-20-1	0.4619
I	95.66	5B-NID-20-1	0.5308	5T-NID-20-1	0.4045
J	102.36	5B-NID-20-1	0.5755	5T-NID-20-1	0.442
K	334.58	5B-NID-20-1	0.5673	5T-NID-20-1	0.7335

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	5B-NID-20-1	0.5429	5T-NID-20-1	0.5397
A	81.19	5B-NID-20-2	0.4631	5T-NID-20-2	0.4282
B	91.92	5B-NID-20-2	0.4994	5T-NID-20-2	0.4616
C	108.44	5B-NID-20-2	0.5636	5T-NID-20-2	0.4647
D	104	5B-NID-20-2	0.4946	5T-NID-20-2	0.458
E	102.48	5B-NID-20-2	0.5528	5T-NID-20-2	0.4504
F	107.1	5B-NID-20-2	0.5563	5T-NID-20-2	0.4575
G	101.22	5B-NID-20-2	0.555	5T-NID-20-2	0.491
H	112.49	5B-NID-20-2	0.5424	5T-NID-20-2	0.4732
I	95.66	5B-NID-20-2	0.5065	5T-NID-20-2	0.4312
J	102.36	5B-NID-20-2	0.5849	5T-NID-20-2	0.452
K	334.58	5B-NID-20-2	0.5859	5T-NID-20-2	0.6922
L	187.93	5B-NID-20-2	0.5616	5T-NID-20-2	0.5485
A	81.19	5B-NID-20-3	0.4694	5T-NID-20-3	0.4192
B	91.92	5B-NID-20-3	0.5009	5T-NID-20-3	0.4494
C	108.44	5B-NID-20-3	0.5937	5T-NID-20-3	0.4819
D	104	5B-NID-20-3	0.4675	5T-NID-20-3	0.4481
E	102.48	5B-NID-20-3	0.5595	5T-NID-20-3	0.4516
F	107.1	5B-NID-20-3	0.5511	5T-NID-20-3	0.4653
G	101.22	5B-NID-20-3	0.5451	5T-NID-20-3	0.4712
H	112.49	5B-NID-20-3	0.5565	5T-NID-20-3	0.4638
I	95.66	5B-NID-20-3	0.5303	5T-NID-20-3	0.4392
J	102.36	5B-NID-20-3	0.5694	5T-NID-20-3	0.4648
K	334.58	5B-NID-20-3	0.5661	5T-NID-20-3	0.7046
L	187.93	5B-NID-20-3	0.5915	5T-NID-20-3	0.536
A	81.19	5B-NID-40-1	0.2895	5T-NID-40-1	0.4715
B	91.92	5B-NID-40-1	0.3186	5T-NID-40-1	0.4476
C	108.44	5B-NID-40-1	0.4946	5T-NID-40-1	0.4655
D	104	5B-NID-40-1	0.3162	5T-NID-40-1	0.4467
E	102.48	5B-NID-40-1	0.445	5T-NID-40-1	0.4713
F	107.1	5B-NID-40-1	0.4445	5T-NID-40-1	0.4926
G	101.22	5B-NID-40-1	0.4594	5T-NID-40-1	0.465
H	112.49	5B-NID-40-1	0.4435	5T-NID-40-1	0.4679
I	95.66	5B-NID-40-1	0.4168	5T-NID-40-1	0.4588
J	102.36	5B-NID-40-1	0.5883	5T-NID-40-1	0.4743
K	334.58	5B-NID-40-1	0.5865	5T-NID-40-1	0.6852
L	187.93	5B-NID-40-1	0.4818	5T-NID-40-1	0.4731
A	81.19	5B-NID-40-2	0.2634	5T-NID-40-2	0.472
B	91.92	5B-NID-40-2	0.3224	5T-NID-40-2	0.4722
C	108.44	5B-NID-40-2	0.4797	5T-NID-40-2	0.4651
D	104	5B-NID-40-2	0.4094	5T-NID-40-2	0.4538
