

**SOIL & AGGREGATE
COMPACTION INSPECTOR
PROGRAMMED INSTRUCTION
MANUAL**

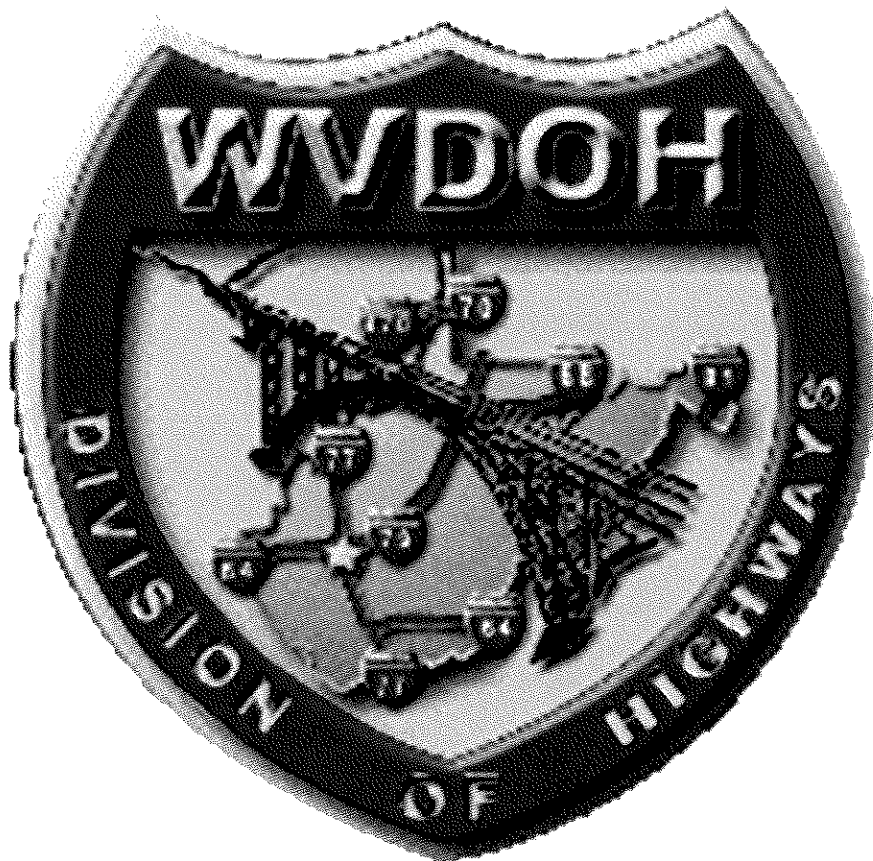


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THEORY OF COMPACTION

COMPACTION CONCEPTS - AN OVERVIEW

Compaction is very important when soil is used as an engineering material; that is, when the structure itself is constructed of soil. Earth dams and highway embankments are typical examples of earth structures. If soils are dumped or otherwise placed at random in a fill, the result will be an embankment with low stability and high settlement.

The embankment and base materials provide the foundation for the pavement. The performance of the pavement depends on the quality of materials and construction techniques used to place the underlying materials. The placement of materials in an embankment, subgrade, base, or pipe and structure backfill, involves several factors which influence the quality of the final product. The goal is to provide materials that possess the engineering properties required by the design.

Construction personnel must be experienced and knowledgeable in the placement of materials and recognize and resolve problems as they are encountered. Each type of material has unique properties which must be addressed in design and construction. Failure to correctly place materials can have devastating effects. The problems can range from rutting of the pavement to excessive settlement and other instabilities such as landslides. Settlement always occurs to some degree but must be minimized and uniform over a large area. Differential settlement can be very detrimental to the performance of the roadway.

Earthwork construction consists of placing lifts of material. Sound engineering decisions must be made before each lift is covered. The performance of the roadway depends on the daily decisions and workmanship as the construction progresses. Errors are difficult to correct and poor construction can lead to failures and large financial expenditures.

COMPACTION

Compaction is the densification of soils by the application of mechanical energy. It may also involve modification of water content and blending of soils. Coarse-grained soils are efficiently compacted by vibration. In the field, hand-operated vibrating plates and motorized vibratory rollers of various sizes are quite efficient for compacting shallow deposits of sand and gravel soils. Rubber-tired equipment can also be used efficiently to compact sands. In certain situations, large free-falling weights are used to dynamically compact loose granular deposits and fills.

Fine-grained and cohesive soils may be compacted in the laboratory by falling weights and hammers, by special "kneading" compactors, and even statically. In the field, common compaction equipment includes hand-operated tampers,

sheepsfoot rollers, rubber-tired rollers, vibratory rollers, and other types of heavy compaction equipment.

The objective of compaction is to improve the engineering properties of the soil mass. By compaction:

- Detrimental settlements can be reduced or prevented;
- Soil strength can be increased and slope stability improved;
- Bearing capacity of pavement subgrades can be improved; and
- Undesirable volume changes, for example, caused by frost action, swelling, and shrinkage, may be controlled.

THEORY OF COMPACTION

Soils form the foundation for most highway structures. The final structure, whether it is a pavement or a bridge structure, can only be as durable as the foundation upon which it rests. Compaction of the soil is necessary in order to assure that the soil or soil aggregate structure will perform and support its intended design loads. Material that is densely compacted will support more load than uncompacted material.

The fundamentals of compaction of cohesive soils were developed by R. R. Proctor in the early 1930s. Proctor published a series of articles in Engineering News-Record (Proctor 1933) on the principles of compaction, and in his honor, the standard laboratory compaction test he developed is called the Proctor test.

Proctor noted that compaction is a function of four variables: (a) dry density, γ_d ; (b) water content, w ; (c) compactive effort; and (d) soil type. Compactive effort is a measure of the mechanical energy applied to a soil mass. In the field, compactive effort is the number of passes of "coverages" of the roller of a certain type and weight on a given volume of soil. In the laboratory impact compaction test, a hammer is dropped several times on a soil sample in a mold. The mass of the hammer, height of drop, number of drops, number of layers of soil, and the volume of the mold are specified.

The "percent compaction" is a comparison between the compaction actually achieved in the field (in place density) and the maximum compaction possible for that soil type when compaction is performed under a set of controlled conditions. These controlled conditions exist in the laboratory. AASHTO T 99 and T 180 are used to determine the maximum possible density that can be expected for that specific soil type using normal construction compacting efforts.

Maximum density of a soil or soil-aggregate is also dependent on the optimum moisture content of the soil being tested. Since it is possible that several types of soil will be used on a particular construction project, it is

necessary for a laboratory to test and develop the different moisture-density relationships for each soil or soil aggregate that will be encountered. A soil or soil aggregate mixture which is not compacted to the required density may subside or undergo excessive settlement due to its own mass or traffic loadings, causing failure of the highway structure. It is critical that these tests and procedures, which determine the maximum density and the optimum moisture content, be performed properly.

The process of compaction for cohesive soils can best be illustrated by the Proctor test. Several samples of the same soil, but at different water contents, are compacted according to the standard Proctor test specifications given earlier. The total or wet density and the actual water content of each compacted sample are measured. Then the dry density for each sample can be calculated from

$$\text{Wet density, } D_{\text{wet}} = \frac{\text{total mass of wet sample, } W_s}{\text{Total volume of sample, } V_t}$$

$$\text{Dry density, } D_{\text{dry}} = \frac{\text{wet density, } D_{\text{wet}}}{100 + \text{water content, } w\%} \times 100$$

When the dry densities of each sample are determined and plotted versus the water contents for each sample, a curve called a compaction curve for standard Proctor compaction is obtained (See Figure 4.1) Each data point on the curve represents a single compaction test, and usually four or five individual tests are required to completely determine the compaction curve. This curve is unique for a given soil type, method of compaction, and (constant) compactive effort. The peak point of the curve determines the maximum dry density $\gamma_{d \text{ max}}$ at a water content known as the optimum water content w_{opt} [also called the optimum moisture content (OMC)].

Note the maximum dry density is only a maximum for a specific compactive effort and method of compaction. This does not necessarily reflect the maximum dry density that can be obtained in the field. Increasing the compactive effort tends to increase the maximum dry density, as expected, but it also decreases the optimum water content.

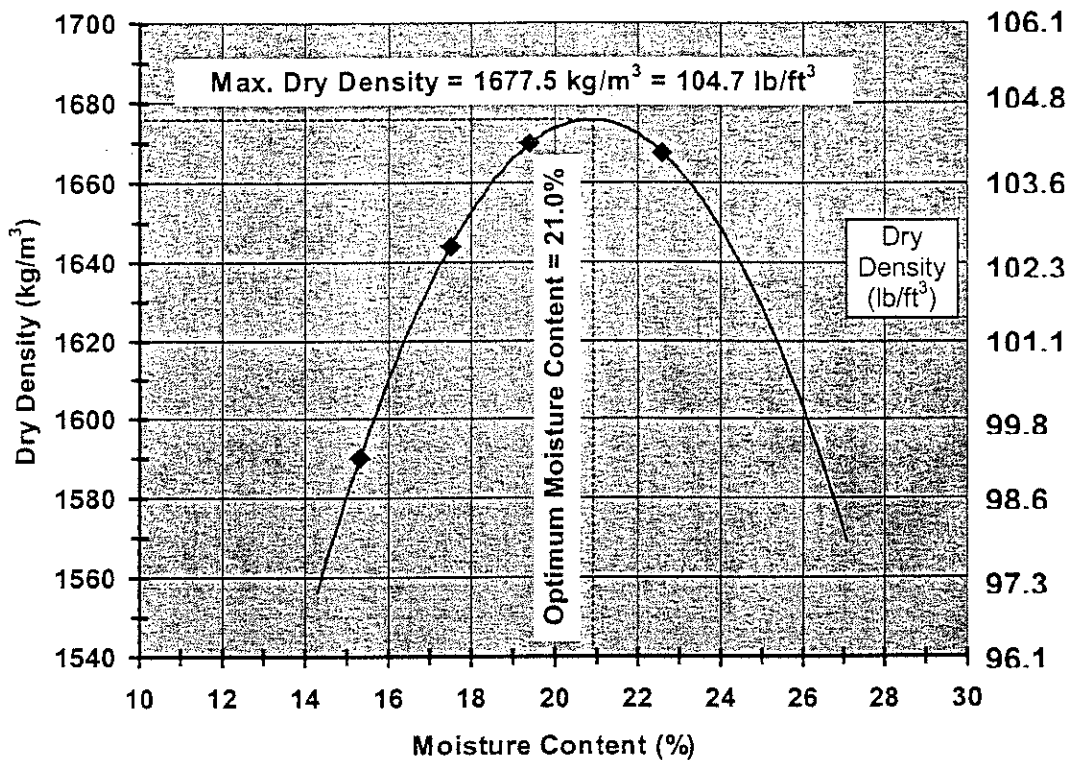


Fig. 4.1 Example Moisture-Density Curve

As the water content increases, the particles develop larger and larger water films around them, which tend to “lubricate” the particles and make them easier to be moved about and reoriented into a denser configuration. However, eventually a water content is reached at which the density does not increase any further. At this point, water starts to replace soil particles in the mold, and because the density of water is much less than the density of the mineral grains, the dry density curve starts to fall off.

EMBANKMENTS

Usually, materials that are to be used to construct the embankment are selected by the contractor and approved by the engineer. Many agencies have general requirements in their standard specifications for the soil types that are acceptable for embankment construction. These requirements or any special provision for the project should be strictly adhered to so that only suitable materials are used.

Suitable materials, if properly placed and compacted, will make satisfactory embankments. Water content in the natural state has no bearing on suitability. However, materials with excessive moisture will require drying before compaction, or they must be replaced with materials having proper water content. During excavation, if materials are uncovered that have an excessive water content, construction personnel should refer to the contract specifications. If there is still a question about whether to use the wet soils, the engineer should be consulted.

COMPACTION OPERATIONS

General

Compaction of a soil layer is probably the most important aspect of proper embankment construction. A uniform, densely compacted embankment will provide a satisfactory platform upon which to place the base courses and pavement. The word "uniform" is important in that uniform conditions during construction of the embankment will result in uniform behavior of the pavement, assuming that foundation conditions do not enter the picture. The benefits of good compaction are substantial and the consequences of poor compaction are severe. Compaction increases bearing capacity, slope stability, and resistance to frost action. It also decreases permeability and future settlement. Inadequate compaction may result in general and differential subsidence, which causes depressions and potential for premature failure of the pavement.

Heaving or Pumping

Heaving or pumping is an elastic-type deformation of the soil. When loaded, the material deforms and as the load is removed, the material springs back to its original position. The construction equipment looks as if it is riding on a wave as it travels over the fill. The soil will deflect and a wave will be created ahead of the wheel, but once the equipment moves on, the area looks the same, although there may be some cracking of the surface. Heaving occurs when there is excess moisture in the soil that does not have time to drain as the load is applied. The load is then borne jointly by the soil and the pore water pressure. This gives a temporary elasticity to the soil, thus creating the heaving or pumping effect. Note that, when in this condition, the strength of the soil is substantially reduced. Repeated loadings will continue to create cumulative pore pressures and may ultimately result in shear failure or rutting. Continued compaction operations can only worsen the situation.

Rutting

Rutting is a surface shear or bearing failure. As the equipment moves across the embankment, the loads imposed exceed the shear strength of the soil, the wheels sink, and rutting occurs. Rutting destroys the previous compaction, and

makes it impossible to place the next lift to a uniform thickness. This is particularly critical at the top of subgrade.

Compaction Equipment

There are many types and sizes of compaction equipment. The equipment ranges from large rollers such as pneumatic tired, vibratory, tamping foot etc. to small walk behind or hand held compactors. In any case, the equipment should be of the proper type and size to provide the compactive effort required for the material being placed. For example, a vibratory roller is well suited for a granular type material. Vibrations move the finer particles into void spaces. For cohesive soils, a tamping foot (sheeps foot) roller is ideal. The tamping feet provide a kneading action which compacts the material.

The efficiency of compaction equipment often depends on such things as ballast, roller speed, vibration amplitude and frequency, etc. Checking the equipment should be part of the construction activities. The compaction equipment selected should be determined by the type of soils encountered.

Pneumatic-tired compactors achieve compaction by the interaction of (a) wheel load, (b) tire size, (c) tire ply, (d) inflation pressure, and (e) the kneading action of the rubber tires as they pass over the lift. Pneumatic-tired rollers should be ballasted to meet at least the minimum wheel load.

Vibratory drum compactors develop their compactive effort by load and vibrations. Five machine features must be known in order to rate vibratory rollers: (a) unsprung drum weight, (b) rated dynamic force, (c) frequency at which the rated dynamic force is developed, (d) amplitude of the drum vibration, and (e) drum width. The dynamic force is proportional to the square of the frequency. A reduction in the frequency will significantly reduce the compactive force.

Compaction of granular soils is mostly due to the dynamic force created by a rotating eccentric weight. Vibratory compactors dramatically lose their effectiveness when the vibration is shut off because the compaction is due solely to the weight of the machine.

When sheepsfoot rollers are used, the feet must penetrate into the loose lift. If they ride on top, the machine is too light and the ballast must be increased. With succeeding passes, the feet should "walk out" of the layer. The number of passes required for the feet to walk out of the layer will be used to control compaction of subsequent layers. If the feet do not walk out, the machine is too heavy and is shearing the soils, or the soil is too wet.

MATERIALS

Materials to be compacted must be of a satisfactory quality and possess the necessary properties for the particular use. Poor quality materials may not perform properly or require extensive time and expense to improve.

In many cases embankment materials are excavated on the project. The quality of these materials may vary and it is the designer's responsibility to adequately evaluate the material properties and address their use in design. The disposition of poor materials should be addressed in the design and not left to construction personnel to handle without specific guidelines.

Poor quality materials may be improved. This might include reducing the moisture content by aeration, adding a stabilizer such as lime or cement, mixing with higher strength materials, etc.

If off-site borrow sources are used, the material must be of satisfactory quality.

The following tables and figures provide general descriptions, properties and classification of various soils and soil components. Table 4.1 defines soil components and their properties. Table 4.2 and Figure 4.2 define the AASHTO classification system of soils and soil-aggregate mixtures. Table 4.3 and Figure 4.3 define the Unified Soil Classification System (USCS). Table 4.4 provides a comparison and cross referencing of the AASHTO and USCS methods.

Table 4.1 Soil Components and Significant Properties

	Soil Component	Symbol	Grain Size Range And Description	Significant Properties
Coarse-grained components	Boulder	None	Rounded to angular, bulky, hard, rock particle, average dia. Smaller than 300 mm (12 in.)	Boulders and cobbles are very stable components, use for fills, ballast, and to stabilize slopes (riprap). Because of size and weight, their occurrence in natural deposits tends to improve the stability of foundation. Angularity of particles increase stability.
	Cobble	None	Rounded to angular, bulky, hard, rock particle, average dia. Smaller than 300 mm (12 in.) but larger than 76 mm (3 in.)	
	Gravel	G	Round to angular, bulky, hard, rock particle, passing 76 mm (3 in.) sieve retained on 4.75 mm (#4) sieve	Gravel and sand have essentially the same engineering properties differing mainly in degree. The 4.75mm sieve is arbitrary division, and does not correspond to significant change in properties. They are easy to compact, little affected by moisture, not subject to frost action. Gravels are generally more pervious and stable, resistant to erosion and piping than are sands. The well-graded sands and gravels are generally less pervious and more stable than those which are poorly graded and uniform in gradation. Irregularity of particles increases the stability slightly. Finer, uniform sands approaches the characteristics of silts, i.e. decreases in permeability and reduction in stability with increase in moisture.
	Coarse		76 mm to 19 mm (3 in. to 0.75 in.)	
	Fine		19 mm to 4.75 mm (0.75 in. to #4 sieve)	
	Sands	S	Rounded to angular, bulky, hard, rock particle, passing 4.75 mm (#4) sieve, retained on 0.075 mm (#200) sieve	
	Coarse		4.75 mm to 2.0 mm (#4 to #10) sieves	
	Medium		2.0 mm to 0.425 mm (#10 to #40) sieves	
	Fine		0.425 mm to 0.075 mm (#40 to #200) sieves	

Table 4.1 Soil Components and Significant Properties - continued				
	Soil Component	Symbol	Grain Size Range And Description	Significant Properties
Fine-grained components	Silt	M	Particles smaller than 0.075 mm (#200) sieve identified by behavior: that is, slightly or non-plastic regardless of moisture and exhibits little or not strength when air dried.	Silt is inherently unstable, particularly when moisture is increased, with a tendency to become quick when saturated. It is relatively impervious, difficult to compact highly susceptible to frost heave, easily erodible and subject to piping and boiling.
	Clay	C	Particles smaller than 0.075 mm (#200) sieve identified by behavior: that is, it can be made to exhibit plastic properties within a certain range of moisture and exhibits considerable strength when air dried.	<p>Bulky grains reduce compressibility; flaky grains, i.e., mica, diatoms, increase compressibility, produce an 'elastic' silt.</p> <p>The distinguishing characteristic of clay is cohesion or cohesive strength, which increases with decreases in moisture. The permeability of clay is very low, it is difficult to compact when wet and impossible to drain by ordinary means, when compacted is resistant to erosion and piping, is not susceptible to frost heave, is subject to expansion and shrinkage with changes in moisture.</p> <p>The properties are influenced not only by size and shape, flat, plate-like particles, but also by their mineral composition; i.e., the type of clay mineral, and chemical environment or base exchange capacity. In general, the montmorillonite clay mineral has greatest illite and kaolinite the least adverse effect on the properties.</p>

Table 4.1 Soil Components and Significant Properties - continued

	Soil Component	Symbol	Grain Size Range And Description	Significant Properties
Organic Matter	Organic Matter	O	Organic matter in various sizes and stages of decomposition	Organic matter present even in moderate amounts increases the compressibility and reduces the stability of the fine-grained components. It may decay causing voids or by chemical alteration change the properties of the soil, hence organic soils are not desirable for engineering uses.

TABLE 4.2 - AASHTO Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing 0.075 mm (No. 200) Sieve)						Silt-Clay Materials (More than 35 Percent Passing 0.0075 mm (No. 200) Sieve)			
	A-1		A-3	A-2			A-4	A-5	A-6	A-7
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6				
Sieve Analysis, percent passing	50 max	-	-	-	-	-	-	-	-	-
2.00 mm (No. 10)	30 max	50 max	51 min	-	-	-	-	-	-	-
0.425 mm (No. 40)	15 max	25 max	10 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40) sieve										
Liquid Limit	-	-	40 max	40 max	41 min	41 min	40 max	41 min	40 max	41 min
Plasticity Index	6 max	N.P.	10 max	11 min	11 min	11 min	10 max	10 max	11 min	11 min
Usual types of significant constituent materials	Stone fragments, gravel and sand	Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General rating as subgrade	Excellent to Good						Fair to Poor			

Note: Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30. See Figure 4.2.

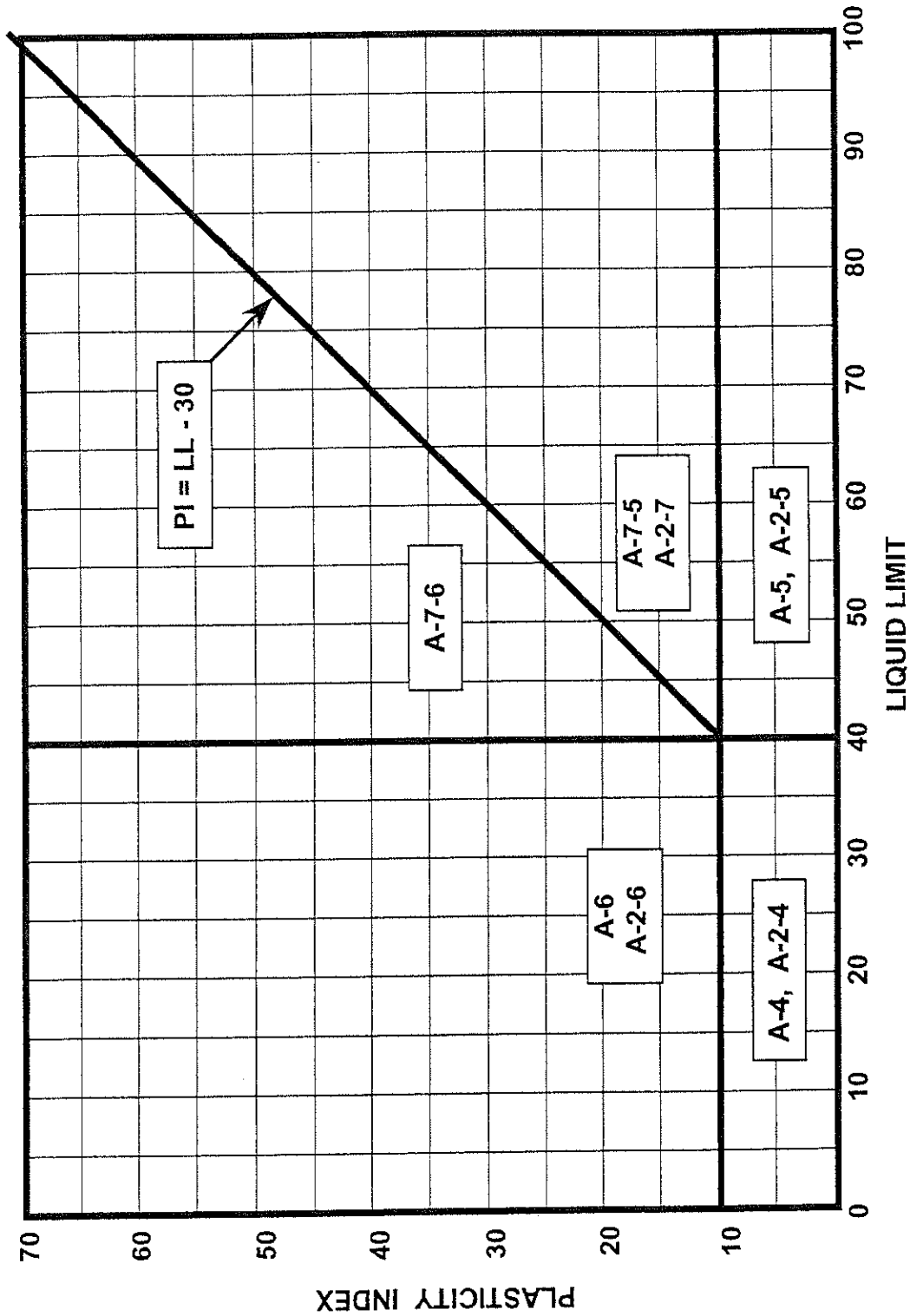


Figure 4.2 – Liquid and Plasticity Index Ranges for Silt-Clay Materials

Table 4.3 – Unified Soil Classification System

Major Division	Group Symbol	Laboratory Classification Criteria		Soil Description
		Percent finer than 0.075 mm (No. 200) sieve	Supplementary Requirements	
Coarse-grained (over 50% by weight retained on the 0.075 mm (No.200) sieve)	GW	0 to 5	C_u greater than 4; C_c between 1 and 3	Well-graded gravels, sandy gravels
	GP	0 to 5	Not meeting above gradation requirements for GW	Gap-graded or uniform gravels, sandy gravels
Sandy soils (over half of coarse fraction passing #4 sieve)	GM	12 or more	PI less than 4 or below A-line	Silty gravels, silty sandy gravels
	GC	12 or more	PI greater than 7 and above A-line	Clayey gravels, clayey sandy gravels
Fine-grained (over 50% by weight passing the 0.075 mm (No. 200) sieve)	SW	0 to 5*	C_u greater than 4; C_c between 1 and 3	Well-graded, gravelly sands
	SP	0 to 5*	Not meeting above gradation requirements for SW	Gap-graded or uniform sands, gravelly sands
Soils with fibrous organic matter	SM	12 or more*	PI less than 4 or below A-line	Silty sands, silty gravelly sands
	SC	12 or more*	PI greater than 7 and above A-line	Clayey sands, clayey gravelly sands
High compressibility (liquid limit more than 50)	ML	Plasticity Chart (Figure 4.3)		Silts, very fine sands, silty or clayey fine sands, micaceous silts
	CL	Plasticity Chart (Figure 4.3)		Low plasticity clays, sandy or silty clays
Low compressibility (liquid limit less than 50)	OL	Plasticity Chart (Figure 4.3), organic odor or color		Organic silts and clays of low plasticity
	MH	Plasticity Chart (Figure 4.3)		Micaceous silts, diatomaceous silts, volcanic ash
Soils with fibrous organic matter	CH	Plasticity Chart (Figure 4.3)		Highly plastic clays and sandy clays
	OH	Plasticity Chart (Figure 4.3), organic odor or color		Organic silts and clays of high plasticity
	Pt	Fibrous organic matter; will char, burn or glow		Peat, sandy peats and clayey peat

* Note: For soils having 5 to 12 percent passing the 0.075 mm (No. 200) sieve, use dual symbol (e.g. GW-GC)

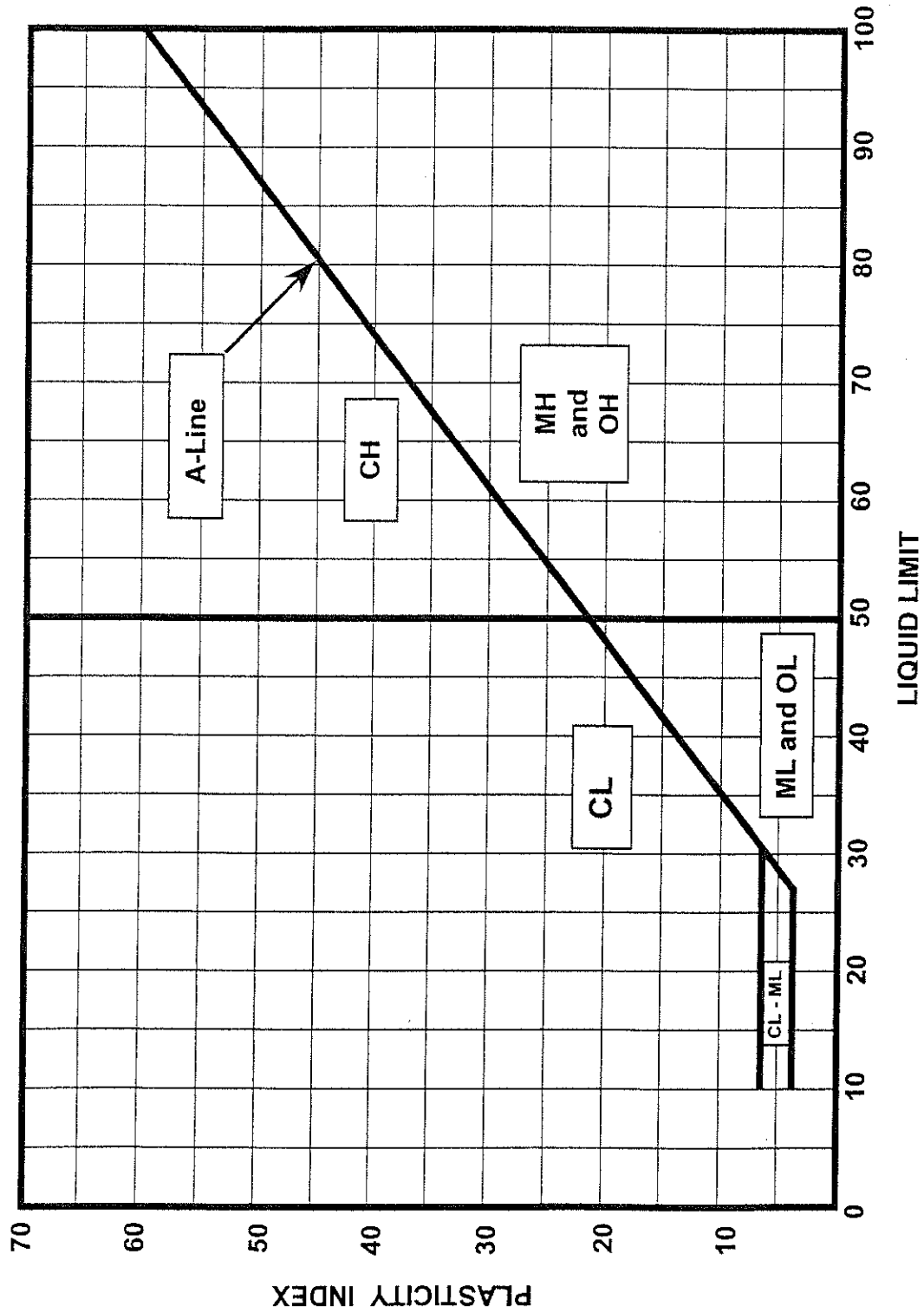


Figure 4.3 – Liquid and Plasticity Index Ranges for Silt-Clay Materials

**TABLE 4.4
COMPARISON OF AASHTO & USCS SOILS CLASSIFICATION SYSTEMS**

SOIL GROUP IN AASHTO SYSTEM	COMPARABLE SOIL GROUPS IN UNIFIED SYSTEM			SOIL GROUP IN USCS SYSTEM	COMPARABLE SOIL GROUPS IN AASHTO SYSTEM		
	MOST LIKELY	POSSIBLE	POSSIBLE BUT NOT LIKELY		MOST LIKELY	POSSIBLE	POSSIBLE BUT NOT LIKELY
A-1-a	GW, GP	SW, SP	GM, SM	GW	A-1-a	----	A-2-4 A-2-5 A-2-6 A-2-7
A-1-b	SW, SP GM, SM	GP	----	GP	A-1-a	A-1-b	A-3, A-2-4 A-2-5 A-2-6 A-2-7
A-3	SP	----	SW, GP	GM	A-1-b A-2-4 A-2-5 A-2-7	A-2-6	A-4, A-1-a A-5, A-7-5 A-6, A-7-6
A-2-4	GM, SM	GC, SC	GW, GP SW, SP	GC	A-2-6 A-2-7	A-2-4 A-6	A-4 A-7-5 A-7-6
A-2-5	GM, SM	----	GW, GP SW, SP	SW	A-1-b	A-1-a	A-3, A-2-4 A-2-5 A-2-6 A-2-7
A-2-6	GC, SC	GM, SM	GW, GP SW, SP	SP	A-3 A-1-b	A-1-a	A-2-4 A-2-5 A-2-6 A-2-7
A-2-7	GM, GC SM, SC	----	GW, GP SW, SP	SM	A-1-b A-2-4 A-2-5 A-2-7	A-4 A-5 A-2-6	A-6 A-1-a A-7-5 A-7-6
A-4	ML, OL	CL, SM SC	GM, GC	SC	A-2-6 A-2-7	A-4 A-6 A-2-4 A-7-6	A-7-5
A-5	OH, MH ML, OL	----	SM, GM	ML	A-4 A-5	A-6 A-7-5	----
A-6	CL	ML, OL SC	GC, GM SM	CL	A-6 A-7-6	A-4	----
A-7-5	OH, MH	ML, OL CH	GM, SM GC, SC	OL	A-4 A-5	A-6 A-7-5 A-7-6	----
A-7-6	CH, CL	ML, OL SC	OH, MH GC, GM SM	MH	A-5 A-7-5	----	A-7-6
				CH	A-7-6	A-7-5	----
				OH	A-5 A-7-5	----	A-7-6
				PT	----	----	----

COMPACTION CONTROL

Compaction is more than just operating a piece of equipment. There is a tendency to assume that, as long as compaction equipment is being used, the necessary degree of compaction is being achieved. This is quite often the case with embankment materials, especially materials that are not tested. Uniform compaction is just as important as adequate compaction. The operator should develop a roller pattern so that all of the material in a lift receives the same compactive effort.

The reaction of the compaction equipment to changes in the material can aid the roller operator. For example, when compacting cohesive soils with a tamping foot roller, the feet will initially sink into the material. As the material is compacted, the feet will sink in less (walk out) and continue until there are very small feet impressions. The roller operator should observe the effects and incorporate the observations in his/her rolling technique.

The equipment must be operated properly. Roller speed is particularly important with vibratory rollers. If the roller speed is too fast, the vibrations are too far apart to effectively compact. A granular material, such as a base, should be seated with one or two initial passes with the vibrator off to avoid displacing the material.

The entire lift should receive the same number of roller passes. Compaction problems occur when there are more than one type of material in the same lift. The materials may require different compactive efforts. Some materials may be over compacted while others may be under compacted.

For a base material, a gradation requirement is generally specified. Once the material is compacted to the point that the maximum density has been achieved, further compaction may start to break down the particles and the gradation will no longer be according to specifications. On the other hand, materials such as shales often break down to a soil material when exposed to air and water. Breaking these materials down during construction prevents excessive consolidation.

LIFT THICKNESS

The lift thickness depends on the type material and particle size. Materials must be placed in lifts thin enough to insure that adequate compaction can be achieved. Soils and aggregates are generally placed in thin lifts, from say 4 to 8 inches, while bedrock materials are placed in thicker lifts depending on the size of the particles and material type. Compaction testing is generally restricted to the finer materials (soils and aggregates). The lift thickness should be uniform throughout the lift. If the lift thickness is variable, some material may be under compacted and some over compacted.

Embankment lift thicknesses are often difficult to control. Lift thickness should be controlled by the dominant particle size rather than the largest pieces. For example, when a small quantity of large durable pieces are mixed with fine material (soil), the roller rides on top of the large pieces, especially when drum rollers are used, and the soil between the large pieces is not compacted. The large pieces should be removed or isolated during the excavation to prevent this problem.

DENSITY

AASHTO T 99 and AASHTO T 180 have been the standards for determining the maximum dry densities and optimum moistures for soils and aggregates. Roller pass test sections are also used to determine the maximum dry densities in the field. This involves compacting a material with a specified piece(s) of compaction equipment until the material no longer appreciably increases in density. From the test section a roller pattern can also be developed which determines the number of roller passes with a specific roller(s) necessary to achieve the desired degree of compaction.

Compacting materials increases the internal strength and load bearing capacity. The particles are rearranged and the volume is reduced. With sufficient compactive effort, the density increases to a point that no further compaction can occur unless either the particles are broken down or water is forced from the material. Further compaction, depending on the quality of the material, may cause the particles to start breaking down. For soils and aggregate bases, the maximum densities determined by either AASHTO T 99 or AASHTO T 180 are achieved before the zero air voids is reached. Materials, such as soft shales, will break down in the compaction process and the resulting soil like material is tested as soil.

A density curve, as determined by one of the methods in AASHTO T 99 or AASHTO T 180, provides the maximum dry density and optimum moisture for a particular soil at a designated compactive effort. Soil samples can be obtained for the various soils on a project and density curves developed. When compaction tests are performed, the maximum density and optimum moisture for the soil being tested can be used to evaluate the test. Representative soil samples from a large area can be tested (such as an entire state) and a family of curves can be developed. The appropriate curve from the family of curves can be selected by performing a one-point proctor with the soil being tested. The density and moisture content of the one point proctor is used to select the correct curve and the subsequent maximum dry density and optimum moisture for the soil.

Specifications for a project state the degree of compaction required for the different materials. For density there is a specified percentage of theoretical maximum dry density to which materials must be compacted. The percentage varies; however, 95% is a common value.

The field density can be determined by several methods such as the nuclear density gauge, sand cone, rubber balloon method, etc. The nuclear density gauge is the most common method. Some soils contain materials, for example mica, which affect the accuracy of the nuclear gauge. When these soils are encountered, other methods to determine the density are required.

MOISTURE

The moisture content is a critical component of the compaction process. Moisture provides a lubricant so that the particles can move and fill void spaces. The moisture content is critical especially for cohesive soils. The ideal moisture content for a particular soil is referred to as the optimum moisture. The optimum moisture is the moisture content at which a material will compact to the maximum density for the given compactive effort. Remember that the optimum moisture and maximum density depend on the applied force. As the compactive effort increases the maximum density increases and the optimum moisture decreases. The opposite occurs when the applied force decreases; the maximum density decreases and the optimum moisture increases. This is why different maximum densities and optimum moistures are obtained between AASHTO T 99 and AASHTO T 180. These methods have proven to be adequate for highway construction and provide the necessary standards on which to base acceptance decisions.

The field moisture can be determined with the nuclear density–moisture gauge, stove drying or speedy moisture. The nuclear gauge is generally the primary method with the speedy moisture or stove drying as the secondary methods. A nuclear gauge measures the moisture content based on the presence of hydrogen. Soils with organic materials or hydrogen rich minerals (i.e. hydrogen that is not attributed to water), will affect the accuracy of the moisture reading. Stove drying or speedy moisture tests are more appropriate in this case.

Specifications for a project usually indicate an allowable range that the moisture content of the soils can vary from the optimum moisture. The ranges are generally within plus or minus four percentage points from the optimum moisture content. Base course material may or may not have a moisture tolerance.

COMPACTION TESTING

Testing is a verification process to determine if the desired degree of compaction has been achieved. Random selection of test sites reduces the influence of human bias. Test results and field observations can be used to make engineering decisions on the quality of the materials. A sound testing program provides necessary information to assure the final product will perform as intended.

STABILITY

Some materials compact to a very dense, high strength condition, while others are difficult to compact to a stable condition. Materials containing large quantities of silt and fine sand, for example, are very unstable under loading. Even though the materials can be placed and compacted to the desired degree, they are susceptible to rutting and shoving when loaded. When these materials are used, special construction precautions are required to limit loading until the materials are bridged by lifts of higher strength materials. This is also the case with some cohesive soils, which are weak and easily displaced under loading (pumping or rutting).

The performance of a roadway depends on drainage. Internal drainage, as well as surface drainage, is of utmost importance. The strength of the materials must be maintained after construction in order for the roadway to perform as intended. Free draining granular materials will not be appreciably affected by moisture. In comparison, an increase in the moisture content of cohesive soils results in swelling and the material becomes unstable as it loses shear strength. Provisions in the design for drainage layers to divert water away from the materials are essential. Construction personnel must watch for seepage areas, springs, etc. that were not addressed in the design.

Construction personnel should observe the reaction of materials to construction equipment. Areas which yield (pump) under the weight of construction equipment, need to be corrected. The method(s) of corrective action depends on the situation. Some of the possible corrective measures include removing the material and replacing with a suitable material, aerating the material to reduce the moisture content, bridging the area using a high strength material such as rock, stabilizing the material with lime or cement, etc.

COMPACTION CHARACTERISTICS OF SOILS AND AGGREGATES

No one method of compaction is equally suitable for all types of soil. The following review of methods for compacting fills are divided into three groups: those suitable for cohesionless soils, those for sandy or silty soils with moderate cohesion, and those for clays. Many different compaction methods are used, each with its own benefits and limitations that must be understood to be employed effectively. Compaction problems are often the result of the use of improper compaction equipment or its improper application.

For greatest efficiency the applied compactive force must be high enough, and of sufficient duration, to rearrange the particles. However, this effort must not be so high as to cause shearing of the compacted mass. A cohesionless materials strength is affected by confinement. This is most easily accomplished by wide area of load application. In cohesive materials, the strength is affected by void ratio and moisture, and less dependent on confinement.

In cohesionless materials efficient compaction results are obtained with moderate force applied to a wide area while using vibration. In cohesive materials efficient compaction requires higher pressure for dry versus wet material, with a smaller loaded area preferable.

Along with the following discussion, Tables 4.5 and 4.6 provide basic guidance concerning various compaction methods, equipment, applicable materials and conditions.