E	102.48	5B-NID-40-2	0.4009	5T-NID-40-2	0.4782

Section	Sp	Test ID	F60	Test ID	F60
F	107.1	5B-NID-40-2	0.4615	5T-NID-40-2	0.4864
G	101.22	5B-NID-40-2	0.4235	5T-NID-40-2	0.4688
H	112.49	5B-NID-40-2	0.4269	5T-NID-40-2	0.4679
I	95.66	5B-NID-40-2	0.4197	5T-NID-40-2	0.4536
J	102.36	5B-NID-40-2	0.5251	5T-NID-40-2	0.4635
K	334.58	5B-NID-40-2	0.5476	5T-NID-40-2	0.7171
L	187.93	5B-NID-40-2	0.4606	5T-NID-40-2	0.4759
A	81.19	5B-NID-40-3	0.2662	5T-NID-40-3	0.4523
B	91.92	5B-NID-40-3	0.32	5T-NID-40-3	0.4586
C	108.44	5B-NID-40-3	0.4129	5T-NID-40-3	0.4763
D	104	5B-NID-40-3	0.3858	5T-NID-40-3	0.4689
E	102.48	5B-NID-40-3	0.3932	5T-NID-40-3	0.4707
F	107.1	5B-NID-40-3	0.4041	5T-NID-40-3	0.4869
G	101.22	5B-NID-40-3	0.4312	5T-NID-40-3	0.4625
H	112.49	5B-NID-40-3	0.4443	5T-NID-40-3	0.4748
I	95.66	5B-NID-40-3	0.4216	5T-NID-40-3	0.4661
J	102.36	5B-NID-40-3	0.5364	5T-NID-40-3	0.4673
K	334.58	5B-NID-40-3	0.5839	5T-NID-40-3	0.7055
L	187.93	5B-NID-40-3	0.4567	5T-NID-40-3	0.4576
A	81.19	5B-NID-50-1	0.2599	5T-NID-50-1	0.5286
B	91.92	5B-NID-50-1	0.2185	5T-NID-50-1	0.4912
C	108.44	5B-NID-50-1	0.3754	5T-NID-50-1	0.4812
D	104	5B-NID-50-1	0.2989	5T-NID-50-1	0.4779
E	102.48	5B-NID-50-1	0.4053	5T-NID-50-1	0.5167
F	107.1	5B-NID-50-1	0.4287	5T-NID-50-1	0.5081
G	101.22	5B-NID-50-1	0.346	5T-NID-50-1	0.5051
H	112.49	5B-NID-50-1	0.3882	5T-NID-50-1	0.5228
I	95.66	5B-NID-50-1	0.4286	5T-NID-50-1	0.5049
J	102.36	5B-NID-50-1	0.5171	5T-NID-50-1	0.5209
K	334.58	5B-NID-50-1	0.562	5T-NID-50-1	0.7511
L	187.93	5B-NID-50-1	0.4535	5T-NID-50-1	0.4849
A	81.19	5B-NID-50-2	0.2376	5T-NID-50-2	0.5194
B	91.92	5B-NID-50-2	0.2415	5T-NID-50-2	0.5064
C	108.44	5B-NID-50-2	0.4436	5T-NID-50-2	0.486
D	104	5B-NID-50-2	0.3254	5T-NID-50-2	0.4522
E	102.48	5B-NID-50-2	0.3912	5T-NID-50-2	0.4934
F	107.1	5B-NID-50-2	0.4354	5T-NID-50-2	0.4847
G	101.22	5B-NID-50-2	0.4467	5T-NID-50-2	0.4939
H	112.49	5B-NID-50-2	0.4233	5T-NID-50-2	0.4873
I	95.66	5B-NID-50-2	0.5156	5T-NID-50-2	0.4966
J	102.36	5B-NID-50-2	0.5074	5T-NID-50-2	0.512
K	334.58	5B-NID-50-2	0.5642	5T-NID-50-2	0.718

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	5B-NID-50-2	0.4462	5T-NID-50-2	0.4628
A	81.19	5B-NID-50-3	0.2442	5T-NID-50-3	0.5004
B	91.92	5B-NID-50-3	0.2396	5T-NID-50-3	0.474
C	108.44	5B-NID-50-3	0.3804	5T-NID-50-3	0.499
D	104	5B-NID-50-3	0.313	5T-NID-50-3	0.4713
E	102.48	5B-NID-50-3	0.3784	5T-NID-50-3	0.4745
F	107.1	5B-NID-50-3	0.3842	5T-NID-50-3	0.4827
G	101.22	5B-NID-50-3	0.3631	5T-NID-50-3	0.4798
H	112.49	5B-NID-50-3	0.3883	5T-NID-50-3	0.4951
I	95.66	5B-NID-50-3	0.3605	5T-NID-50-3	0.4728
J	102.36	5B-NID-50-3	0.4822	5T-NID-50-3	0.4943
K	334.58	5B-NID-50-3	0.5546	5T-NID-50-3	0.7179
L	187.93	5B-NID-50-3	0.4286	5T-NID-50-3	0.4737
A	81.19	5B-NIU-20-1	0.4782	5T-NIU-20-1	0.383
B	91.92	5B-NIU-20-1	0.611	5T-NIU-20-1	0.4353
C	108.44	5B-NIU-20-1	0.5559	5T-NIU-20-1	0.46
D	104	5B-NIU-20-1	0.5311	5T-NIU-20-1	0.4498
E	102.48	5B-NIU-20-1	0.553	5T-NIU-20-1	0.4517
F	107.1	5B-NIU-20-1	0.5771	5T-NIU-20-1	0.4528
G	101.22	5B-NIU-20-1	0.5662	5T-NIU-20-1	0.4408
H	112.49	5B-NIU-20-1	0.5623	5T-NIU-20-1	0.4756
I	95.66	5B-NIU-20-1	0.5401	5T-NIU-20-1	0.4441
J	102.36	5B-NIU-20-1	0.5469	5T-NIU-20-1	0.4593
K	334.58	5B-NIU-20-1	0.5599	5T-NIU-20-1	0.6484
L	187.93	5B-NIU-20-1	0.5395	5T-NIU-20-1	0.5144
A	81.19	5B-NIU-20-2	0.491	5T-NIU-20-2	0.4025
B	91.92	5B-NIU-20-2	0.5938	5T-NIU-20-2	0.4499
C	108.44	5B-NIU-20-2	0.5624	5T-NIU-20-2	0.4672
D	104	5B-NIU-20-2	0.5701	5T-NIU-20-2	0.4542
E	102.48	5B-NIU-20-2	0.5378	5T-NIU-20-2	0.4669
F	107.1	5B-NIU-20-2	0.5568	5T-NIU-20-2	0.482
G	101.22	5B-NIU-20-2	0.5855	5T-NIU-20-2	0.4633
H	112.49	5B-NIU-20-2	0.5688	5T-NIU-20-2	0.4904
I	95.66	5B-NIU-20-2	0.5395	5T-NIU-20-2	0.4557
J	102.36	5B-NIU-20-2	0.5475	5T-NIU-20-2	0.4611
K	334.58	5B-NIU-20-2	0.5207	5T-NIU-20-2	0.6599
L	187.93	5B-NIU-20-2	0.5396	5T-NIU-20-2	0.5416
A	81.19	5B-NIU-20-3	0.5118	5T-NIU-20-3	0.4228
B	91.92	5B-NIU-20-3	0.5796	5T-NIU-20-3	0.4461
C	108.44	5B-NIU-20-3	0.606	5T-NIU-20-3	0.4754
D	104	5B-NIU-20-3	0.6094	5T-NIU-20-3	0.4678
E	102.48	5B-NIU-20-3	0.5675	5T-NIU-20-3	0.4546

Section	Sp	Test ID	F60	Test ID	F60
F	107.1	5B-NIU-20-3	0.5897	5T-NIU-20-3	0.4752
G	101.22	5B-NIU-20-3	0.5675	5T-NIU-20-3	0.4512
H	112.49	5B-NIU-20-3	0.5725	5T-NIU-20-3	0.4852