COMPACTION OF COHESIONLESS MATERIALS

For granular materials such as sand and gravel, the best results are achieved by use of vibratory compaction equipment (vibratory rollers). Ideally, equipment should vibrate at a frequency close to the resonant frequency of the material. When this is conducted properly, void reduction can be 20 to 40 times greater than that produced by an equivalent static load. Rock fills can also be compacted effectively using vibratory equipment.

The maximum size of particles is controlled by the thickness of compacted layers. Two to four passes of vibratory rollers, moving at a speed up to 1.5 mph, are usually sufficient to achieve the desired level of compaction. Moisture control may not be necessary for granular materials due to their high permeability. Granular materials can also be compacted by use of pneumatic-tired rollers pulled by heavy track-mounted equipment. Vibrations induced by the tracked equipment work in conjunction with the static pneumatic tired rollers. Six to eight passes of such equipment are typically required to attain a satisfactory degree of compaction. Water may be added

to the material to facilitate the compaction process by temporarily "lubricating" the granular material (i.e. temporarily reducing inter-particle friction).

In confined areas the use of small self-propelled, hand-operated vibratory compactors is often necessary. The weight of these compactors varies from several hundred to several thousand pounds. The vibrating force is delivered to the material with a flat plate or roller. Four to eight inch layers can be effectively compacted.

The use of static rollers to compact cohesionless granular materials is inefficient and generally ineffective. A high degree of saturation is necessary to achieve acceptable results.

COMPACTION OF SANDY OR SILTY MATERIALS WITH MODERATE COHESION

As cohesion (and plasticity) of a material increases, the compacting effect of vibrations decreases greatly. Even a slight bond between particles interferes with their tendency to move into a more stable position. The lower permeability of these materials results in the development of excess pore water pressures. Use of vibratory equipment often results in shear failure of the material rather than densification. Compaction in layers by static rollers usually provides satisfactory results.

Two types of rollers are effective with materials of this type: pneumatic-tired (rubber-tired) rollers and sheepsfoot or padfoot rollers. Pneumatic-tired rollers are most effective for compacting slightly cohesive sandy materials, mixed-grained materials ranging from gravels to silts and clays, and non-plastic silty materials (clean silts). Sheepsfoot rollers are most effective for compaction of cohesive, plastic materials.

Pneumatic-tired rollers usually consist of a cart or bin loaded with ballast, supported on a single row of four or more wheels. Tires are inflated at pressures ranging from 50 to 125 psi. The wheels have independent suspensions so that the weight is transmitted roughly equal to all wheels, even over non-uniform ground surfaces. Embankment materials are compacted in lifts or layers of six to twelve inches (when loose), using high tire pressures, and heavy loads (30 to 50 tons). Four to eight passes generally achieve the required level of compaction.

The surface of sheepsfoot rollers are usually covered with slightly rounded pads or feet. The size, shape and arrangement of the pads can vary greatly, with a typical arrangement of approximately one pad for every 100 in.² of roller surface area. The feet extend distances typically in the range of four to eight inches from the drum, with surface areas ranging from approximately 5 to 14 in.² Depending on the size and arrangement of the feet, contact pressures typically vary from 300 to 600 psi. Material lifts are generally thin, not exceeding six inches when compacted.

Regardless of the type of compaction equipment and the degree of cohesion and plasticity, the efficiency and effectiveness of the compaction procedure depends largely on the moisture content of the material – especially for low to non-plastic uniform fine grained materials. If the moisture content during compaction is not almost exactly equal to the optimum moisture content (for the specific level of compactive effort), these materials cannot be compacted to a stable condition.

If an embankment is constructed using uniform material under carefully controlled conditions (layer thickness, type of compaction equipment, and number of passes kept constant), the effectiveness of compaction depends only on the moisture content of the material at the time of compaction. If all conditions remain the same except a lighter roller is used for compaction, the value of the maximum dry density is lower, and the optimum moisture content is higher (see Figure 5.14). Similar changes in the moisture-density relation for a given material will occur with variations in layer or lift thickness, type and/or weight of compaction equipment, roller speed, and rate of energy application. Therefore, the values of maximum dry density and optimum moisture content for a given material, will be specific with a given compaction procedure.

The water content at which a material is compacted affects the resulting density, strength, stability, and permeability. An increase in initial water content from a value below optimum moisture, to a value above optimum moisture, generally accompanies a large decrease in the material's permeability. The decrease generally is larger with increasing clay content.

COMPACTION OF CLAY

If the natural water content (natural moisture content) of a clay is not near the optimum moisture content, it may be difficult to change the moisture, especially if the water content is too high. When clay is excavated, it is generally removed in solid blocks or chunks. An individual block of clay cannot be compacted by any of the conventional compaction procedures previously discussed. Neither vibration nor short duration pressures results in significant change in water content. Use of a sheep'sfoot roller can be effective in reducing open spaces between clay chunks. Results are best if the moisture content is slightly greater than the plastic limit of the material.

If the moisture content is too high, the clay tends to stick to the roller, or the roller starts rutting or sinking into the surface. If the moisture content is considerably less than optimum, the chunks are too stiff and do not yield, with the spaces between clay blocks not effectively closed.

Table 4.5 Compaction Equipment and Methods (Navdocks DM-7)

Equipment Type	Applicability	Requirement for Compaction of 95 to 100 Percent Standard Proctor Maximum Density			Possible Variations in Equipment
		Compacted Lift Thickness, (inches)	Passes or Coverages	Dimensions and Weight of Equipment	
Sheepsfoot roller	For fine-grained soils or dirty coarse-grained soils with more than 20 percent assign the No. 200 sieve. Not suitable for clean coarse-grained soils. Particularly appropriate for compaction of impervious zone for earth dam or linings where bonding of lifts is important	6	4 to 6 passes for fine-grained soil; 6 to 8 passes for coarse-grained soil	<p>soil type fine-grained soil PI > 30 fine-grained soil PI < 30 coarse-grained soil</p> <p>Foot contact area in² 5 to 12 7 to 14 10 to 14</p> <p>foot contact pressures, psi 250 to 500 200 to 400 150 to 250</p> <p>Efficient compaction of soils wet of optimum requires less contact pressures than the same soils at lower moisture contents</p>	For earth dam, highway and airfield work, drum of 60-in dia., loaded to 1.5 to 3 tons per lineal foot of drum is generally utilized. For smaller projects 40-in dia. Drum, loaded to .75 to 1.75 tons per lineal foot of drum is used. Foot contact pressure should be regulated so as to avoid shearing the soil on the third or fourth pass.
Rubber tire rollers	For clean, coarse-grained soils with 4 to 8 percent passing the No. 200 sieve For fine-grained soils or well-graded, dirty coarse-grained soils with more than 8 percent passing the No. 200 sieve	10 6 to 8	3 to 5 coverages 4 to 6 coverages	<p>Tire inflation pressures of 60 to 80 psi for clean granular material or base course and subgrade compaction. Wheel load 18 000 to 25 000 lb</p> <p>Tire inflation pressure in excess of 65 psi for fine-grained soils of high plasticity. For uniform clean sands or silty fine sands, use large size tires with pressures of 40 to 50 psi</p>	Wide variety of rubber tire compaction equipment is available. For cohesive soils, light wheel loads, such as provided by wobble-wheel equipment, may be substituted for heavy-wheel load if lift thickness is decreased. For cohesionless soils, large-size tires are desirable to avoid shear and rutting.
Smooth wheel rollers	Appropriate for subgrade or base course compaction of well-graded sand-gravel mixtures May be used for fine-grained soils other than in earth dams. Not suitable for clean well-graded sands or silty uniform sands	8 to 12 6 to 8	4 coverages 6 coverages	<p>Tandem type roller for base course or subgrade compaction, 10 to 15 ton weight, 300 to 500 lb per lineal inch of width of rear roller</p> <p>3-Wheel roller for compaction of fine-grained soil; weights from 5 to 6 tons for materials of low plasticity to 10 tons for materials of high plasticity</p>	3-Wheel rollers obtainable in wide range of sizes. 2-Wheel tandem rollers are available in the range of 1 to 20 ton weight. 3-Axle tandem rollers are generally used in the range of 10 to 20 ton weight. Very heavy rollers are used for proof rolling of subgrade or base course.

Table 4.5 Compaction Equipment and Methods – continued (Navdocks DM-7)

Equipment Type	Applicability	Requirement for Compaction of 95 to 100 Percent Standard Proctor Maximum Density				Possible Variations in Equipment
		Compacted Lift Thickness, (inches)	Passes or Coverages	Dimensions and Weight of Equipment		
Vibrating baseplate compactors	For coarse-grained soils with less than about 12 percent passing No. 200 sieve. Best suited for materials with 4 to 8 percent passing No. 200 placed thoroughly wet	8 to 10	3 coverages	Single pads or plates should weigh no less than 200 lb. May be used in tandem where working space is available. For clean coarse-grained soil, vibration frequency should be no less than 1600 cycles per minute	Vibrating pads or plates are available, hand-propelled or self-propelled, single or in gangs, with width of coverage from 1 ½ to 15 ft. Various types of vibrating-drum equipment should be considered for compaction in large areas.	
Crawler tractor	Best suited for coarse-grained soils with less than 4 to 8 percent passing No. 200 sieve, placed thoroughly wet	10 to 12	3 to 4 coverages	No smaller than D8 tractor with blade, 34 500 lb weight, for high compaction	Tractor weights up to 60 000 lb.	
Power lamper or rammer	For difficult access, trench backfill. Suitable for all inorganic soils	4 to 6 in for silt or clay, 6 in for coarse-grained soils	2 coverages	30-lb minimum weight. Considerable range is tolerable, depending on materials and conditions	Weights up to 250 lb, for diameter 4 to 10 in	

Table 4.6 Compaction Equipment for Different Conditions			
Soil	First choice	Second choice	Comment
Rock fill	Vibratory	Pneumatic	--
Plastic soils, CH, MH	Sheepsfoot or padfoot	Pneumatic	Thin lifts usually needed
Low-plasticity soils, CL, ML	Sheepsfoot or padfoot	Pneumatic, vibratory	Moisture control often critical for silty soils
Plastic sands and gravels, GC, SC	Vibratory, pneumatic	Pad foot	--
Silty sands and gravels, SM, GM	Vibratory	Pneumatic, pad foot	Moisture control often critical
Clean sands, SW, SP	Vibratory	Impact, pneumatic	--
Clean gravels, GW, GP	Vibratory	Pneumatic, impact, grid	Grid useful for oversize particles

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
CONTRACT ADMINISTRATION DIVISION

MATERIALS PROCEDURE

NUCLEAR DENSITY TEST BY THE ROLLER PASS METHOD

1. PURPOSE
 - 1.1 The purpose of this procedure is to determine the density of construction materials by the roller pass method. The procedure consists of two parts, with Part I to determine the required maximum density and Part II to compare field densities to the required maximum density.
2. SCOPE
 - 2.1 This test method or method of testing is applicable to aggregate base courses, select material for backfilling, crushed aggregate backfill, granular subgrade, and random material having 40% or more of +3/4 inch (+19 mm) material as specified in MP 717.04.21.
3. REFERENCES

MP 712.21.26
MP 717.04.21
4. EQUIPMENT
 - 4.1 One complete nuclear density gauge unit meeting the requirements specified in MP 717.04.21. This would include the manufacturer's printout of standard counts.
 - 4.2 One measuring tape, approximately 50 feet (15 m)
 - 4.3 Lime or other suitable material to mark test sites
 - 4.4 Dry silica sand
 - 4.5 Supply of data sheets

4.6 One vehicle meeting the safety and security requirements of the Nuclear Regulatory Commission for transporting nuclear gauges.

5.0 PERSONNEL TRAINING

5.1 All personnel performing the testing must have the minimum training requirements specified in MP 717.04.21.

5.2 All personnel must know and follow the requirements of the Nuclear Regulatory Commission.

6.0 ROUNDING OF DATA

6.1 Rounding procedures have been adopted from the standard method taught in schools, and may be described as follows:

6.1.1 If the number following the last number to be retained is less than 5, the last number to be retained is left unchanged and the number(s) following the last number to be retained is/are discarded.

6.1.2 If the number following the last number to be retained is 5 or larger, increase the last number to be retained by 1 and discard the number(s) following the last number to be retained.

6.2 Test values and calculations shall be rounded to the following nearest significant digit:

6.2.1 Form T-313 (Test Section)

Lift thickness compacted	0.1 in. (10 mm)
Depth below grade	1 ft (0.1 m)
Length of test section	1 ft (1 m)
Width of test section	1 ft (0.1 m)
Station number	1 ft (0.1 m)
Offset	1 ft (0.1 m)
Dry density (DA)	1 lb /ft³ (1 kg/m³)
Average density (DB)	1 lb /ft³ (1 kg/m³)
Maximum density (DC)	1 lb/ft³ (1 kg/m³)

6.2.2 Form T-317 (Quality Control Tests)

Station number	1 ft (0.1 m)
Offset	1 ft (0.1 m)
Depth below grade	1 ft (0.1 m)
Lift thickness compacted	0.1 in. (10 mm)
Maximum density (DC)	1 lb/ft³ (1 kg/m³)
Dry density (DE)	1 lb/ft³ (1 kg/m³)
Relative density (DF)	1%
Average DF (\bar{X})	0.1%
Target (T)	1%
Quality index (QL)	0.01
Within tolerance (DG)	1%
Minimum percent for 100% Pay (DH)	1%

7. PREPARATION FOR TESTING

7.1 Standardization of the Nuclear Gauge

7.1.1 Warm up the gauge according to the manufacturer's recommendations.

7.1.2 Standardization of the gauge must be performed away from metal and other objects.

7.1.3 Clean the top of the standard block and the bottom of the gauge with a cloth.

- 7.1.4 Standardize according to manufacturer's recommendations.
- 7.1.5 Compare the standard counts to the manufacturer's standard counts using tolerances acceptable to the Division. For the Troxler 3430 gauge, the standard counts must be within $\pm 2\%$ for density and $\pm 4\%$ for moisture from the manufacturer's standards.
- 7.1.6 If the gauge is not within the specified tolerances for either moisture or density, repeat section 7.1.4 -7.1.5. If the gauge will not standardize for either moisture or density after 4 attempts, there is probably something wrong with the gauge. There may be electronics problems, the gauge needs calibrated or a stability check needs to be performed. Refer to MP 717.04.21 for a more detailed explanation. In any case, do not use a gauge for testing that will not standardize.
- 7.1.7 A gauge must be standardized before testing and at least every four hours during testing.
- 7.1.8 When a gauge is to be used for testing pipe or structure backfill in a trench, first check the standardization of the gauge according to sections 7.1 - 7.1.5. If the gauge is functioning properly, standardize the gauge in the trench. The standard counts in the trench would be used for testing in the trench only and the tolerances would not be applied to the standard counts taken in the trench. When the gauge is moved to a non-trench condition for testing, new standard counts would be required.
8. PART I PROCEDURE FOR DETERMINING THE MAXIMUM DENSITY
- 8.1 All data and calculations for Part I of this procedure will be recorded on form T-313 (copy attached). Record the project number, lab number etc. before starting the test.
- 8.2 The test is to be performed at the beginning of placement of an item. However, any problems with the material, placement or compaction equipment shall be corrected prior to performing the test.
- 8.3 The test section will be 100 feet (30 m) long by the width being placed in one operation except in restricted areas.

- 8.3.1 In restricted areas, where the 100 foot (30 m) length cannot be obtained, check the project's records to determine if a maximum density for the material has been determined on the project. The maximum density shall be used for Part II of this procedure, if available. A maximum density determined in a restricted area shall not be used in a non-restricted area. If a maximum density is not available for the material, obtain as large a test section as possible. For pipe backfill, a lift on both sides of the pipe can be used.
- 8.4 Divide the test section into 5 equal subsections and number the subsections. Randomly locate a test site within each of the subsections according to MP 712.21.26.
- 8.5 Water shall be added to untreated aggregates, if necessary, in a quantity satisfactory to the Engineer. The aggregate must visually appear wet in order to properly compact.
- 8.6 Once the material had been placed in the test section, the material shall be rolled with compaction equipment meeting the following requirements:
- 8.6.1 All compaction equipment must be in good working condition.
- 8.6.2 The materials shall be compacted with rollers providing a minimum applied force of 10 tons (9 Mg).
- 8.6.3 In restricted areas, inaccessible to conventional rollers, the compaction equipment must be satisfactory to the Engineer to provide the desired compactive effort. The Division may request verification that the above compaction equipment meets the specified requirements.
- 8.7 The test section shall be rolled with 12 roller passes. A roller pass is one complete coverage over the material. In restricted areas, where conventional rollers can not be used, the material shall be compacted until it appears well densified.

- 8.8 If the material shears or breaks down during rolling, the number of roller passes may need to be reduced. The designated number of roller passes must not be changed without the approval of the Engineer.
- 8.9 Once the material has been rolled, testing will be performed on test sites numbers 1 and 2.
- 8.10 Smooth the test site and fill any voids with fines scraped from the surface, no more than 1/8 inch (3 mm).
- 8.10.1 Place the guide plate on the test site. Next place the drive rod in the guide plate and while standing on the plate, drive the rod at least two inches (50 mm) deeper than the location where the end of the gauge source rod will be when testing. The gauge source rod can be extended in two inch (50 mm) increments. The source rod must be as deep as possible within the lift but must not extend beyond the lift. For example, a five inch (125 mm) lift would be tested with the source rod in the four inch (100 mm) position and the hole would be six (150 mm) inches deep. Carefully remove the drive rod to prevent material from falling into the hole.
- 8.10.2 Place the gauge over the test site and insert the source rod to the desired depth. Pull the gauge tight against the side of the hole toward the scaler. Make sure the gauge is sitting flush on the material. Mark the outline of the gauge with lime or other suitable material so the test sites can be relocated.
- 8.10.3 Take a one minute density reading .
- 8.10.3.1 Record the dry density (DA) in Section A of form T-313. Perform the same testing on site 2.
- 8.11 Average the two dry densities (DA) obtained in 8.10.3.1.
- 8.12 Roll the material in the test section two additional roller passes. In restricted areas, the compaction equipment would pass over the material the above indicated number of passes.

- 8.13 After the material has been rolled the additional number of passes, perform tests again on sites 1 and 2 according to 8.10 through 8.10.3 and record the values in section B.
- 8.14 Average the two densities according to 8.11.
- 8.15 Compare the value in 8.14 to the value obtained in 8.11. If the increase in density is 1 lb/ft³ (16 kg/m³) or less, the material is considered to have achieved its maximum density. If the increase in density is greater than 1 lb/ft³ (16 kg/m³), roll the material two additional passes according to 8.12 and repeat the testing on sites 1 and 2. Continue the rolling and testing sequence until the increase in density between two consecutive rolling sequences is 1 lb/ft³ (16 kg/m³) or less. The Division may request the contractor to cease rolling even though the increase is more than 1 lb/ft³ (16 kg/m³) if the material is breaking down.
- 8.16 Once the increase in density is 1 lb/ft³ (16 kg/m³) or less, move the last two density readings to the maximum density determination section on form T-313. Then take density measurements on sites 3, 4, and 5.
- 8.17 The average of the five density readings is the maximum density (DC) for the material.
- 8.17.1 The maximum density will be used to control the material for Part II of this procedure.
- 8.18 Division personnel may request that Part I be repeated if the test was not performed properly or the maximum density obtained does not appear to be realistic.
9. PART II QUALITY CONTROL TESTING
- 9.1 All test data and calculations for Part II of this procedure will be recorded on form T-317 (copy attached). Record the project number, item number, etc. on the form before starting the testing.

9.2 The lot number would have a prefix letter based on the following designations for the use of the material being tested:

Embankment	F
Subgrade	S
Base	B
Pipe and Structure Backfill	P

9.3 Transfer the maximum density (DC) and the lab number from form T-313 to form T-317. Record the lab number in the section for reference lab number.

9.4 Randomly locate the test site according to MP 712.21.26.

9.5 Determine the dry density (DE) with the nuclear gauge according to the procedure described in sections 8.10 through 8.10.3. The test sites do not have to be marked on the roadway.

9.6 Calculate the percent relative density (DF) by using the equation on form T-317.

9.7 Perform the remaining four tests in the lot. Five tests are always required to evaluate a lot.

9.8 Calculate the average relative density (\bar{X}) for the five tests in the lot.

9.9 Obtain the target percentage of dry density (T) from the project's governing specifications.

9.10 Determine the range (R) of the relative densities (DF) by subtracting the smallest value from the largest.

9.11 Calculate the quality index (QL) by using the equation on form T-317.

9.12 Use the Table for Estimating the Percent of a Lot Within Tolerance (copy attached) and determine the percent within tolerance (DG) that corresponds to the QL value calculated in 9.11 above.

- 9.13 Obtain the minimum percent for 100% pay (DH) from the project's governing specifications.
- 9.14 In order for a lot to meet specifications, the percent within tolerance (DG) must be equal to or greater than the minimum percent for 100% pay (DH).
10. General
- 10.1 Independent tests for similarity checks can be recorded on form T-317. Use only the applicable sections of the form.
- 10.2.1 If the material changes or the material is supplied from a new source, repeat Part I to obtain new control data.
- 10.3 If the percent relative densities are consistently above 105 percent or below 95 percent, and there is no apparent cause for the high or low values, repeat Part I to obtain new control data.
- 10.4 Test data for several lots can be recorded on form T-317.
-

Aaron C Gillispie

Aaron C. Gillispie, P.E.
Director
Materials Control, Soils
And Testing Division

ACG:Lw

Attachments

TABLE FOR ESTIMATING PERCENT OF LOT WITHIN TOLERANCE

Quality Index (QL) Positive Values	Percent Within Tolerance	Quality Index (QL) Negative Values	Percent Within Tolerance
.66	99	.00	50
.65	98	.01	49
.62	97	.02	48
.60	96	.04	47
.58	95	.05	46
.57	94	.06	45
.55	93	.07	44
.53	92	.08	43
.51	91	.09	42
.50	90	.10	41
.48	89	.11	40
.46	88	.13	39
.45	87	.14	38
.44	86	.15	37
.42	85	.16	36
.41	84	.17	35
.40	83	.18	34
.38	82	.19	33
.37	81	.21	32
.36	80	.22	31
.34	79	.23	30
.33	78	.24	29
.32	77	.25	28
.30	76	.27	27
.29	75	.28	26
.28	74	.29	25
.27	73	.30	24
.25	72	.32	23
.24	71	.33	22
.23	70	.34	21
.22	69	.36	20
.21	68	.37	19
.19	67	.38	18
.18	66	.40	17
.17	65	.41	16
.16	64	.42	15
.15	63	.44	14
.14	62	.45	13
.13	61	.46	12
.11	60	.48	11
.10	59	.50	10
.09	58	.51	9
.08	57	.53	8
.07	56	.55	7
.06	55	.57	6
.05	54	.58	5
.04	53	.60	4
.02	52	.62	3
.01	51	.63	2
.00	50	.66	1

West Virginia Division of Highways
Materials Control Soil and Testing Division



Lab Number _____
 Auth. Number _____
 Project Number _____
 District Number _____
 Item Number _____
 Date _____

FORM T-313
 MP 700.00.24
 REV. 08-08

Source of Material:			Length of Test Section:		
Roller Type:			Width of Test Section:		
Roller Weight	Static:	Working:	Gauge Number		
Lift Thickness Compacted:			Manufacturer's Standards		
Depth Below Grade:			Density:	Moisture:	
Depth of Gauge Source:			Standard Counts		
Observed	Yes	No	Density:	Moisture:	

Test Site Number	1	2	3	4	5
Station Number					
Offset					

A	Number of Passes		
	Test Site	DA	Dry Density
	1		
	2		
DB	Average		

B	Number of Passes		
	Test Site	DA	Dry Density
	1		
	2		
DB	Average		

C	Number of Passes		
	Test Site	DA	Dry Density
	1		
	2		
DB	Average		

D	Number of Passes		
	Test Site	DA	Dry Density
	1		
	2		
DB	Average		

$$DB = \sum DA / 2$$

$$DC = \sum DA / 5$$

Maximum Density Determination		
Test Site	DA	Dry Density
1		
2		
3		
4		
5		
DC	Max. Density	

Inspector's Name: _____
 Inspector's Signature: _____
Project's Evaluation
 Checked By: _____
 Date: _____

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS & TESTING DIVISION



LAB NUMBER _____
 AUTH. NUMBER _____
 PROJECT NUMBER _____
 DISTRICT _____
 ITEM NUMBER _____

FORM T-317
 MP 700.00.24
 REV. 08-08

GAUGE #	DATE						
MANUFACTURER'S DENSITY STANDARD	LOT NUMBER						
	BEGINNING STATION						
	ENDING STATION						
MANUFACTURER'S MOISTURE STANDARD	OFFSET						
	DEPTH BELOW GRADE						
	DEPTH OF GAUGE SOURCE						
	LIFT THICKNESS COMPACTED						
DC FROM TEST SECTION	DENSITY STANDARD						
	MOISTURE STANDARD						
$DF = \frac{DE (100)}{DC}$ $\bar{X} = \frac{\sum DF}{5}$ $QL = \frac{\bar{X} - T}{R}$		DC	MAXIMUM DENSITY				
		REFERENCE LAB NUMBER					
TEST NUMBER 1	DE	DRY DENSITY					
	DF	% RELATIVE DENSITY					
TEST NUMBER 2	DE	DRY DENSITY					
	DF	% RELATIVE DENSITY					
TEST NUMBER 3	DE	DRY DENSITY					
	DF	% RELATIVE DENSITY					
TEST NUMBER 4	DE	DRY DENSITY					
	DF	% RELATIVE DENSITY					
TEST NUMBER 5	DE	DRY DENSITY					
	DF	% RELATIVE DENSITY					
LOT EVALUATION	\bar{X}	AVERAGE DF					
	T	TARGET					
	QL	QUALITY INDEX					
	DG	% WITHIN TOLERANCE					
	DH	MIN. FOR 100% PAY					
	DI	PASS / FAIL					

INSPECTOR'S NAME: _____
 INSPECTOR'S SIGNATURE: _____
 PROJECT'S EVALUATION _____
 CHECKED BY: _____ DATE: _____

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
CONTRACT ADMINISTRATION DIVISION

MATERIALS PROCEDURE

Procedure For Determining The Random
Location Of Compaction Tests

- 1.0 Purpose
 - 1.1 This procedure provides methods for determining the random locations for compaction tests.
- 2.0 Scope
 - 2.1 This procedure is applicable for locating all compaction tests.
- 3.0 Equipment
 - 3.1 Measuring tape, approximately 50 feet (15 m)
- 4.0 Procedure
 - 4.1 Compaction test site locations are to be randomly located along the roadway centerline (length) and offset (width) randomly from this reference line. Some test site locations, such as pipe backfill, require random selection of lifts for the tests and a random determination of the side of the pipe backfill to test.
 - 4.2 Selection of random numbers
 - 4.2.1 Determine the number of test sites which will be required for the lot or test section.

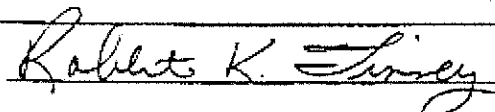
- 4.2.2 The table of random numbers (Table I attached) or a calculator, which will generate random numbers, can be used.
- 4.2.3 The table of random numbers contains 5 sections with 2 columns of numbers in each section.
- 4.2.3.1 The first column of numbers in each section is for determining the test site along the centerline. The second column of numbers is for determining the distance from the centerline (offset). Either column of numbers can be used for selecting lifts to be tested.
- 4.2.3.2 To use the table, select a random point on the table by tossing a pencil upon the page or blindly pointing out a location with the finger. The selection of random numbers will consist of a pair of random numbers. Once the point is located, select the number in the first column for the length and the corresponding number in the right column for the width. When more than one pair of random numbers is needed, continue selecting the pairs of numbers down the page. If the bottom of the page is reached, go to the top of the next section to the right or to the top of the first section on the left side of the page if the bottom of the right most section of the page is reached. When selecting lifts to be tested, only single random numbers are needed and can be obtained from any of the columns of numbers.
- 4.2.3.3 To use a calculator, which will generate random numbers, select all numbers needed for a test site before selecting numbers for additional test sites.
- 4.3 Location of test sites
- 4.3.1 There are many variations in the required number of tests and the physical dimensions of the area to be tested.
- 4.3.2 Random location of tests on a single lift that is rectangular in shape (Example 1 attached)

- 4.3.2.1 Generally the Materials Procedure used for testing a material and/or Specifications requires a lot, portion of a lot, or a test section to determine the maximum density of a material to be divided into equal sublots or subsections when more than one test is required.
- 4.3.2.2 Divide the length of the area along the centerline by the number of tests to determine the length of each subplot or subsection.
- 4.3.2.3 From the beginning station number, add the length of the subsection or subplot to the station number to determine the station number for the beginning of the next subplot or subsection. Next add the length of the subsection or subplot to this station number to determine the station number at the beginning of the next subsection or subplot. Continue this procedure until the beginning station numbers for all subsections or sublots have been calculated.
- 4.3.2.4 Select the random numbers according to 4.2 through 4.2.3.3.
- 4.3.2.5 Multiply the length of the subsections or sublots by the random numbers selected for the length.
- 4.3.2.6 Add the values to the corresponding station numbers for the beginning of each subsection or subplot. The station numbers locate the test sites along centerline.
- 4.3.2.7 Next multiply the width of the test section or lot by the random numbers selected for the offset.
- 4.3.2.8 Determine the offset distance of the lot or test section from the centerline when the centerline is not within the area to be tested. This will usually be a constant value. Always calculate the offset by working from the side nearest the centerline. Add each of the values calculated in 4.4.2.7 to the constant value. The values establish the offset distance of each test site from the centerline. Designate rather the offset is left or right of centerline.

When the centerline is contained within the area to be tested, the offset can be calculated from the left or right side of the test area and test location designated in relation to centerline.

- 4.3.3 Random location of test sites on a single lift that is irregular in shape (Example 2 attached).
 - 4.3.3.1 Determine the dimensions of the area to be tested.
 - 4.3.3.2 Determine the minimum dimensions of a rectangle that will contain the area to be tested and has two sides parallel to centerline.
 - 4.3.3.3 Divide the rectangle into the desired number of subsections or sublots and randomly locate the test sites locations as in sections 4.3.2 - 4.3.2.8 above. If a test site location falls outside the area to be tested, obtain a new set of random numbers for the test site and recalculate the test site location. Continue this procedure until the test site falls within the area to be tested.
- 4.3.4 Random selection of lifts to be tested (Example 3 attached).
 - 4.3.4.1 When testing certain materials, especially backfill material, where an area to be backfilled will constitute a lot of material to be tested, a random selection of lifts to be tested is required.
 - 4.3.4.2 Determine the projected number of lifts to be contained in the lot. Divide the number of lifts by the number of tests in the lot. If the value is not an even number, assign an additional lift to the first subplot and continue to assign a lift to each consecutive subplot until all remaining lifts have been assigned to a subplot.
 - 4.3.4.3 By starting with the bottom lift, number the lifts in the lot.

-
- 4.3.4.4 Select a single random number for each test site.
 - 4.3.4.5 Multiply each random number by the number of lifts in each subplot and round the values to whole numbers. Each value designates which lift in each subplot that will be tested.
 - 4.3.5 Once the lifts to be tested have been selected, the random location of the test site on the lift can be determined.
 - 4.3.6 Random selection of the side of backfill for pipe culverts.
 - 4.3.6.1 When a lot of pipe backfill is being tested, tests should be performed on both sides of the pipe. The side to be tested can be randomly selected by using the random numbers selected for the location of the tests along the pipe. If the random number is less than 0.500, the test is on the left side and greater than 0.500 on the right side of the pipe.


Robert K. Tinney, Director
Contract Administration Division

RKT:Sra

Attachments

TABLE 1
 RANDOM NUMBERS

.858	.082	.886	.125	.263	.176	.551	.711	.355	.698
.576	.417	.242	.316	.960	.819	.444	.323	.331	.179
.687	.288	.835	.636	.596	.174	.866	.685	.066	.170
.068	.391	.739	.002	.159	.423	.629	.631	.979	.399
.140	.324	.215	.358	.663	.193	.215	.667	.627	.595
.574	.601	.623	.855	.339	.486	.065	.627	.458	.137
.966	.529	.757	.308	.025	.836	.200	.055	.510	.656
.608	.910	.944	.281	.539	.371	.217	.882	.324	.284
.215	.355	.645	.460	.719	.057	.237	.146	.135	.903
.761	.883	.771	.388	.928	.654	.815	.570	.539	.600
.869	.222	.115	.447	.658	.989	.921	.924	.560	.447
.562	.036	.302	.673	.911	.512	.972	.576	.838	.014
.481	.791	.454	.731	.770	.500	.980	.183	.385	.012
.599	.966	.356	.183	.797	.503	.180	.657	.077	.165
.464	.747	.299	.530	.675	.646	.385	.109	.780	.699
.675	.654	.221	.777	.172	.738	.324	.669	.079	.587
.279	.707	.372	.486	.340	.680	.928	.397	.337	.564
.338	.917	.942	.985	.838	.805	.278	.898	.906	.939
.316	.935	.403	.629	.130	.575	.195	.887	.142	.488
.011	.283	.762	.988	.102	.068	.902	.850	.569	.977
.683	.441	.572	.486	.732	.721	.275	.023	.088	.402
.493	.155	.530	.125	.841	.171	.794	.850	.797	.367
.059	.502	.963	.055	.128	.655	.043	.293	.792	.739
.996	.729	.370	.139	.306	.858	.183	.464	.457	.863
.240	.972	.495	.696	.350	.642	.188	.135	.470	.765

EXAMPLE I
 ENGLISH

Length of test section = 100 ft
 Width of section = 10 ft
 Number of tests required = 5
 5 equal subsections $100/5 = 20$ ft
 Test section starts at station 5+46

Station number at the beginning of each subsection

1. 5+46
2. $5+46 + 20 = 5+66$
3. $5+66 + 20 = 5+86$
4. $5+86 + 20 = 6+06$
5. $6+06 + 20 = 6+26$

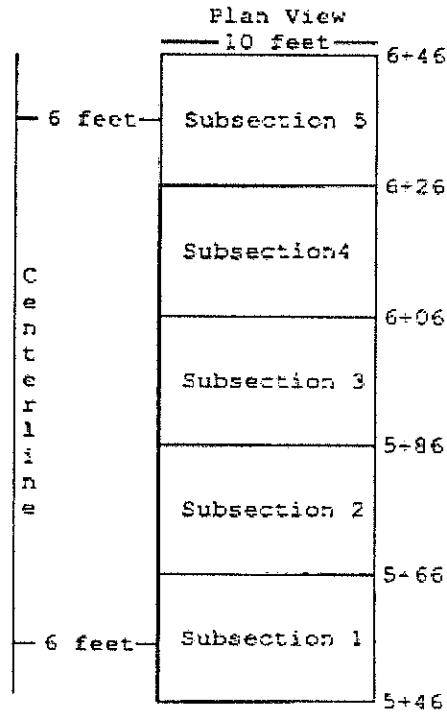
	Random Numbers	
	Length	Width
1.	.869	.222
2.	.562	.036
3.	.481	.791
4.	.599	.966
5.	.464	.747

Multiply the length of each subsection by the random numbers for the length.

1. $20 \times .869 = 17$
2. $20 \times .562 = 11$
3. $20 \times .481 = 10$
4. $20 \times .599 = 12$
5. $20 \times .464 = 9$

Add the values to the beginning station numbers of each subsection to determine the station number for each test.

1. $5+46 + 17 = 5+63$
2. $5+66 + 11 = 5+77$
3. $5+86 + 10 = 5+96$
4. $6+06 + 12 = 6+18$
5. $6+26 + 9 = 6+35$



Multiply the width of each subsection by the random numbers for the width.

1. $10 \times .222 = 2$
2. $10 \times .036 = 0$
3. $10 \times .791 = 8$
4. $10 \times .966 = 10$
5. $10 \times .747 = 7$

Add the values to the constant distance the test section is from the centerline and label the values as right of centerline .

1. $6 + 2 = 8$ ft right of centerline
2. $6 + 0 = 0$ ft right of centerline
3. $6 + 8 = 14$ ft right of centerline
4. $6 + 10 = 16$ ft right of centerline
5. $6 + 7 = 13$ ft right of centerline

EXAMPLE I
 METRIC

Length of test section = 30.00 m
 Width of section = 3.00 m
 Number of tests required = 5
 5 equal subsections $30/5 = 6$ m
 Test section starts at station 15+340

Station number at the beginning of each subsection

1. 15+340
2. $15+340 + 6 = 15+346$
3. $15+346 + 6 = 15+352$
4. $15+352 + 6 = 15+358$
5. $15+358 + 6 = 15+364$

Random Numbers

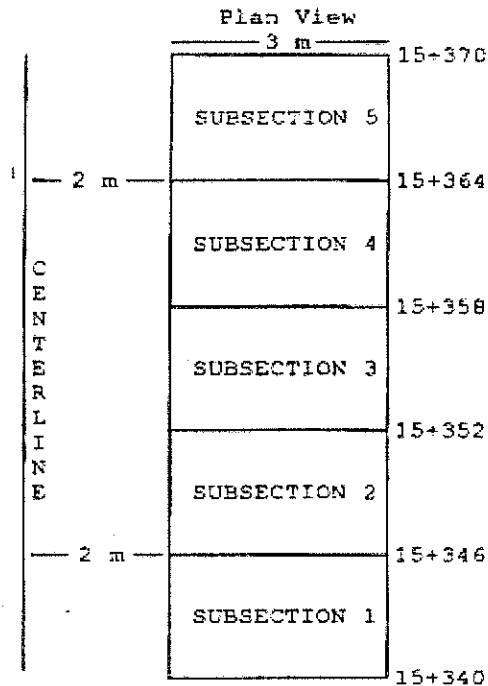
	Length	Width
1.	.869	.222
2.	.562	.036
3.	.481	.791
4.	.599	.966
5.	.464	.747

Multiply the length of each subsection by the random numbers for the length.

1. $6.00 \times .869 = 5.2$
2. $6.00 \times .562 = 3.4$
3. $6.00 \times .481 = 2.9$
4. $6.00 \times .599 = 3.6$
5. $6.00 \times .464 = 2.8$

Add the values to the beginning station numbers of each subsection to determine the station number for each test site.

1. $15+340 + 5.2 = 15+345.2$
2. $15+346 + 3.4 = 15+349.4$
3. $15+352 + 2.9 = 15+354.9$
4. $15+358 + 3.6 = 15+361.6$
5. $15+364 + 2.8 = 15+366.8$



Multiply the width of the test section by the random numbers for the width.

1. $3.00 \times .222 = 0.7$
2. $3.00 \times .036 = 0.1$
3. $3.00 \times .791 = 2.4$
4. $3.00 \times .966 = 2.9$
5. $3.00 \times .747 = 2.2$

Add the values to the constant distance the test section is from the centerline and label the values as right of centerline.

1. $2.00 + 0.7 = 2.7$ m rt of centerline
2. $2.00 + 0.1 = 2.1$ m rt of centerline
3. $2.00 + 2.4 = 4.4$ m rt of centerline
4. $2.00 + 2.9 = 4.9$ m rt of centerline
5. $2.00 + 2.2 = 4.4$ m rt of centerline

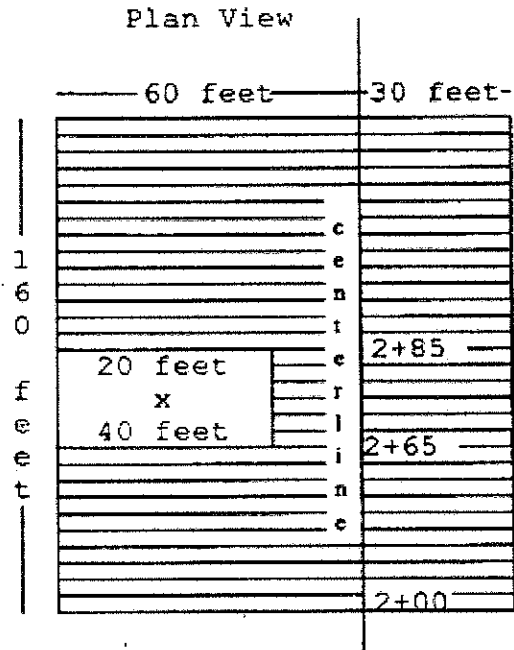
EXAMPLE 2
 METRIC

The shaded area designates the lift to be tested. For this example, 2 sublots are required with 1 test in each subplot.

Since the area to be tested is not rectangular in shape, place the smallest rectangle around the area that will include all the shaded area.

Divide the rectangle into 2 equal areas (160 feet long by 90 feet wide).

Since the centerline is located within the area to be tested, the offset can be calculated and measured from either side. For this example, work from the right side.



Determine the station number for the beginning of each subplot.

Sublot No. 1 2.+00
 Sublot No. 2 2+00 + 80 = 2+80

Random Numbers		Since there is the possibility that the location of a
Length	Width	test site may fall outside the area to be tested, an
.902	.850	additional set of random numbers was selected.
.275	.023	
.794	.850	

Multiply the random number by the length of the subplot (80 x .902 = 72 feet). Add the value of the beginning station number (2+00 + 72 = 2+72). Multiply the width of the subplot by the random number (90 x .850 = 76 feet). By working from the right side, it is 30 feet to the centerline, therefore the test site is 76 - 30 = 46 feet to the left of centerline. The test site falls outside the test area.

By using the next set of random numbers, calculate the test site location.
 80 x .275 = 22 feet 90 x .023 = 2 feet
 2+00 + 22 = 2+22 30 - 2 feet = 28 feet right of centerline
 The test site for subplot 1 now falls within the test area.

Calculate the test location for subplot 2.
 80 x .794 = 64 feet 90 x .850 = 76 feet
 2+80 + 64 = 3+44 76 - 30 = 46 feet left of centerline

EXAMPLE 2
 METRIC

The shaded area designates the lift to be tested. For this example, 2 sublots are required with 1 test in each subplot.

Since the area to be tested is not rectangular in shape, place the smallest rectangle around the area that will include all the shaded area.

Divide the rectangle into 2 equal areas (30 m long by 33 m wide).

Since the centerline is located within the area to be tested, the offset can be calculated and measured from either side. For this example, work from the right side.

Determine the station number for the beginning of each subplot.

Sublot No. 1 2.+165
 Sublot No. 2 2+165 + 30 = 2+195

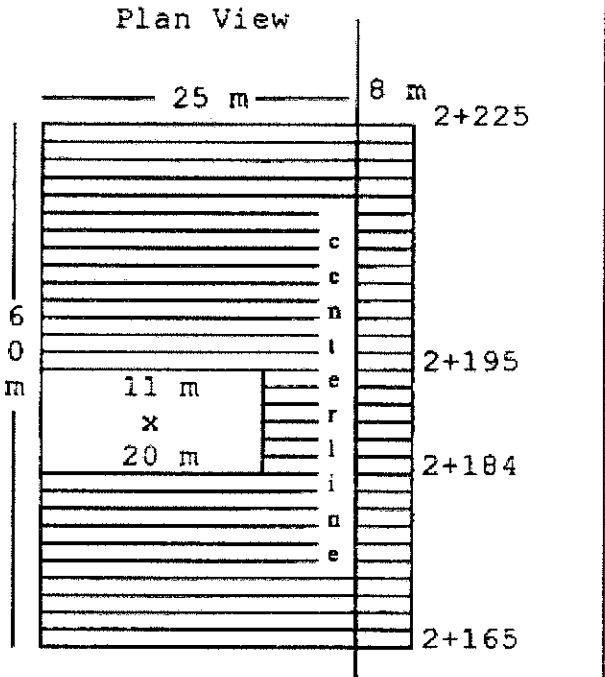
Random Numbers	
Length	Width
.902	.850
.275	.023
.794	.850

Since there is the possibility that the location of a test site may fall outside the area to be tested, an additional set of random numbers was selected.

Multiply the random number by the length of the subplot (30 x .902 = 27.1 m). Add the value of the beginning station number (2+165 + 27.1 = 2+192.1). Multiply the width of the subplot by the random number (33 x .850 = 28.1 m). By working from the right side, it is 8 m to the centerline, therefore the test site is 28.1 - 8 = 20.1 m to the left of centerline. The test site falls outside the test area.

By using the next set of random numbers, calculate the test site location.
 30 x .275 = 8.2 m 33 x .323 = 0.8 m
 2+165 + 8.2 = 2+173.2 8 - 0.8 m = 7.2 m right of centerline
 The test site for subplot 1 now falls within the test area.

Calculate the test location for subplot 2
 30 x .794 = 23.8 m 33 x .850 = 28.0 m
 2+195 + 23.8 = 2+218.8 28 - 8 = 20 m left of centerline



EXAMPLE 3

21 lifts of material are required to backfill the pipe.

All of the backfill material is included in 1 lot. There are 5 tests required with 1 test in each subplot.

Divide the number of lifts by the number of sublots to determine the number of lifts in each subplot (21/5 = lifts with 1 lift left over). This includes the lift in subplot number 1.

Sublot Number 1	Lifts 1 - 5
Sublot Number 2	Lifts 6 - 9
Sublot Number 3	Lifts 10 - 13
Sublot Number 4	Lifts 14 - 17
Sublot Number 5	Lifts 18 - 21

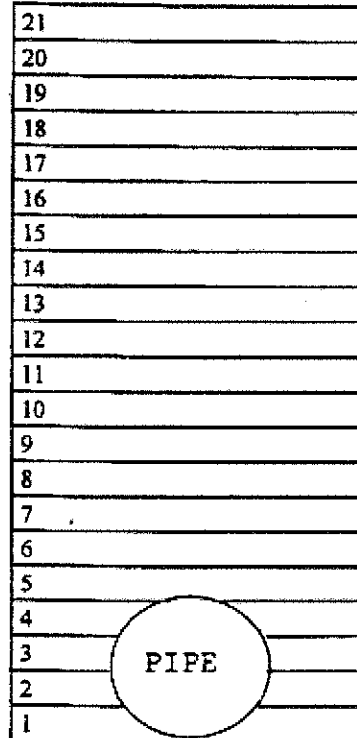
Random numbers

1.	.599
2.	.464
3.	.675
4.	.279
5.	.338

Multiply the number of lifts in the subplot by the random numbers. The values determine which lift in each subplot to test.

1.	$5 \times .599 = 3$	Test lift 3 in subplot number 1, Lift number 3
2.	$4 \times .464 = 2$	Test lift 2 in subplot number 2, Lift number 7
3.	$4 \times .675 = 3$	Test lift 3 in subplot number 3, Lift number 12
4.	$4 \times .279 = 1$	Test lift 1 in subplot number 4, Lift number 14
5.	$4 \times .338 = 1$	Test lift 1 in subplot number 5, Lift number 18

CROSS SECTION OF
 PIPE BACKFILL



WEST VIRGINIA DEPARTMENT OF HIGHWAYS
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOIL AND TESTING DIVISION

MATERIALS PROCEDURE

METHOD FOR ACCEPTANCE OF COMPACTION TESTING

1.0 PURPOSE

1.1 To provide a procedure for the acceptance of compaction testing.

2.0 SCOPE

2.1 This procedure is applicable to all materials that require evaluation of compaction tests.

3.0 TESTING

3.1 The minimum frequency for acceptance testing shall be 10% of the contractor's individual tests. Five tests shall be performed in a lot for acceptance testing.

3.2 Acceptance testing shall be distributed throughout the placement of material.

3.3 The material should be categorized according to the base, subgrade, pipe backfill, embankment, etc.

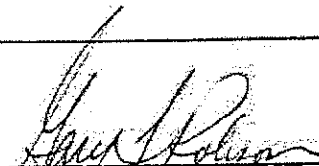
4.0 EVALUATION

4.1 Calculations shall be rounded to the following significant digits according to
NEW ROUNDING PROCEDURE

Page 8 - 1	
Average (X)	0.1%
Standard Deviation	0.01
Range	1%

4.2 Determine the number of lots tested by the contractor for a particular material since the last monitoring including the lot just tested. Record the percent relative densities on the attached form.

- 4.3 Calculate the standard deviation (S) for the percent relative densities.
- 4.4 Calculate the range (R) for plus and minus 1.65 standard deviations (S) from the average (X) for the contractor's tests ($R = X \pm 1.65 S$).
- 4.5 Compare the acceptance tests to the calculated range.
- 4.5.1 If all the acceptance tests are within the range, the testing is similar. When the testing is similar, the degree of compaction for the lots of material represented by the acceptance evaluation can be accepted.
- 4.5.2 If any of the 5 acceptance tests are outside the range, calculate 3 standard deviations for the contractor's tests ($R = X \pm 3 S$).
- 4.5.2.1 If all acceptance tests are within the range, the testing is considered similar, however, the quality control practices by the contractor should be reviewed for possible problems.
- 4.5.2.2 Any test outside the standard 3 deviation range indicates that there are probably problems with the quality control system and no additional material should be placed until the problem is resolved. The investigation would include checking such areas as equipment, test procedures, location of tests, variability of materials, compaction techniques, etc. The results of the investigation shall be documented in the project files.


Gary L. Robson, Director
Materials Control, Soils
and Testing Division

GLR:d

MP 700.00.50
 ORIGINAL ISSUANCE: AUGUST 1981
 1ST REVISION: FEBRUARY 1992
 REISSUED: JANUARY 1995
 ATTACHMENT 1

PROJECT NUMBER: _____
 ITEM NUMBER (S): _____
 TYPE OF MATERIAL: _____
 DATE: _____

QUALITY CONTROL TESTS

QUALITY CONTROL TESTS				
LOT NUMBER				
	1			
	2			
	3			
	4			
	5			
	AVERAGE (X)		STANDARD DEVIATION	
ACCEPTANCE TESTS				
TEST NUMBER	1	X + 1.65 (S) = X - 1.65 (S) =	YES NO	= UPPER LIMIT = LOWER LIMIT
	2			
	3	WITHIN LIMITS		(SIMILAR) (DISSIMILAR)
	4			
	5			
		X + +3 (S) = X - -3 (S) = WITHIN LIMITS	YES NO	= UPPER LIMIT = LOWER LIMIT (SIMILAR) (DISSIMILAR)

EVALUATED BY: _____
 CHECKED BY: _____

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

GUIDE FOR QUALITY CONTROL OF COMPACTION

1.0 PURPOSE

- 1.1 This procedure sets forth guidelines for the contractor's Quality Control Plan for embankment, subgrade, pipe and structure backfill material and aggregate base courses.

2.0 SCOPE

- 2.1 This procedure is applicable to all items requiring compaction control except bituminous concrete pavements.

3.0 REFERENCES

- 3.1 MP 700.00.06
MP 700.00.24
MP 207.07.20
MP 712.21.26
MP 700.00.50
WV Division of Highways Construction Manual
WV Division of Highways Standard Specifications

4.0 QUALITY CONTROL PLAN

- 4.1 As required by the Specifications, a Quality Control Plan must be designed by the contractor and submitted to the Engineer at the Preconstruction Conference. The plan should clearly describe the methods by which the Quality Control Program will be conducted. The plan may be updated as required during the life of the contract. Changes in the plan must be approved by the Division prior to being implemented.

- 5.0 MINIMUM REQUIREMENTS OF THE CONTRACTOR'S QUALITY CONTROL PLAN
- 5.1 Identifying Information
 - 5.1.1 The plan should include the project number, route number, location, county, district, and items to be controlled.
- 5.2 Personnel
 - 5.2.1 Provide the name of the company official for the project that is responsible for quality control and liaison with the Division's personnel.
 - 5.2.2 List all inspectors for the project including the certification number for certified compaction inspectors. All personnel performing compaction tests must be Certified Compaction Inspectors.
- 5.3 Field Test Methods
 - 5.3.1 Compaction tests are performed according to MP 207.07.20 and MP 700.00.24.
 - 5.3.2 Specify in the plan the methods by which each item will be tested. Table A and Table B (attached) summarizes the different materials, minimum frequencies, and the appropriate test procedure or method for controlling each material. A flow chart for embankment material, Table C (attached), is intended to serve as a guide for making field decisions to insure that each type of material is properly placed.
- 5.4 Test Equipment
 - 5.4.1 The plan should include a statement that all necessary test equipment will be provided. Materials Procedures 700.00.24 and MP 207.07.20 lists the required test equipment for compaction tests.

- 5.4.2 List all nuclear gauges to be used including serial number, manufacturer, model number, calibration data, and frequency of calibration. The calibration frequency must be acceptable to the Division. Nuclear gauges must be calibrated at least once every two years.
- 5.4.3 Outline the procedure for performing a stability check on nuclear gauges which are not within the tolerance range for standard counts during the interval between calibrations. Standard counts derived during the stability check for stable gauges may be used in lieu of the manufacturer's standards. Gauges found to be unstable can not be used until repaired and calibrated.
- 5.5 Lot and Sublot Sizes
- 5.5.1 Include in the plan the lot and sublot sizes to be used for testing each type of installation. During construction, some flexibility in lot sizes may be made if the situation warrants in order to maintain a workable system. For example, two or more areas containing small quantities of embankment material might be combined into one lot at the contractor's option and subject to the Division's approval.
- 5.5.2 Specify the maximum time period for completion of a lot of embankment material. As a guide, if the desired lot size can not be obtained within seven calendar days, then the material placed up to that time would constitute the lot and the specified number of tests for a lot would still be performed.
- 5.5.3 Specify in the plan when quality control tests for base and subgrade will be performed. Quality control tests are to be performed after the material has been shaped and final rolling has been completed.
- 5.5.4 The contractor is responsible for the accuracy of their individual testing and calculations.
- 5.6 Forms, Documentation and Distribution
- 5.6.1 List the forms and method of distribution for tests and measurements.

- 5.6.1.1 Compaction test results are reported on forms specified in MP 207.07.20 and MP 700.00.24. The forms are supplied by the Division. Each form consists of an original and one copy. The original of a completed form is submitted to the Division's project supervisor and the other copy is for the contractor's records.
- 5.6.2 Indicate the length of time after tests and measurements are completed that documentation will be provided.
- 5.6.2.1 Test results and measurements are made available to project personnel for review on a daily basis. Formal submission of measurements should be made within 24 hours after the measurements are taken and test results within 24 hours after testing of a lot is completed.
- 5.6.2.2 Tests performed in a lot before final rolling is completed should be submitted to the project supervisor and retained in the project files. This includes test documents for failing lots, moisture checks, etc.
- 5.7 Compaction Equipment
- 5.7.1 List the compaction equipment giving the quantity, make, model, and weight or applied force at which each roller will be operated. If ballast will be added to a roller, indicate the type and quantity of ballast and the method for verifying the gross weight. Attach the manufacturer's specifications for compaction capabilities for each roller to the plan or state the procedure for verifying the compaction capabilities of each roller in cases where the manufacturer's specifications are not available.
- 5.7.2 Indicate in the plan that a minimum of a 10 ton (9.07 Mg) roller will be used for test sections as per MP 700.00.24.
- 5.8 Proof Rolling
- 5.8.1 Specify the method by which proof rolling will be conducted on embankment materials. The materials to be proof rolled are summarized in Table B (attached).

- 5.8.2.1.1 List the number of passes to be made and corrective measures if soft areas are detected. Documentation should include the type of material, number of passes, and corrective action if soft areas are detected.
- 5.8.2.2 Specify the make, model, and type of proof roller. If ballast will be added, explain how the gross weight will be determined. For alternate proof rollers, attach to the plan the calculations used to determine that the roller meets specifications. Also, attach the manufacturer's specifications for all proof rollers to the plan. The following calculation is used to determine if an alternate proof roller meets specifications:

ENGLISH	Metric
$c = \frac{\sqrt{(ab\pi)}}{2}$	$c = \frac{\sqrt{(ab\pi)}}{50.8}$

Where:

- a = weight(force) on a single tire = pounds (kg x .009807 = kN)
b = operating tire pressure = psi (kPa)
c = weight (force) per inch (mm) width of tire = pounds per inch (Nm)

The weight (force) per inch (mm) width of tire must be equal to or greater than 1315 pounds (9.067 kN/mm).

- 5.9 Test Section
- 5.9.1 Outline the procedure for notifying the Division when the test section in MP 700.00.24 will be performed. The Division should be notified a minimum of 24 hours in advance unless other arrangements acceptable to the Division can be made.
- 5.10 Laboratory Testing
- 5.10.1 Specify in the plan the sampling frequency, place of sampling, and test procedures for material requiring laboratory testing. List the testing laboratory and the qualifications of the personnel performing the testing.

- 5.10.1.1 Laboratory testing for random material is not required unless the material has unusual characteristics or differs from the soil and rock data used to develop the design. Testing to develop density curves, specific gravities, organic content, etc. may be required. A list of test procedures is contained in Section 716 of the Standard Specifications.
- 5.10.1.2 Laboratory test procedures for granular material for subgrade are listed in Section 716 of the Standard Specifications. The minimum frequencies for gradation and plasticity index tests are specified in Table D (attached). Sampling of the material is according to MP 700.00.06.
- 5.10.1.3 Laboratory test procedures for gradation tests on select material for backfilling are listed in Section 716 of the Standard Specifications. The minimum frequency for gradation tests is specified in Table D (attached).
- 5.11 Non-Specification Material
- 5.11.1 Design a plan of action for the disposition of non-specification material, such as material with excessive moisture, excessive organic content, etc. The Project Supervisor should be immediately notified in the event a nonconformance situation is detected.
- 5.12 Lift Thickness Measurements
- 5.12.1 List the method(s) and frequencies by which lift thickness measurements will be taken. One method of measuring lift thicknesses is specified in the Construction Manual. The minimum frequency for lift thickness measurements is specified in Table E (attached).
-



Richard Donald Genthner, Director
Materials Control, Soil and Testing Division

RDG:Aw

Attachments

TABLE A
COMPACTION CONTROL OF AGGREGATE BASE COURSES

TEST PROCEDURE	LOT SIZE	NUMBER OF TEST	MATERIAL TYPE			
			PORTLAND CEMENT TREATED AGGREGATE BASE COURSE	CRUSHED AGGREGATE BASES AND SUBBASE COURSES	HOT-MIX HOT-LAID BITUMINOUS TREATED BASE COURSE	SOIL CEMENT BASE COURSE
MP 700.00.24	2000 FEET (600 METERS)	1 PER SUBLOT 5 PER LOT	X	X	X	
MP 207.07.20	2000 FEET (600 METERS)	1 PER SUBLOT 5 PER LOT				X

TABLE B
COMPACTION CONTROL OF EMBANKMENT
BACKFILL AND SUBGRADE

TEST	LOT SIZE	NUMBER OF TESTS	MATERIAL WITH LESS THAN 40% RETAINED ON ¾" (19.0 mm) SIEVE	MATERIAL WITH 40% OR MORE RETAINED ON ¾" (19.0 mm) SIEVE AND CAN BE PLACED IN A 12" (300 mm) LOOSE LIFT OR LESS		MATERIAL THAT CAN BE PLACED IN A LOOSE LIFT GREATER THAN 12" (300 mm)		GRANULAR SUBGRADE	SELECT MATERIAL FOR BACKFILLING AND CLASS I AGGREGATE
				UNIFORM	NON UNIFORM	ROCK	HARD SHALE		
MP 207.07.20	SEE STD. SPECS.	1 PER SUBLLOT 5 PER LOT	X						
MP 700.00.24	SEE STD. SPECS.	1 PER SUBLLOT 5 PER LOT		X (1)				X	X
PROOF ROLLING		1 REPORT PER LIFT			X (2)		X		

NOTES:

- [1] If a hole for a direct transmission density reading cannot be readily made due to the coarse material, proof roll the lift.
- [2] Material shall be considered non-uniform if the percent of random material varies by more than 25% by visual inspection.

TABLE C

MP 717.04.21
ATTACHMENT NO. 3

GUIDE FOR CONTROL OF EMBANKMENT MATERIAL

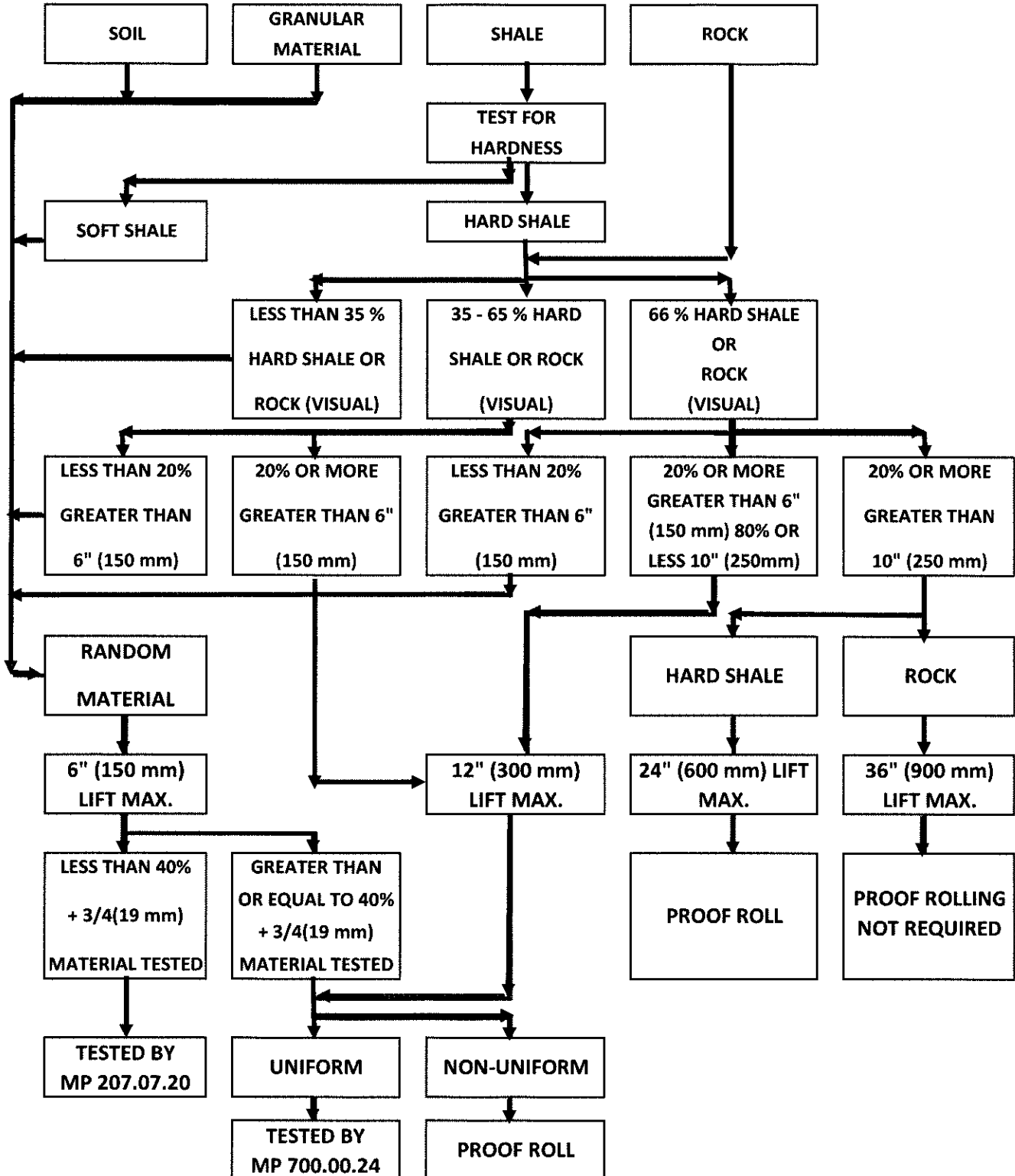


TABLE D
LABORATORY TESTING OF GRANULAR MATERIAL FOR
SUBGRADE AND SELECT MATERIAL FOR BACKFILLING

MATERIAL TYPE	TEST	FREQUENCY
GRANULAR MATERIAL FOR SUBGRADE	GRADATION	MINIMUM OF 1 PER DAY OF PLACEMENT NOTE 1
GRANULAR MATERIAL FOR SUBGRADE	PLASTIC LIMIT	MINIMUM OF 1 PER 6 DAYS OF PLACEMENT
SELECT MATERIAL FOR BACKFILLING	GRADATION	MINIMUM OF 1 PER DAY OF STOCKPILING, PRODUCTION, OR SHIPMENT

Note 1: In the event project activities are such that relatively small quantities of material are being placed per placement date, and to prevent over sampling, the Engineer may approve the following alternate sampling method: During one or more consecutive placement dates, one sample shall be taken to represent a maximum of 170 cubic yards (250 tons). In this case the sample shall be taken at a random time and place, represent the same material and production, and shall represent material placed during a period not to exceed one week.

TABLE E
LIFT THICKNESS MEASUREMENTS

MATERIAL TYPE	NUMBER OF MEASUREMENTS
EMBANKMENT	MINIMUM OF 3 PER LIFT
SUBGRADE	MINIMUM OF ONE PER 1200 FEET (350 METERS) PER WORKING WIDTH
PIPE BACKFILL	MINIMUM OF ONE PER SIDE PER LIFT
STRUCTURE BACKFILL	MINIMUM OF ONE PER LIFT

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

NUCLEAR FIELD DENSITY - MOISTURE TEST FOR
RANDOM MATERIAL HAVING LESS THAN 40%
OF + 3/4 INCH (+19 mm) MATERIAL

- 1.0 PURPOSE
- 1.1 The purpose of this procedure is to determine the density and moisture content of random materials.
- 2.0 SCOPE
- 2.1 This method of testing is applicable to random materials used for embankments, subgrades, backfill, and soil cement base courses.
- 3.0 REFERENCES
- 3.1 MP 717.04.21
MP 712.21.26
AASHTO T-99, Method C
- 4.0 EQUIPMENT
- 4.1 One complete nuclear density-moisture gauge unit meeting the requirements specified in MP 717.04.21. A copy of the manufacturer's print-out of standard counts is to be included.
- 4.2 One $1/30 \text{ ft}^3$ (0.000943 m^3) proctor mold assembly with a 5.5 LB (2.5 kg) rammer meeting the requirements of AASHTO T-99.
- 4.3 One steel foundation plate having minimum dimensions of 15 in. x 15 in. x 5/8 in. (380 mm x 380 mm x 16 mm) or a 200 LB (91 kg) block of concrete.
- 4.4 One extruder for removing specimens from proctor mold.

- 4.5 One balance having a capacity of at least 10 kg and sensitive to 1.0 g.
- 4.6 One stove for drying moisture samples.
- 4.7 One 32 oz. (900 g) ballpeen hammer or equivalent.
- 4.8 Two pans with a capacity to hold 10 lbs. (4500 g) of material.
- 4.9 One pan suitable for drying moisture samples.
- 4.10 One wire brush.
- 4.11 One 3/4 in. (19 mm) U.S. standard sieve.
- 4.12 One scoop.
- 4.13 One ruler or tape measure.
- 4.14 One measuring tape (should be a minimum of 50 ft. (15 mm)).
- 4.15 One 2 in. (50 mm) approximate size paint brush.
- 4.16 One 18 in. (450 mm) chisel or equivalent.
- 4.17 One draw knife.
- 4.18 Supply of data sheets and attached tables.
- 4.19 One appropriate vehicle for transporting nuclear gauge and test equipment.
- 5.0 PERSONNEL TRAINING
- 5.1 All personnel performing the testing must have the minimum training requirements specified in MP 717.04.21.
- 5.2 All personnel must know and follow the requirements of the Nuclear Regulatory Commission.

6.0 ROUNDING OF DATA

6.1 Rounding procedures have been adopted from the standard method taught in schools, and may be described as follows:

6.1.1 If the number following the last number to be retained is less than 5, the last number to be retained is left unchanged and the number(s) following the last number to be retained is/are discarded.

6.1.2 If the number following the last number to be retained is 5 or larger, increase the last number to be retained by 1 and discard the number(s) following the last number to be retained.

6.2 Test values and calculations shall be rounded to the following nearest significant digit:

Station Number:	1 ft. (0.1m)
Offset:	1 ft. (0.1m)
Lift Thickness:	1/2 in. (10 mm)
Depth Below Grade:	1 ft. (0.1m)
Dry Density (DA):	1 lb./ft. ³ (10 kg/m ³)
Moisture (MA):	1 lb./ft. ³ (10 kg/m ³)
Dry Density -3/4 in. (-19 mm) (DB):	1 lb./ft. ³ (10 kg/m ³)
Moisture (MB):	1%
Excavated Material & Pan (CA):	1 g
Pan (CB):	1 g
Excavated Material (CC):	1 g
+3/4 in. (+19 mm) Material & Pan (CD):	1 g
Pan (CE):	1 g
+3/4 in. (+19 mm) Material (CF):	1 g
+3/4 in. (+19 mm) Material (CG):	1%
Weight of Soil & Mold (PA):	1 g
Mold (PC):	1 g
Weight of Soil (PD):	1 g
Wet Density (PE):	1 lb./ft. ³ (10 kg/m ³)
Dry Density (PF):	1 lb./ft. ³ (10 kg/m ³)
Wet Weight & Pan (SA):	1 g
Pan (SB):	1 g
Wet Weight (SC):	1 g
Dry Weight & Pan (SD):	1 g
Dry Weight (SE):	1 g

Moisture (SF):	1 g
Moisture (SG):	1%
Optimum Moisture (OA):	1%
Maximum Density (DC):	1 LB/ft ³ (10 kg/m ³)
Relative Density (DE):	1%
Average DE (X):	0.1%
Target (T):	1%
Quality Index (L):	0.01
Within Tolerance (DF):	1%
Minimum Percent for 100% Pay (DG):	1%

7.0 PREPARATION FOR TESTING

- 7.1 Weigh the pans and proctor mold and record the weights on the sides of the equipment. The weights should be checked at least on a monthly basis.
- 7.2 All test data is to be recorded on the attached form.
- 7.3 Standardization of the nuclear gauge
- 7.3.1 Warm up the gauge according to manufacturer's recommendations.
- 7.3.2 Standardization of the gauge must be performed away from metal and other objects.
- 7.3.3 Clean the top of the standard block and the bottom of the gauge with a cloth.
- 7.3.4 Place the gauge on the standard block with the gauge turned the correct way. For the Troxler 3411 gauge, the scaler end of the gauge must be tight against the standard block flange.
- 7.3.5 Make the necessary adjustments on the gauge for standardization and take a four minute count for density and moisture.
- 7.3.6 Compare the standard counts to the manufacturer's standard counts. The standard count must be within $\pm 2\%$ for density and $\pm 4\%$ for moisture from the manufacturer's standards.
- 7.3.7 If the gauge is not within the specified tolerances for either moisture or density, repeat Section 7.3.5 - 7.3.6. If the gauge will not standardize for either moisture or density after 4 attempts, there is probably something

wrong with the gauge. There may be electronics problems, the gauge needs calibrated, or a stability check needs to be performed. Refer to MP 717.04.21 for a more detailed explanation. In any case, do not use a gauge for testing that will not properly standardize.

- 7.3.8 When a gauge is used for testing pipe or structure backfill in a trench, first check the standardization of the gauge according to Sections 7.3.1 - 7.3.6. If the gauge is functioning properly, then standardize the gauge in the trench. The standard counts in the trench are used for testing in the trench only and the tolerances would not be applied to the standard counts taken in the trench. When the gauge is moved to a non-trench condition for testing, new standard counts would be required.
- 7.3.9 Gauges are to be standardized before testing and at least every four hours during testing.
- 7.4 Record the project number, item number, etc.
- 7.5 The lot number has the following prefix letter designations based on the use of the material:
- Embankment - F
 - Subgrade - S
 - Base - B
 - Pipe and Structure Backfill - P
- 7.6 Randomly locate the test site according to MP 712.21.26.
- 8.0 PROCEDURE
- 8.1 Density and moisture determination
- 8.1.1 Smooth the test site selected for testing. Fill any voids in the surface using the fines scraped from the surface. Avoid adding excessive fines that would form a build-up on the surface (no more than 1/8 in. (3 mm)).
- 8.1.2 Place the guide plate on the test site. Next, place the drive rod in the plate guide and while standing on the plate, drive the rod at least 2 in. (50 mm) deeper than the location where the end of the gauge source rod will be when testing. The gauge source rod can be extended in

2 in. (50 mm) increments. The source rod must be as deep as possible within the lift but must not extend beyond the lift. For example, a 5 inch (125 mm) lift would be tested with the source rod in the 4 in. (100 mm) position and the hole would be 6 in. (150 mm) deep. Carefully remove the drive rod to prevent material from falling into the hole.

- 8.1.3 Place the gauge over the test site and insert the source rod to the desired depth. Pull the gauge tight against the side of the hole toward the scaler. Make sure the gauge is sitting flush on the material.
- 8.1.4 Take a one minute density and moisture reading. Record the dry density (DA) and moisture (MA).
- 8.2 Determination of the percent + 3/4 in. (+19 mm) material.
 - 8.2.1 Excavate approximately 10 pounds (4500 grams) of material immediately beneath the test site. Excavate the material from the test hole toward the scaler end of the gauge and to the depth of the position where the source rod was located. Keep the excavated material covered to prevent moisture loss.
 - 8.2.2 Zero the scales. The scales are to be located in an enclosed area of the vehicle that is protected from air movement. The scales are to be checked for zero before each weighing. Weigh the excavated material (CA).
 - 8.2.3 All of the material weighed in 8.2.2 shall be passed over the 3/4 in. (19 mm) sieve. Break up any clumps of soil that are retained on the sieve and clean the fines from the + 3/4 in. (+19 mm) material.
 - 8.2.4 Weigh the + 3/4 in. (+19 mm) material (CD) obtained in 8.2.3.
 - 8.2.5 Calculate the percent of + 3/4 in. (+19 mm) material (CG) by using the equations on the form. If the percent of + 3/4 in. (+19 mm) material is 40% or more, terminate the test. Refer to MP 717.04.21 for instructions on how to proceed with the material.

8.2.6 Determine the bulk specific gravity (CH) of the dominant +3/4 in. (+19 mm) material by using the values from the following table:

	Bulk Specific Gravity
Soft Shale:	2.4
Hard Shale:	2.5
Sandstone:	2.5
Gravel:	2.6
Limestone:	2.7
Red Shale (Iron Bearing)	2.7

8.3 Determination of the dry density of the -3/4 in. (-19 mm) material and percent field moisture.

8.3.1 The dry density of the -3/4 in. (-19 mm) material (DB) can be calculated by the equation on the form or obtained from the tables for converting total dry density to density of the -3/4 in. (-19 mm) material. The index with the tables explains how to use the tables.

8.3.2 Calculate the percent field moisture (MB) by the equation on the form.

8.4 One point proctor

8.4.1 Place the proctor mold with collar and base attached on the foundation plate. The foundation plate must be firmly seated so that it does not rock when compacting the material. Mix the -3/4 in. (-19 mm) material obtained in 8.2.3. Form a specimen by compacting the material in the mold in three equal layers 1 1/2 in. \pm 1/4 in. (38 mm \pm 7 mm). Each layer is compacted by 25 uniformly distributed blows with the metal rammer dropped freely from a height of 12 in. (305 mm). Stand on the edges of the mold base while compacting the specimen. The rammer must be held vertically.

8.4.2 After the specimen has been made, remove the extension collar. The sample must not extend more than a 1/2 in. (13 mm) above nor be below the top of the mold. A new specimen shall be made if it is too high or low. Carefully trim the material flush with the top of the mold by using the draw knife. Fill any voids in the surface with the fines obtained from the trimming. Use the paint brush to clean.

the fines from the outside of the mold. Remove the mold base and by holding the mold vertically, visually check the bottom of the mold to determine if the material extends beyond the mold. Do not turn the mold upside down nor trim the bottom. If the material extends beyond the bottom of the mold, perform another specimen with special precautions to seat and tighten the mold to the base.

- 8.4.3 Weigh the soil plus mold (PA). Record the values in the first column (left of dashed line) in the one point proctor section.
- 8.4.4 Remove the specimen from the mold by using the extruder. Place the specimen back in the remaining -3/4 in. (-19 mm) material.
- 8.4.5 Perform the calculations using the equations on the form to determine the dry density of the one point proctor (PE).
- 8.5 Determination of the maximum density and optimum moisture
- 8.5.1 To determine the maximum density and optimum moisture, plot the percent field moisture (MB) and the dry density of the one point proctor (PE) on the maximum density-optimum moisture table (copy attached). The values at the intersection of the density line and moisture column are the maximum density (DC) and optimum moisture (OA). If there are no values given, the sample is either too wet or too dry to determine the maximum density and optimum moisture. When the plotted point is to the right of the maximum densities and optimum moistures, the sample is too wet and when the plotted value is to the left, the sample is too dry.
- 8.5.2 If the sample is found to be too wet, air dry the -3/4 in. (-19 mm) material to decrease the moisture content between four percentage points below optimum and optimum moisture. The sample is dried by spreading the sample on a sheet of metal, canvas, etc. Do not dry the sample on a stove. If the sample is too dry, add water to increase the moisture content to the above moisture range. Care should be taken not to over dry or add too much water to the sample.

- 8.5.3 Rerun one point proctor
- 8.5.3.1 Once the sample has been air dried or water added, thoroughly mix the sample and perform another one point proctor according to 8.4.1 - 8.4.4. Record the data in the second column (right of dashed line) in the one point proctor section.
- 8.5.3.2 Calculate the wet density of the rerun one point proctor (PE) by using the equations on the form.
- 8.5.4 Stove dried moisture
- 8.5.4.1 Scoop out a representative sample between 200 g and 400 g from the sample in 8.5.3.1. The moisture determination can be made in conjunction with making the rerun one point proctor specimen. Place the sample in the pan for drying samples and determine the sample weight plus pan (SA).
- 8.5.4.2 Adjust the stove flame to a low heat so that the sample will not oxidize during drying. Occasionally stir the sample and be very careful not to lose any of the sample. Once the sample appears dry, weigh the sample and record the weight. Place the sample back on the stove and dry for approximately two minutes. Weigh the sample and compare the two weights. The weights should be the same (constant). If there is a decrease in weight, reheat the sample again for two minutes and weigh. Continue this process until two consecutive weighings are the same and this weight is dry weight plus pan (SD).
- 8.5.4.3 By using the equations on the form, calculate the percent moisture (SG).
- 8.5.5 Use the percent moisture (SG) from the stove dried moisture to calculate the dry density of the rerun one point proctor (PE).
- 8.5.6 Plot the dry density of the rerun one point proctor (PE) and the percent stove dried moisture (SG) on the maximum density-optimum table to obtain the maximum density (DC) and the optimum moisture (OA).

9.0 MOISTURE EVALUATION

- 9.1 Obtain the \pm moisture tolerance (OB) from the project's governing specifications.
- 9.2 To determine the acceptable moisture range, add the plus tolerance and subtract the minus tolerance from the optimum moisture. The field moisture (MB) must be within this range for the moisture to meet specifications. If the moisture fails specifications, corrective action is required.

10.0 DENSITY EVALUATION

- 10.1 Calculate the percent relative density (DE) by the equation on the form.
- 10.2 If the percent relative density (DE) is 105 or more, the test results may be in error. Plot the dry density of the -3/4 in. (-19 mm) material (DB) and the percent field moisture (MB) on the maximum density-optimum moisture table to check the validity of the test results. The plotted point should fall on or to the left of the darkened blocks (zero air voids). Another method of checking the test results is to calculate the maximum moisture content possible (zero air voids) by the following equation:

$$\text{Maximum moisture content possible (English)} = (62.4/DB - .373)100$$

$$\text{Maximum moisture content possible (Metric)} = (1000/DB - 0.373)100$$

When the test results are equal to or less than the above evaluation, the results are acceptable.

- 10.3 When the conditions in 10.2 are not met, perform another complete test, including a one point proctor, at a new random location. The checks in 10.2 would again be made if the test results are 105% or more. If the conditions in 10.2 are still not met, obtain a sample and determine the specific gravity of both the +3/4 in. (+19 mm) and -3/4 in. (-19 mm) material, performed separately. Then recalculate the test results using the specific gravity of the +3/4 in. (+19 mm) material to determine the dry density of the -3/4 in. (-19 mm) material (DB). If the percent relative density is still 105% or more, perform the following calculation using the specific gravity of the -3/4 in. (-19 mm) material.

Maximum moisture content = $(62.4/DB - 1/Sp. Gr.)100$

Maximum moisture content = $(1000/DB - 1/Sp. Gr.)100$

The field moisture (MB) must be equal to or less than the maximum moisture content (new zero air voids). If the test results still appear to be invalid, an immediate investigation must be conducted.

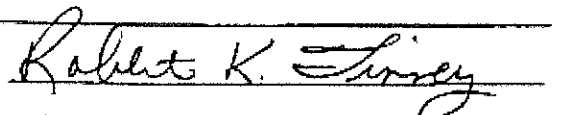
11.0 LOT EVALUATION

- 11.1 Five tests are required for a lot evaluation. Each test shall be performed according to previous sections of this procedure.
- 11.2 Calculate the average relative density (x) for the five tests in the lot.
- 11.3 Obtain the target percentage of dry density (T) from the project's governing specifications.
- 11.4 Determine the range (R) of the relative densities (DE) by subtracting the smallest value from the largest.
- 11.5 Calculate the quality index (QL) by using the equation on the form.
- 11.6 Enter the table for estimating the percent of a lot within tolerance (copy attached). Determine the percent within tolerance (DF) which corresponds to the QL value calculated in 11.5 above.
- 11.7 Obtain the minimum percent for 100% pay (DG) from the project's governing specifications.
- 11.8 In order for a lot to meet specifications for density, the percent within tolerance (DF) must be equal to or greater than the percent for 100% pay (DG). Corrective action is required to bring a failing lot into specification requirements.

12.0 GENERAL REQUIREMENTS

- 12.1 In order for a lot to meet specifications, the requirements in 9.2 and 11.8 must be met.

- 12.2 The maximum density, optimum moisture, and percent of +3/4 in. (+19 mm) material may be used for subsequent tests in a lot if the -3/4 in. (-19 mm) material does not change. When the material changes, the determination of new control data is required. There must be at least one, one point proctor, for each lot.
- 12.3 If the test results indicate that the material meets specifications and the material exhibits pumping or displacing action under the weight of construction equipment, the test results are probably in error. Obtain a sample of the material and determine the maximum density and optimum moisture according to AASHTO T99, Method C. Until the laboratory test results are obtained, the material in question would be dried and recompacted until the pumping stops. The area would then be retested and this moisture content used as the upper limit for moisture during the interim period.
- 12.4 During the compaction of soil cement base course, if the material starts to shear, cease rolling even though the required specifications for compaction are not met. The material is accepted for compaction and the proper documentation in the project's records would be made.
- 12.5 Independent tests for similarity checks can be recorded on the form. Use only the applicable sections of the form.