I	95.66	5B-NIU-20-3	0.5444	5T-NIU-20-3	0.4644
J	102.36	5B-NIU-20-3	0.5538	5T-NIU-20-3	0.4611
K	334.58	5B-NIU-20-3	0.5299	5T-NIU-20-3	0.6806
L	187.93	5B-NIU-20-3	0.5434	5T-NIU-20-3	0.5145
A	81.19	5B-NIU-40-1	0.2944	5T-NIU-40-1	0.466
B	91.92	5B-NIU-40-1	0.4894	5T-NIU-40-1	0.4884
C	108.44	5B-NIU-40-1	0.4876	5T-NIU-40-1	0.4605
D	104	5B-NIU-40-1	0.4316	5T-NIU-40-1	0.4866
E	102.48	5B-NIU-40-1	0.4294	5T-NIU-40-1	0.4838
F	107.1	5B-NIU-40-1	0.4512	5T-NIU-40-1	0.4921
G	101.22	5B-NIU-40-1	0.4279	5T-NIU-40-1	0.5018
H	112.49	5B-NIU-40-1	0.4819	5T-NIU-40-1	0.4966
I	95.66	5B-NIU-40-1	0.4336	5T-NIU-40-1	0.4856
J	102.36	5B-NIU-40-1	0.4497	5T-NIU-40-1	0.4877
K	334.58	5B-NIU-40-1	0.5702	5T-NIU-40-1	0.6371
L	187.93	5B-NIU-40-1	0.437	5T-NIU-40-1	0.4603
A	81.19	5B-NIU-40-2	0.2745	5T-NIU-40-2	0.4559
B	91.92	5B-NIU-40-2	0.4969	5T-NIU-40-2	0.471
C	108.44	5B-NIU-40-2	0.4771	5T-NIU-40-2	0.4821
D	104	5B-NIU-40-2	0.4812	5T-NIU-40-2	0.4728
E	102.48	5B-NIU-40-2	0.4562	5T-NIU-40-2	0.4688
F	107.1	5B-NIU-40-2	0.4372	5T-NIU-40-2	0.4808
G	101.22	5B-NIU-40-2	0.4409	5T-NIU-40-2	0.4714
H	112.49	5B-NIU-40-2	0.432	5T-NIU-40-2	0.501
I	95.66	5B-NIU-40-2	0.4127	5T-NIU-40-2	0.477
J	102.36	5B-NIU-40-2	0.4869	5T-NIU-40-2	0.4909
K	334.58	5B-NIU-40-2	0.5429	5T-NIU-40-2	0.6381
L	187.93	5B-NIU-40-2	0.4551	5T-NIU-40-2	0.4697
A	81.19	5B-NIU-40-3	0.2881	5T-NIU-40-3	0.4447
B	91.92	5B-NIU-40-3	0.4949	5T-NIU-40-3	0.4726
C	108.44	5B-NIU-40-3	0.4832	5T-NIU-40-3	0.4551
D	104	5B-NIU-40-3	0.4535	5T-NIU-40-3	0.4619
E	102.48	5B-NIU-40-3	0.4076	5T-NIU-40-3	0.4814
F	107.1	5B-NIU-40-3	0.4313	5T-NIU-40-3	0.4846
G	101.22	5B-NIU-40-3	0.3871	5T-NIU-40-3	0.4872
H	112.49	5B-NIU-40-3	0.4644	5T-NIU-40-3	0.4707
I	95.66	5B-NIU-40-3	0.3928	5T-NIU-40-3	0.4921
J	102.36	5B-NIU-40-3	0.5422	5T-NIU-40-3	0.4909
K	334.58	5B-NIU-40-3	0.5314	5T-NIU-40-3	0.6359

Section	Sp	Test ID	F60	Test ID	F60
L	187.93	5B-NIU-40-3	0.4416	5T-NIU-40-3	0.4521
A	81.19	5B-NIU-50-1	0.2643	5T-NIU-50-1	0.4967
B	91.92	5B-NIU-50-1	0.4942	5T-NIU-50-1	0.5082
C	108.44	5B-NIU-50-1	0.4807	5T-NIU-50-1	0.5015
D	104	5B-NIU-50-1	0.4366	5T-NIU-50-1	0.5143
E	102.48	5B-NIU-50-1	0.346	5T-NIU-50-1	0.5004