Robert K. Tinney, Director
Contract Administration Division

RTK:Sra

Attachments

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS & TESTING DIVISION



LAB NUMBER _____
 AUTHORIZATION NUMBER _____
 PROJECT NUMBER _____
 DISTRICT _____
 LOT NUMBER _____
 ITEM NUMBER _____

ATTACHMENT 1
FORM T-316
 MP 207.07.20
 REV. 08-08

GAUGE NUMBER		TEST NUMBER		1	2	3	4	5
MANUFACTURER'S STANDARDS		DATE						
DENSITY		STATION NUMBER	ft.					
MOISTURE		OFFSET	ft.					
GAUGE STANDARD COUNTS		DEPTH BELOW GRADE						
DENSITY		LIFT THICKNESS	in.					
MOISTURE		DEPTH OF SOURCE	in.					
DB FROM TABLES	Field Density Moisture	DA	TOTAL DRY DENSITY	lb/ft ³				
		MA	MOISTURE	lb/ft ³				
		DB	DRY DENSITY - 3/4	lb/ft ³				
		MB	MOISTURE	%				
MB = MA · (100)	PLUS 3/4 MATERIAL DETERMINATION	CA	EXC. MATERIAL + PAN	grams				
DB		CB	PAN	grams				
CC = CA - CB		CC	EXCAVATED MAT.	grams				
CF = CD - CE		CD	PLUS 3/4 MAT. + PAN	grams				
CG = CF (100)		CE	PAN	grams				
CC		CF	PLUS 3/4 MAT.	grams				
PC = PA - PB		CG	PLUS 3/4 MAT.	%				
PD = PC (0.066)		CH	SPECIFIC GRAVITY					
PE = PD (100)					RERUN	RERUN	RERUN	RERUN
100 + MB					RERUN	RERUN	RERUN	RERUN
RERUN PROCTOR PE (RERUN) = PD (100) 100 + SG	ONE POINT PROCTOR	PA	WEIGHT SOIL & MOLD	grams				
		PB	MOLD	grams				
		PC	WEIGHT OF SOIL	grams				
		PD	WET DENSITY	lb/ft ³				
		PE	DRY DENSITY	lb/ft ³				
SC = SA - SB SE = SD - SB SF = SC - SE SG = SF (100) SE DE = DB (100) DC	STOVE DRIED MOISTURE	SA	WET WEIGHT + PAN	grams				
		SB	PAN	grams				
		SC	WET WEIGHT	grams				
		SD	DRY WEIGHT + PAN	grams				
		SE	DRY WEIGHT	grams				
		SF	MOISTURE	grams				
		SG	MOISTURE	%				
$\bar{X} = \frac{\sum DE}{5}$	MOIST. EVAL.	OA	OPTIMUM MOISTURE	%				
		OB	PLUS / MINUS TOLER.					
		OC	PASS / FAIL					
$QL = \frac{\bar{X} - T}{R}$	DEN EVAL	DC	MAXIMUM DENSITY	lb/ft ³				
		DE	RELATIVE DENSITY	%				
LOT EVALUATION		X	AVERAGE DE	%	INSPECTOR'S NAME:			
		T	TARGET	%				
		QL	QUALITY INDEX		INSPECTOR'S SIGNATURE:			
		DF	WITHIN TOLERANCE	%				
		DG	MIN. FOR 100% PAY	%	PROJECT'S EVALUATION			
		DH	PASS / FAIL	YES				
				CHECKED BY:				
				DATE:				

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TABLE FOR ESTIMATING PERCENT OF LOT WITHIN TOLERANCE

Quality Index (QL) Positive Values	Percent Within Tolerance
.66	99
.65	98
.62	97
.60	96
.58	95
.57	94
.55	93
.53	92
.51	91
.50	90
.48	89
.46	88
.45	87
.44	86
.42	85
.41	84
.40	83
.38	82
.37	81
.36	80
.34	79
.33	78
.32	77
.30	76
.29	75
.28	74
.27	73
.25	72
.24	71
.23	70
.22	69
.21	68
.19	67
.18	66
.17	65
.16	64
.15	63
.14	62
.13	61
.11	60
.10	59
.09	58
.08	57
.07	56
.06	55
.05	54
.04	53
.02	52
.01	51
.00	50

Quality Index (QL) Negative Values	Percent Within Tolerance
.00	50
.01	49
.02	48
.04	47
.05	46
.06	45
.07	44
.08	43
.09	42
.10	41
.11	40
.13	39
.14	38
.15	37
.16	36
.17	35
.18	34
.19	33
.21	32
.22	31
.23	30
.24	29
.25	28
.27	27
.28	26
.29	25
.30	24
.32	23
.33	22
.34	21
.36	20
.37	19
.38	18
.40	17
.41	16
.42	15
.44	14
.45	13
.46	12
.48	11
.50	10
.51	9
.53	8
.55	7
.57	6
.58	5
.60	4
.62	3
.63	2
.66	1

MAXIMUM DENSITY-OPTIMUM MOISTURE TABLE

DRY DENSITY OF ONE POINT PROCTOR

	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
130			131 9	130 9																	
129		131 9	130 9	129 9																	
128		130 9	130 9	128 10																	
127	131 9	130 9	128 10	127 10	127 10																
126	131 9	130 9	128 10	127 10	126 10																
125	130 9	128 10	127 10	126 10	125 10																
124		128 10	126 10	125 11	125 11	124 11															
123		127 10	126 10	124 11	123 11	123 11															
122		126 10	125 11	124 11	123 11	122 12															
121		126 11	125 11	123 12	122 12	121 12	121 12														
120		125 11	124 11	122 12	121 12	120 12	120 12														
119			123 12	122 12	120 12	120 12	119 13														
118			122 12	120 12	120 12	119 13	118 13	118 13													
117				120 12	119 13	118 13	117 13	117 13													
116				119 13	118 13	117 13	117 13	116 14													
115				118 13	117 13	116 14	116 14	115 14	115 14												
114				117 13	116 14	116 14	115 14	114 14	114 14												
113				116 14	115 14	114 14	114 14	114 15	113 15												
112				115 14	115 14	113 15	113 15	112 15	112 15	112 15											
111				115 14	113 15	112 15	112 15	111 15	111 16	111 16											
110				113 15	112 15	112 15	111 15	111 16	110 16	110 16											
109					112 15	111 16	110 16	110 16	109 16	109 16	109 16										
108					111 16	110 16	110 16	109 17	109 17	108 17	108 17										
107						110 16	109 17	108 17	108 17	107 17	107 17	107 17									
106						109 17	108 17	107 17	107 17	106 18	106 18	106 18									
105						108 17	107 17	107 17	106 18	106 18	105 18	105 18	105 18								
104							107 17	106 18	105 18	105 18	104 19	104 19	104 19								
103							106 18	105 19	105 19	104 19	103 19	103 19	103 19	103 19							
102							105 18	105 19	104 19	103 19	103 20	102 20	102 20	102 20	102 20						
101								104 19	103 20	102 20	102 20	101 20	101 20	101 21	101 21	101 21					
100								103 19	102 20	101 20	101 21	100 21	100 21	100 21	100 21	100 21					
99								102 20	101 20	101 21	100 21	100 21	99 21	99 21	99 22	99 22					
98									100 21	100 21	99 21	99 22	98 22	98 22	98 22	98 22	98 22				
97									100 21	99 21	99 22	98 22	98 22	98 22	97 22	97 22	97 22				
96										99 22	98 22	98 22	98 22	97 22	97 23	97 23	96 23				
95										99 22	98 22	97 23	97 23	96 23	96 23	95 24	95 24	95 24			
94										98 22	97 23	96 23	95 24	95 24	94 24	94 24	94 24	94 24	94 24		
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	

PERCENT MOISTURE

MAXIMUM DENSITY-OPTIMUM MOISTURE TABLE

DRY DENSITY OF ONE POINT PROCTOR

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1790	1850 14	1830 14	1810 15	1800 15	1790 15	1790 15									
1780	1840 14	1820 15	1810 15	1790 15	1790 15	1780 15									
1770	1820 14	1810 15	1800 15	1780 15	1780 16	1770 16									
1760	1810 15	1800 15	1790 15	1780 16	1770 16	1760 16									
1750		1790 15	1780 15	1770 16	1760 16	1750 16	1750 16								
1740		1790 15	1770 16	1760 16	1750 16	1750 16	1740 17								
1730		1780 15	1770 16	1760 16	1750 16	1740 17	1730 17								
1720			1760 16	1750 16	1740 17	1730 17	1720 17	1720 17							
1710			1750 16	1740 17	1730 17	1720 17	1710 17	1710 17							
1700			1750 16	1730 17	1720 17	1710 17	1710 18	1700 18							
1690			1740 17	1720 17	1720 17	1710 18	1700 18	1690 18	1690 18						
1680			1730 17	1720 17	1710 17	1700 18	1690 18	1680 18	1680 18						
1670			1720 17	1710 17	1700 18	1690 18	1680 18	1680 19	1670 19						
1660				1710 18	1700 18	1680 19	1670 19	1660 19	1660 19	1660 19					
1650				1700 18	1690 18	1680 19	1670 19	1660 19	1650 19	1650 19					
1640				1690 18	1680 18	1670 19	1660 19	1650 19	1640 19	1640 19					
1630				1680 18	1670 19	1660 19	1650 20	1640 20	1630 20	1630 20	1630 20				
1620					1660 19	1650 19	1640 20	1630 20	1620 20	1620 20	1620 20				
1610					1650 19	1640 20	1630 20	1620 21	1610 21	1610 21	1610 21				
1600					1650 20	1630 20	1620 21	1610 21	1600 21	1600 21	1600 21	1600 21			
1590					1640 20	1630 20	1620 21	1610 21	1600 21	1590 21	1590 21	1590 21			
1580					1630 20	1620 20	1610 21	1600 21	1590 21	1580 22	1580 22	1580 22			
1570						1610 21	1600 21	1590 22	1580 22	1570 22	1570 22	1570 22	1570 22		
1560						1600 21	1590 22	1580 22	1570 22	1560 22	1560 22	1560 22	1560 22		
1550						1600 21	1590 22	1580 22	1570 22	1560 23	1560 23	1560 23	1560 23		
1540						1590 21	1580 22	1570 22	1560 22	1550 23	1550 23	1550 23	1550 23	1540 23	1540 23
1530							1580 22	1570 22	1560 23	1550 23	1540 23	1530 23	1530 23	1530 23	1530 23
1520							1570 22	1570 22	1560 23	1550 23	1540 24	1530 24	1520 24	1520 24	1520 24
1510							1570 22	1560 22	1550 23	1540 23	1530 24	1520 24	1510 24	1510 24	1510 24
1500							1570 22	1560 23	1550 23	1540 24	1530 24	1520 24	1510 24	1500 25	1500 25
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

PERCENT MOISTURE

MAXIMUM DENSITY-OPTIMUM MOISTURE TABLE

DRY DENSITY OF ONE POINT PROCTOR

	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2080			2090 9	2080 9											
2070		2100 9	2080 9	2070 9											
2060		2090 9	2080 9	2060 10											
2050		2080 9	2070 9	2050 10											
2040		2090 9	2060 10	2050 10	2040 10										
2030	2100 9	2080 9	2050 10	2040 10	2030 10										
2020	2100 9	2080 9	2050 10	2030 10	2020 10										
2010	2090 9	2070 9	2040 10	2030 10	2010 10										
2000	2090 9	2060 10	2030 10	2020 10	2000 11										
1990		2050 10	2030 10	2010 11	2000 11	1990 11									
1980		2040 10	2020 10	2000 11	1990 11	1980 11									
1970		2040 10	2020 10	2000 11	1980 11	1970 11									
1960		2030 10	2010 11	1990 11	1970 11	1960 12									
1950		2020 10	2000 11	1980 11	1960 12	1950 12									
1940		2020 10	2000 11	1970 11	1950 12	1940 12	1940 12								
1930		2010 11	1990 11	1980 12	1950 12	1940 12	1930 12								
1920		2010 11	1980 11	1960 12	1940 12	1930 12	1920 12								
1910			1970 11	1950 12	1930 12	1920 12	1910 13								
1900			1960 12	1940 12	1920 12	1910 13	1900 13								
1890			1950 12	1930 12	1910 12	1900 13	1890 13								
1880				1920 12	1910 13	1890 13	1880 13	1880 13							
1870				1910 13	1900 13	1880 13	1880 13	1870 13							
1860				1900 13	1890 13	1880 13	1870 13	1860 14							
1850				1900 13	1880 13	1870 13	1860 14	1850 14							
1840				1890 13	1870 13	1860 14	1850 14	1840 14	1840 14						
1830				1880 13	1870 13	1860 14	1850 14	1840 14	1830 14						
1820				1870 13	1860 14	1850 14	1840 14	1830 14	1820 14						
1810					1860 14	1850 14	1830 14	1820 14	1810 15						
1800					1850 14	1840 14	1820 14	1810 15	1800 15						
	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

PERCENT MOISTURE

TABLES FOR CONVERTING
TOTAL DRY DENSITY TO DENSITY
OF THE -3/4 in. (-19 mm) MATERIAL

INSTRUCTIONS FOR USING THE TABLES

To use the tables, locate in the index the page number corresponding to the specific gravity (CH), the total dry density (DA), and the percent of +3/4 in. (+19 mm) material (CG). Turn to the selected page and locate the total dry density in the left column and read across the page to the column corresponding to the percent of +3/4 in. (+19 mm) material. The percents of +3/4 in. (+19 mm) material are listed across the top of the page. The value at the intersection is the dry density of the -3/4 in. (-19 mm) material (DB).

EXAMPLE:

Given: Specific Gravity = 2.5
Percent of +3/4 in. (+19 mm) material = 29
Total Dry Density = 1 970 kg/m³

Turn to the index with the values and select Page 20. Next, turn to Page 20 and notice that a specific gravity of 2.5 is listed at the top of the page. Read down the left column and locate 1 970 kg/m³. Then read across the page to the column corresponding to 29%. The value of 1 880 kg/m³ at the intersection is the dry density of the -3/4 in. (-19 mm) material.

INDEX

PERCENT OF +3/4 in. (+19 mm) MATERIAL	TOTAL DRY DENSITY	PAGE NUMBER
Specific Gravity of 2.4		
1 - 10	1280 - 1770	1
1 - 10	1780 - 2260	2
1 - 10	2270 - 2560	3
11 - 20	1280 - 1770	4
11 - 20	1780 - 2260	5
11 - 20	2270 - 2560	6
21 - 30	1280 - 1770	7
21 - 30	1780 - 2260	8
21 - 30	2270 - 2560	9
31 - 40	1280 - 1770	10
31 - 40	1780 - 2260	11
31 - 40	2270 - 2560	12
Specific Gravity of 2.5		
1 - 10	1280 - 1770	13
1 - 10	1780 - 2260	14
1 - 10	2270 - 2560	15
11 - 20	1280 - 1770	16
11 - 20	1780 - 2260	17
11 - 20	2270 - 2560	18
21 - 30	1280 - 1770	19
21 - 30	1780 - 2260	20
21 - 30	2270 - 2560	21
31 - 40	1280 - 1770	22
31 - 40	1780 - 2260	23
31 - 40	2270 - 2560	24
Specific Gravity of 2.6		
1 - 10	1280 - 1770	25
1 - 10	1780 - 2260	26
1 - 10	2270 - 2560	27
11 - 20	1280 - 1770	28
11 - 20	1780 - 2260	29
11 - 20	2270 - 2560	30
21 - 30	1280 - 1770	31
21 - 30	1780 - 2260	32
21 - 30	2270 - 2560	33
31 - 40	1280 - 1770	34
31 - 40	1780 - 2260	35
31 - 40	2270 - 2560	36
Specific Gravity of 2.7		
1 - 10	1280 - 1770	37
1 - 10	1780 - 2260	38
1 - 10	2270 - 2560	39
11 - 20	1280 - 1770	40
11 - 20	1780 - 2260	41
11 - 20	2270 - 2560	42
21 - 30	1280 - 1770	43
21 - 30	1780 - 2260	44
21 - 30	2270 - 2560	45
31 - 40	1280 - 1770	46
31 - 40	1780 - 2260	47
31 - 40	2270 - 2560	48

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	← PERCENT of + 3/4 MATERIAL →									
	1	2	3	4	5	6	7	8	9	10
80	79	79	78	78	77	77	76	75	75	74
81	80	80	79	79	78	78	77	77	76	75
82	81	81	80	80	79	79	78	78	77	76
83	83	82	81	81	80	80	79	79	78	78
84	84	83	83	82	81	81	80	80	79	79
85	85	84	84	83	83	82	81	81	80	80
86	86	85	85	84	84	83	83	82	81	81
87	87	86	86	85	85	84	84	83	83	82
88	88	87	87	86	86	85	85	84	84	83
89	89	88	88	87	87	86	86	85	85	84
90	90	89	89	88	88	87	87	86	86	85
91	91	90	90	89	89	88	88	87	87	86
92	92	91	91	90	90	89	89	89	88	88
93	93	92	92	91	91	91	90	90	89	89
94	94	93	93	92	92	92	91	91	90	90
95	95	94	94	93	93	93	92	92	91	91
96	96	95	95	95	94	94	93	93	92	92
97	97	96	96	96	95	95	94	94	94	93
98	98	97	97	97	96	96	95	95	95	94
99	99	98	98	98	97	97	97	96	96	95
100	100	99	99	99	98	98	98	97	97	96
101	101	100	100	100	99	99	99	98	98	98
102	102	101	101	101	100	100	100	99	99	99
103	103	102	102	102	101	101	101	100	100	100
104	104	103	103	103	103	102	102	102	101	101
105	105	104	104	104	104	103	103	103	102	102
106	106	105	105	105	105	104	104	104	103	103
107	107	106	106	106	106	105	105	105	105	104
108	108	108	107	107	107	106	106	106	106	105
109	109	109	108	108	108	108	107	107	107	106
110	110	110	109	109	109	109	108	108	108	108
111	111	111	110	110	110	110	109	109	109	109
112	112	112	111	111	111	111	111	110	110	110
113	113	113	112	112	112	112	112	111	111	111
114	114	114	113	113	113	113	113	112	112	112
115	115	115	114	114	114	114	114	114	113	113
116	116	116	116	115	115	115	115	115	114	114
117	117	117	117	116	116	116	116	116	116	115
118	118	118	118	117	117	117	117	117	117	116
119	119	119	119	118	118	118	118	118	118	118
120	120	120	120	120	119	119	119	119	119	119

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF **2.4**

DD	←----- PERCENT of + 3/4 MATERIAL -----→									
	1	2	3	4	5	6	7	8	9	10
121	121	121	121	121	120	120	120	120	120	120
122	122	122	122	122	121	121	121	121	121	121
123	123	123	123	123	123	122	122	122	122	122
124	124	124	124	124	124	124	123	123	123	123
125	125	125	125	125	125	125	124	124	124	124
126	126	126	126	126	126	126	126	125	125	125
127	127	127	127	127	127	127	127	127	127	126
128	128	128	128	128	128	128	128	128	128	128
129	129	129	129	129	129	129	129	129	129	129
130	130	130	130	130	130	130	130	130	130	130
131	131	131	131	131	131	131	131	131	131	131
132	132	132	132	132	132	132	132	132	132	132
133	133	133	133	133	133	133	133	133	133	133
134	134	134	134	134	134	134	134	134	134	134
135	135	135	135	135	135	135	135	135	135	135
136	136	136	136	136	136	136	136	136	136	136
137	137	137	137	137	137	137	137	137	138	138
138	138	138	138	138	138	138	138	139	139	139
139	139	139	139	139	139	139	140	140	140	140
140	140	140	140	140	140	141	141	141	141	141
141	141	141	141	141	141	142	142	142	142	142
142	142	142	142	142	143	143	143	143	143	143
143	143	143	143	143	144	144	144	144	144	144
144	144	144	144	145	145	145	145	145	145	145
145	145	145	145	146	146	146	146	146	146	146
146	146	146	146	147	147	147	147	147	147	148
147	147	147	147	148	148	148	148	148	149	149
148	148	148	149	149	149	149	149	149	150	150
149	149	149	150	150	150	150	150	150	151	151
150	150	150	151	151	151	151	151	152	152	152
151	151	151	152	152	152	152	152	153	153	153
152	152	152	153	153	153	153	154	154	154	154
153	153	153	154	154	154	154	155	155	155	155
154	154	154	155	155	155	155	156	156	156	156
155	155	155	156	156	156	156	157	157	157	158
156	156	156	157	157	157	158	158	158	158	159
157	157	158	158	158	158	159	159	159	159	160
158	158	159	159	159	159	160	160	160	161	161
159	159	160	160	160	160	161	161	161	162	162
160	160	161	161	161	161	162	162	162	163	163

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
80	74	73	72	72	71	70	69	69	68	67
81	75	74	73	73	72	71	71	70	69	68
82	76	75	75	74	73	73	72	71	70	70
83	77	76	76	75	74	74	73	72	72	71
84	78	77	77	76	76	75	74	74	73	72
85	79	79	78	77	77	76	75	75	74	73
86	80	80	79	79	78	77	77	76	75	75
87	81	81	80	80	79	78	78	77	76	76
88	83	82	81	81	80	80	79	78	78	77
89	84	83	83	82	81	81	80	80	79	78
90	85	84	84	83	83	82	81	81	80	80
91	86	85	85	84	84	83	83	82	81	81
92	87	87	86	86	85	84	84	83	83	82
93	88	88	87	87	86	86	85	84	84	83
94	89	89	88	88	87	87	86	86	85	85
95	90	90	90	89	89	88	87	87	86	86
96	92	91	91	90	90	89	89	88	88	87
97	93	92	92	91	91	90	90	89	89	88
98	94	93	93	92	92	92	91	91	90	90
99	95	95	94	94	93	93	92	92	91	91
100	96	96	95	95	94	94	93	93	93	92
101	97	97	96	96	96	95	95	94	94	93
102	98	98	98	97	97	96	96	95	95	95
103	99	99	99	98	98	98	97	97	96	96
104	101	100	100	99	99	99	98	98	97	97
105	102	101	101	101	100	100	100	99	99	98
106	103	102	102	102	101	101	101	100	100	100
107	104	104	103	103	103	102	102	102	101	101
108	105	105	104	104	104	103	103	103	102	102
109	106	106	106	105	105	105	104	104	104	103
110	107	107	107	106	106	106	106	105	105	105
111	108	108	108	108	107	107	107	106	106	106
112	110	109	109	109	109	108	108	108	107	107
113	111	110	110	110	110	109	109	109	109	108
114	112	112	111	111	111	111	110	110	110	110
115	113	113	112	112	112	112	112	111	111	111
116	114	114	114	113	113	113	113	113	112	112
117	115	115	115	115	114	114	114	114	114	113
118	116	116	116	116	116	115	115	115	115	115
119	117	117	117	117	117	117	116	116	116	116
120	119	118	118	118	118	118	118	117	117	117

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
121	120	120	119	119	119	119	119	119	118	118
122	121	121	121	120	120	120	120	120	120	120
123	122	122	122	122	121	121	121	121	121	121
124	123	123	123	123	123	123	122	122	122	122
125	124	124	124	124	124	124	124	124	123	123
126	125	125	125	125	125	125	125	125	125	125
127	126	126	126	126	126	126	126	126	126	126
128	128	127	127	127	127	127	127	127	127	127
129	129	129	129	129	129	128	128	128	128	128
130	130	130	130	130	130	130	130	130	130	130
131	131	131	131	131	131	131	131	131	131	131
132	132	132	132	132	132	132	132	132	132	132
133	133	133	133	133	133	133	133	133	133	133
134	134	134	134	134	134	134	134	134	135	135
135	135	135	135	136	136	136	136	136	136	136
136	137	137	137	137	137	137	137	137	137	137
137	138	138	138	138	138	138	138	138	138	138
138	139	139	139	139	139	139	139	139	139	140
139	140	140	140	140	140	140	140	141	141	141
140	141	141	141	141	141	142	142	142	142	142
141	142	142	142	142	143	143	143	143	143	143
142	143	143	144	144	144	144	144	144	144	145
143	144	145	145	145	145	145	145	145	146	146
144	146	146	146	146	146	146	147	147	147	147
145	147	147	147	147	147	148	148	148	148	148
146	148	148	148	148	149	149	149	149	149	150
147	149	149	149	149	150	150	150	150	151	151
148	150	150	150	151	151	151	151	152	152	152
149	151	151	152	152	152	152	153	153	153	153
150	152	152	153	153	153	153	154	154	154	155
151	153	154	154	154	154	155	155	155	156	156
152	154	155	155	155	156	156	156	156	157	157
153	156	156	156	156	157	157	157	158	158	158
154	157	157	157	158	158	158	159	159	159	160
155	158	158	158	159	159	159	160	160	160	161
156	159	159	160	160	160	161	161	161	162	162
157	160	160	161	161	161	162	162	163	163	163
158	161	162	162	162	163	163	163	164	164	165
159	162	163	163	163	164	164	165	165	165	166
160	163	164	164	165	165	165	166	166	167	167

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF **2.4**

DD	PERCENT of + 3/4 MATERIAL									
	21	22	23	24	25	26	27	28	29	30
80	66	65	65	64	63	62	61	60	59	58
81	67	67	66	65	64	63	62	61	60	59
82	69	68	67	66	65	65	64	63	62	61
83	70	69	68	68	67	66	65	64	63	62
84	71	71	70	69	68	67	66	65	64	64
85	73	72	71	70	69	69	68	67	66	65
86	74	73	72	72	71	70	69	68	67	66
87	75	74	74	73	72	71	70	70	69	68
88	76	76	75	74	73	73	72	71	70	69
89	78	77	76	75	75	74	73	72	72	71
90	79	78	78	77	76	75	75	74	73	72
91	80	79	79	78	77	77	76	75	74	74
92	81	81	80	79	79	78	77	77	76	75
93	83	82	81	81	80	79	79	78	77	76
94	84	83	83	82	81	81	80	79	79	78
95	85	85	84	83	83	82	81	81	80	79
96	86	86	85	85	84	83	83	82	81	81
97	88	87	87	86	85	85	84	83	83	82
98	89	88	88	87	87	86	86	85	84	84
99	90	90	89	89	88	87	87	86	86	85
100	92	91	91	90	89	89	88	88	87	86
101	93	92	92	91	91	90	90	89	88	88
102	94	94	93	93	92	92	91	90	90	89
103	95	95	94	94	93	93	92	92	91	91
104	97	96	96	95	95	94	94	93	93	92
105	98	97	97	97	96	96	95	95	94	94
106	99	99	98	98	97	97	96	96	95	95
107	100	100	100	99	99	98	98	97	97	96
108	102	101	101	100	100	100	99	99	98	98
109	103	103	102	102	101	101	101	100	100	99
110	104	104	103	103	103	102	102	102	101	101
111	105	105	105	104	104	104	103	103	103	102
112	107	106	106	106	105	105	105	104	104	104
113	108	108	107	107	107	106	106	106	105	105
114	109	109	109	108	108	108	107	107	107	106
115	111	110	110	110	109	109	109	108	108	108
116	112	112	111	111	111	110	110	110	110	109
117	113	113	113	112	112	112	112	111	111	111
118	114	114	114	114	113	113	113	113	112	112
119	116	115	115	115	115	115	114	114	114	114
120	117	117	116	116	116	116	116	115	115	115

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
121	118	118	118	118	117	117	117	117	117	116
122	119	119	119	119	119	119	118	118	118	118
123	121	121	120	120	120	120	120	120	119	119
124	122	122	122	122	121	121	121	121	121	121
125	123	123	123	123	123	123	122	122	122	122
126	124	124	124	124	124	124	124	124	124	124
127	126	126	126	125	125	125	125	125	125	125
128	127	127	127	127	127	127	127	127	126	126
129	128	128	128	128	128	128	128	128	128	128
130	130	129	129	129	129	129	129	129	129	129
131	131	131	131	131	131	131	131	131	131	131
132	132	132	132	132	132	132	132	132	132	132
133	133	133	133	133	133	133	133	133	133	134
134	135	135	135	135	135	135	135	135	135	135
135	136	136	136	136	136	136	136	136	136	136
136	137	137	137	137	137	137	138	138	138	138
137	138	138	139	139	139	139	139	139	139	139
138	140	140	140	140	140	140	140	140	141	141
139	141	141	141	141	141	142	142	142	142	142
140	142	142	142	143	143	143	143	143	143	144
141	143	144	144	144	144	144	144	145	145	145
142	145	145	145	145	145	146	146	146	146	146
143	146	146	146	147	147	147	147	147	148	148
144	147	147	148	148	148	148	149	149	149	149
145	149	149	149	149	149	150	150	150	150	151
146	150	150	150	150	151	151	151	152	152	152
147	151	151	152	152	152	152	153	153	153	154
148	152	153	153	153	153	154	154	154	155	155
149	154	154	154	154	155	155	155	156	156	156
150	155	155	155	156	156	156	157	157	157	158
151	156	156	157	157	157	158	158	158	159	159
152	157	158	158	158	159	159	159	160	160	161
153	159	159	159	160	160	160	161	161	162	162
154	160	160	161	161	161	162	162	163	163	164
155	161	162	162	162	163	163	164	164	164	165
156	162	163	163	164	164	165	165	165	166	166
157	164	164	165	165	165	166	166	167	167	168
158	165	165	166	166	167	167	168	168	169	169
159	166	167	167	168	168	169	169	170	170	171
160	167	168	168	169	169	170	170	171	172	172

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
80	57	56	54	53	52	51	50	48	47	45
81	58	57	56	55	54	52	51	50	49	47
82	60	59	57	56	55	54	53	51	50	49
83	61	60	59	58	57	56	54	53	52	50
84	63	62	60	59	58	57	56	55	53	52
85	64	63	62	61	60	59	58	56	55	54
86	65	64	63	62	61	60	59	58	57	55
87	67	66	65	64	63	62	61	60	58	57
88	68	67	66	65	64	63	62	61	60	59
89	70	69	68	67	66	65	64	63	62	60
90	71	70	69	68	67	66	65	64	63	62
91	73	72	71	70	69	68	67	66	65	64
92	74	73	72	72	71	70	69	68	67	65
93	76	75	74	73	72	71	70	69	68	67
94	77	76	75	75	74	73	72	71	70	69
95	78	78	77	76	75	74	73	72	71	70
96	80	79	78	78	77	76	75	74	73	72
97	81	81	80	79	78	77	77	76	75	74
98	83	82	81	81	80	79	78	77	76	75
99	84	84	83	82	81	81	80	79	78	77
100	86	85	84	84	83	82	81	81	80	79
101	87	87	86	85	84	84	83	82	81	80
102	89	88	87	87	86	85	85	84	83	82
103	90	89	89	88	87	87	86	85	85	84
104	92	91	90	90	89	88	88	87	86	85
105	93	92	92	91	91	90	89	89	88	87
106	94	94	93	93	92	91	91	90	90	89
107	96	95	95	94	94	93	92	92	91	90
108	97	97	96	96	95	95	94	93	93	92
109	99	98	98	97	97	96	96	95	94	94
110	100	100	99	99	98	98	97	97	96	95
111	102	101	101	100	100	99	99	98	98	97
112	103	103	102	102	101	101	100	100	99	99
113	105	104	104	103	103	102	102	101	101	100
114	106	106	105	105	104	104	104	103	103	102
115	107	107	107	106	106	106	105	105	104	104
116	109	109	108	108	107	107	107	106	106	105
117	110	110	110	109	109	109	108	108	108	107
118	112	112	111	111	111	110	110	110	109	109
119	113	113	113	112	112	112	111	111	111	110
120	115	114	114	114	114	113	113	113	112	112

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.4

DD	←----- PERCENT of + 3/4 MATERIAL -----→									
	31	32	33	34	35	36	37	38	39	40
121	116	116	116	115	115	115	115	114	114	114
122	118	117	117	117	117	116	116	116	116	115
123	119	119	119	118	118	118	118	118	117	117
124	121	120	120	120	120	120	119	119	119	119
125	122	122	122	122	121	121	121	121	121	120
126	123	123	123	123	123	123	123	122	122	122
127	125	125	125	125	124	124	124	124	124	124
128	126	126	126	126	126	126	126	126	126	125
129	128	128	128	128	127	127	127	127	127	127
130	129	129	129	129	129	129	129	129	129	129
131	131	131	131	131	131	131	131	131	130	130
132	132	132	132	132	132	132	132	132	132	132
133	134	134	134	134	134	134	134	134	134	134
134	135	135	135	135	135	135	135	135	135	135
135	136	137	137	137	137	137	137	137	137	137
136	138	138	138	138	138	138	138	139	139	139
137	139	139	140	140	140	140	140	140	140	140
138	141	141	141	141	141	141	142	142	142	142
139	142	142	143	143	143	143	143	143	144	144
140	144	144	144	144	144	145	145	145	145	145
141	145	145	146	146	146	146	146	147	147	147
142	147	147	147	147	147	148	148	148	149	149
143	148	148	149	149	149	149	150	150	150	150
144	149	150	150	150	151	151	151	151	152	152
145	151	151	152	152	152	152	153	153	153	154
146	152	153	153	153	154	154	154	155	155	155
147	154	154	154	155	155	156	156	156	157	157
148	155	156	156	156	157	157	158	158	158	159
149	157	157	157	158	158	159	159	160	160	160
150	158	159	159	159	160	160	161	161	162	162
151	160	160	160	161	161	162	162	163	163	164
152	161	162	162	162	163	163	164	164	165	165
153	163	163	163	164	164	165	165	166	167	167
154	164	164	165	165	166	166	167	168	168	169
155	165	166	166	167	167	168	169	169	170	170
156	167	167	168	168	169	170	170	171	171	172
157	168	169	169	170	171	171	172	172	173	174
158	170	170	171	172	172	173	173	174	175	175
159	171	172	172	173	174	174	175	176	176	177
160	173	173	174	175	175	176	177	177	178	179

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	← PERCENT of + 3/4 MATERIAL →									
	1	2	3	4	5	6	7	8	9	10
80	79	79	78	78	77	76	76	75	74	74
81	80	80	79	79	78	77	77	76	75	75
82	81	81	80	80	79	78	78	77	77	76
83	82	82	81	81	80	80	79	78	78	77
84	83	83	82	82	81	81	80	79	79	78
85	84	84	83	83	82	82	81	80	80	79
86	85	85	84	84	83	83	82	82	81	80
87	86	86	85	85	84	84	83	83	82	81
88	88	87	86	86	85	85	84	84	83	83
89	89	88	88	87	86	86	85	85	84	84
90	90	89	89	88	88	87	86	86	85	85
91	91	90	90	89	89	88	88	87	86	86
92	92	91	91	90	90	89	89	88	88	87
93	93	92	92	91	91	90	90	89	89	88
94	94	93	93	92	92	91	91	90	90	89
95	95	94	94	93	93	92	92	91	91	90
96	96	95	95	94	94	93	93	92	92	91
97	97	96	96	95	95	94	94	93	93	93
98	98	97	97	96	96	95	95	95	94	94
99	99	98	98	97	97	97	96	96	95	95
100	100	99	99	98	98	98	97	97	96	96
101	101	100	100	99	99	99	98	98	97	97
102	102	101	101	101	100	100	99	99	99	98
103	103	102	102	102	101	101	100	100	100	99
104	104	103	103	103	102	102	101	101	101	100
105	105	104	104	104	103	103	103	102	102	101
106	106	105	105	105	104	104	104	103	103	103
107	107	106	106	106	105	105	105	104	104	104
108	108	107	107	107	106	106	106	105	105	105
109	109	108	108	108	108	107	107	107	106	106
110	110	109	109	109	109	108	108	108	107	107
111	111	110	110	110	110	109	109	109	108	108
112	112	111	111	111	111	110	110	110	109	109
113	113	113	112	112	112	111	111	111	111	110
114	114	114	113	113	113	113	112	112	112	111
115	115	115	114	114	114	114	113	113	113	113
116	116	116	115	115	115	115	114	114	114	114
117	117	117	116	116	116	116	115	115	115	115
118	118	118	117	117	117	117	117	116	116	116
119	119	119	118	118	118	118	118	117	117	117
120	120	120	119	119	119	119	119	118	118	118

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	←————— PERCENT of + 3/4 MATERIAL —————→									
	1	2	3	4	5	6	7	8	9	10
121	121	121	120	120	120	120	120	120	119	119
122	122	122	122	121	121	121	121	121	120	120
123	123	123	123	122	122	122	122	122	122	121
124	124	124	124	123	123	123	123	123	123	123
125	125	125	125	124	124	124	124	124	124	124
126	126	126	126	126	125	125	125	125	125	125
127	127	127	127	127	126	126	126	126	126	126
128	128	128	128	128	128	127	127	127	127	127
129	129	129	129	129	129	128	128	128	128	128
130	130	130	130	130	130	130	129	129	129	129
131	131	131	131	131	131	131	131	130	130	130
132	132	132	132	132	132	132	132	132	131	131
133	133	133	133	133	133	133	133	133	133	133
134	134	134	134	134	134	134	134	134	134	134
135	135	135	135	135	135	135	135	135	135	135
136	136	136	136	136	136	136	136	136	136	136
137	137	137	137	137	137	137	137	137	137	137
138	138	138	138	138	138	138	138	138	138	138
139	139	139	139	139	139	139	139	139	139	139
140	140	140	140	140	140	140	140	140	140	140
141	141	141	141	141	141	141	141	141	141	141
142	142	142	142	142	142	142	142	142	142	143
143	143	143	143	143	143	143	143	143	144	144
144	144	144	144	144	144	144	145	145	145	145
145	145	145	145	145	145	145	146	146	146	146
146	146	146	146	146	146	147	147	147	147	147
147	147	147	147	147	148	148	148	148	148	148
148	148	148	148	148	149	149	149	149	149	149
149	149	149	149	149	150	150	150	150	150	150
150	150	150	150	151	151	151	151	151	151	151
151	151	151	151	152	152	152	152	152	152	153
152	152	152	152	153	153	153	153	153	153	154
153	153	153	153	154	154	154	154	154	155	155
154	154	154	155	155	155	155	155	155	156	156
155	155	155	156	156	156	156	156	157	157	157
156	156	156	157	157	157	157	157	158	158	158
157	157	157	158	158	158	158	158	159	159	159
158	158	158	159	159	159	159	160	160	160	160
159	159	159	160	160	160	160	161	161	161	161
160	160	160	161	161	161	161	162	162	162	163

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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF **2.5**

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
80	73	72	71	71	70	69	68	67	67	66
81	74	73	73	72	71	70	69	69	68	67
82	75	74	74	73	72	71	71	70	69	68
83	76	76	75	74	73	73	72	71	70	69
84	77	77	76	75	75	74	73	72	72	71
85	79	78	77	76	76	75	74	74	73	72
86	80	79	78	78	77	76	75	75	74	73
87	81	80	79	79	78	77	77	76	75	74
88	82	81	81	80	79	79	78	77	76	76
89	83	82	82	81	80	80	79	78	78	77
90	84	84	83	82	82	81	80	80	79	78
91	85	85	84	83	83	82	82	81	80	79
92	86	86	85	85	84	83	83	82	81	81
93	88	87	86	86	85	85	84	83	83	82
94	89	88	88	87	86	86	85	84	84	83
95	90	89	89	88	88	87	86	86	85	84
96	91	90	90	89	89	88	88	87	86	86
97	92	92	91	90	90	89	89	88	88	87
98	93	93	92	92	91	91	90	89	89	88
99	94	94	93	93	92	92	91	91	90	89
100	95	95	94	94	93	93	92	92	91	91
101	97	96	96	95	95	94	94	93	92	92
102	98	97	97	96	96	95	95	94	94	93
103	99	98	98	97	97	96	96	95	95	94
104	100	99	99	99	98	98	97	97	96	96
105	101	101	100	100	99	99	98	98	97	97
106	102	102	101	101	100	100	100	99	99	98
107	103	103	102	102	102	101	101	100	100	99
108	104	104	104	103	103	102	102	102	101	101
109	106	105	105	104	104	104	103	103	102	102
110	107	106	106	106	105	105	104	104	104	103
111	108	107	107	107	106	106	106	105	105	104
112	109	109	108	108	108	107	107	106	106	106
113	110	110	109	109	109	108	108	108	107	107
114	111	111	111	110	110	110	109	109	109	108
115	112	112	112	111	111	111	110	110	110	109
116	113	113	113	113	112	112	112	111	111	111
117	114	114	114	114	113	113	113	113	112	112
118	116	115	115	115	115	114	114	114	113	113
119	117	117	116	116	116	116	115	115	115	114
120	118	118	117	117	117	117	116	116	116	116

WEST VIRGINIA DIVISION OF HIGHWAYS
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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
121	119	119	119	118	118	118	118	117	117	117
122	120	120	120	120	119	119	119	119	118	118
123	121	121	121	121	120	120	120	120	120	119
124	122	122	122	122	122	121	121	121	121	121
125	123	123	123	123	123	123	122	122	122	122
126	125	124	124	124	124	124	124	124	123	123
127	126	126	125	125	125	125	125	125	125	124
128	127	127	127	126	126	126	126	126	126	126
129	128	128	128	128	128	127	127	127	127	127
130	129	129	129	129	129	129	129	128	128	128
131	130	130	130	130	130	130	130	130	130	129
132	131	131	131	131	131	131	131	131	131	131
133	132	132	132	132	132	132	132	132	132	132
134	134	134	134	133	133	133	133	133	133	133
135	135	135	135	135	135	135	135	134	134	134
136	136	136	136	136	136	136	136	136	136	136
137	137	137	137	137	137	137	137	137	137	137
138	138	138	138	138	138	138	138	138	138	138
139	139	139	139	139	139	139	139	139	139	139
140	140	140	140	140	140	141	141	141	141	141
141	141	142	142	142	142	142	142	142	142	142
142	143	143	143	143	143	143	143	143	143	143
143	144	144	144	144	144	144	144	144	144	144
144	145	145	145	145	145	145	145	145	146	146
145	146	146	146	146	146	146	147	147	147	147
146	147	147	147	147	148	148	148	148	148	148
147	148	148	148	149	149	149	149	149	149	149
148	149	149	150	150	150	150	150	150	151	151
149	150	151	151	151	151	151	151	152	152	152
150	152	152	152	152	152	152	153	153	153	153
151	153	153	153	153	153	154	154	154	154	154
152	154	154	154	154	155	155	155	155	155	156
153	155	155	155	156	156	156	156	156	157	157
154	156	156	156	157	157	157	157	158	158	158
155	157	157	158	158	158	158	159	159	159	159
156	158	159	159	159	159	160	160	160	160	161
157	159	160	160	160	160	161	161	161	162	162
158	161	161	161	161	162	162	162	163	163	163
159	162	162	162	163	163	163	163	164	164	164
160	163	163	163	164	164	164	165	165	165	166

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
13 OF 32

DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	←————— PERCENT of + 3/4 MATERIAL —————→									
	21	22	23	24	25	26	27	28	29	30
80	65	64	63	62	61	60	59	58	57	55
81	66	65	64	63	62	61	60	59	58	57
82	67	66	65	65	64	63	62	61	59	58
83	69	68	67	66	65	64	63	62	61	60
84	70	69	68	67	66	65	64	63	62	61
85	71	70	69	68	68	67	66	65	64	63
86	72	72	71	70	69	68	67	66	65	64
87	74	73	72	71	70	69	68	67	66	65
88	75	74	73	72	72	71	70	69	68	67
89	76	75	75	74	73	72	71	70	69	68
90	77	77	76	75	74	73	73	72	71	70
91	79	78	77	76	76	75	74	73	72	71
92	80	79	78	78	77	76	75	74	74	73
93	81	81	80	79	78	77	77	76	75	74
94	82	82	81	80	80	79	78	77	76	75
95	84	83	82	82	81	80	79	79	78	77
96	85	84	84	83	82	81	81	80	79	78
97	86	86	85	84	84	83	82	81	81	80
98	88	87	86	86	85	84	83	83	82	81
99	89	88	88	87	86	86	85	84	83	83
100	90	89	89	88	88	87	86	86	85	84
101	91	91	90	90	89	88	88	87	86	85
102	93	92	91	91	90	90	89	88	88	87
103	94	93	93	92	92	91	90	90	89	88
104	95	95	94	93	93	92	92	91	90	90
105	96	96	95	95	94	94	93	92	92	91
106	98	97	97	96	96	95	94	94	93	93
107	99	98	98	97	97	96	96	95	95	94
108	100	100	99	99	98	98	97	97	96	95
109	101	101	101	100	100	99	99	98	97	97
110	103	102	102	101	101	100	100	99	99	98
111	104	104	103	103	102	102	101	101	100	100
112	105	105	104	104	104	103	103	102	102	101
113	107	106	106	105	105	104	104	104	103	103
114	108	107	107	107	106	106	105	105	104	104
115	109	109	108	108	108	107	107	106	106	105
116	110	110	110	109	109	109	108	108	107	107
117	112	111	111	111	110	110	109	109	109	108
118	113	113	112	112	112	111	111	111	110	110
119	114	114	114	113	113	113	112	112	112	111
120	115	115	115	115	114	114	114	113	113	113

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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
121	117	116	116	116	116	115	115	115	114	114
122	118	118	117	117	117	117	116	116	116	115
123	119	119	119	118	118	118	118	117	117	117
124	120	120	120	120	120	119	119	119	119	118
125	122	122	121	121	121	121	120	120	120	120
126	123	123	123	122	122	122	122	122	121	121
127	124	124	124	124	124	123	123	123	123	123
128	126	125	125	125	125	125	125	124	124	124
129	127	127	127	126	126	126	126	126	126	125
130	128	128	128	128	128	127	127	127	127	127
131	129	129	129	129	129	129	129	129	128	128
132	131	131	130	130	130	130	130	130	130	130
133	132	132	132	132	132	131	131	131	131	131
134	133	133	133	133	133	133	133	133	133	133
135	134	134	134	134	134	134	134	134	134	134
136	136	136	136	136	136	136	136	136	135	135
137	137	137	137	137	137	137	137	137	137	137
138	138	138	138	138	138	138	138	138	138	138
139	139	139	140	140	140	140	140	140	140	140
140	141	141	141	141	141	141	141	141	141	141
141	142	142	142	142	142	142	142	142	143	143
142	143	143	143	143	144	144	144	144	144	144
143	145	145	145	145	145	145	145	145	145	145
144	146	146	146	146	146	146	146	147	147	147
145	147	147	147	147	148	148	148	148	148	148
146	148	148	149	149	149	149	149	149	150	150
147	150	150	150	150	150	150	151	151	151	151
148	151	151	151	151	152	152	152	152	152	153
149	152	152	153	153	153	153	153	154	154	154
150	153	154	154	154	154	154	155	155	155	155
151	155	155	155	155	156	156	156	156	157	157
152	156	156	156	157	157	157	157	158	158	158
153	157	157	158	158	158	159	159	159	159	160
154	158	159	159	159	160	160	160	161	161	161
155	160	160	160	161	161	161	162	162	162	163
156	161	161	162	162	162	163	163	163	164	164
157	162	163	163	163	164	164	164	165	165	165
158	164	164	164	165	165	165	166	166	166	167
159	165	165	165	166	166	167	167	167	168	168
160	166	166	167	167	168	168	168	169	169	170

WEST VIRGINIA DIVISION OF HIGHWAYS
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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
80	54	53	52	50	49	48	46	45	43	42
81	56	55	53	52	51	49	48	47	45	43
82	57	56	55	54	52	51	50	48	47	45
83	59	57	56	55	54	52	51	50	48	47
84	60	59	58	57	55	54	53	51	50	48
85	62	60	59	58	57	56	54	53	52	50
86	63	62	61	60	58	57	56	55	53	52
87	64	63	62	61	60	59	57	56	55	53
88	66	65	64	63	61	60	59	58	56	55
89	67	66	65	64	63	62	61	59	58	57
90	69	68	67	66	65	63	62	61	60	58
91	70	69	68	67	66	65	64	63	61	60
92	72	71	70	69	68	67	65	64	63	62
93	73	72	71	70	69	68	67	66	65	63
94	75	74	73	72	71	70	69	67	66	65
95	76	75	74	73	72	71	70	69	68	67
96	77	77	76	75	74	73	72	71	70	68
97	79	78	77	76	75	74	73	72	71	70
98	80	80	79	78	77	76	75	74	73	72
99	82	81	80	79	78	77	77	76	75	73
100	83	82	82	81	80	79	78	77	76	75
101	85	84	83	82	81	81	80	79	78	77
102	86	85	85	84	83	82	81	80	79	78
103	88	87	86	85	85	84	83	82	81	80
104	89	88	88	87	86	85	84	84	83	82
105	90	90	89	88	88	87	86	85	84	83
106	92	91	91	90	89	88	88	87	86	85
107	93	93	92	91	91	90	89	88	88	87
108	95	94	94	93	92	92	91	90	89	88
109	96	96	95	94	94	93	92	92	91	90
110	98	97	97	96	95	95	94	93	93	92
111	99	99	98	97	97	96	96	95	94	93
112	101	100	100	99	98	98	97	97	96	95
113	102	102	101	100	100	99	99	98	97	97
114	104	103	103	102	101	101	100	100	99	98
115	105	105	104	104	103	102	102	101	101	100
116	106	106	106	105	105	104	104	103	102	102
117	108	107	107	107	106	106	105	105	104	103
118	109	109	109	108	108	107	107	106	106	105
119	111	110	110	110	109	109	108	108	107	107
120	112	112	111	111	111	110	110	109	109	108

WEST VIRGINIA DIVISION OF HIGHWAYS
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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.5

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
121	114	113	113	113	112	112	111	111	111	110
122	115	115	114	114	114	113	113	113	112	112
123	117	116	116	116	115	115	115	114	114	113
124	118	118	117	117	117	117	116	116	116	115
125	119	119	119	119	118	118	118	117	117	117
126	121	121	120	120	120	120	119	119	119	118
127	122	122	122	122	121	121	121	121	120	120
128	124	124	123	123	123	123	123	122	122	122
129	125	125	125	125	125	124	124	124	124	123
130	127	127	126	126	126	126	126	126	125	125
131	128	128	128	128	128	127	127	127	127	127
132	130	130	129	129	129	129	129	129	129	128
133	131	131	131	131	131	131	130	130	130	130
134	133	132	132	132	132	132	132	132	132	132
135	134	134	134	134	134	134	134	134	134	133
136	135	135	135	135	135	135	135	135	135	135
137	137	137	137	137	137	137	137	137	137	137
138	138	138	138	138	138	138	138	138	138	138
139	140	140	140	140	140	140	140	140	140	140
140	141	141	141	141	141	142	142	142	142	142
141	143	143	143	143	143	143	143	143	143	143
142	144	144	144	144	145	145	145	145	145	145
143	146	146	146	146	146	146	146	147	147	147
144	147	147	147	147	148	148	148	148	148	148
145	148	149	149	149	149	149	150	150	150	150
146	150	150	150	150	151	151	151	151	152	152
147	151	152	152	152	152	152	153	153	153	153
148	153	153	153	154	154	154	154	155	155	155
149	154	155	155	155	155	156	156	156	156	157
150	156	156	156	157	157	157	157	158	158	158
151	157	157	158	158	158	159	159	159	160	160
152	159	159	159	160	160	160	161	161	161	162
153	160	160	161	161	161	162	162	163	163	163
154	162	162	162	163	163	163	164	164	165	165
155	163	163	164	164	165	165	165	166	166	167
156	164	165	165	166	166	167	167	167	168	168
157	166	166	167	167	168	168	169	169	170	170
158	167	168	168	169	169	170	170	171	171	172
159	169	169	170	170	171	171	172	172	173	173
160	170	171	171	172	172	173	173	174	175	175

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF **2.6**

DD	← PERCENT of + 3/4 MATERIAL →									
	1	2	3	4	5	6	7	8	9	10
80	79	79	78	77	77	76	75	75	74	73
81	80	80	79	78	78	77	76	76	75	74
82	81	81	80	79	79	78	77	77	76	75
83	82	82	81	81	80	79	79	78	77	76
84	83	83	82	82	81	80	80	79	78	77
85	84	84	83	83	82	81	81	80	79	79
86	85	85	84	84	83	82	82	81	80	80
87	86	86	85	85	84	83	83	82	81	81
88	87	87	86	86	85	85	84	83	83	82
89	88	88	87	87	86	86	85	84	84	83
90	89	89	88	88	87	87	86	85	85	84
91	90	90	89	89	88	88	87	86	86	85
92	91	91	90	90	89	89	88	88	87	86
93	92	92	91	91	90	90	89	89	88	87
94	94	93	92	92	91	91	90	90	89	89
95	95	94	94	93	92	92	91	91	90	90
96	96	95	95	94	94	93	92	92	91	91
97	97	96	96	95	95	94	94	93	92	92
98	98	97	97	96	96	95	95	94	94	93
99	99	98	98	97	97	96	96	95	95	94
100	100	99	99	98	98	97	97	96	96	95
101	101	100	100	99	99	98	98	97	97	96
102	102	101	101	100	100	99	99	98	98	97
103	103	102	102	101	101	100	100	100	99	99
104	104	103	103	102	102	102	101	101	100	100
105	105	104	104	103	103	103	102	102	101	101
106	106	105	105	104	104	104	103	103	102	102
107	107	106	106	106	105	105	104	104	103	103
108	108	107	107	107	106	106	105	105	105	104
109	109	108	108	108	107	107	106	106	106	105
110	110	109	109	109	108	108	108	107	107	106
111	111	110	110	110	109	109	109	108	108	107
112	112	111	111	111	110	110	110	109	109	109
113	113	112	112	112	111	111	111	110	110	110
114	114	113	113	113	112	112	112	111	111	111
115	115	114	114	114	114	113	113	113	112	112
116	116	115	115	115	115	114	114	114	113	113
117	117	116	116	116	116	115	115	115	114	114
118	118	117	117	117	117	116	116	116	116	115
119	119	119	118	118	118	117	117	117	117	116
120	120	120	119	119	119	119	118	118	118	117

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 ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	←----- PERCENT of + 3/4 MATERIAL -----→									
	1	2	3	4	5	6	7	8	9	10
121	121	121	120	120	120	120	119	119	119	119
122	122	122	121	121	121	121	120	120	120	120
123	123	123	122	122	122	122	122	121	121	121
124	124	124	123	123	123	123	123	122	122	122
125	125	125	124	124	124	124	124	123	123	123
126	126	126	125	125	125	125	125	125	124	124
127	127	127	127	126	126	126	126	126	125	125
128	128	128	128	127	127	127	127	127	127	126
129	129	129	129	128	128	128	128	128	128	127
130	130	130	130	129	129	129	129	129	129	129
131	131	131	131	131	130	130	130	130	130	130
132	132	132	132	132	131	131	131	131	131	131
133	133	133	133	133	132	132	132	132	132	132
134	134	134	134	134	134	133	133	133	133	133
135	135	135	135	135	135	135	134	134	134	134
136	136	136	136	136	136	136	135	135	135	135
137	137	137	137	137	137	137	137	136	136	136
138	138	138	138	138	138	138	138	138	138	137
139	139	139	139	139	139	139	139	139	139	139
140	140	140	140	140	140	140	140	140	140	140
141	141	141	141	141	141	141	141	141	141	141
142	142	142	142	142	142	142	142	142	142	142
143	143	143	143	143	143	143	143	143	143	143
144	144	144	144	144	144	144	144	144	144	144
145	145	145	145	145	145	145	145	145	145	145
146	146	146	146	146	146	146	146	146	146	146
147	147	147	147	147	147	147	147	147	147	147
148	148	148	148	148	148	148	148	148	149	149
149	149	149	149	149	149	149	149	150	150	150
150	150	150	150	150	150	150	151	151	151	151
151	151	151	151	151	151	152	152	152	152	152
152	152	152	152	152	152	153	153	153	153	153
153	153	153	153	153	154	154	154	154	154	154
154	154	154	154	154	155	155	155	155	155	155
155	155	155	155	156	156	156	156	156	156	156
156	156	156	156	157	157	157	157	157	157	157
157	157	157	157	158	158	158	158	158	158	159
158	158	158	158	159	159	159	159	159	160	160
159	159	159	160	160	160	160	160	160	161	161
160	160	160	161	161	161	161	161	161	162	162

WEST VIRGINIA DIVISION OF HIGHWAYS
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF **2.6**

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
80	72	71	71	70	69	68	67	66	65	64
81	73	73	72	71	70	69	68	67	67	66
82	74	74	73	72	71	70	70	69	68	67
83	76	75	74	73	72	72	71	70	69	68
84	77	76	75	74	74	73	72	71	70	69
85	78	77	76	76	75	74	73	72	71	71
86	79	78	78	77	76	75	74	74	73	72
87	80	79	79	78	77	76	76	75	74	73
88	81	81	80	79	78	78	77	76	75	74
89	82	82	81	80	80	79	78	77	76	76
90	83	83	82	81	81	80	79	78	78	77
91	85	84	83	83	82	81	80	80	79	78
92	86	85	84	84	83	82	82	81	80	79
93	87	86	86	85	84	84	83	82	81	81
94	88	87	87	86	85	85	84	83	83	82
95	89	88	88	87	87	86	85	85	84	83
96	90	90	89	88	88	87	86	86	85	84
97	91	91	90	90	89	88	88	87	86	86
98	92	92	91	91	90	89	89	88	87	87
99	94	93	92	92	91	91	90	89	89	88
100	95	94	94	93	92	92	91	91	90	89
101	96	95	95	94	94	93	92	92	91	91
102	97	96	96	95	95	94	94	93	92	92
103	98	98	97	97	96	95	95	94	94	93
104	99	99	98	98	97	97	96	95	95	94
105	100	100	99	99	98	98	97	97	96	96
106	101	101	101	100	100	99	98	98	97	97
107	103	102	102	101	101	100	100	99	99	98
108	104	103	103	102	102	101	101	100	100	99
109	105	104	104	104	103	103	102	102	101	101
110	106	106	105	105	104	104	103	103	102	102
111	107	107	106	106	105	105	104	104	104	103
112	108	108	107	107	107	106	106	105	105	104
113	109	109	109	108	108	107	107	106	106	106
114	110	110	110	109	109	109	108	108	107	107
115	112	111	111	110	110	110	109	109	108	108
116	113	112	112	112	111	111	111	110	110	109
117	114	113	113	113	112	112	112	111	111	111
118	115	115	114	114	114	113	113	113	112	112
119	116	116	115	115	115	114	114	114	113	113
120	117	117	117	116	116	116	115	115	115	114

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
20 OF 32

DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
121	118	118	118	117	117	117	117	116	116	116
122	119	119	119	119	118	118	118	117	117	117
123	121	120	120	120	120	119	119	119	118	118
124	122	121	121	121	121	120	120	120	120	119
125	123	123	122	122	122	122	121	121	121	121
126	124	124	123	123	123	123	123	122	122	122
127	125	125	125	124	124	124	124	124	123	123
128	126	126	126	126	125	125	125	125	125	124
129	127	127	127	127	127	126	126	126	126	126
130	128	128	128	128	128	128	127	127	127	127
131	130	129	129	129	129	129	129	128	128	128
132	131	131	130	130	130	130	130	130	129	129
133	132	132	132	131	131	131	131	131	131	131
134	133	133	133	133	132	132	132	132	132	132
135	134	134	134	134	134	134	133	133	133	133
136	135	135	135	135	135	135	135	135	134	134
137	136	136	136	136	136	136	136	136	136	136
138	137	137	137	137	137	137	137	137	137	137
139	139	138	138	138	138	138	138	138	138	138
140	140	140	140	140	140	139	139	139	139	139
141	141	141	141	141	141	141	141	141	141	141
142	142	142	142	142	142	142	142	142	142	142
143	143	143	143	143	143	143	143	143	143	143
144	144	144	144	144	144	144	144	144	144	144
145	145	145	145	145	145	145	145	145	146	146
146	146	146	146	147	147	147	147	147	147	147
147	148	148	148	148	148	148	148	148	148	148
148	149	149	149	149	149	149	149	149	149	149
149	150	150	150	150	150	150	150	150	150	151
150	151	151	151	151	151	151	151	152	152	152
151	152	152	152	152	152	153	153	153	153	153
152	153	153	153	154	154	154	154	154	154	154
153	154	154	155	155	155	155	155	155	155	156
154	155	156	156	156	156	156	156	156	157	157
155	157	157	157	157	157	157	158	158	158	158
156	158	158	158	158	158	159	159	159	159	159
157	159	159	159	159	160	160	160	160	160	161
158	160	160	160	160	161	161	161	161	162	162
159	161	161	161	162	162	162	162	163	163	163
160	162	162	163	163	163	163	164	164	164	164

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
80	63	62	61	60	59	58	57	56	54	53
81	65	64	63	61	60	59	58	57	56	55
82	66	65	64	63	62	61	60	58	57	56
83	67	66	65	64	63	62	61	60	59	57
84	68	67	66	65	64	63	62	61	60	59
85	70	69	68	67	66	65	64	63	61	60
86	71	70	69	68	67	66	65	64	63	62
87	72	71	70	69	68	67	66	65	64	63
88	73	73	72	71	70	69	68	67	66	65
89	75	74	73	72	71	70	69	68	67	66
90	76	75	74	73	72	71	70	69	68	67
91	77	76	76	75	74	73	72	71	70	69
92	79	78	77	76	75	74	73	72	71	70
93	80	79	78	77	76	76	75	74	73	72
94	81	80	79	79	78	77	76	75	74	73
95	82	82	81	80	79	78	77	76	75	75
96	84	83	82	81	80	80	79	78	77	76
97	85	84	83	83	82	81	80	79	78	77
98	86	85	85	84	83	82	81	81	80	79
99	87	87	86	85	84	84	83	82	81	80
100	89	88	87	86	86	85	84	83	83	82
101	90	89	89	88	87	86	86	85	84	83
102	91	91	90	89	88	88	87	86	85	85
103	92	92	91	90	90	89	88	88	87	86
104	94	93	92	92	91	90	90	89	88	87
105	95	94	94	93	92	92	91	90	90	89
106	96	96	95	94	94	93	92	92	91	90
107	97	97	96	96	95	94	94	93	92	92
108	99	98	98	97	96	96	95	94	94	93
109	100	99	99	98	98	97	97	96	95	95
110	101	101	100	100	99	98	98	97	97	96
111	103	102	102	101	100	100	99	99	98	97
112	104	103	103	102	102	101	101	100	99	99
113	105	105	104	104	103	103	102	101	101	100
114	106	106	105	105	104	104	103	103	102	102
115	108	107	107	106	106	105	105	104	104	103
116	109	108	108	108	107	107	106	106	105	105
117	110	110	109	109	108	108	107	107	106	106
118	111	111	111	110	110	109	109	108	108	107
119	113	112	112	111	111	111	110	110	109	109
120	114	114	113	113	112	112	112	111	111	110

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
121	115	115	114	114	114	113	113	113	112	112
122	116	116	116	115	115	115	114	114	114	113
123	118	117	117	117	116	116	116	115	115	115
124	119	119	118	118	118	117	117	117	116	116
125	120	120	120	119	119	119	118	118	118	117
126	122	121	121	121	120	120	120	119	119	119
127	123	123	122	122	122	121	121	121	121	120
128	124	124	124	123	123	123	123	122	122	122
129	125	125	125	125	124	124	124	124	123	123
130	127	126	126	126	126	126	125	125	125	125
131	128	128	127	127	127	127	127	126	126	126
132	129	129	129	129	128	128	128	128	128	127
133	130	130	130	130	130	130	129	129	129	129
134	132	132	131	131	131	131	131	131	130	130
135	133	133	133	133	132	132	132	132	132	132
136	134	134	134	134	134	134	133	133	133	133
137	135	135	135	135	135	135	135	135	135	135
138	137	137	137	136	136	136	136	136	136	136
139	138	138	138	138	138	138	138	138	137	137
140	139	139	139	139	139	139	139	139	139	139
141	141	141	140	140	140	140	140	140	140	140
142	142	142	142	142	142	142	142	142	142	142
143	143	143	143	143	143	143	143	143	143	143
144	144	144	144	144	144	144	144	144	145	145
145	146	146	146	146	146	146	146	146	146	146
146	147	147	147	147	147	147	147	147	147	147
147	148	148	148	148	148	148	149	149	149	149
148	149	149	150	150	150	150	150	150	150	150
149	151	151	151	151	151	151	151	151	152	152
150	152	152	152	152	152	153	153	153	153	153
151	153	153	153	154	154	154	154	154	154	155
152	154	155	155	155	155	155	155	156	156	156
153	156	156	156	156	156	157	157	157	157	157
154	157	157	157	158	158	158	158	158	159	159
155	158	158	159	159	159	159	160	160	160	160
156	160	160	160	160	160	161	161	161	161	162
157	161	161	161	161	162	162	162	163	163	163
158	162	162	163	163	163	163	164	164	164	165
159	163	164	164	164	164	165	165	165	166	166
160	165	165	165	165	166	166	166	167	167	167

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
23 OF 32

DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
80	52	50	49	48	46	45	43	42	40	38
81	53	52	51	49	48	46	45	43	42	40
82	55	53	52	51	49	48	46	45	43	41
83	56	55	54	52	51	49	48	46	45	43
84	58	56	55	54	52	51	49	48	46	45
85	59	58	57	55	54	53	51	50	48	46
86	60	59	58	57	55	54	53	51	50	48
87	62	61	60	58	57	56	54	53	51	50
88	63	62	61	60	59	57	56	54	53	51
89	65	64	63	61	60	59	57	56	55	53
90	66	65	64	63	62	60	59	58	56	55
91	68	67	66	64	63	62	61	59	58	56
92	69	68	67	66	65	63	62	61	60	58
93	71	70	68	67	66	65	64	62	61	60
94	72	71	70	69	68	67	65	64	63	61
95	74	73	71	70	69	68	67	66	64	63
96	75	74	73	72	71	70	69	67	66	65
97	76	75	74	73	72	71	70	69	68	66
98	78	77	76	75	74	73	72	71	69	68
99	79	78	77	76	75	74	73	72	71	70
100	81	80	79	78	77	76	75	74	73	71
101	82	81	80	79	79	78	76	75	74	73
102	84	83	82	81	80	79	78	77	76	75
103	85	84	83	83	82	81	80	79	78	76
104	87	86	85	84	83	82	81	80	79	78
105	88	87	86	86	85	84	83	82	81	80
106	89	89	88	87	86	85	84	83	82	81
107	91	90	89	89	88	87	86	85	84	83
108	92	92	91	90	89	88	88	87	86	85
109	94	93	92	92	91	90	89	88	87	86
110	95	95	94	93	92	92	91	90	89	88
111	97	96	95	95	94	93	92	92	91	90
112	98	98	97	96	95	95	94	93	92	91
113	100	99	98	98	97	96	96	95	94	93
114	101	100	100	99	99	98	97	96	96	95
115	103	102	101	101	100	99	99	98	97	96
116	104	103	103	102	102	101	100	100	99	98
117	105	105	104	104	103	103	102	101	101	100
118	107	106	106	105	105	104	103	103	102	101
119	108	108	107	107	106	106	105	104	104	103
120	110	109	109	108	108	107	107	106	105	105

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.6

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
121	111	111	110	110	109	109	108	108	107	106
122	113	112	112	111	111	110	110	109	109	108
123	114	114	113	113	112	112	111	111	110	110
124	116	115	115	114	114	113	113	112	112	111
125	117	117	116	116	115	115	115	114	114	113
126	118	118	118	117	117	117	116	116	115	115
127	120	120	119	119	119	118	118	117	117	116
128	121	121	121	120	120	120	119	119	119	118
129	123	123	122	122	122	121	121	121	120	120
130	124	124	124	123	123	123	122	122	122	121
131	126	125	125	125	125	124	124	124	123	123
132	127	127	127	126	126	126	126	125	125	125
133	129	128	128	128	128	128	127	127	127	126
134	130	130	130	129	129	129	129	129	128	128
135	132	131	131	131	131	131	130	130	130	130
136	133	133	133	133	132	132	132	132	132	131
137	134	134	134	134	134	134	134	133	133	133
138	136	136	136	136	135	135	135	135	135	135
139	137	137	137	137	137	137	137	137	137	136
140	139	139	139	139	139	138	138	138	138	138
141	140	140	140	140	140	140	140	140	140	140
142	142	142	142	142	142	142	142	142	142	141
143	143	143	143	143	143	143	143	143	143	143
144	145	145	145	145	145	145	145	145	145	145
145	146	146	146	146	146	146	146	146	146	146
146	147	148	148	148	148	148	148	148	148	148
147	149	149	149	149	149	149	149	150	150	150
148	150	150	151	151	151	151	151	151	151	151
149	152	152	152	152	152	153	153	153	153	153
150	153	153	154	154	154	154	154	154	155	155
151	155	155	155	155	155	156	156	156	156	156
152	156	156	157	157	157	157	157	158	158	158
153	158	158	158	158	159	159	159	159	160	160
154	159	159	160	160	160	160	161	161	161	161
155	160	161	161	161	162	162	162	162	163	163
156	162	162	163	163	163	163	164	164	164	165
157	163	164	164	164	165	165	165	166	166	166
158	165	165	166	166	166	167	167	167	168	168
159	166	167	167	167	168	168	169	169	169	170
160	168	168	168	169	169	170	170	171	171	171

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	1	2	3	4	5	6	7	8	9	10
80	79	79	78	77	76	76	75	74	73	72
81	80	80	79	78	77	77	76	75	74	74
82	81	81	80	79	79	78	77	76	75	75
83	82	82	81	80	80	79	78	77	77	76
84	83	83	82	81	81	80	79	78	78	77
85	84	84	83	82	82	81	80	79	79	78
86	85	85	84	83	83	82	81	81	80	79
87	86	86	85	84	84	83	82	82	81	80
88	87	87	86	85	85	84	83	83	82	81
89	88	88	87	87	86	85	85	84	83	82
90	89	89	88	88	87	86	86	85	84	84
91	90	90	89	89	88	87	87	86	85	85
92	91	91	90	90	89	88	88	87	86	86
93	92	92	91	91	90	89	89	88	88	87
94	93	93	92	92	91	91	90	89	89	88
95	94	94	93	93	92	92	91	90	90	89
96	95	95	94	94	93	93	92	91	91	90
97	96	96	95	95	94	94	93	93	92	91
98	97	97	96	96	95	95	94	94	93	92
99	99	98	97	97	96	96	95	95	94	94
100	100	99	99	98	97	97	96	96	95	95
101	101	100	100	99	99	98	97	97	96	96
102	102	101	101	100	100	99	99	98	97	97
103	103	102	102	101	101	100	100	99	99	98
104	104	103	103	102	102	101	101	100	100	99
105	105	104	104	103	103	102	102	101	101	100
106	106	105	105	104	104	103	103	102	102	101
107	107	106	106	105	105	104	104	103	103	102
108	108	107	107	106	106	105	105	104	104	104
109	109	108	108	107	107	106	106	106	105	105
110	110	109	109	108	108	108	107	107	106	106
111	111	110	110	109	109	109	108	108	107	107
112	112	111	111	110	110	110	109	109	108	108
113	113	112	112	112	111	111	110	110	110	109
114	114	113	113	113	112	112	111	111	111	110
115	115	114	114	114	113	113	112	112	112	111
116	116	115	115	115	114	114	114	113	113	112
117	117	116	116	116	115	115	115	114	114	114
118	118	117	117	117	116	116	116	115	115	115
119	119	118	118	118	117	117	117	116	116	116
120	120	119	119	119	119	118	118	118	117	117

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	1	2	3	4	5	6	7	8	9	10
121	121	120	120	120	120	119	119	119	118	118
122	122	121	121	121	121	120	120	120	119	119
123	123	122	122	122	122	121	121	121	121	120
124	124	124	123	123	123	122	122	122	122	121
125	125	125	124	124	124	124	123	123	123	122
126	126	126	125	125	125	125	124	124	124	124
127	127	127	126	126	126	126	125	125	125	125
128	128	128	127	127	127	127	126	126	126	126
129	129	129	128	128	128	128	128	127	127	127
130	130	130	129	129	129	129	129	128	128	128
131	131	131	130	130	130	130	130	129	129	129
132	132	132	131	131	131	131	131	131	130	130
133	133	133	133	132	132	132	132	132	131	131
134	134	134	134	133	133	133	133	133	133	132
135	135	135	135	134	134	134	134	134	134	134
136	136	136	136	135	135	135	135	135	135	135
137	137	137	137	137	136	136	136	136	136	136
138	138	138	138	138	137	137	137	137	137	137
139	139	139	139	139	139	138	138	138	138	138
140	140	140	140	140	140	139	139	139	139	139
141	141	141	141	141	141	141	140	140	140	140
142	142	142	142	142	142	142	142	141	141	141
143	143	143	143	143	143	143	143	143	142	142
144	144	144	144	144	144	144	144	144	144	144
145	145	145	145	145	145	145	145	145	145	145
146	146	146	146	146	146	146	146	146	146	146
147	147	147	147	147	147	147	147	147	147	147
148	148	148	148	148	148	148	148	148	148	148
149	149	149	149	149	149	149	149	149	149	149
150	150	150	150	150	150	150	150	150	150	150
151	151	151	151	151	151	151	151	151	151	151
152	152	152	152	152	152	152	152	152	152	152
153	153	153	153	153	153	153	153	153	153	154
154	154	154	154	154	154	154	154	154	155	155
155	155	155	155	155	155	155	156	156	156	156
156	156	156	156	156	156	156	157	157	157	157
157	157	157	157	157	157	158	158	158	158	158
158	158	158	158	158	159	159	159	159	159	159
159	159	159	159	159	160	160	160	160	160	160
160	160	160	160	160	161	161	161	161	161	161

WEST VIRGINIA DIVISION OF HIGHWAYS
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ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
80	72	71	70	69	68	67	66	65	64	63
81	73	72	71	70	69	68	67	66	65	64
82	74	73	72	71	70	69	68	67	66	65
83	75	74	73	72	71	71	70	69	68	67
84	76	75	74	74	73	72	71	70	69	68
85	77	76	76	75	74	73	72	71	70	69
86	78	78	77	76	75	74	73	72	71	70
87	79	79	78	77	76	75	74	74	73	72
88	81	80	79	78	77	77	76	75	74	73
89	82	81	80	79	79	78	77	76	75	74
90	83	82	81	81	80	79	78	77	76	75
91	84	83	82	82	81	80	79	78	78	77
92	85	84	84	83	82	81	80	80	79	78
93	86	85	85	84	83	82	82	81	80	79
94	87	87	86	85	84	84	83	82	81	80
95	88	88	87	86	86	85	84	83	83	82
96	90	89	88	87	87	86	85	85	84	83
97	91	90	89	89	88	87	87	86	85	84
98	92	91	90	90	89	88	88	87	86	85
99	93	92	92	91	90	90	89	88	87	87
100	94	93	93	92	91	91	90	89	89	88
101	95	95	94	93	93	92	91	91	90	89
102	96	96	95	94	94	93	93	92	91	90
103	97	97	96	96	95	94	94	93	92	92
104	99	98	97	97	96	96	95	94	94	93
105	100	99	99	98	97	97	96	96	95	94
106	101	100	100	99	99	98	97	97	96	95
107	102	101	101	100	100	99	99	98	97	97
108	103	103	102	101	101	100	100	99	99	98
109	104	104	103	103	102	102	101	100	100	99
110	105	105	104	104	103	103	102	102	101	100
111	106	106	105	105	104	104	103	103	102	102
112	108	107	107	106	106	105	105	104	103	103
113	109	108	108	107	107	106	106	105	105	104
114	110	109	109	108	108	107	107	106	106	105
115	111	110	110	110	109	109	108	108	107	107
116	112	112	111	111	110	110	109	109	108	108
117	113	113	112	112	111	111	111	110	110	109
118	114	114	113	113	113	112	112	111	111	110
119	115	115	115	114	114	113	113	113	112	112
120	117	116	116	115	115	115	114	114	113	113

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
28 OF 32

DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	11	12	13	14	15	16	17	18	19	20
121	118	117	117	117	116	116	115	115	115	114
122	119	118	118	118	117	117	117	116	116	115
123	120	120	119	119	119	118	118	117	117	117
124	121	121	120	120	120	119	119	119	118	118
125	122	122	122	121	121	121	120	120	120	119
126	123	123	123	122	122	122	121	121	121	120
127	124	124	124	124	123	123	123	122	122	122
128	125	125	125	125	124	124	124	124	123	123
129	127	126	126	126	126	125	125	125	124	124
130	128	128	127	127	127	127	126	126	126	125
131	129	129	128	128	128	128	127	127	127	127
132	130	130	130	129	129	129	129	128	128	128
133	131	131	131	131	130	130	130	130	129	129
134	132	132	132	132	131	131	131	131	131	130
135	133	133	133	133	133	132	132	132	132	132
136	134	134	134	134	134	134	133	133	133	133
137	136	135	135	135	135	135	135	135	134	134
138	137	137	136	136	136	136	136	136	136	135
139	138	138	138	137	137	137	137	137	137	137
140	139	139	139	139	139	138	138	138	138	138
141	140	140	140	140	140	140	140	139	139	139
142	141	141	141	141	141	141	141	141	141	140
143	142	142	142	142	142	142	142	142	142	142
144	143	143	143	143	143	143	143	143	143	143
145	145	145	145	144	144	144	144	144	144	144
146	146	146	146	146	146	146	146	146	145	145
147	147	147	147	147	147	147	147	147	147	147
148	148	148	148	148	148	148	148	148	148	148
149	149	149	149	149	149	149	149	149	149	149
150	150	150	150	150	150	150	150	150	150	150
151	151	151	151	151	151	152	152	152	152	152
152	152	153	153	153	153	153	153	153	153	153
153	154	154	154	154	154	154	154	154	154	154
154	155	155	155	155	155	155	155	155	155	155
155	156	156	156	156	156	156	156	156	157	157
156	157	157	157	157	157	157	158	158	158	158
157	158	158	158	158	159	159	159	159	159	159
158	159	159	159	160	160	160	160	160	160	160
159	160	160	161	161	161	161	161	161	162	162
160	161	162	162	162	162	162	162	163	163	163

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
29 OF 32

DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
80	62	61	60	58	57	56	55	53	52	51
81	63	62	61	60	59	57	56	55	54	52
82	64	63	62	61	60	59	57	56	55	54
83	66	65	64	62	61	60	59	58	56	55
84	67	66	65	64	63	61	60	59	58	56
85	68	67	66	65	64	63	62	60	59	58
86	69	68	67	66	65	64	63	62	61	59
87	71	70	69	68	67	65	64	63	62	61
88	72	71	70	69	68	67	66	65	63	62
89	73	72	71	70	69	68	67	66	65	64
90	75	74	73	72	71	70	68	67	66	65
91	76	75	74	73	72	71	70	69	68	66
92	77	76	75	74	73	72	71	70	69	68
93	78	77	76	76	75	74	73	72	70	69
94	80	79	78	77	76	75	74	73	72	71
95	81	80	79	78	77	76	75	74	73	72
96	82	81	80	79	79	78	77	76	75	74
97	83	83	82	81	80	79	78	77	76	75
98	85	84	83	82	81	80	79	78	77	76
99	86	85	84	83	83	82	81	80	79	78
100	87	86	86	85	84	83	82	81	80	79
101	88	88	87	86	85	84	84	83	82	81
102	90	89	88	87	87	86	85	84	83	82
103	91	90	89	89	88	87	86	85	85	84
104	92	92	91	90	89	88	88	87	86	85
105	93	93	92	91	91	90	89	88	87	86
106	95	94	93	93	92	91	90	90	89	88
107	96	95	95	94	93	93	92	91	90	89
108	97	97	96	95	95	94	93	92	92	91
109	99	98	97	97	96	95	94	94	93	92
110	100	99	99	98	97	97	96	95	94	94
111	101	100	100	99	99	98	97	97	96	95
112	102	102	101	101	100	99	99	98	97	96
113	104	103	102	102	101	101	100	99	99	98
114	105	104	104	103	103	102	101	101	100	99
115	106	106	105	104	104	103	103	102	101	101
116	107	107	106	106	105	105	104	103	103	102
117	109	108	108	107	107	106	105	105	104	104
118	110	109	109	108	108	107	107	106	106	105
119	111	111	110	110	109	109	108	108	107	106
120	112	112	112	111	111	110	110	109	108	108

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	21	22	23	24	25	26	27	28	29	30
121	114	113	113	112	112	111	111	110	110	109
122	115	115	114	114	113	113	112	112	111	111
123	116	116	115	115	115	114	114	113	113	112
124	118	117	117	116	116	115	115	115	114	114
125	119	118	118	118	117	117	116	116	115	115
126	120	120	119	119	119	118	118	117	117	116
127	121	121	121	120	120	120	119	119	118	118
128	123	122	122	122	121	121	121	120	120	119
129	124	124	123	123	123	122	122	122	121	121
130	125	125	125	124	124	124	123	123	123	122
131	126	126	126	126	125	125	125	124	124	124
132	128	127	127	127	127	126	126	126	125	125
133	129	129	128	128	128	128	127	127	127	126
134	130	130	130	129	129	129	129	128	128	128
135	131	131	131	131	131	130	130	130	130	129
136	133	133	132	132	132	132	131	131	131	131
137	134	134	134	133	133	133	133	133	132	132
138	135	135	135	135	135	134	134	134	134	134
139	137	136	136	136	136	136	136	135	135	135
140	138	138	138	137	137	137	137	137	137	136
141	139	139	139	139	139	138	138	138	138	138
142	140	140	140	140	140	140	140	140	139	139
143	142	142	141	141	141	141	141	141	141	141
144	143	143	143	143	143	143	142	142	142	142
145	144	144	144	144	144	144	144	144	144	144
146	145	145	145	145	145	145	145	145	145	145
147	147	147	147	147	147	147	147	147	146	146
148	148	148	148	148	148	148	148	148	148	148
149	149	149	149	149	149	149	149	149	149	149
150	150	150	151	151	151	151	151	151	151	151
151	152	152	152	152	152	152	152	152	152	152
152	153	153	153	153	153	153	153	153	154	154
153	154	154	154	154	155	155	155	155	155	155
154	156	156	156	156	156	156	156	156	156	156
155	157	157	157	157	157	157	157	158	158	158
156	158	158	158	158	159	159	159	159	159	159
157	159	159	160	160	160	160	160	160	161	161
158	161	161	161	161	161	161	162	162	162	162
159	162	162	162	162	163	163	163	163	163	164
160	163	163	164	164	164	164	164	165	165	165

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF

2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
80	49	48	46	45	43	42	40	38	36	34
81	51	49	48	46	45	43	41	40	38	36
82	52	51	49	48	46	45	43	41	40	38
83	54	52	51	49	48	46	45	43	41	39
84	55	54	52	51	49	48	46	45	43	41
85	57	55	54	52	51	49	48	46	45	43
86	58	57	55	54	52	51	49	48	46	44
87	59	58	57	55	54	53	51	49	48	46
88	61	60	58	57	56	54	53	51	49	48
89	62	61	60	58	57	56	54	53	51	49
90	64	63	61	60	59	57	56	54	53	51
91	65	64	63	62	60	59	57	56	54	53
92	67	66	64	63	62	60	59	58	56	54
93	68	67	66	65	63	62	61	59	58	56
94	70	68	67	66	65	63	62	61	59	58
95	71	70	69	68	66	65	64	62	61	59
96	73	71	70	69	68	67	65	64	63	61
97	74	73	72	71	69	68	67	66	64	63
98	75	74	73	72	71	70	68	67	66	64
99	77	76	75	74	72	71	70	69	68	66
100	78	77	76	75	74	73	72	70	69	68
101	80	79	78	77	76	74	73	72	71	69
102	81	80	79	78	77	76	75	74	72	71
103	83	82	81	80	79	78	76	75	74	73
104	84	83	82	81	80	79	78	77	76	74
105	86	85	84	83	82	81	80	78	77	76
106	87	86	85	84	83	82	81	80	79	78
107	88	88	87	86	85	84	83	82	81	79
108	90	89	88	87	86	85	84	83	82	81
109	91	91	90	89	88	87	86	85	84	83
110	93	92	91	90	89	88	88	87	86	84
111	94	93	93	92	91	90	89	88	87	86
112	96	95	94	93	92	92	91	90	89	88
113	97	96	96	95	94	93	92	91	90	89
114	99	98	97	96	96	95	94	93	92	91
115	100	99	99	98	97	96	95	95	94	93
116	102	101	100	99	99	98	97	96	95	94
117	103	102	102	101	100	99	99	98	97	96
118	104	104	103	102	102	101	100	99	99	98
119	106	105	105	104	103	103	102	101	100	99
120	107	107	106	105	105	104	103	103	102	101

WEST VIRGINIA DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING

MP 207.07.20
ATTACHMENT NO. 5
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DENSITY OF -3/4 INCH MATERIAL WITH THE +3/4 INCH MATERIAL SPECIFIC GRAVITY OF 2.7

DD	← PERCENT of + 3/4 MATERIAL →									
	31	32	33	34	35	36	37	38	39	40
121	109	108	108	107	106	106	105	104	104	103
122	110	110	109	108	108	107	107	106	105	104
123	112	111	111	110	109	109	108	108	107	106
124	113	113	112	112	111	110	110	109	108	108
125	115	114	114	113	112	112	111	111	110	109
126	116	116	115	115	114	113	113	112	112	111
127	117	117	117	116	116	115	115	114	113	113
128	119	118	118	118	117	117	116	116	115	114
129	120	120	120	119	119	118	118	117	117	116
130	122	121	121	121	120	120	119	119	118	118
131	123	123	122	122	122	121	121	120	120	119
132	125	124	124	124	123	123	122	122	122	121
133	126	126	125	125	125	124	124	124	123	123
134	128	127	127	127	126	126	126	125	125	124
135	129	129	128	128	128	128	127	127	127	126
136	130	130	130	130	129	129	129	128	128	128
137	132	132	131	131	131	131	130	130	130	129
138	133	133	133	133	132	132	132	132	131	131
139	135	135	134	134	134	134	134	133	133	133
140	136	136	136	136	136	135	135	135	135	134
141	138	138	137	137	137	137	137	137	136	136
142	139	139	139	139	139	138	138	138	138	138
143	141	141	140	140	140	140	140	140	140	139
144	142	142	142	142	142	142	141	141	141	141
145	144	143	143	143	143	143	143	143	143	143
146	145	145	145	145	145	145	145	145	145	144
147	146	146	146	146	146	146	146	146	146	146
148	148	148	148	148	148	148	148	148	148	148
149	149	149	149	149	149	149	149	149	149	149
150	151	151	151	151	151	151	151	151	151	151
151	152	152	152	152	152	153	153	153	153	153
152	154	154	154	154	154	154	154	154	154	154
153	155	155	155	155	156	156	156	156	156	156
154	157	157	157	157	157	157	157	158	158	158
155	158	158	158	158	159	159	159	159	159	159
156	159	160	160	160	160	160	161	161	161	161
157	161	161	161	162	162	162	162	162	163	163
158	162	163	163	163	163	163	164	164	164	164
159	164	164	164	165	165	165	165	166	166	166
160	165	166	166	166	166	167	167	167	168	168

TABLES FOR CONVERTING
TOTAL DRY DENSITY TO DENSITY
OF THE -19 MM MATERIAL

INSTRUCTIONS FOR USING THE TABLES

To use the tables, locate in the index the page number corresponding to the specific gravity (CH), the total dry density (DA), and the percent of +19 mm material (CG). Turn to the selected page and locate the total dry density in the left column and read across the page to the column corresponding to the percent of +19 mm material. The percents of +19 mm material are listed across the top of the page. The value at the intersection is the dry density of the -19 mm material (DB).