F	107.1	5B-NIU-50-1	0.3955	5T-NIU-50-1	0.5156
G	101.22	5B-NIU-50-1	0.3853	5T-NIU-50-1	0.4893
H	112.49	5B-NIU-50-1	0.359	5T-NIU-50-1	0.5038
I	95.66	5B-NIU-50-1	0.3688	5T-NIU-50-1	0.5184
J	102.36	5B-NIU-50-1	0.4456	5T-NIU-50-1	0.5389
K	334.58	5B-NIU-50-1	0.5312	5T-NIU-50-1	0.6482
L	187.93	5B-NIU-50-1	0.4706	5T-NIU-50-1	0.478
A	81.19	5B-NIU-50-2	0.2278	5T-NIU-50-2	0.5001
B	91.92	5B-NIU-50-2	0.4527	5T-NIU-50-2	0.5159
C	108.44	5B-NIU-50-2	0.4437	5T-NIU-50-2	0.4977
D	104	5B-NIU-50-2	0.4223	5T-NIU-50-2	0.4889
E	102.48	5B-NIU-50-2	0.3714	5T-NIU-50-2	0.5063
F	107.1	5B-NIU-50-2	0.3545	5T-NIU-50-2	0.495
G	101.22	5B-NIU-50-2	0.3301	5T-NIU-50-2	0.5027
H	112.49	5B-NIU-50-2	0.4022	5T-NIU-50-2	0.514
I	95.66	5B-NIU-50-2	0.3658	5T-NIU-50-2	0.5323
J	102.36	5B-NIU-50-2	0.4008	5T-NIU-50-2	0.5252
K	334.58	5B-NIU-50-2	0.5245	5T-NIU-50-2	0.6452
L	187.93	5B-NIU-50-2	0.4291	5T-NIU-50-2	0.4814
A	81.19	5B-NIU-50-3	0.2065	5T-NIU-50-3	0.4871
B	91.92	5B-NIU-50-3	0.4386	5T-NIU-50-3	0.4844
C	108.44	5B-NIU-50-3	0.3911	5T-NIU-50-3	0.4884
D	104	5B-NIU-50-3	0.4253	5T-NIU-50-3	0.4625
E	102.48	5B-NIU-50-3	0.3436	5T-NIU-50-3	0.488
F	107.1	5B-NIU-50-3	0.3545	5T-NIU-50-3	0.4614
G	101.22	5B-NIU-50-3	0.3258	5T-NIU-50-3	0.4561
H	112.49	5B-NIU-50-3	0.4223	5T-NIU-50-3	0.476
I	95.66	5B-NIU-50-3	0.4403	5T-NIU-50-3	0.511
J	102.36	5B-NIU-50-3	0.394	5T-NIU-50-3	0.5239
K	334.58	5B-NIU-50-3	0.5409	5T-NIU-50-3	0.6556
L	187.93	5B-NIU-50-3	0.4206	5T-NIU-50-3	0.4524

VITA

Robin Michelle Davis was born in Hampton, Virginia on June 24, 1977 to David C. Davis and Judith P. Davis. She lived in Grafton, Virginia and attended Tabb High School, where she graduated in June 1995. After graduation, Robin attended Virginia Polytechnic Institute and State University. In 1999, she graduated with a Bachelor of Science degree in Civil Engineering.

Upon graduation, Robin pursued a Masters of Science degree in Civil Engineering at Virginia Polytechnic Institute and State University. She was a graduate research assistant and teaching assistant throughout her tenure. She expects her Maters degree in July 2001.