EXAMPLE:

Given: Specific Gravity = 2.5
Percent of +19 mm material = 29
Total Dry Density = 1 970 kg/m³

Turn to the index with the values and select Page 20. Next, turn to Page 20 and notice that a specific gravity of 2.5 is listed at the top of the page. Read down the left column and locate 1 970 kg/m³. Then read across the page to the column corresponding to 29%. The value of 1 880 kg/m³ at the intersection is the dry density of the -19 mm material.

INDEX

PERCENT OF +19 MM MATERIAL	TOTAL DRY DENSITY	PAGE NUMBER
Specific Gravity of 2.4		
1 - 10	1280 - 1700	1
1 - 10	1710 - 2130	2
1 - 10	2140 - 2560	3
11 - 20	1280 - 1700	4
11 - 20	1710 - 2130	5
11 - 20	2140 - 2560	6
21 - 30	1280 - 1700	7
21 - 30	1710 - 2130	8
21 - 30	2140 - 2560	9
31 - 40	1280 - 1700	10
31 - 40	1710 - 2130	11
31 - 40	2140 - 2560	12
Specific Gravity of 2.5		
1 - 10	1280 - 1700	13
1 - 10	1710 - 2130	14
1 - 10	2140 - 2560	15
11 - 20	1280 - 1700	16
11 - 20	1710 - 2130	17
11 - 20	2140 - 2560	18
21 - 30	1280 - 1700	19
21 - 30	1710 - 2130	20
21 - 30	2140 - 2560	21
31 - 40	1280 - 1700	22
31 - 40	1710 - 2130	23
31 - 40	2140 - 2560	24
Specific Gravity of 2.6		
1 - 10	1280 - 1700	25
1 - 10	1710 - 2130	26
1 - 10	2140 - 2560	27
11 - 20	1280 - 1700	28
11 - 20	1710 - 2130	29
11 - 20	2140 - 2560	30
21 - 30	1280 - 1700	31
21 - 30	1710 - 2130	32
21 - 30	2140 - 2560	33
31 - 40	1280 - 1700	34
31 - 40	1710 - 2130	35
31 - 40	2140 - 2560	36
Specific Gravity of 2.7		
1 - 10	1280 - 1700	37
1 - 10	1710 - 2130	38
1 - 10	2140 - 2560	39
11 - 20	1280 - 1700	40
11 - 20	1710 - 2130	41
11 - 20	2140 - 2560	42
21 - 30	1280 - 1700	43
21 - 30	1710 - 2130	44
21 - 30	2140 - 2560	45
31 - 40	1280 - 1700	46
31 - 40	1710 - 2130	47
31 - 40	2140 - 2560	48

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1280	1270	1260	1250	1250	1240	1230	1220	1210	1200	1190	
1290	1280	1270	1260	1260	1250	1240	1230	1220	1210	1200	
1300	1290	1280	1270	1270	1260	1250	1240	1230	1220	1210	
1310	1300	1290	1290	1280	1270	1260	1250	1240	1230	1220	
1320	1310	1300	1300	1290	1280	1270	1260	1250	1240	1230	
1330	1320	1310	1310	1300	1290	1280	1270	1260	1250	1240	
1340	1330	1320	1320	1310	1300	1290	1280	1270	1260	1250	
1350	1340	1330	1330	1320	1310	1300	1290	1280	1270	1260	
1360	1350	1340	1340	1330	1320	1310	1300	1290	1280	1270	
1370	1360	1350	1350	1340	1330	1320	1310	1300	1290	1280	
1380	1370	1370	1360	1350	1340	1330	1320	1310	1300	1290	
1390	1380	1380	1370	1360	1350	1340	1330	1320	1310	1300	
1400	1390	1390	1380	1370	1360	1350	1340	1330	1320	1310	
1410	1400	1400	1390	1380	1370	1360	1350	1340	1330	1320	
1420	1410	1410	1400	1390	1380	1370	1360	1350	1340	1330	
1430	1420	1420	1410	1400	1390	1380	1370	1360	1350	1340	
1440	1430	1430	1420	1410	1400	1390	1380	1370	1360	1350	
1450	1440	1440	1430	1420	1410	1400	1390	1380	1370	1360	
1460	1450	1450	1440	1430	1420	1410	1400	1390	1380	1370	
1470	1460	1460	1450	1440	1430	1420	1410	1400	1390	1380	
1480	1470	1470	1460	1450	1440	1430	1420	1410	1400	1390	
1490	1480	1480	1470	1460	1450	1440	1430	1420	1410	1400	
1500	1490	1490	1480	1470	1460	1450	1440	1430	1420	1410	
1510	1500	1500	1490	1480	1470	1460	1450	1440	1430	1420	
1520	1510	1510	1500	1490	1480	1470	1460	1450	1440	1430	
1530	1520	1520	1510	1500	1490	1480	1470	1460	1450	1440	
1540	1530	1530	1520	1510	1500	1490	1480	1470	1460	1450	
1550	1540	1540	1530	1520	1510	1500	1490	1480	1470	1460	
1560	1550	1550	1540	1530	1520	1510	1500	1490	1480	1470	
1570	1560	1560	1550	1540	1530	1520	1510	1500	1490	1480	
1580	1570	1570	1560	1550	1540	1530	1520	1510	1500	1490	
1590	1580	1580	1570	1560	1550	1540	1530	1520	1510	1500	
1600	1590	1590	1580	1570	1560	1550	1540	1530	1520	1510	
1610	1600	1600	1590	1580	1570	1560	1550	1540	1530	1520	
1620	1610	1610	1600	1590	1580	1570	1560	1550	1540	1530	
1630	1620	1620	1610	1600	1590	1580	1570	1560	1550	1540	
1640	1630	1630	1620	1610	1600	1590	1580	1570	1560	1550	
1650	1640	1640	1630	1620	1610	1600	1590	1580	1570	1560	
1660	1650	1650	1640	1630	1620	1610	1600	1590	1580	1570	
1670	1660	1660	1650	1640	1630	1620	1610	1600	1590	1580	
1680	1670	1670	1660	1650	1640	1630	1620	1610	1600	1590	
1690	1680	1680	1670	1660	1650	1640	1630	1620	1610	1600	
1700	1690	1690	1680	1670	1660	1650	1640	1630	1620	1610	
1710	1700	1700	1690	1680	1670	1660	1650	1640	1630	1620	
1720	1710	1710	1700	1690	1680	1670	1660	1650	1640	1630	
1730	1720	1720	1710	1700	1690	1680	1670	1660	1650	1640	
1740	1730	1730	1720	1710	1700	1690	1680	1670	1660	1650	
1750	1740	1740	1730	1720	1710	1700	1690	1680	1670	1660	
1760	1750	1750	1740	1730	1720	1710	1700	1690	1680	1670	
1770	1760	1760	1750	1740	1730	1720	1710	1700	1690	1680	
1780	1770	1770	1760	1750	1740	1730	1720	1710	1700	1690	
1790	1780	1780	1770	1760	1750	1740	1730	1720	1710	1700	
1800	1790	1790	1780	1770	1760	1750	1740	1730	1720	1710	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1710	1710	1700	1700	1690	1690	1680	1680	1680	1670	1670	1670
1720	1720	1710	1710	1700	1700	1690	1690	1690	1680	1680	1680
1730	1730	1720	1720	1710	1710	1710	1700	1700	1690	1690	1690
1740	1740	1730	1730	1720	1720	1720	1710	1710	1700	1700	1700
1750	1750	1740	1740	1730	1730	1730	1720	1720	1710	1710	1710
1760	1760	1750	1750	1750	1740	1740	1740	1730	1730	1730	1720
1770	1770	1760	1760	1760	1750	1750	1740	1740	1740	1740	1730
1780	1780	1770	1770	1770	1760	1760	1760	1750	1750	1750	1740
1790	1790	1780	1780	1780	1770	1770	1770	1760	1760	1760	1750
1800	1800	1790	1790	1790	1780	1780	1780	1770	1770	1770	1770
1810	1810	1800	1800	1800	1790	1790	1790	1780	1780	1780	1780
1820	1820	1810	1810	1810	1800	1800	1800	1790	1790	1790	1790
1830	1830	1820	1820	1820	1820	1810	1810	1810	1800	1800	1800
1840	1840	1830	1830	1830	1830	1820	1820	1820	1810	1810	1810
1850	1850	1840	1840	1840	1840	1830	1830	1830	1820	1820	1820
1860	1860	1850	1850	1850	1850	1840	1840	1840	1840	1840	1830
1870	1870	1870	1860	1860	1860	1850	1850	1850	1850	1850	1840
1880	1880	1880	1870	1870	1870	1870	1860	1860	1860	1860	1850
1890	1890	1890	1880	1880	1880	1880	1870	1870	1870	1870	1870
1900	1900	1900	1890	1890	1890	1890	1880	1880	1880	1880	1880
1910	1910	1910	1900	1900	1900	1900	1890	1890	1890	1890	1890
1920	1920	1920	1910	1910	1910	1910	1910	1900	1900	1900	1900
1930	1930	1930	1920	1920	1920	1920	1920	1910	1910	1910	1910
1940	1940	1940	1930	1930	1930	1930	1930	1930	1920	1920	1920
1950	1950	1950	1940	1940	1940	1940	1940	1940	1930	1930	1930
1960	1960	1960	1960	1950	1950	1950	1950	1950	1940	1940	1940
1970	1970	1970	1970	1960	1960	1960	1960	1960	1960	1960	1950
1980	1980	1980	1980	1970	1970	1970	1970	1970	1970	1970	1970
1990	1990	1990	1990	1980	1980	1980	1980	1980	1980	1980	1980
2000	2000	2000	2000	2000	1990	1990	1990	1990	1990	1990	1990
2010	2010	2010	2010	2010	2000	2000	2000	2000	2000	2000	2000
2020	2020	2020	2020	2020	2020	2010	2010	2010	2010	2010	2010
2030	2030	2030	2030	2030	2030	2020	2020	2020	2020	2020	2020
2040	2040	2040	2040	2040	2040	2040	2030	2030	2030	2030	2030
2050	2050	2050	2050	2050	2050	2050	2050	2040	2040	2040	2040
2060	2060	2060	2060	2060	2060	2060	2060	2060	2050	2050	2050
2070	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070	2070
2080	2080	2080	2080	2080	2080	2080	2080	2080	2080	2080	2080
2090	2090	2090	2090	2090	2090	2090	2090	2090	2090	2090	2090
2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
2110	2110	2110	2110	2110	2110	2110	2110	2110	2110	2110	2110
2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120
2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140
2150	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150
2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2170
2170	2170	2170	2170	2170	2170	2170	2170	2170	2180	2180	2180
2180	2180	2180	2180	2180	2180	2180	2180	2190	2190	2190	2190
2190	2190	2190	2190	2190	2190	2190	2190	2200	2200	2200	2200
2200	2200	2200	2200	2200	2200	2200	2210	2210	2210	2210	2210
2210	2210	2210	2210	2210	2210	2220	2220	2220	2220	2220	2220
2220	2220	2220	2220	2220	2220	2230	2230	2230	2230	2230	2230
2230	2230	2230	2230	2230	2230	2240	2240	2240	2240	2240	2240
2240	2240	2240	2240	2240	2250	2250	2250	2250	2250	2250	2250
2250	2250	2250	2250	2250	2260	2260	2260	2260	2260	2260	2270
2260	2260	2260	2260	2260	2270	2270	2270	2270	2270	2270	2280
2270	2270	2270	2270	2270	2280	2280	2280	2280	2280	2290	2290
2280	2280	2280	2290	2290	2290	2290	2290	2290	2290	2300	2300
2290	2290	2290	2300	2300	2300	2300	2300	2300	2310	2310	2310
2300	2300	2300	2310	2310	2310	2310	2310	2310	2320	2320	2320
2310	2310	2310	2320	2320	2320	2320	2320	2320	2330	2330	2330
2320	2320	2320	2330	2330	2330	2330	2330	2340	2340	2340	2340
2330	2330	2330	2340	2340	2340	2340	2340	2350	2350	2350	2350
2340	2340	2340	2350	2350	2350	2350	2350	2360	2360	2360	2370
2350	2350	2350	2360	2360	2360	2360	2370	2370	2370	2370	2380
2360	2360	2370	2370	2370	2370	2370	2380	2380	2380	2380	2390
2370	2370	2380	2380	2380	2380	2380	2390	2390	2390	2400	2400
2380	2380	2390	2390	2390	2390	2390	2400	2400	2400	2410	2410
2390	2390	2400	2400	2400	2400	2400	2410	2410	2410	2420	2420
2400	2400	2410	2410	2410	2410	2420	2420	2420	2430	2430	2430
2410	2410	2420	2420	2420	2420	2430	2430	2430	2440	2440	2440
2420	2420	2430	2430	2430	2430	2440	2440	2440	2450	2450	2450
2430	2430	2440	2440	2440	2440	2450	2450	2450	2460	2460	2470
2440	2440	2450	2450	2450	2450	2460	2460	2460	2470	2470	2480
2450	2450	2460	2460	2460	2460	2470	2470	2480	2480	2480	2490
2460	2460	2470	2470	2470	2470	2480	2480	2490	2490	2490	2500
2470	2470	2480	2480	2480	2480	2490	2490	2500	2500	2510	2510
2480	2480	2490	2490	2490	2500	2500	2500	2510	2510	2520	2520
2490	2490	2500	2500	2500	2510	2510	2510	2520	2520	2530	2530
2500	2500	2510	2510	2510	2520	2520	2520	2530	2530	2540	2540
2510	2510	2520	2520	2520	2530	2530	2540	2540	2540	2550	2550
2520	2520	2530	2530	2530	2540	2540	2550	2550	2560	2560	2570
2530	2530	2540	2540	2540	2550	2550	2560	2560	2570	2570	2580
2540	2540	2550	2550	2550	2560	2560	2570	2570	2580	2580	2590
2550	2550	2560	2560	2560	2570	2570	2580	2580	2590	2590	2600
2560	2560	2570	2570	2570	2580	2580	2590	2590	2600	2600	2610

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1280	1180	1170	1160	1140	1130	1120	1110	1100	1080	1070	
1290	1190	1180	1170	1160	1140	1130	1120	1110	1100	1080	
1300	1200	1190	1180	1170	1160	1150	1130	1120	1110	1100	
1310	1210	1200	1190	1180	1170	1160	1150	1130	1120	1110	
1320	1220	1210	1200	1190	1180	1170	1160	1150	1130	1120	
1330	1230	1220	1210	1200	1190	1180	1170	1160	1150	1130	
1340	1240	1230	1220	1210	1200	1190	1180	1170	1160	1150	
1350	1260	1250	1240	1230	1220	1200	1190	1180	1170	1160	
1360	1270	1260	1250	1240	1230	1220	1210	1190	1180	1170	
1370	1280	1270	1260	1250	1240	1230	1220	1210	1200	1180	
1380	1290	1280	1270	1260	1250	1240	1230	1220	1210	1200	
1390	1300	1290	1280	1270	1260	1250	1240	1230	1220	1210	
1400	1310	1300	1290	1280	1270	1260	1250	1240	1230	1220	
1410	1320	1310	1310	1300	1290	1280	1270	1260	1250	1230	
1420	1330	1330	1320	1310	1300	1290	1280	1270	1260	1250	
1430	1350	1340	1330	1320	1310	1300	1290	1280	1270	1260	
1440	1360	1350	1340	1330	1320	1310	1300	1290	1280	1270	
1450	1370	1360	1350	1340	1330	1320	1310	1300	1290	1280	
1460	1380	1370	1360	1350	1340	1340	1330	1320	1310	1300	
1470	1390	1380	1370	1370	1360	1350	1340	1330	1320	1310	
1480	1400	1390	1390	1380	1370	1360	1350	1340	1330	1320	
1490	1410	1410	1400	1390	1380	1370	1360	1350	1340	1330	
1500	1420	1420	1410	1400	1390	1380	1370	1360	1350	1340	
1510	1440	1430	1420	1410	1400	1400	1390	1380	1370	1360	
1520	1450	1440	1430	1420	1420	1410	1400	1390	1380	1370	
1530	1460	1450	1440	1440	1430	1420	1410	1400	1390	1380	
1540	1470	1460	1450	1450	1440	1430	1420	1410	1410	1400	
1550	1480	1470	1470	1460	1450	1440	1430	1430	1420	1410	
1560	1490	1480	1480	1470	1460	1450	1450	1440	1430	1420	
1570	1500	1500	1490	1480	1470	1470	1460	1450	1440	1430	
1580	1510	1510	1500	1490	1490	1480	1470	1460	1460	1450	
1590	1530	1520	1510	1510	1500	1490	1480	1480	1470	1460	
1600	1540	1530	1520	1520	1510	1500	1500	1490	1480	1470	
1610	1550	1540	1530	1530	1520	1510	1510	1500	1490	1480	
1620	1560	1550	1550	1540	1530	1530	1520	1510	1500	1500	
1630	1570	1560	1560	1550	1540	1540	1530	1520	1520	1510	
1640	1580	1580	1570	1560	1560	1550	1540	1540	1530	1520	
1650	1590	1590	1580	1570	1570	1560	1560	1550	1540	1530	
1660	1600	1600	1590	1590	1580	1570	1570	1560	1550	1550	
1670	1620	1610	1600	1600	1590	1590	1580	1570	1570	1560	
1680	1630	1620	1620	1610	1600	1600	1590	1590	1580	1570	
1690	1640	1630	1630	1620	1620	1610	1600	1600	1590	1580	
1700	1650	1640	1640	1630	1630	1620	1620	1610	1600	1600	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1710	1660	1660	1650	1640	1640	1630	1630	1620	1620	1610	
1720	1670	1670	1660	1660	1650	1650	1640	1630	1630	1620	
1730	1680	1680	1670	1670	1660	1660	1650	1650	1640	1630	
1740	1690	1690	1680	1680	1670	1670	1660	1660	1650	1650	
1750	1710	1700	1700	1690	1690	1680	1680	1670	1670	1660	
1760	1720	1710	1710	1700	1700	1690	1690	1680	1680	1670	
1770	1730	1720	1720	1710	1710	1700	1700	1690	1690	1680	
1780	1740	1730	1730	1730	1720	1720	1710	1710	1700	1700	
1790	1750	1750	1740	1740	1730	1730	1720	1720	1710	1710	
1800	1760	1760	1750	1750	1740	1740	1740	1730	1730	1720	
1810	1770	1770	1760	1760	1760	1750	1750	1740	1740	1730	
1820	1780	1780	1780	1770	1770	1760	1760	1760	1750	1750	
1830	1800	1790	1790	1780	1780	1780	1770	1770	1760	1760	
1840	1810	1800	1800	1800	1790	1790	1780	1780	1780	1770	
1850	1820	1810	1810	1810	1800	1800	1800	1790	1790	1780	
1860	1830	1830	1820	1820	1820	1810	1810	1800	1800	1800	
1870	1840	1840	1830	1830	1830	1820	1820	1820	1810	1810	
1880	1850	1850	1850	1840	1840	1840	1830	1830	1830	1820	
1890	1860	1860	1860	1850	1850	1850	1840	1840	1840	1830	
1900	1870	1870	1870	1870	1860	1860	1860	1850	1850	1850	
1910	1890	1880	1880	1880	1870	1870	1870	1870	1860	1860	
1920	1900	1890	1890	1890	1890	1880	1880	1880	1870	1870	
1930	1910	1910	1900	1900	1900	1900	1890	1890	1890	1880	
1940	1920	1920	1910	1910	1910	1910	1900	1900	1900	1900	
1950	1930	1930	1930	1920	1920	1920	1920	1910	1910	1910	
1960	1940	1940	1940	1940	1930	1930	1930	1930	1920	1920	
1970	1950	1950	1950	1950	1940	1940	1940	1940	1940	1930	
1980	1960	1960	1960	1960	1960	1950	1950	1950	1950	1950	
1990	1970	1970	1970	1970	1970	1970	1970	1960	1960	1960	
2000	1990	1980	1980	1980	1980	1980	1980	1980	1970	1970	
2010	2000	2000	1990	1990	1990	1990	1990	1990	1990	1980	
2020	2010	2010	2010	2010	2000	2000	2000	2000	2000	2000	
2030	2020	2020	2020	2020	2020	2010	2010	2010	2010	2010	
2040	2030	2030	2030	2030	2030	2030	2030	2020	2020	2020	
2050	2040	2040	2040	2040	2040	2040	2040	2040	2040	2030	
2060	2050	2050	2050	2050	2050	2050	2050	2050	2050	2050	
2070	2060	2060	2060	2060	2060	2060	2060	2060	2060	2060	
2080	2080	2080	2080	2070	2070	2070	2070	2070	2070	2070	
2090	2090	2090	2090	2090	2090	2090	2090	2090	2080	2080	
2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	
2110	2110	2110	2110	2110	2110	2110	2110	2110	2110	2110	
2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	2120	
2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
2140	2140	2140	2140	2140	2140	2140	2150	2150	2150	2150	2150
2150	2150	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
2160	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
2170	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180
2180	2190	2190	2190	2190	2190	2190	2190	2190	2190	2200	2200
2190	2200	2200	2200	2200	2200	2200	2200	2210	2210	2210	2210
2200	2210	2210	2210	2210	2210	2220	2220	2220	2220	2220	2220
2210	2220	2220	2220	2230	2230	2230	2230	2230	2230	2230	2230
2220	2230	2230	2240	2240	2240	2240	2240	2240	2240	2250	2250
2230	2240	2250	2250	2250	2250	2250	2250	2250	2260	2260	2260
2240	2260	2260	2260	2260	2260	2260	2260	2270	2270	2270	2270
2250	2270	2270	2270	2270	2270	2270	2280	2280	2280	2280	2280
2260	2280	2280	2280	2280	2280	2290	2290	2290	2290	2290	2300
2270	2290	2290	2290	2300	2300	2300	2300	2300	2300	2310	2310
2280	2300	2300	2310	2310	2310	2310	2310	2310	2320	2320	2320
2290	2310	2310	2320	2320	2320	2320	2320	2330	2330	2330	2330
2300	2320	2330	2330	2330	2330	2330	2340	2340	2340	2340	2350
2310	2330	2340	2340	2340	2340	2340	2350	2350	2350	2360	2360
2320	2350	2350	2350	2350	2350	2360	2360	2360	2370	2370	2370
2330	2360	2360	2360	2370	2370	2370	2370	2370	2380	2380	2380
2340	2370	2370	2370	2380	2380	2380	2380	2390	2390	2390	2400
2350	2380	2380	2390	2390	2390	2390	2400	2400	2400	2410	2410
2360	2390	2390	2400	2400	2400	2400	2410	2410	2410	2420	2420
2370	2400	2410	2410	2410	2410	2420	2420	2420	2430	2430	2430
2380	2410	2420	2420	2420	2420	2430	2430	2430	2440	2440	2450
2390	2420	2430	2430	2440	2440	2440	2440	2450	2450	2460	2460
2400	2440	2440	2440	2450	2450	2450	2450	2460	2460	2470	2470
2410	2450	2450	2450	2460	2460	2460	2470	2470	2480	2480	2480
2420	2460	2460	2470	2470	2470	2470	2480	2480	2490	2490	2500
2430	2470	2470	2480	2480	2480	2490	2490	2500	2500	2500	2510
2440	2480	2480	2490	2490	2490	2500	2500	2510	2510	2520	2520
2450	2490	2500	2500	2510	2510	2510	2510	2520	2520	2530	2530
2460	2500	2510	2510	2520	2520	2520	2530	2530	2540	2540	2550
2470	2510	2520	2520	2530	2530	2530	2540	2540	2550	2550	2560
2480	2530	2530	2530	2540	2540	2540	2550	2560	2560	2570	2570
2490	2540	2540	2550	2550	2550	2560	2560	2570	2570	2580	2580
2500	2550	2550	2560	2560	2560	2570	2570	2580	2590	2590	2600
2510	2560	2560	2570	2570	2570	2580	2590	2590	2600	2600	2610
2520	2570	2580	2580	2590	2590	2590	2600	2600	2610	2620	2620
2530	2580	2590	2590	2600	2600	2600	2610	2620	2620	2630	2630
2540	2590	2600	2600	2610	2620	2620	2620	2630	2630	2640	2650
2550	2600	2610	2620	2620	2620	2630	2630	2640	2650	2650	2660
2560	2620	2620	2630	2630	2630	2640	2650	2650	2660	2670	2670

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1280	1060	1050	1030	1020	1000	990	970	960	940	920	
1290	1070	1060	1040	1030	1020	1000	990	970	950	940	
1300	1080	1070	1060	1040	1030	1010	1000	980	970	950	
1310	1100	1080	1070	1060	1040	1030	1010	1000	980	970	
1320	1110	1100	1080	1070	1060	1040	1030	1010	1000	980	
1330	1120	1110	1100	1080	1070	1060	1040	1030	1010	990	
1340	1130	1120	1110	1100	1080	1070	1050	1040	1020	1010	
1350	1150	1140	1120	1110	1100	1080	1070	1050	1040	1020	1010
1360	1160	1150	1140	1120	1110	1100	1080	1070	1050	1040	1020
1370	1170	1160	1150	1140	1120	1110	1100	1080	1070	1050	1040
1380	1190	1170	1160	1150	1140	1120	1110	1100	1080	1070	1050
1390	1200	1190	1170	1160	1150	1140	1120	1110	1100	1080	1070
1400	1210	1200	1190	1180	1160	1150	1140	1120	1110	1090	1080
1410	1220	1210	1200	1190	1180	1160	1150	1140	1120	1110	1090
1420	1240	1220	1210	1200	1190	1180	1160	1150	1140	1120	1110
1430	1250	1240	1230	1210	1200	1190	1180	1160	1150	1140	1120
1440	1260	1250	1240	1230	1220	1200	1190	1180	1170	1150	1140
1450	1270	1260	1250	1240	1230	1220	1210	1190	1180	1170	1150
1460	1290	1280	1270	1250	1240	1230	1220	1210	1190	1180	1170
1470	1300	1290	1280	1270	1260	1240	1230	1220	1210	1190	1180
1480	1310	1300	1290	1280	1270	1260	1250	1230	1220	1210	1190
1490	1320	1310	1300	1290	1280	1270	1260	1250	1240	1220	1210
1500	1340	1330	1320	1310	1300	1280	1270	1260	1250	1240	1220
1510	1350	1340	1330	1320	1310	1300	1290	1280	1260	1250	1240
1520	1360	1350	1340	1330	1320	1310	1300	1290	1280	1260	1250
1530	1380	1370	1360	1350	1340	1330	1310	1300	1290	1280	1260
1540	1390	1380	1370	1360	1350	1340	1330	1320	1310	1290	1280
1550	1400	1390	1380	1370	1360	1350	1340	1330	1320	1310	1290
1560	1410	1400	1400	1390	1380	1370	1360	1350	1330	1320	1310
1570	1430	1420	1410	1400	1390	1380	1370	1360	1350	1330	1320
1580	1440	1430	1420	1410	1400	1390	1380	1370	1360	1350	1330
1590	1450	1440	1430	1430	1420	1410	1400	1390	1380	1360	1350
1600	1460	1460	1450	1440	1430	1420	1410	1400	1390	1380	1360
1610	1480	1470	1460	1450	1440	1430	1420	1410	1400	1390	1380
1620	1490	1480	1470	1460	1460	1450	1440	1430	1420	1410	1400
1630	1500	1490	1490	1480	1470	1460	1450	1440	1430	1420	1410
1640	1510	1510	1500	1490	1480	1470	1460	1450	1440	1430	1420
1650	1530	1520	1510	1500	1490	1480	1470	1460	1450	1440	1430
1660	1540	1530	1520	1520	1510	1500	1490	1480	1480	1470	1460
1670	1550	1550	1540	1530	1520	1510	1510	1500	1490	1480	1470
1680	1570	1560	1550	1540	1540	1530	1520	1510	1500	1490	1480
1690	1580	1570	1560	1560	1550	1540	1530	1530	1520	1510	1500
1700	1590	1580	1580	1570	1560	1560	1550	1540	1530	1520	1510

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1710		1600	1600	1590	1580	1580	1570	1560	1550	1550	1540
1720		1620	1610	1600	1600	1590	1580	1580	1570	1560	1550
1730		1630	1620	1620	1610	1600	1600	1590	1580	1570	1570
1740		1640	1640	1630	1620	1620	1610	1600	1600	1590	1580
1750		1650	1650	1640	1640	1630	1620	1620	1610	1600	1590
1760		1670	1660	1650	1650	1640	1640	1630	1620	1620	1610
1770		1680	1670	1670	1660	1660	1650	1640	1640	1630	1620
1780		1690	1690	1680	1680	1670	1660	1660	1650	1640	1640
1790		1700	1700	1690	1690	1680	1680	1670	1660	1660	1650
1800		1720	1710	1710	1700	1700	1690	1680	1680	1670	1670
1810		1730	1720	1720	1710	1710	1700	1700	1690	1690	1680
1820		1740	1740	1730	1730	1720	1720	1710	1710	1700	1690
1830		1760	1750	1750	1740	1740	1730	1730	1720	1710	1710
1840		1770	1760	1760	1750	1750	1740	1740	1730	1730	1720
1850		1780	1780	1770	1770	1760	1760	1750	1750	1740	1740
1860		1790	1790	1780	1780	1780	1770	1770	1760	1760	1750
1870		1810	1800	1800	1790	1790	1780	1780	1780	1770	1770
1880		1820	1810	1810	1810	1800	1800	1790	1790	1790	1780
1890		1830	1830	1820	1820	1820	1810	1810	1800	1800	1790
1900		1840	1840	1840	1830	1830	1830	1820	1820	1810	1810
1910		1860	1850	1850	1850	1840	1840	1840	1830	1830	1820
1920		1870	1870	1860	1860	1860	1850	1850	1850	1840	1840
1930		1880	1880	1880	1870	1870	1870	1860	1860	1860	1850
1940		1890	1890	1890	1890	1880	1880	1880	1870	1870	1870
1950		1910	1900	1900	1900	1900	1890	1890	1890	1880	1880
1960		1920	1920	1910	1910	1910	1910	1900	1900	1900	1890
1970		1930	1930	1930	1930	1920	1920	1920	1910	1910	1910
1980		1940	1940	1940	1940	1940	1930	1930	1930	1930	1920
1990		1960	1960	1950	1950	1950	1950	1940	1940	1940	1940
2000		1970	1970	1970	1960	1960	1960	1960	1960	1950	1950
2010		1980	1980	1980	1980	1980	1970	1970	1970	1970	1970
2020		2000	1990	1990	1990	1990	1990	1990	1980	1980	1980
2030		2010	2010	2010	2000	2000	2000	2000	2000	2000	1990
2040		2020	2020	2020	2020	2020	2010	2010	2010	2010	2010
2050		2030	2030	2030	2030	2030	2030	2030	2030	2020	2020
2060		2050	2050	2040	2040	2040	2040	2040	2040	2040	2040
2070		2060	2060	2060	2060	2060	2060	2050	2050	2050	2050
2080		2070	2070	2070	2070	2070	2070	2070	2070	2070	2070
2090		2080	2080	2080	2080	2080	2080	2080	2080	2080	2080
2100		2100	2100	2100	2100	2100	2100	2100	2100	2100	2090
2110		2110	2110	2110	2110	2110	2110	2110	2110	2110	2110
2120		2120	2120	2120	2120	2120	2120	2120	2120	2120	2120
2130		2130	2140	2140	2140	2140	2140	2140	2140	2140	2140

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
2140	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150
2150	2160	2160	2160	2160	2160	2160	2160	2160	2160	2170	2170
2160	2170	2170	2170	2170	2180	2180	2180	2180	2180	2180	2180
2170	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
2180	2200	2200	2200	2200	2200	2200	2200	2210	2210	2210	2210
2190	2210	2210	2210	2210	2210	2220	2220	2220	2220	2220	2220
2200	2220	2220	2230	2230	2230	2230	2230	2230	2230	2240	2240
2210	2240	2240	2240	2240	2240	2240	2240	2250	2250	2250	2250
2220	2250	2250	2250	2250	2250	2260	2260	2260	2260	2260	2270
2230	2260	2260	2270	2270	2270	2270	2270	2270	2280	2280	2280
2240	2270	2280	2280	2280	2280	2280	2280	2290	2290	2290	2290
2250	2290	2290	2290	2290	2290	2300	2300	2300	2300	2300	2310
2260	2300	2300	2300	2310	2310	2310	2310	2310	2320	2320	2320
2270	2310	2310	2320	2320	2320	2320	2330	2330	2330	2330	2340
2280	2320	2330	2330	2330	2330	2340	2340	2340	2350	2350	2350
2290	2340	2340	2340	2350	2350	2350	2360	2360	2360	2360	2370
2300	2350	2350	2360	2360	2360	2370	2370	2370	2370	2380	2380
2310	2360	2370	2370	2370	2380	2380	2380	2380	2390	2390	2390
2320	2380	2380	2380	2390	2390	2390	2390	2400	2400	2400	2410
2330	2390	2390	2400	2400	2400	2410	2410	2410	2410	2420	2420
2340	2400	2400	2410	2410	2410	2420	2420	2420	2430	2430	2440
2350	2410	2420	2420	2430	2430	2430	2430	2440	2440	2450	2450
2360	2430	2430	2430	2440	2440	2440	2450	2450	2460	2460	2470
2370	2440	2440	2450	2450	2460	2460	2460	2470	2470	2480	2480
2380	2450	2460	2460	2460	2470	2470	2470	2480	2480	2490	2490
2390	2460	2470	2470	2480	2480	2480	2490	2490	2500	2500	2510
2400	2480	2480	2490	2490	2490	2500	2500	2510	2510	2520	2520
2410	2490	2490	2500	2500	2510	2510	2510	2520	2530	2530	2540
2420	2500	2510	2510	2520	2520	2520	2530	2530	2540	2550	2550
2430	2510	2520	2520	2530	2540	2540	2540	2550	2550	2560	2570
2440	2530	2530	2540	2540	2550	2550	2560	2560	2570	2570	2580
2450	2540	2550	2550	2560	2560	2560	2570	2580	2580	2590	2590
2460	2550	2560	2560	2570	2580	2580	2580	2590	2600	2600	2610
2470	2570	2570	2580	2580	2590	2600	2600	2600	2610	2620	2620
2480	2580	2580	2590	2600	2600	2600	2610	2620	2620	2630	2640
2490	2590	2600	2600	2610	2620	2620	2620	2630	2640	2640	2650
2500	2600	2610	2620	2620	2630	2630	2640	2640	2650	2660	2670
2510	2620	2620	2630	2640	2640	2640	2650	2660	2660	2670	2680
2520	2630	2640	2640	2650	2660	2660	2660	2670	2680	2690	2690
2530	2640	2650	2650	2660	2670	2680	2680	2680	2690	2700	2710
2540	2650	2660	2670	2680	2680	2690	2690	2700	2710	2710	2720
2550	2670	2670	2680	2690	2700	2700	2700	2710	2720	2730	2740
2560	2680	2690	2690	2700	2710	2720	2730	2730	2740	2750	2750

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1280		910	890	870	850	830	810	790	770	750	730
1290		920	900	890	870	850	830	810	790	760	740
1300		940	920	900	880	860	840	820	800	780	760
1310		950	930	910	900	880	860	840	820	800	780
1320		960	950	930	910	890	870	850	830	810	790
1330		980	960	940	930	910	890	870	850	830	810
1340		990	980	960	940	920	910	890	870	850	830
1350	1010	990	970	960	940	940	920	900	880	860	840
1360	1020	1010	990	970	960	960	940	920	900	880	860
1370	1040	1020	1000	990	970	970	950	930	920	900	880
1380	1050	1040	1020	1000	990	970	970	950	930	910	890
1390	1070	1050	1030	1020	1000	980	970	950	950	930	910
1400	1080	1060	1050	1030	1020	1000	980	960	960	940	930
1410	1090	1080	1060	1050	1030	1020	1000	980	960	960	940
1420	1110	1090	1080	1060	1050	1030	1010	1000	980	960	960
1430	1120	1110	1090	1080	1060	1050	1030	1010	990	980	980
1440	1140	1120	1110	1090	1080	1060	1050	1030	1010	990	990
1450	1150	1140	1120	1110	1090	1080	1060	1040	1030	1010	1010
1460	1170	1150	1140	1120	1110	1090	1080	1060	1040	1030	1030
1470	1180	1170	1150	1140	1120	1110	1090	1080	1060	1040	1040
1480	1200	1180	1170	1150	1140	1120	1110	1090	1080	1060	1060
1490	1210	1200	1180	1170	1160	1140	1120	1110	1090	1080	1080
1500	1230	1210	1200	1180	1170	1160	1140	1120	1110	1090	1090
1510	1240	1230	1210	1200	1190	1170	1160	1140	1130	1110	1110
1520	1250	1240	1230	1220	1200	1190	1170	1160	1140	1130	1130
1530	1270	1260	1240	1230	1220	1200	1190	1170	1160	1140	1140
1540	1280	1270	1260	1250	1230	1220	1200	1190	1170	1160	1160
1550	1300	1290	1270	1260	1250	1230	1220	1210	1190	1180	1180
1560	1310	1300	1290	1280	1260	1250	1240	1220	1210	1190	1190
1570	1330	1310	1300	1290	1280	1270	1250	1240	1220	1210	1210
1580	1340	1330	1320	1310	1290	1280	1270	1250	1240	1230	1230
1590	1360	1340	1330	1320	1310	1300	1280	1270	1260	1240	1240
1600	1370	1360	1350	1340	1320	1310	1300	1290	1270	1260	1260
1610	1380	1370	1360	1350	1340	1330	1320	1300	1290	1280	1280
1620	1400	1390	1380	1370	1360	1340	1330	1320	1310	1290	1290
1630	1410	1400	1390	1380	1370	1360	1350	1330	1320	1310	1310
1640	1430	1420	1410	1400	1390	1370	1360	1350	1340	1330	1330
1650	1440	1430	1420	1410	1400	1390	1380	1370	1350	1340	1340
1660	1460	1450	1440	1430	1420	1410	1390	1380	1370	1360	1360
1670	1470	1460	1450	1440	1430	1420	1410	1400	1390	1380	1380
1680	1490	1480	1470	1460	1450	1440	1430	1420	1400	1390	1390
1690	1500	1490	1480	1470	1460	1450	1440	1430	1420	1410	1410
1700	1510	1510	1500	1490	1480	1470	1460	1450	1440	1430	1430

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1710		1530	1520	1510	1500	1490	1480	1470	1460	1450	1440
1720		1540	1540	1530	1520	1510	1500	1490	1480	1470	1460
1730		1560	1550	1540	1530	1520	1520	1510	1500	1490	1480
1740		1570	1560	1560	1550	1540	1530	1520	1510	1500	1490
1750		1590	1580	1570	1560	1560	1550	1540	1530	1520	1510
1760		1600	1590	1590	1580	1570	1560	1550	1540	1530	1530
1770		1620	1610	1600	1590	1590	1580	1570	1560	1550	1540
1780		1630	1620	1620	1610	1600	1590	1590	1580	1570	1560
1790		1650	1640	1630	1620	1620	1610	1600	1590	1580	1580
1800		1660	1650	1650	1640	1630	1620	1620	1610	1600	1590
1810		1670	1670	1660	1650	1650	1640	1630	1620	1620	1610
1820		1690	1680	1680	1670	1660	1660	1650	1640	1630	1630
1830		1700	1700	1690	1680	1680	1670	1660	1660	1650	1640
1840		1720	1710	1710	1700	1690	1690	1680	1670	1670	1660
1850		1730	1730	1720	1720	1710	1700	1700	1690	1680	1680
1860		1750	1740	1740	1730	1720	1720	1710	1710	1700	1690
1870		1760	1760	1750	1750	1740	1730	1730	1720	1720	1710
1880		1780	1770	1770	1760	1760	1750	1740	1740	1730	1730
1890		1790	1790	1780	1780	1770	1770	1760	1750	1750	1740
1900		1800	1800	1800	1790	1790	1780	1780	1770	1760	1760
1910		1820	1810	1810	1810	1800	1800	1790	1790	1780	1780
1920		1830	1830	1830	1820	1820	1810	1810	1800	1800	1790
1930		1850	1840	1840	1840	1830	1830	1820	1820	1810	1810
1940		1860	1860	1860	1850	1850	1840	1840	1830	1830	1830
1950		1880	1870	1870	1870	1860	1860	1850	1850	1850	1840
1960		1890	1890	1890	1880	1880	1870	1870	1870	1860	1860
1970		1910	1900	1900	1900	1890	1890	1890	1880	1880	1880
1980		1920	1920	1910	1910	1910	1910	1900	1900	1900	1890
1990		1940	1930	1930	1930	1920	1920	1920	1920	1910	1910
2000		1950	1950	1940	1940	1940	1940	1930	1930	1930	1930
2010		1960	1960	1960	1960	1960	1950	1950	1950	1940	1940
2020		1980	1980	1970	1970	1970	1970	1970	1960	1960	1960
2030		1990	1990	1990	1990	1990	1980	1980	1980	1980	1980
2040		2010	2010	2000	2000	2000	2000	2000	2000	1990	1990
2050		2020	2020	2020	2020	2020	2020	2010	2010	2010	2010
2060		2040	2040	2030	2030	2030	2030	2030	2030	2030	2030
2070		2050	2050	2050	2050	2050	2050	2050	2040	2040	2040
2080		2070	2060	2060	2060	2060	2060	2060	2060	2060	2060
2090		2080	2080	2080	2080	2080	2080	2080	2080	2080	2080
2100		2090	2090	2090	2090	2090	2090	2090	2090	2090	2090
2110		2110	2110	2110	2110	2110	2110	2110	2110	2110	2110
2120		2120	2120	2120	2120	2120	2120	2120	2120	2130	2130
2130		2140	2140	2140	2140	2140	2140	2140	2140	2140	2140

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.4
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
2140		2150	2150	2150	2150	2160	2160	2160	2160	2160	2160
2150		2170	2170	2170	2170	2170	2170	2170	2170	2170	2180
2160		2180	2180	2180	2180	2190	2190	2190	2190	2190	2190
2170		2200	2200	2200	2200	2200	2200	2200	2210	2210	2210
2180		2210	2210	2210	2220	2220	2220	2220	2220	2220	2230
2190		2230	2230	2230	2230	2230	2230	2240	2240	2240	2240
2200		2240	2240	2240	2250	2250	2250	2250	2250	2260	2260
2210		2250	2260	2260	2260	2260	2270	2270	2270	2270	2280
2220		2270	2270	2270	2280	2280	2280	2280	2290	2290	2290
2230		2280	2290	2290	2290	2290	2300	2300	2300	2310	2310
2240		2300	2300	2300	2310	2310	2310	2320	2320	2320	2330
2250		2310	2310	2320	2320	2320	2330	2330	2330	2340	2340
2260		2330	2330	2330	2340	2340	2340	2350	2350	2350	2360
2270		2340	2340	2350	2350	2360	2360	2360	2370	2370	2380
2280		2360	2360	2360	2370	2370	2370	2380	2380	2390	2390
2290		2370	2370	2380	2380	2390	2390	2390	2400	2400	2410
2300		2380	2390	2390	2400	2400	2410	2410	2420	2420	2430
2310		2400	2400	2410	2410	2420	2420	2430	2430	2440	2440
2320		2410	2420	2420	2430	2430	2440	2440	2450	2450	2460
2330		2430	2430	2440	2440	2450	2450	2460	2460	2470	2480
2340		2440	2450	2450	2460	2460	2470	2470	2480	2490	2490
2350		2460	2460	2470	2470	2480	2480	2490	2500	2500	2510
2360		2470	2480	2480	2490	2490	2500	2510	2510	2520	2530
2370		2490	2490	2500	2500	2510	2520	2520	2530	2530	2540
2380		2500	2510	2510	2520	2520	2530	2540	2540	2550	2560
2390		2510	2520	2530	2530	2540	2550	2550	2560	2570	2580
2400		2530	2540	2540	2550	2560	2560	2570	2580	2580	2590
2410		2540	2550	2560	2560	2570	2580	2590	2590	2600	2610
2420		2560	2560	2570	2580	2590	2590	2600	2610	2620	2630
2430		2570	2580	2590	2590	2600	2610	2620	2620	2630	2640
2440		2590	2590	2600	2610	2620	2620	2630	2640	2650	2660
2450		2600	2610	2620	2620	2630	2640	2650	2660	2670	2680
2460		2620	2620	2630	2640	2650	2660	2660	2670	2680	2690
2470		2630	2640	2650	2650	2660	2670	2680	2690	2700	2710
2480		2650	2650	2660	2670	2680	2690	2700	2710	2720	2730
2490		2660	2670	2680	2680	2690	2700	2710	2720	2730	2740
2500		2670	2680	2690	2700	2710	2720	2730	2740	2750	2760
2510		2690	2700	2710	2720	2720	2730	2740	2750	2760	2780
2520		2700	2710	2720	2730	2740	2750	2760	2770	2780	2790
2530		2720	2730	2740	2750	2760	2770	2780	2790	2800	2810
2540		2730	2740	2750	2760	2770	2780	2790	2800	2810	2830
2550		2750	2760	2770	2780	2790	2800	2810	2820	2830	2840
2560		2760	2770	2780	2790	2800	2810	2820	2830	2850	2860

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1280	1270	1260	1250	1240	1230	1220	1210	1200	1190	1180	
1290	1280	1270	1260	1250	1240	1230	1220	1210	1200	1190	
1300	1290	1280	1270	1260	1250	1240	1230	1220	1210	1200	
1310	1300	1290	1280	1270	1260	1250	1240	1230	1220	1210	
1320	1310	1300	1290	1280	1270	1260	1250	1240	1230	1220	
1330	1320	1310	1300	1290	1280	1270	1260	1250	1240	1230	
1340	1330	1320	1310	1300	1290	1290	1280	1270	1250	1240	
1350	1340	1330	1320	1310	1310	1300	1290	1280	1270	1250	
1360	1350	1340	1330	1320	1320	1310	1300	1290	1280	1270	
1370	1360	1350	1340	1340	1330	1320	1310	1300	1290	1280	
1380	1370	1360	1350	1350	1340	1330	1320	1310	1300	1290	
1390	1380	1370	1360	1360	1350	1340	1330	1320	1310	1300	
1400	1390	1380	1380	1370	1360	1350	1340	1330	1320	1310	
1410	1400	1390	1390	1380	1370	1360	1350	1340	1330	1320	
1420	1410	1400	1400	1390	1380	1370	1360	1350	1340	1330	
1430	1420	1410	1410	1400	1390	1380	1370	1360	1350	1340	
1440	1430	1420	1420	1410	1400	1390	1380	1370	1360	1350	
1450	1440	1430	1430	1420	1410	1400	1390	1380	1370	1360	
1460	1450	1440	1440	1430	1420	1410	1400	1400	1390	1380	
1470	1460	1460	1450	1440	1430	1420	1420	1410	1400	1390	
1480	1470	1470	1460	1450	1440	1430	1430	1420	1410	1400	
1490	1480	1480	1470	1460	1450	1440	1440	1430	1420	1410	
1500	1490	1490	1480	1470	1460	1460	1450	1440	1430	1420	
1510	1500	1500	1490	1480	1470	1470	1460	1450	1440	1430	
1520	1510	1510	1500	1490	1480	1480	1470	1460	1450	1440	
1530	1520	1520	1510	1500	1490	1490	1480	1470	1460	1450	
1540	1530	1530	1520	1510	1510	1500	1490	1480	1470	1460	
1550	1540	1540	1530	1520	1520	1510	1500	1490	1480	1470	
1560	1550	1550	1540	1530	1530	1520	1510	1500	1490	1480	
1570	1560	1560	1550	1540	1540	1530	1520	1520	1510	1500	
1580	1570	1570	1560	1550	1550	1540	1530	1530	1520	1510	
1590	1580	1580	1570	1560	1560	1550	1540	1540	1530	1520	
1600	1590	1590	1580	1570	1570	1560	1550	1550	1540	1530	
1610	1600	1600	1590	1590	1580	1570	1570	1560	1550	1540	
1620	1610	1610	1600	1600	1590	1580	1580	1570	1560	1550	
1630	1620	1620	1610	1610	1600	1590	1590	1580	1570	1560	
1640	1630	1630	1620	1620	1610	1600	1600	1590	1580	1570	
1650	1640	1640	1630	1630	1620	1610	1610	1600	1590	1580	
1660	1650	1650	1640	1640	1630	1630	1620	1610	1600	1590	
1670	1660	1660	1650	1650	1640	1640	1630	1620	1610	1600	
1680	1670	1670	1660	1660	1650	1650	1640	1630	1620	1610	
1690	1680	1680	1670	1670	1660	1660	1650	1640	1630	1620	
1700	1690	1690	1680	1680	1670	1670	1660	1650	1640	1630	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1710	1710	1700	1690	1690	1680	1680	1670	1670	1660	1660	
1720	1720	1710	1710	1700	1690	1690	1680	1680	1670	1670	
1730	1730	1720	1720	1710	1710	1700	1690	1690	1680	1680	
1740	1740	1730	1730	1720	1720	1710	1710	1700	1690	1690	
1750	1750	1740	1740	1730	1730	1720	1720	1710	1710	1700	
1760	1760	1750	1750	1740	1740	1730	1730	1720	1720	1710	
1770	1770	1760	1760	1750	1750	1740	1740	1730	1730	1720	
1780	1780	1770	1770	1760	1760	1750	1750	1740	1740	1730	
1790	1790	1780	1780	1770	1770	1760	1760	1750	1750	1740	
1800	1800	1790	1790	1780	1780	1770	1770	1760	1760	1750	
1810	1810	1800	1800	1790	1790	1780	1780	1770	1770	1760	
1820	1820	1810	1810	1800	1800	1790	1790	1780	1780	1770	
1830	1830	1820	1820	1810	1810	1800	1800	1790	1790	1780	
1840	1840	1830	1830	1820	1820	1810	1810	1800	1790	1790	
1850	1850	1840	1840	1840	1830	1830	1820	1820	1820	1810	
1860	1860	1850	1850	1850	1840	1840	1830	1830	1830	1820	
1870	1870	1860	1860	1860	1850	1850	1840	1840	1840	1830	
1880	1880	1870	1870	1870	1860	1860	1850	1850	1850	1840	
1890	1890	1880	1880	1880	1870	1870	1860	1860	1860	1850	
1900	1900	1890	1890	1890	1880	1880	1870	1870	1870	1860	
1910	1910	1900	1900	1900	1890	1890	1880	1880	1880	1870	
1920	1920	1910	1910	1910	1900	1900	1890	1890	1890	1880	
1930	1930	1920	1920	1920	1910	1910	1900	1900	1900	1890	
1940	1940	1930	1930	1930	1920	1920	1910	1910	1910	1900	
1950	1950	1940	1940	1940	1930	1930	1920	1920	1920	1910	
1960	1960	1950	1950	1950	1940	1940	1930	1930	1930	1920	
1970	1970	1960	1960	1960	1950	1950	1940	1940	1940	1930	
1980	1980	1970	1970	1970	1960	1960	1950	1950	1950	1940	
1990	1990	1980	1980	1980	1970	1970	1960	1960	1960	1950	
2000	2000	1990	1990	1990	1980	1980	1970	1970	1970	1960	
2010	2010	2000	2000	2000	1990	1990	1980	1980	1980	1970	
2020	2020	2010	2010	2010	2000	2000	1990	1990	1990	1980	
2030	2030	2020	2020	2020	2010	2010	2000	2000	2000	1990	
2040	2040	2030	2030	2030	2020	2020	2010	2010	2010	2000	
2050	2050	2040	2040	2040	2030	2030	2020	2020	2020	2010	
2060	2060	2050	2050	2050	2040	2040	2030	2030	2030	2020	
2070	2070	2060	2060	2060	2050	2050	2040	2040	2040	2030	
2080	2080	2070	2070	2070	2060	2060	2050	2050	2050	2040	
2090	2090	2080	2080	2080	2070	2070	2060	2060	2060	2050	
2100	2100	2090	2090	2090	2080	2080	2070	2070	2070	2060	
2110	2110	2100	2100	2100	2090	2090	2080	2080	2080	2070	
2120	2120	2110	2110	2110	2100	2100	2090	2090	2090	2080	
2130	2130	2120	2120	2120	2110	2110	2100	2100	2100	2090	
		2130	2130	2130	2120	2120	2110	2110	2110	2100	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
2140	2140	2140	2140	2140	2140	2140	2140	2140	2130	2130	2130
2150	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150	2140
2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
2170	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180
2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
2210	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210
2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220
2230	2230	2230	2230	2230	2230	2230	2230	2230	2230	2230	2230
2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240
2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2260
2260	2260	2260	2260	2260	2260	2260	2260	2260	2270	2270	2270
2270	2270	2270	2270	2270	2270	2270	2270	2280	2280	2280	2280
2280	2280	2280	2280	2280	2280	2280	2290	2290	2290	2290	2290
2290	2290	2290	2290	2290	2290	2290	2300	2300	2300	2300	2300
2300	2300	2300	2300	2300	2300	2310	2310	2310	2310	2310	2310
2310	2310	2310	2310	2310	2310	2320	2320	2320	2320	2320	2320
2320	2320	2320	2320	2320	2320	2330	2330	2330	2330	2330	2330
2330	2330	2330	2330	2330	2340	2340	2340	2340	2340	2340	2340
2340	2340	2340	2340	2340	2350	2350	2350	2350	2350	2350	2360
2350	2350	2350	2350	2350	2360	2360	2360	2360	2360	2360	2370
2360	2360	2360	2360	2360	2370	2370	2370	2370	2370	2380	2380
2370	2370	2370	2380	2380	2380	2380	2380	2380	2380	2390	2390
2380	2380	2380	2390	2390	2390	2390	2390	2390	2400	2400	2400
2390	2390	2390	2400	2400	2400	2400	2400	2400	2410	2410	2410
2400	2400	2400	2410	2410	2410	2410	2410	2420	2420	2420	2420
2410	2410	2410	2420	2420	2420	2420	2420	2430	2430	2430	2430
2420	2420	2420	2430	2430	2430	2430	2430	2440	2440	2440	2440
2430	2430	2430	2440	2440	2440	2440	2440	2450	2450	2450	2460
2440	2440	2440	2450	2450	2450	2450	2460	2460	2460	2460	2470
2450	2450	2460	2460	2460	2460	2460	2470	2470	2470	2470	2480
2460	2460	2470	2470	2470	2470	2470	2480	2480	2480	2480	2490
2470	2470	2480	2480	2480	2480	2480	2490	2490	2490	2490	2490
2480	2480	2490	2490	2490	2490	2490	2500	2500	2500	2500	2500
2490	2490	2500	2500	2500	2500	2510	2510	2510	2510	2510	2510
2500	2500	2510	2510	2510	2510	2520	2520	2520	2520	2520	2520
2510	2510	2520	2520	2520	2520	2530	2530	2530	2530	2530	2530
2520	2520	2530	2530	2530	2530	2540	2540	2540	2540	2540	2540
2530	2530	2540	2540	2540	2540	2550	2550	2550	2550	2550	2560
2540	2540	2550	2550	2550	2550	2560	2560	2560	2570	2570	2580
2550	2550	2560	2560	2560	2560	2570	2570	2570	2580	2580	2590
2560	2560	2570	2570	2570	2570	2580	2580	2580	2590	2600	2600

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1280	1170	1150	1140	1130	1120	1100	1090	1080	1060	1050	
1290	1180	1170	1150	1140	1130	1120	1100	1090	1080	1060	
1300	1190	1180	1170	1150	1140	1130	1120	1100	1090	1070	
1310	1200	1190	1180	1170	1150	1140	1130	1110	1100	1090	
1320	1210	1200	1190	1180	1160	1150	1140	1130	1110	1100	
1330	1220	1210	1200	1190	1180	1160	1150	1140	1130	1110	
1340	1230	1220	1210	1200	1190	1180	1160	1150	1140	1120	
1350	1240	1230	1220	1210	1200	1190	1180	1160	1150	1140	
1360	1260	1250	1230	1220	1210	1200	1190	1180	1160	1150	
1370	1270	1260	1250	1230	1220	1210	1200	1190	1180	1160	
1380	1280	1270	1260	1250	1240	1220	1210	1200	1190	1170	
1390	1290	1280	1270	1260	1250	1240	1220	1210	1200	1190	
1400	1300	1290	1280	1270	1260	1250	1240	1220	1210	1200	
1410	1310	1300	1290	1280	1270	1260	1250	1240	1220	1210	
1420	1320	1310	1300	1290	1280	1270	1260	1250	1240	1220	
1430	1330	1320	1310	1300	1290	1280	1270	1260	1250	1240	
1440	1350	1340	1330	1320	1310	1300	1280	1270	1260	1250	
1450	1360	1350	1340	1330	1320	1310	1300	1290	1270	1260	
1460	1370	1360	1350	1340	1330	1320	1310	1300	1290	1270	
1470	1380	1370	1360	1350	1340	1330	1320	1310	1300	1290	
1480	1390	1380	1370	1360	1350	1340	1330	1320	1310	1300	
1490	1400	1390	1380	1370	1360	1350	1340	1330	1320	1310	
1500	1410	1400	1400	1390	1380	1370	1360	1350	1340	1320	
1510	1420	1420	1410	1400	1390	1380	1370	1360	1350	1340	
1520	1440	1430	1420	1410	1400	1390	1380	1370	1360	1350	
1530	1450	1440	1430	1420	1410	1400	1390	1380	1370	1360	
1540	1460	1450	1440	1430	1420	1410	1400	1400	1390	1370	
1550	1470	1460	1450	1440	1440	1430	1420	1410	1400	1390	
1560	1480	1470	1460	1460	1450	1440	1430	1420	1410	1400	
1570	1490	1480	1480	1470	1460	1450	1440	1430	1420	1410	
1580	1500	1500	1490	1480	1470	1460	1450	1440	1430	1420	
1590	1510	1510	1500	1490	1480	1470	1470	1460	1450	1440	
1600	1530	1520	1510	1500	1490	1490	1480	1470	1460	1450	
1610	1540	1530	1520	1510	1510	1500	1490	1480	1470	1460	
1620	1550	1540	1530	1530	1520	1510	1500	1490	1480	1470	
1630	1560	1550	1540	1540	1530	1520	1510	1500	1500	1490	
1640	1570	1560	1560	1550	1540	1530	1530	1520	1510	1500	
1650	1580	1570	1570	1560	1550	1550	1540	1530	1520	1510	
1660	1590	1590	1580	1570	1560	1560	1550	1540	1530	1520	
1670	1600	1600	1590	1580	1580	1570	1560	1550	1550	1540	
1680	1620	1610	1600	1600	1590	1580	1570	1570	1560	1550	
1690	1630	1620	1610	1610	1600	1590	1590	1580	1570	1560	
1700	1640	1630	1630	1620	1610	1600	1600	1590	1580	1570	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1710	1650	1640	1640	1630	1620	1620	1610	1600	1600	1590	
1720	1660	1650	1650	1640	1640	1630	1620	1610	1610	1600	
1730	1670	1670	1660	1650	1650	1640	1630	1630	1620	1610	
1740	1680	1680	1670	1670	1660	1650	1650	1640	1630	1620	
1750	1690	1690	1680	1680	1670	1660	1660	1650	1640	1640	
1760	1710	1700	1690	1690	1680	1680	1670	1660	1660	1650	
1770	1720	1710	1710	1700	1690	1690	1680	1680	1670	1660	
1780	1730	1720	1720	1710	1710	1700	1690	1690	1680	1670	
1790	1740	1730	1730	1720	1720	1710	1710	1700	1690	1690	
1800	1750	1750	1740	1730	1730	1720	1720	1710	1710	1700	
1810	1760	1760	1750	1750	1740	1740	1730	1720	1720	1710	
1820	1770	1770	1760	1760	1750	1750	1740	1740	1730	1720	
1830	1780	1780	1770	1770	1760	1760	1750	1750	1740	1740	
1840	1800	1790	1790	1780	1780	1770	1770	1760	1760	1750	
1850	1810	1800	1800	1790	1790	1780	1780	1770	1770	1760	
1860	1820	1810	1810	1800	1800	1800	1790	1790	1780	1770	
1870	1830	1820	1820	1820	1810	1810	1800	1800	1790	1790	
1880	1840	1840	1830	1830	1820	1820	1810	1810	1800	1800	
1890	1850	1850	1840	1840	1840	1830	1830	1820	1820	1810	
1900	1860	1860	1860	1850	1850	1840	1840	1830	1830	1820	
1910	1870	1870	1870	1860	1860	1850	1850	1850	1840	1840	
1920	1890	1880	1880	1870	1870	1870	1860	1860	1850	1850	
1930	1900	1890	1890	1890	1880	1880	1870	1870	1870	1860	
1940	1910	1900	1900	1900	1890	1890	1890	1880	1880	1870	
1950	1920	1920	1910	1910	1910	1900	1900	1900	1890	1890	
1960	1930	1930	1920	1920	1920	1910	1910	1910	1900	1900	
1970	1940	1940	1940	1930	1930	1930	1920	1920	1920	1910	
1980	1950	1950	1950	1940	1940	1940	1930	1930	1930	1920	
1990	1960	1960	1960	1960	1950	1950	1950	1940	1940	1940	
2000	1980	1970	1970	1970	1960	1960	1960	1960	1950	1950	
2010	1990	1980	1980	1980	1980	1970	1970	1970	1970	1960	
2020	2000	2000	1990	1990	1990	1990	1980	1980	1980	1970	
2030	2010	2010	2000	2000	2000	2000	2000	2000	1990	1990	
2040	2020	2020	2020	2010	2010	2010	2010	2000	2000	2000	
2050	2030	2030	2030	2030	2020	2020	2020	2020	2010	2010	
2060	2040	2040	2040	2040	2040	2030	2030	2030	2030	2020	
2070	2050	2050	2050	2050	2050	2050	2040	2040	2040	2040	
2080	2070	2060	2060	2060	2060	2060	2060	2050	2050	2050	
2090	2080	2070	2070	2070	2070	2070	2070	2070	2070	2060	
2100	2090	2090	2090	2080	2080	2080	2080	2080	2080	2080	
2110	2100	2100	2100	2100	2090	2090	2090	2090	2090	2090	
2120	2110	2110	2110	2110	2110	2110	2100	2100	2100	2100	
2130	2120	2120	2120	2120	2120	2120	2120	2110	2110	2110	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
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 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
2140	2130	2130	2130	2130	2130	2130	2130	2130	2130	2130	2120
2150	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140	2140
2160	2160	2150	2150	2150	2150	2150	2150	2150	2150	2150	2150
2170	2170	2170	2170	2170	2170	2160	2160	2160	2160	2160	2160
2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2180	2170
2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
2210	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210
2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220
2230	2230	2230	2230	2230	2230	2240	2240	2240	2240	2240	2240
2240	2240	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
2250	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
2260	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270
2270	2280	2280	2280	2280	2280	2280	2280	2280	2290	2290	2290
2280	2290	2290	2290	2290	2290	2290	2300	2300	2300	2300	2300
2290	2300	2300	2300	2300	2300	2310	2310	2310	2310	2310	2310
2300	2310	2310	2310	2310	2320	2320	2320	2320	2320	2320	2320
2310	2320	2320	2330	2330	2330	2330	2330	2330	2330	2340	2340
2320	2330	2340	2340	2340	2340	2340	2340	2340	2350	2350	2350
2330	2350	2350	2350	2350	2350	2350	2350	2360	2360	2360	2360
2340	2360	2360	2360	2360	2360	2360	2370	2370	2370	2370	2370
2350	2370	2370	2370	2370	2370	2380	2380	2380	2380	2390	2390
2360	2380	2380	2380	2390	2390	2390	2390	2390	2400	2400	2400
2370	2390	2390	2400	2400	2400	2400	2400	2400	2410	2410	2410
2380	2400	2400	2410	2410	2410	2410	2410	2420	2420	2420	2420
2390	2410	2420	2420	2420	2420	2420	2430	2430	2430	2430	2440
2400	2420	2430	2430	2430	2430	2440	2440	2440	2440	2450	2450
2410	2440	2440	2440	2440	2440	2450	2450	2450	2460	2460	2460
2420	2450	2450	2450	2460	2460	2460	2460	2470	2470	2470	2470
2430	2460	2460	2460	2470	2470	2470	2470	2480	2480	2480	2490
2440	2470	2470	2480	2480	2480	2480	2490	2490	2490	2500	2500
2450	2480	2480	2490	2490	2490	2490	2500	2500	2500	2510	2510
2460	2490	2500	2500	2500	2500	2510	2510	2510	2520	2520	2520
2470	2500	2510	2510	2510	2510	2520	2520	2530	2530	2530	2540
2480	2510	2520	2520	2530	2530	2530	2530	2540	2540	2550	2550
2490	2530	2530	2530	2540	2540	2550	2550	2550	2550	2560	2560
2500	2540	2540	2540	2550	2550	2550	2560	2560	2570	2570	2570
2510	2550	2550	2560	2560	2560	2560	2570	2570	2580	2580	2590
2520	2560	2560	2570	2570	2570	2580	2580	2590	2590	2600	2600
2530	2570	2570	2580	2580	2580	2590	2590	2600	2600	2610	2610
2540	2580	2590	2590	2600	2600	2600	2600	2610	2610	2620	2620
2550	2590	2600	2600	2610	2610	2610	2620	2620	2630	2630	2640
2560	2600	2610	2610	2620	2620	2620	2630	2630	2640	2640	2650

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 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1280	1040	1020	1010	990	970	960	940	920	900	890	
1290	1050	1030	1020	1000	990	970	950	940	920	900	
1300	1060	1050	1030	1020	1000	980	970	950	930	910	
1310	1070	1060	1040	1030	1010	1000	980	960	950	930	
1320	1090	1070	1060	1040	1030	1010	990	980	960	940	
1330	1100	1080	1070	1060	1040	1020	1010	990	970	960	
1340	1110	1100	1080	1070	1050	1040	1020	1010	990	970	
1350	1120	1110	1100	1080	1070	1050	1040	1020	1000	990	
1360	1140	1120	1110	1090	1080	1060	1050	1030	1020	1000	
1370	1150	1140	1120	1110	1090	1080	1060	1050	1030	1010	
1380	1160	1150	1140	1120	1110	1090	1080	1060	1050	1030	
1390	1170	1160	1150	1130	1120	1110	1090	1070	1060	1040	
1400	1190	1170	1160	1150	1130	1120	1100	1090	1070	1060	
1410	1200	1190	1170	1160	1150	1130	1120	1100	1090	1070	
1420	1210	1200	1190	1170	1160	1150	1130	1120	1100	1090	
1430	1230	1210	1200	1190	1170	1160	1150	1130	1120	1100	
1440	1240	1230	1210	1200	1190	1170	1160	1140	1130	1110	
1450	1250	1240	1230	1210	1200	1190	1170	1160	1140	1130	
1460	1260	1250	1240	1230	1210	1200	1190	1170	1160	1140	
1470	1280	1260	1250	1240	1230	1210	1200	1190	1170	1160	
1480	1290	1280	1260	1250	1240	1230	1210	1200	1190	1170	
1490	1300	1290	1280	1270	1250	1240	1230	1210	1200	1190	
1500	1310	1300	1290	1280	1270	1250	1240	1230	1210	1200	
1510	1330	1320	1300	1290	1280	1270	1250	1240	1230	1210	
1520	1340	1330	1320	1310	1290	1280	1270	1260	1240	1230	
1530	1350	1340	1330	1320	1310	1290	1280	1270	1260	1240	
1540	1360	1350	1340	1330	1320	1310	1300	1280	1270	1260	
1550	1380	1370	1360	1340	1330	1320	1310	1300	1280	1270	
1560	1390	1380	1370	1360	1350	1340	1320	1310	1300	1290	
1570	1400	1390	1380	1370	1360	1350	1340	1320	1310	1300	
1580	1420	1410	1390	1380	1370	1360	1350	1340	1330	1310	
1590	1430	1420	1410	1400	1390	1380	1360	1350	1340	1330	
1600	1440	1430	1420	1410	1400	1390	1380	1370	1350	1340	
1610	1450	1440	1430	1420	1410	1400	1390	1380	1370	1360	
1620	1470	1460	1450	1440	1430	1420	1410	1390	1380	1370	
1630	1480	1470	1460	1450	1440	1430	1420	1410	1400	1390	
1640	1490	1480	1470	1460	1450	1440	1430	1420	1410	1400	
1650	1500	1490	1490	1480	1470	1460	1450	1440	1430	1410	
1660	1520	1510	1500	1490	1480	1470	1460	1450	1440	1430	
1670	1530	1520	1510	1500	1490	1480	1470	1460	1450	1440	
1680	1540	1530	1520	1520	1510	1500	1490	1480	1470	1460	
1690	1550	1550	1540	1530	1520	1510	1500	1490	1480	1470	
1700	1570	1560	1550	1540	1530	1520	1520	1510	1500	1490	

WEST VIRGINIA DIVISION OF HIGHWAYS
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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1710	1580	1570	1560	1560	1550	1540	1530	1520	1510	1500	
1720	1590	1580	1580	1570	1560	1550	1540	1530	1520	1510	
1730	1610	1600	1590	1580	1570	1560	1560	1550	1540	1530	
1740	1620	1610	1600	1590	1590	1580	1570	1560	1550	1540	
1750	1630	1620	1620	1610	1600	1590	1580	1570	1570	1560	
1760	1640	1640	1630	1620	1610	1610	1600	1590	1580	1570	
1770	1660	1650	1640	1630	1630	1620	1610	1600	1590	1590	
1780	1670	1660	1650	1650	1640	1630	1620	1620	1610	1600	
1790	1680	1670	1670	1660	1650	1650	1640	1630	1620	1610	
1800	1690	1690	1680	1670	1670	1660	1650	1640	1640	1630	
1810	1710	1700	1690	1690	1680	1670	1670	1660	1650	1640	
1820	1720	1710	1710	1700	1690	1690	1680	1670	1660	1660	
1830	1730	1730	1720	1710	1710	1700	1690	1690	1680	1670	
1840	1740	1740	1730	1730	1720	1710	1710	1700	1690	1690	
1850	1760	1750	1750	1740	1730	1730	1720	1710	1710	1700	
1860	1770	1760	1760	1750	1750	1740	1730	1730	1720	1710	
1870	1780	1780	1770	1770	1760	1750	1750	1740	1740	1730	
1880	1790	1790	1780	1780	1770	1770	1760	1760	1750	1740	
1890	1810	1800	1800	1790	1790	1780	1780	1770	1760	1760	
1900	1820	1820	1810	1810	1800	1790	1790	1780	1780	1770	
1910	1830	1830	1820	1820	1810	1810	1800	1800	1790	1790	
1920	1850	1840	1840	1830	1830	1820	1820	1810	1810	1800	
1930	1860	1850	1850	1840	1840	1840	1830	1820	1820	1810	
1940	1870	1870	1860	1860	1850	1850	1840	1840	1830	1830	
1950	1880	1880	1880	1870	1870	1860	1860	1850	1850	1840	
1960	1900	1890	1890	1880	1880	1880	1870	1870	1860	1860	
1970	1910	1910	1900	1900	1890	1890	1880	1880	1880	1870	
1980	1920	1920	1910	1910	1910	1900	1900	1890	1890	1890	
1990	1930	1930	1930	1920	1920	1920	1910	1910	1900	1900	
2000	1950	1940	1940	1940	1930	1930	1930	1920	1920	1910	
2010	1960	1960	1950	1950	1950	1940	1940	1940	1930	1930	
2020	1970	1970	1970	1960	1960	1960	1950	1950	1950	1940	
2030	1980	1980	1980	1980	1970	1970	1970	1960	1960	1960	
2040	2000	1990	1990	1990	1990	1980	1980	1980	1970	1970	
2050	2010	2010	2010	2000	2000	2000	1990	1990	1990	1990	
2060	2020	2020	2020	2020	2010	2010	2010	2010	2000	2000	
2070	2040	2030	2030	2030	2030	2020	2020	2020	2020	2010	
2080	2050	2050	2040	2040	2040	2040	2040	2030	2030	2030	
2090	2060	2060	2060	2060	2050	2050	2050	2050	2050	2040	
2100	2070	2070	2070	2070	2070	2060	2060	2060	2060	2060	
2110	2090	2080	2080	2080	2080	2080	2080	2070	2070	2070	
2120	2100	2100	2100	2090	2090	2090	2090	2090	2090	2090	
2130	2110	2110	2110	2110	2110	2110	2100	2100	2100	2100	

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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
2140		2120	2120	2120	2120	2120	2120	2120	2120	2120	2110
2150		2140	2140	2140	2130	2130	2130	2130	2130	2130	2130
2160		2150	2150	2150	2150	2150	2150	2150	2140	2140	2140
2170		2160	2160	2160	2160	2160	2160	2160	2160	2160	2160
2180		2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
2190		2190	2190	2190	2190	2190	2190	2190	2190	2190	2190
2200		2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
2210		2210	2210	2210	2210	2210	2210	2210	2210	2210	2210
2220		2230	2230	2230	2230	2230	2230	2230	2230	2230	2230
2230		2240	2240	2240	2240	2240	2240	2240	2240	2240	2240
2240		2250	2250	2250	2250	2250	2250	2250	2260	2260	2260
2250		2260	2260	2260	2270	2270	2270	2270	2270	2270	2270
2260		2280	2280	2280	2280	2280	2280	2280	2280	2280	2290
2270		2290	2290	2290	2290	2290	2290	2300	2300	2300	2300
2280		2300	2300	2300	2310	2310	2310	2310	2310	2310	2310
2290		2310	2320	2320	2320	2320	2320	2320	2320	2330	2330
2300		2330	2330	2330	2330	2330	2340	2340	2340	2340	2340
2310		2340	2340	2340	2340	2350	2350	2350	2350	2350	2360
2320		2350	2350	2360	2360	2360	2360	2360	2370	2370	2370
2330		2360	2370	2370	2370	2370	2380	2380	2380	2380	2390
2340		2380	2380	2380	2380	2390	2390	2390	2390	2400	2400
2350		2390	2390	2390	2400	2400	2400	2410	2410	2410	2410
2360		2400	2410	2410	2410	2410	2420	2420	2420	2430	2430
2370		2420	2420	2420	2420	2430	2430	2430	2440	2440	2440
2380		2430	2430	2430	2440	2440	2440	2450	2450	2450	2460
2390		2440	2440	2450	2450	2450	2460	2460	2460	2470	2470
2400		2450	2460	2460	2460	2470	2470	2470	2480	2480	2490
2410		2470	2470	2470	2480	2480	2480	2490	2490	2500	2500
2420		2480	2480	2490	2490	2490	2500	2500	2510	2510	2510
2430		2490	2490	2500	2500	2510	2510	2520	2520	2520	2530
2440		2500	2510	2510	2520	2520	2520	2530	2530	2540	2540
2450		2520	2520	2520	2530	2530	2540	2540	2550	2550	2560
2460		2530	2530	2540	2540	2550	2550	2560	2560	2570	2570
2470		2540	2550	2550	2560	2560	2560	2570	2570	2580	2590
2480		2550	2560	2560	2570	2570	2580	2580	2590	2590	2600
2490		2570	2570	2580	2580	2590	2590	2600	2600	2610	2610
2500		2580	2580	2590	2590	2600	2610	2610	2620	2620	2630
2510		2590	2600	2600	2610	2610	2620	2620	2630	2640	2640
2520		2610	2610	2620	2620	2630	2630	2640	2640	2650	2660
2530		2620	2620	2630	2630	2640	2650	2650	2660	2660	2670
2540		2630	2640	2640	2650	2650	2660	2670	2670	2680	2690
2550		2640	2650	2650	2660	2670	2670	2680	2690	2690	2700
2560		2660	2660	2670	2670	2680	2690	2690	2700	2710	2710

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1280		870	850	830	810	780	760	740	720	690	670
1290		880	860	840	820	800	780	760	730	710	680
1300		900	880	860	840	820	790	770	750	720	700
1310		910	890	870	850	830	810	790	760	740	720
1320		920	910	890	870	850	820	800	780	760	730
1330		940	920	900	880	860	840	820	800	770	750
1340		950	940	920	900	880	860	830	810	790	770
1350		970	950	930	910	890	870	850	830	810	780
1360		980	960	950	930	910	890	870	850	820	800
1370	1000	980	960	940	920	900	880	860	840	820	800
1380	1010	990	980	960	940	920	900	880	860	840	820
1390	1030	1010	990	970	950	930	910	890	870	850	830
1400	1040	1020	1010	990	970	950	930	910	890	870	850
1410	1060	1040	1020	1000	980	960	940	920	900	880	860
1420	1070	1050	1040	1020	1000	980	960	940	920	900	880
1430	1080	1070	1050	1030	1020	1000	980	960	940	920	900
1440	1100	1080	1070	1050	1030	1010	990	970	950	930	910
1450	1110	1100	1080	1060	1050	1030	1010	990	970	950	930
1460	1130	1110	1100	1080	1060	1040	1030	1010	990	970	950
1470	1140	1130	1110	1090	1080	1060	1040	1020	1000	980	960
1480	1160	1140	1130	1110	1090	1070	1060	1040	1020	1000	980
1490	1170	1160	1140	1120	1110	1090	1070	1050	1040	1020	1000
1500	1190	1170	1160	1140	1120	1110	1090	1070	1050	1030	1010
1510	1200	1190	1170	1150	1140	1120	1100	1090	1070	1050	1030
1520	1210	1200	1190	1170	1150	1140	1120	1100	1090	1070	1050
1530	1230	1210	1200	1180	1170	1150	1140	1120	1100	1080	1060
1540	1240	1230	1210	1200	1180	1170	1150	1140	1120	1100	1080
1550	1260	1240	1230	1220	1200	1180	1170	1150	1130	1120	1100
1560	1270	1260	1240	1230	1220	1200	1180	1170	1150	1130	1120
1570	1290	1270	1260	1250	1230	1220	1200	1180	1170	1150	1130
1580	1300	1290	1270	1260	1250	1230	1220	1200	1180	1170	1150
1590	1320	1300	1290	1280	1260	1250	1230	1220	1200	1180	1170
1600	1330	1320	1300	1290	1280	1260	1250	1230	1220	1200	1180
1610	1340	1330	1320	1310	1290	1280	1260	1250	1230	1220	1200
1620	1360	1350	1330	1320	1310	1290	1280	1260	1250	1230	1220
1630	1370	1360	1350	1340	1320	1310	1300	1280	1270	1250	1240
1640	1390	1380	1360	1350	1340	1320	1310	1300	1280	1270	1250
1650	1400	1390	1380	1370	1350	1340	1330	1310	1300	1280	1270
1660	1420	1410	1390	1380	1370	1360	1340	1330	1310	1300	1280
1670	1430	1420	1410	1400	1380	1370	1360	1350	1330	1320	1300
1680	1450	1440	1420	1410	1400	1390	1370	1360	1350	1330	1320
1690	1460	1450	1440	1430	1420	1400	1390	1380	1360	1350	1330
1700	1480	1460	1450	1440	1430	1420	1410	1390	1380	1360	1350

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1710		1490	1480	1470	1460	1450	1430	1420	1410	1400	1380
1720		1500	1490	1480	1470	1460	1450	1440	1430	1410	1400
1730		1520	1510	1500	1490	1480	1470	1450	1440	1430	1420
1740		1530	1520	1510	1500	1490	1480	1470	1460	1450	1430
1750		1550	1540	1530	1520	1510	1500	1490	1470	1460	1450
1760		1560	1550	1540	1530	1520	1510	1500	1490	1480	1470
1770		1580	1570	1560	1550	1540	1530	1520	1510	1500	1480
1780		1590	1580	1570	1560	1550	1540	1530	1520	1510	1500
1790		1610	1600	1590	1580	1570	1560	1550	1540	1530	1520
1800		1620	1610	1600	1590	1580	1570	1560	1550	1540	1530
1810		1630	1630	1620	1610	1600	1590	1580	1570	1560	1550
1820		1650	1640	1630	1620	1620	1610	1600	1590	1580	1570
1830		1660	1660	1650	1640	1630	1620	1610	1600	1590	1580
1840		1680	1670	1660	1650	1650	1640	1630	1620	1610	1600
1850		1690	1690	1680	1670	1660	1650	1640	1640	1630	1620
1860		1710	1700	1690	1680	1680	1670	1660	1650	1640	1630
1870		1720	1710	1710	1700	1690	1680	1680	1670	1660	1650
1880		1740	1730	1720	1720	1710	1700	1690	1680	1680	1670
1890		1750	1740	1740	1730	1720	1720	1710	1700	1690	1680
1900		1770	1760	1750	1750	1740	1730	1720	1720	1710	1700
1910		1780	1770	1770	1760	1750	1750	1740	1730	1720	1720
1920		1790	1790	1780	1780	1770	1760	1760	1750	1740	1730
1930		1810	1800	1800	1790	1780	1780	1770	1760	1760	1750
1940		1820	1820	1810	1810	1800	1790	1790	1780	1770	1770
1950		1840	1830	1830	1820	1820	1810	1800	1800	1790	1780
1960		1850	1850	1840	1840	1830	1820	1820	1810	1810	1800
1970		1870	1860	1860	1850	1850	1840	1830	1830	1820	1820
1980		1880	1880	1870	1870	1860	1860	1850	1850	1840	1830
1990		1900	1890	1890	1880	1880	1870	1870	1860	1860	1850
2000		1910	1910	1900	1900	1890	1890	1880	1880	1870	1870
2010		1920	1920	1920	1910	1910	1900	1900	1890	1890	1880
2020		1940	1940	1930	1930	1920	1920	1910	1910	1900	1900
2030		1950	1950	1950	1940	1940	1930	1930	1930	1920	1920
2040		1970	1960	1960	1960	1950	1950	1950	1940	1940	1930
2050		1980	1980	1980	1970	1970	1970	1960	1960	1950	1950
2060		2000	1990	1990	1990	1980	1980	1980	1970	1970	1970
2070		2010	2010	2010	2000	2000	2000	1990	1990	1990	1980
2080		2030	2020	2020	2020	2020	2010	2010	2010	2000	2000
2090		2040	2040	2040	2030	2030	2030	2030	2020	2020	2020
2100		2060	2050	2050	2050	2050	2040	2040	2040	2040	2030
2110		2070	2070	2070	2060	2060	2060	2060	2050	2050	2050
2120		2080	2080	2080	2080	2080	2070	2070	2070	2070	2070
2130		2100	2100	2100	2090	2090	2090	2090	2090	2090	2080

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.5
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
2140		2110	2110	2110	2110	2110	2110	2100	2100	2100	2100
2150		2130	2130	2130	2120	2120	2120	2120	2120	2120	2120
2160		2140	2140	2140	2140	2140	2140	2140	2140	2130	2130
2170		2160	2160	2160	2150	2150	2150	2150	2150	2150	2150
2180		2170	2170	2170	2170	2170	2170	2170	2170	2170	2170
2190		2190	2190	2190	2180	2180	2180	2180	2180	2180	2180
2200		2200	2200	2200	2200	2200	2200	2200	2200	2200	2200
2210		2210	2210	2210	2220	2220	2220	2220	2220	2220	2220
2220		2230	2230	2230	2230	2230	2230	2230	2230	2230	2230
2230		2240	2240	2240	2250	2250	2250	2250	2250	2250	2250
2240		2260	2260	2260	2260	2260	2260	2260	2260	2270	2270
2250		2270	2270	2270	2280	2280	2280	2280	2280	2280	2280
2260		2290	2290	2290	2290	2290	2290	2300	2300	2300	2300
2270		2300	2300	2300	2310	2310	2310	2310	2310	2310	2320
2280		2320	2320	2320	2320	2320	2320	2330	2330	2330	2330
2290		2330	2330	2330	2340	2340	2340	2340	2350	2350	2350
2300		2340	2350	2350	2350	2350	2360	2360	2360	2360	2370
2310		2360	2360	2360	2370	2370	2370	2370	2380	2380	2380
2320		2370	2380	2380	2380	2380	2390	2390	2390	2400	2400
2330		2390	2390	2390	2400	2400	2400	2410	2410	2410	2420
2340		2400	2410	2410	2410	2420	2420	2420	2430	2430	2430
2350		2420	2420	2420	2430	2430	2430	2440	2440	2450	2450
2360		2430	2440	2440	2440	2450	2450	2450	2460	2460	2470
2370		2450	2450	2450	2460	2460	2470	2470	2470	2480	2480
2380		2460	2460	2470	2470	2480	2480	2490	2490	2500	2500
2390		2480	2480	2480	2490	2490	2500	2500	2510	2510	2520
2400		2490	2490	2500	2500	2510	2510	2520	2520	2530	2530
2410		2500	2510	2510	2520	2520	2530	2530	2540	2540	2550
2420		2520	2520	2530	2530	2540	2540	2550	2550	2560	2570
2430		2530	2540	2540	2550	2550	2560	2570	2570	2580	2580
2440		2550	2550	2560	2560	2570	2570	2580	2590	2590	2600
2450		2560	2570	2570	2580	2580	2590	2600	2600	2610	2620
2460		2580	2580	2590	2590	2600	2610	2610	2620	2630	2630
2470		2590	2600	2600	2610	2620	2620	2630	2640	2640	2650
2480		2610	2610	2620	2620	2630	2640	2640	2650	2660	2670
2490		2620	2630	2630	2640	2650	2650	2660	2670	2680	2680
2500		2630	2640	2650	2650	2660	2670	2680	2680	2690	2700
2510		2650	2660	2660	2670	2680	2680	2690	2700	2710	2720
2520		2660	2670	2680	2680	2690	2700	2710	2720	2720	2730
2530		2680	2690	2690	2700	2710	2720	2720	2730	2740	2750
2540		2690	2700	2710	2720	2720	2730	2740	2750	2760	2770
2550		2710	2710	2720	2730	2740	2750	2760	2760	2770	2780
2560		2720	2730	2740	2750	2750	2760	2770	2780	2790	2800

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1280	1270	1260	1250	1240	1230	1220	1200	1190	1180	1170	
1290	1280	1270	1260	1250	1240	1230	1210	1200	1190	1180	
1300	1290	1280	1270	1260	1250	1240	1230	1210	1200	1190	
1310	1300	1290	1280	1270	1260	1250	1240	1220	1210	1200	
1320	1310	1300	1290	1280	1270	1260	1250	1240	1220	1210	
1330	1320	1310	1300	1290	1280	1270	1260	1250	1240	1220	
1340	1330	1320	1310	1300	1290	1280	1270	1260	1250	1230	
1350	1340	1330	1320	1310	1300	1290	1280	1270	1260	1250	
1360	1350	1340	1330	1320	1310	1300	1290	1280	1270	1260	
1370	1360	1350	1340	1330	1320	1310	1300	1290	1280	1270	
1380	1370	1360	1350	1340	1330	1320	1310	1300	1290	1280	
1390	1380	1370	1360	1350	1340	1330	1320	1310	1300	1290	
1400	1390	1380	1370	1360	1350	1340	1330	1320	1310	1300	
1410	1400	1390	1380	1370	1360	1350	1340	1330	1320	1310	
1420	1410	1400	1390	1380	1370	1360	1350	1340	1330	1320	
1430	1420	1410	1400	1390	1380	1380	1370	1360	1350	1330	
1440	1430	1420	1410	1400	1400	1390	1380	1370	1360	1350	
1450	1440	1430	1420	1420	1410	1400	1390	1380	1370	1360	
1460	1450	1440	1430	1430	1420	1410	1400	1390	1380	1370	
1470	1460	1450	1440	1440	1430	1420	1410	1400	1390	1380	
1480	1470	1460	1460	1450	1440	1430	1420	1410	1400	1390	
1490	1480	1470	1470	1460	1450	1440	1430	1420	1410	1400	
1500	1490	1480	1480	1470	1460	1450	1440	1430	1420	1410	
1510	1500	1490	1490	1480	1470	1460	1450	1440	1430	1420	
1520	1510	1500	1500	1490	1480	1470	1460	1450	1440	1430	
1530	1520	1510	1510	1500	1490	1480	1470	1460	1460	1450	
1540	1530	1520	1520	1510	1500	1490	1480	1470	1470	1460	
1550	1540	1530	1530	1520	1510	1500	1490	1490	1480	1470	
1560	1550	1550	1540	1530	1520	1510	1510	1500	1490	1480	
1570	1560	1560	1550	1540	1530	1520	1520	1510	1500	1490	
1580	1570	1570	1560	1550	1540	1530	1530	1520	1510	1500	
1590	1580	1580	1570	1560	1550	1550	1540	1530	1520	1510	
1600	1590	1590	1580	1570	1560	1560	1550	1540	1530	1520	
1610	1600	1600	1590	1580	1570	1570	1560	1550	1540	1530	
1620	1610	1610	1600	1590	1580	1580	1570	1560	1550	1550	
1630	1620	1620	1610	1600	1600	1590	1580	1570	1560	1560	
1640	1630	1630	1620	1610	1610	1600	1590	1580	1580	1570	
1650	1640	1640	1630	1620	1620	1610	1600	1590	1590	1580	
1660	1650	1650	1640	1630	1630	1620	1610	1610	1600	1590	
1670	1660	1660	1650	1640	1640	1630	1620	1620	1610	1600	
1680	1670	1670	1660	1650	1650	1640	1630	1630	1620	1610	
1690	1680	1680	1670	1670	1660	1650	1640	1640	1630	1620	
1700	1690	1690	1680	1680	1670	1660	1660	1650	1640	1630	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1710	1700	1700	1690	1690	1680	1670	1670	1660	1650	1650	
1720	1710	1710	1700	1700	1690	1680	1680	1670	1660	1660	
1730	1720	1720	1710	1710	1700	1690	1690	1680	1670	1670	
1740	1730	1730	1720	1720	1710	1710	1700	1690	1690	1680	
1750	1740	1740	1730	1730	1720	1720	1710	1700	1700	1690	
1760	1750	1750	1740	1740	1730	1730	1720	1710	1710	1700	
1770	1760	1760	1750	1750	1740	1740	1730	1720	1720	1710	
1780	1770	1770	1760	1760	1750	1750	1740	1740	1730	1720	
1790	1780	1780	1770	1770	1760	1760	1750	1750	1740	1730	
1800	1800	1790	1780	1780	1770	1770	1760	1760	1750	1750	
1810	1810	1800	1800	1790	1780	1780	1770	1770	1760	1760	
1820	1820	1810	1810	1800	1800	1790	1780	1780	1770	1770	
1830	1830	1820	1820	1810	1810	1800	1800	1790	1780	1780	
1840	1840	1830	1830	1820	1820	1810	1810	1800	1800	1790	
1850	1850	1840	1840	1830	1830	1820	1820	1810	1810	1800	
1860	1860	1850	1850	1840	1840	1830	1830	1820	1820	1810	
1870	1870	1860	1860	1850	1850	1840	1840	1830	1830	1820	
1880	1880	1870	1870	1860	1860	1850	1850	1840	1840	1830	
1890	1890	1880	1880	1870	1870	1860	1860	1860	1850	1850	
1900	1900	1890	1890	1880	1880	1880	1870	1870	1860	1860	
1910	1910	1900	1900	1890	1890	1890	1880	1880	1870	1870	
1920	1920	1910	1910	1900	1900	1900	1890	1890	1880	1880	
1930	1930	1920	1920	1920	1910	1910	1900	1900	1890	1890	
1940	1940	1930	1930	1930	1920	1920	1910	1910	1910	1900	
1950	1950	1940	1940	1940	1930	1930	1920	1920	1920	1910	
1960	1960	1950	1950	1950	1940	1940	1940	1930	1930	1920	
1970	1970	1960	1960	1960	1950	1950	1950	1940	1940	1930	
1980	1980	1970	1970	1970	1960	1960	1960	1950	1950	1950	
1990	1990	1980	1980	1980	1970	1970	1970	1960	1960	1960	
2000	2000	1990	1990	1990	1980	1980	1980	1970	1970	1970	
2010	2010	2000	2000	2000	2000	1990	1990	1990	1980	1980	
2020	2020	2010	2010	2010	2010	2000	2000	2000	1990	1990	
2030	2030	2020	2020	2020	2020	2010	2010	2010	2000	2000	
2040	2040	2030	2030	2030	2030	2020	2020	2020	2020	2010	
2050	2050	2050	2040	2040	2040	2030	2030	2030	2030	2020	
2060	2060	2060	2050	2050	2050	2050	2040	2040	2040	2030	
2070	2070	2070	2060	2060	2060	2060	2050	2050	2050	2050	
2080	2080	2080	2070	2070	2070	2070	2060	2060	2060	2060	
2090	2090	2090	2080	2080	2080	2080	2080	2070	2070	2070	
2100	2100	2100	2090	2090	2090	2090	2090	2080	2080	2080	
2110	2110	2110	2100	2100	2100	2100	2100	2090	2090	2090	
2120	2120	2120	2110	2110	2110	2110	2110	2110	2100	2100	
2130	2130	2130	2130	2120	2120	2120	2120	2120	2110	2110	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
2140	2140	2140	2140	2140	2130	2130	2130	2130	2130	2130	2120
2150	2150	2150	2150	2150	2140	2140	2140	2140	2140	2140	2130
2160	2160	2160	2160	2160	2150	2150	2150	2150	2150	2150	2150
2170	2170	2170	2170	2170	2170	2160	2160	2160	2160	2160	2160
2180	2180	2180	2180	2180	2180	2170	2170	2170	2170	2170	2170
2190	2190	2190	2190	2190	2190	2180	2180	2180	2180	2180	2180
2200	2200	2200	2200	2200	2200	2200	2190	2190	2190	2190	2190
2210	2210	2210	2210	2210	2210	2210	2210	2200	2200	2200	2200
2220	2220	2220	2220	2220	2220	2220	2220	2210	2210	2210	2210
2230	2230	2230	2230	2230	2230	2230	2230	2230	2220	2220	2220
2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240	2230
2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
2270	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270
2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280
2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290
2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
2310	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310
2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320
2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330
2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2350	2350
2350	2350	2350	2350	2350	2350	2350	2350	2350	2360	2360	2360
2360	2360	2360	2360	2360	2360	2360	2360	2370	2370	2370	2370
2370	2370	2370	2370	2370	2370	2370	2380	2380	2380	2380	2380
2380	2380	2380	2380	2380	2380	2380	2390	2390	2390	2390	2390
2390	2390	2390	2390	2390	2390	2400	2400	2400	2400	2400	2400
2400	2400	2400	2400	2400	2400	2410	2410	2410	2410	2410	2410
2410	2410	2410	2410	2410	2420	2420	2420	2420	2420	2420	2420
2420	2420	2420	2420	2420	2430	2430	2430	2430	2430	2430	2430
2430	2430	2430	2430	2430	2440	2440	2440	2440	2440	2440	2450
2440	2440	2440	2440	2440	2450	2450	2450	2450	2450	2460	2460
2450	2450	2450	2460	2460	2460	2460	2460	2460	2460	2470	2470
2460	2460	2460	2470	2470	2470	2470	2470	2470	2470	2480	2480
2470	2470	2470	2480	2480	2480	2480	2480	2480	2490	2490	2490
2480	2480	2480	2490	2490	2490	2490	2490	2490	2500	2500	2500
2490	2490	2490	2500	2500	2500	2500	2500	2510	2510	2510	2510
2500	2500	2500	2510	2510	2510	2510	2510	2520	2520	2520	2520
2510	2510	2510	2520	2520	2520	2520	2520	2530	2530	2530	2530
2520	2520	2520	2530	2530	2530	2530	2530	2540	2540	2540	2550
2530	2530	2530	2540	2540	2540	2540	2550	2550	2550	2550	2560
2540	2540	2550	2550	2550	2550	2550	2560	2560	2560	2560	2570
2550	2550	2560	2560	2560	2560	2560	2570	2570	2570	2580	2580
2560	2560	2570	2570	2570	2570	2570	2580	2580	2580	2590	2590

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1280		1160	1140	1130	1120	1100	1090	1070	1060	1040	1030
1290		1170	1150	1140	1130	1110	1100	1090	1070	1060	1040
1300		1180	1170	1150	1140	1130	1110	1100	1080	1070	1050
1310		1190	1180	1160	1150	1140	1120	1110	1100	1080	1070
1320		1200	1190	1180	1160	1150	1140	1120	1110	1090	1080
1330		1210	1200	1190	1170	1160	1150	1130	1120	1110	1090
1340		1220	1210	1200	1190	1170	1160	1150	1130	1120	1100
1350		1230	1220	1210	1200	1180	1170	1160	1140	1130	1120
1360		1250	1230	1220	1210	1200	1180	1170	1160	1140	1130
1370		1260	1240	1230	1220	1210	1200	1180	1170	1150	1140
1380		1270	1260	1240	1230	1220	1210	1190	1180	1170	1150
1390		1280	1270	1260	1240	1230	1220	1210	1190	1180	1170
1400		1290	1280	1270	1260	1240	1230	1220	1210	1190	1180
1410		1300	1290	1280	1270	1260	1240	1230	1220	1200	1190
1420		1310	1300	1290	1280	1270	1250	1240	1230	1220	1200
1430		1320	1310	1300	1290	1280	1270	1250	1240	1230	1220
1440		1340	1320	1310	1300	1290	1280	1270	1250	1240	1230
1450		1350	1340	1320	1310	1300	1290	1280	1270	1250	1240
1460		1360	1350	1340	1330	1310	1300	1290	1280	1270	1250
1470		1370	1360	1350	1340	1330	1310	1300	1290	1280	1270
1480		1380	1370	1360	1350	1340	1330	1310	1300	1290	1280
1490		1390	1380	1370	1360	1350	1340	1330	1310	1300	1290
1500		1400	1390	1380	1370	1360	1350	1340	1330	1320	1300
1510		1410	1400	1390	1380	1370	1360	1350	1340	1330	1320
1520		1430	1420	1410	1390	1380	1370	1360	1350	1340	1330
1530		1440	1430	1420	1410	1400	1390	1370	1360	1350	1340
1540		1450	1440	1430	1420	1410	1400	1390	1380	1360	1350
1550		1460	1450	1440	1430	1420	1410	1400	1390	1380	1370
1560		1470	1460	1450	1440	1430	1420	1410	1400	1390	1380
1570		1480	1470	1460	1450	1440	1430	1420	1410	1400	1390
1580		1490	1480	1470	1460	1460	1450	1430	1420	1410	1400
1590		1500	1490	1490	1480	1470	1460	1450	1440	1430	1420
1600		1510	1510	1500	1490	1480	1470	1460	1450	1440	1430
1610		1530	1520	1510	1500	1490	1480	1470	1460	1450	1440
1620		1540	1530	1520	1510	1500	1490	1480	1470	1460	1450
1630		1550	1540	1530	1520	1510	1500	1500	1490	1480	1470
1640		1560	1550	1540	1530	1530	1520	1510	1500	1490	1480
1650		1570	1560	1550	1550	1540	1530	1520	1510	1500	1490
1660		1580	1570	1570	1560	1550	1540	1530	1520	1510	1500
1670		1590	1590	1580	1570	1560	1550	1540	1530	1530	1520
1680		1600	1600	1590	1580	1570	1560	1560	1550	1540	1530
1690		1620	1610	1600	1590	1580	1580	1570	1560	1550	1540
1700		1630	1620	1610	1600	1600	1590	1580	1570	1560	1550

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1710		1640	1630	1620	1620	1610	1600	1590	1580	1570	1570
1720		1650	1640	1640	1630	1620	1610	1600	1600	1590	1580
1730		1660	1650	1650	1640	1630	1620	1620	1610	1600	1590
1740		1670	1670	1660	1650	1640	1640	1630	1620	1610	1600
1750		1680	1680	1670	1660	1660	1650	1640	1630	1620	1620
1760		1690	1690	1680	1670	1670	1660	1650	1640	1640	1630
1770		1710	1700	1690	1690	1680	1670	1660	1660	1650	1640
1780		1720	1710	1700	1700	1690	1680	1680	1670	1660	1650
1790		1730	1720	1720	1710	1700	1700	1690	1680	1670	1670
1800		1740	1730	1730	1720	1710	1710	1700	1690	1690	1680
1810		1750	1740	1740	1730	1730	1720	1710	1710	1700	1690
1820		1760	1760	1750	1740	1740	1730	1720	1720	1710	1700
1830		1770	1770	1760	1760	1750	1740	1740	1730	1720	1720
1840		1780	1780	1770	1770	1760	1750	1750	1740	1730	1730
1850		1800	1790	1780	1780	1770	1770	1760	1750	1750	1740
1860		1810	1800	1800	1790	1780	1780	1770	1770	1760	1750
1870		1820	1810	1810	1800	1800	1790	1780	1780	1770	1770
1880		1830	1820	1820	1810	1810	1800	1800	1790	1780	1780
1890		1840	1840	1830	1830	1820	1810	1810	1800	1800	1790
1900		1850	1850	1840	1840	1830	1830	1820	1810	1810	1800
1910		1860	1860	1850	1850	1840	1840	1830	1830	1820	1820
1920		1870	1870	1870	1860	1860	1850	1840	1840	1830	1830
1930		1890	1880	1880	1870	1870	1860	1860	1850	1850	1840
1940		1900	1890	1890	1880	1880	1870	1870	1860	1860	1850
1950		1910	1900	1900	1890	1890	1890	1880	1880	1870	1870
1960		1920	1920	1910	1910	1900	1900	1890	1890	1880	1880
1970		1930	1930	1920	1920	1910	1910	1900	1900	1900	1890
1980		1940	1940	1930	1930	1930	1920	1920	1910	1910	1900
1990		1950	1950	1950	1940	1940	1930	1930	1920	1920	1920
2000		1960	1960	1960	1950	1950	1950	1940	1940	1930	1930
2010		1980	1970	1970	1960	1960	1960	1950	1950	1940	1940
2020		1990	1980	1980	1980	1970	1970	1970	1960	1960	1950
2030		2000	1990	1990	1990	1980	1980	1980	1970	1970	1970
2040		2010	2010	2000	2000	2000	1990	1990	1990	1980	1980
2050		2020	2020	2010	2010	2010	2000	2000	2000	1990	1990
2060		2030	2030	2030	2020	2020	2020	2010	2010	2010	2000
2070		2040	2040	2040	2030	2030	2030	2030	2020	2020	2020
2080		2050	2050	2050	2050	2040	2040	2040	2030	2030	2030
2090		2070	2060	2060	2060	2060	2050	2050	2050	2040	2040
2100		2080	2070	2070	2070	2070	2060	2060	2060	2060	2050
2110		2090	2090	2080	2080	2080	2080	2070	2070	2070	2070
2120		2100	2100	2090	2090	2090	2090	2090	2080	2080	2080
2130		2110	2110	2110	2100	2100	2100	2100	2100	2090	2090

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
2140	2120	2120	2120	2120	2120	2110	2110	2110	2110	2110	2100
2150	2130	2130	2130	2130	2130	2130	2120	2120	2120	2120	2120
2160	2140	2140	2140	2140	2140	2140	2140	2130	2130	2130	2130
2170	2160	2150	2150	2150	2150	2150	2150	2150	2140	2140	2140
2180	2170	2170	2160	2160	2160	2160	2160	2160	2160	2150	2150
2190	2180	2180	2180	2170	2170	2170	2170	2170	2170	2170	2170
2200	2190	2190	2190	2190	2190	2180	2180	2180	2180	2180	2180
2210	2200	2200	2200	2200	2200	2200	2200	2190	2190	2190	2190
2220	2210	2210	2210	2210	2210	2210	2210	2210	2210	2200	2200
2230	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220	2220
2240	2230	2230	2230	2230	2230	2230	2230	2230	2230	2230	2230
2250	2250	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240
2260	2260	2260	2260	2260	2260	2260	2250	2250	2250	2250	2250
2270	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270	2270
2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280
2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290
2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
2310	2310	2310	2310	2310	2310	2310	2310	2310	2310	2320	2320
2320	2320	2320	2320	2330	2330	2330	2330	2330	2330	2330	2330
2330	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340
2340	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
2350	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2370
2360	2370	2370	2370	2370	2370	2370	2370	2370	2380	2380	2380
2370	2380	2380	2380	2380	2380	2380	2390	2390	2390	2390	2390
2380	2390	2390	2390	2390	2400	2400	2400	2400	2400	2400	2400
2390	2400	2400	2410	2410	2410	2410	2410	2410	2410	2410	2420
2400	2410	2420	2420	2420	2420	2420	2420	2420	2420	2430	2430
2410	2430	2430	2430	2430	2430	2430	2430	2430	2440	2440	2440
2420	2440	2440	2440	2440	2440	2440	2450	2450	2450	2450	2450
2430	2450	2450	2450	2450	2460	2460	2460	2460	2460	2460	2470
2440	2460	2460	2460	2460	2470	2470	2470	2470	2470	2480	2480
2450	2470	2470	2470	2480	2480	2480	2480	2480	2490	2490	2490
2460	2480	2480	2490	2490	2490	2490	2490	2500	2500	2500	2500
2470	2490	2490	2500	2500	2500	2500	2500	2510	2510	2510	2520
2480	2500	2510	2510	2510	2510	2510	2520	2520	2520	2530	2530
2490	2510	2520	2520	2520	2530	2530	2530	2530	2530	2540	2540
2500	2530	2530	2530	2530	2540	2540	2540	2540	2550	2550	2550
2510	2540	2540	2540	2550	2550	2550	2550	2560	2560	2560	2570
2520	2550	2550	2550	2560	2560	2560	2560	2570	2570	2570	2580
2530	2560	2560	2570	2570	2570	2580	2580	2580	2580	2590	2590
2540	2570	2570	2580	2580	2580	2590	2590	2600	2600	2600	2600
2550	2580	2590	2590	2590	2600	2600	2600	2600	2610	2610	2620
2560	2590	2600	2600	2600	2610	2610	2620	2620	2620	2620	2630

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1280	1010	1000	980	960	940	930	910	890	870	850	
1290	1020	1010	990	970	960	940	920	900	880	860	
1300	1040	1020	1000	990	970	950	930	920	900	880	
1310	1050	1030	1020	1000	980	970	950	930	910	890	
1320	1060	1050	1030	1010	1000	980	960	940	920	910	
1330	1080	1060	1040	1030	1010	990	980	960	940	920	
1340	1090	1070	1060	1040	1020	1010	990	970	950	930	
1350	1100	1090	1070	1050	1040	1020	1000	990	970	950	
1360	1110	1100	1080	1070	1050	1030	1020	1000	980	960	
1370	1130	1110	1100	1080	1060	1050	1030	1010	1000	980	
1380	1140	1120	1110	1090	1080	1060	1040	1030	1010	990	
1390	1150	1140	1120	1110	1090	1070	1060	1040	1020	1010	
1400	1160	1150	1130	1120	1100	1090	1070	1050	1040	1020	
1410	1180	1160	1150	1130	1120	1100	1090	1070	1050	1030	
1420	1190	1180	1160	1150	1130	1120	1100	1080	1070	1050	
1430	1200	1190	1170	1160	1140	1130	1110	1100	1080	1060	
1440	1210	1200	1190	1170	1160	1140	1130	1110	1090	1080	
1450	1230	1210	1200	1190	1170	1160	1140	1120	1110	1090	
1460	1240	1230	1210	1200	1180	1170	1150	1140	1120	1110	
1470	1250	1240	1230	1210	1200	1180	1170	1150	1140	1120	
1480	1270	1250	1240	1220	1210	1200	1180	1170	1150	1130	
1490	1280	1260	1250	1240	1220	1210	1190	1180	1160	1150	
1500	1290	1280	1260	1250	1240	1220	1210	1190	1180	1160	
1510	1300	1290	1280	1260	1250	1240	1220	1210	1190	1180	
1520	1320	1300	1290	1280	1260	1250	1240	1220	1210	1190	
1530	1330	1320	1300	1290	1280	1260	1250	1240	1220	1210	
1540	1340	1330	1320	1300	1290	1280	1260	1250	1230	1220	
1550	1350	1340	1330	1320	1300	1290	1280	1260	1250	1230	
1560	1370	1350	1340	1330	1320	1300	1290	1280	1260	1250	
1570	1380	1370	1360	1340	1330	1320	1300	1290	1280	1260	
1580	1390	1380	1370	1360	1340	1330	1320	1300	1290	1280	
1590	1400	1390	1380	1370	1360	1340	1330	1320	1300	1290	
1600	1420	1410	1390	1380	1370	1360	1350	1330	1320	1310	
1610	1430	1420	1410	1400	1380	1370	1360	1350	1330	1320	
1620	1440	1430	1420	1410	1400	1390	1370	1360	1350	1330	
1630	1460	1440	1430	1420	1410	1400	1390	1370	1360	1350	
1640	1470	1460	1450	1440	1420	1410	1400	1390	1380	1360	
1650	1480	1470	1460	1450	1440	1430	1410	1400	1390	1380	
1660	1490	1480	1470	1460	1450	1440	1430	1420	1400	1390	
1670	1510	1500	1490	1470	1460	1450	1440	1430	1420	1410	
1680	1520	1510	1500	1490	1480	1470	1460	1440	1430	1420	
1690	1530	1520	1510	1500	1490	1480	1470	1460	1450	1430	
1700	1540	1530	1520	1510	1500	1490	1480	1470	1460	1450	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1710		1560	1550	1540	1530	1520	1510	1500	1490	1470	1460
1720		1570	1560	1550	1540	1530	1520	1510	1500	1490	1480
1730		1580	1570	1560	1550	1540	1530	1520	1510	1500	1490
1740		1590	1590	1580	1570	1560	1550	1540	1530	1520	1510
1750		1610	1600	1590	1580	1570	1560	1550	1540	1530	1520
1760		1620	1610	1600	1590	1580	1570	1560	1550	1540	1530
1770		1630	1620	1620	1610	1600	1590	1580	1570	1560	1550
1780		1640	1640	1630	1620	1610	1600	1590	1580	1570	1560
1790		1660	1650	1640	1630	1620	1620	1610	1600	1590	1580
1800		1670	1660	1650	1650	1640	1630	1620	1610	1600	1590
1810		1680	1680	1670	1660	1650	1640	1630	1620	1610	1610
1820		1700	1690	1680	1670	1660	1660	1650	1640	1630	1620
1830		1710	1700	1690	1690	1680	1670	1660	1650	1640	1630
1840		1720	1710	1710	1700	1690	1680	1670	1670	1660	1650
1850		1730	1730	1720	1710	1700	1700	1690	1680	1670	1660
1860		1750	1740	1730	1720	1720	1710	1700	1690	1690	1680
1870		1760	1750	1750	1740	1730	1720	1720	1710	1700	1690
1880		1770	1760	1760	1750	1740	1740	1730	1720	1710	1710
1890		1780	1780	1770	1760	1760	1750	1740	1740	1730	1720
1900		1800	1790	1780	1780	1770	1760	1760	1750	1740	1730
1910		1810	1800	1800	1790	1780	1780	1770	1760	1760	1750
1920		1820	1820	1810	1800	1800	1790	1780	1780	1770	1760
1930		1830	1830	1820	1820	1810	1800	1800	1790	1780	1780
1940		1850	1840	1840	1830	1820	1820	1810	1800	1800	1790
1950		1860	1850	1850	1840	1840	1830	1820	1820	1810	1810
1960		1870	1870	1860	1860	1850	1840	1840	1830	1830	1820
1970		1890	1880	1880	1870	1860	1860	1850	1850	1840	1830
1980		1900	1890	1890	1880	1880	1870	1870	1860	1850	1850
1990		1910	1910	1900	1900	1890	1890	1880	1870	1870	1860
2000		1920	1920	1910	1910	1900	1900	1890	1890	1880	1880
2010		1940	1930	1930	1920	1920	1910	1910	1900	1900	1890
2020		1950	1940	1940	1940	1930	1930	1920	1920	1910	1910
2030		1960	1960	1950	1950	1940	1940	1930	1930	1920	1920
2040		1970	1970	1970	1960	1960	1950	1950	1940	1940	1930
2050		1990	1980	1980	1970	1970	1970	1960	1960	1950	1950
2060		2000	2000	1990	1990	1980	1980	1980	1970	1970	1960
2070		2010	2010	2000	2000	2000	1990	1990	1990	1980	1980
2080		2020	2020	2020	2010	2010	2010	2000	2000	2000	1990
2090		2040	2030	2030	2030	2020	2020	2020	2010	2010	2010
2100		2050	2050	2040	2040	2040	2030	2030	2030	2020	2020
2110		2060	2060	2060	2050	2050	2050	2040	2040	2040	2030
2120		2080	2070	2070	2070	2060	2060	2060	2050	2050	2050
2130		2090	2090	2080	2080	2080	2070	2070	2070	2070	2060

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
2140	2100	2100	2100	2100	2090	2090	2090	2090	2080	2080	2080
2150	2110	2110	2110	2110	2110	2100	2100	2100	2100	2090	2090
2160	2130	2120	2120	2120	2120	2120	2120	2110	2110	2110	2110
2170	2140	2140	2130	2130	2130	2130	2130	2130	2120	2120	2120
2180	2150	2150	2150	2150	2140	2140	2140	2140	2140	2140	2130
2190	2160	2160	2160	2160	2160	2160	2160	2150	2150	2150	2150
2200	2180	2180	2170	2170	2170	2170	2170	2170	2170	2160	2160
2210	2190	2190	2190	2190	2180	2180	2180	2180	2180	2180	2180
2220	2200	2200	2200	2200	2200	2200	2200	2190	2190	2190	2190
2230	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210	2210
2240	2230	2230	2230	2220	2220	2220	2220	2220	2220	2220	2220
2250	2240	2240	2240	2240	2240	2240	2240	2240	2240	2230	2230
2260	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250	2250
2270	2270	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2280
2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290
2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300	2310
2310	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320
2320	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330
2330	2340	2340	2340	2340	2340	2340	2340	2350	2350	2350	2350
2340	2350	2350	2360	2360	2360	2360	2360	2360	2360	2360	2360
2350	2370	2370	2370	2370	2370	2370	2370	2370	2370	2380	2380
2360	2380	2380	2380	2380	2380	2380	2390	2390	2390	2390	2390
2370	2390	2390	2390	2400	2400	2400	2400	2400	2400	2400	2410
2380	2400	2410	2410	2410	2410	2410	2410	2410	2420	2420	2420
2390	2420	2420	2420	2420	2420	2420	2430	2430	2430	2430	2430
2400	2430	2430	2430	2440	2440	2440	2440	2440	2440	2450	2450
2410	2440	2440	2450	2450	2450	2450	2450	2460	2460	2460	2460
2420	2460	2460	2460	2460	2460	2460	2470	2470	2470	2470	2480
2430	2470	2470	2470	2470	2480	2480	2480	2480	2490	2490	2490
2440	2480	2480	2490	2490	2490	2490	2490	2500	2500	2500	2510
2450	2490	2500	2500	2500	2500	2500	2510	2510	2510	2520	2520
2460	2510	2510	2510	2510	2520	2520	2520	2520	2530	2530	2530
2470	2520	2520	2520	2530	2530	2530	2540	2540	2540	2540	2550
2480	2530	2530	2540	2540	2540	2550	2550	2550	2550	2560	2560
2490	2540	2550	2550	2550	2560	2560	2560	2560	2570	2570	2580
2500	2560	2560	2560	2570	2570	2570	2580	2580	2580	2590	2590
2510	2570	2570	2580	2580	2580	2590	2590	2600	2600	2600	2610
2520	2580	2590	2590	2590	2600	2600	2610	2610	2610	2610	2620
2530	2590	2600	2600	2610	2610	2620	2620	2620	2620	2630	2630
2540	2610	2610	2620	2620	2620	2630	2630	2640	2640	2640	2650
2550	2620	2620	2630	2630	2640	2640	2650	2650	2650	2660	2660
2560	2630	2640	2640	2650	2650	2660	2660	2670	2670	2670	2680

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1280		830	810	780	760	740	710	690	660	640	610
1290		840	820	800	780	750	730	700	680	650	620
1300		860	840	810	790	770	740	720	690	670	640
1310		870	850	830	810	780	760	740	710	680	660
1320		890	860	840	820	800	780	750	730	700	670
1330		900	880	860	840	810	790	770	740	720	690
1340		910	890	870	850	830	810	780	760	730	710
1350		930	910	890	870	840	820	800	780	750	720
1360		940	920	900	880	860	840	810	790	770	740
1370		960	940	920	900	880	850	830	810	780	760
1380		970	950	930	910	890	870	850	820	800	770
1390		990	970	950	930	910	880	860	840	820	790
1400	1000	980	960	940	920	900	880	860	860	830	810
1410	1020	1000	980	960	940	920	890	870	870	850	820
1420	1030	1010	990	970	950	930	910	890	890	870	840
1430	1040	1030	1010	990	970	950	930	900	900	880	860
1440	1060	1040	1020	1000	980	960	940	920	920	900	870
1450	1070	1060	1040	1020	1000	980	960	940	940	910	890
1460	1090	1070	1050	1030	1010	990	970	950	950	930	910
1470	1100	1090	1070	1050	1030	1010	990	970	970	950	920
1480	1120	1100	1080	1060	1040	1030	1010	980	980	960	940
1490	1130	1110	1100	1080	1060	1040	1020	1000	1000	980	960
1500	1150	1130	1110	1090	1080	1060	1040	1020	1020	1000	970
1510	1160	1140	1130	1110	1090	1070	1050	1030	1030	1010	990
1520	1170	1160	1140	1120	1110	1090	1070	1050	1050	1030	1010
1530	1190	1170	1160	1140	1120	1100	1080	1070	1070	1050	1020
1540	1200	1190	1170	1150	1140	1120	1100	1080	1080	1060	1040
1550	1220	1200	1190	1170	1150	1130	1120	1100	1100	1080	1060
1560	1230	1220	1200	1180	1170	1150	1130	1110	1110	1090	1070
1570	1250	1230	1220	1200	1180	1170	1150	1130	1130	1110	1090
1580	1260	1250	1230	1220	1200	1180	1160	1150	1150	1130	1110
1590	1280	1260	1250	1230	1210	1200	1180	1160	1160	1140	1120
1600	1290	1280	1260	1250	1230	1210	1200	1180	1180	1160	1140
1610	1310	1290	1280	1260	1240	1230	1210	1190	1190	1180	1160
1620	1320	1310	1290	1280	1260	1240	1230	1210	1210	1190	1170
1630	1330	1320	1310	1290	1280	1260	1240	1230	1230	1210	1190
1640	1350	1340	1320	1310	1290	1280	1260	1240	1240	1230	1210
1650	1360	1350	1340	1320	1310	1290	1280	1260	1260	1240	1220
1660	1380	1360	1350	1340	1320	1310	1290	1280	1280	1260	1240
1670	1390	1380	1370	1350	1340	1320	1310	1290	1290	1270	1260
1680	1410	1390	1380	1370	1350	1340	1320	1310	1310	1290	1270
1690	1420	1410	1400	1380	1370	1350	1340	1320	1320	1310	1290
1700	1440	1420	1410	1400	1380	1370	1350	1340	1340	1320	1310

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1710		1450	1440	1430	1410	1400	1380	1370	1360	1340	1320
1720		1460	1450	1440	1430	1410	1400	1390	1370	1360	1340
1730		1480	1470	1460	1440	1430	1420	1400	1390	1370	1360
1740		1490	1480	1470	1460	1440	1430	1420	1400	1390	1370
1750		1510	1500	1490	1470	1460	1450	1430	1420	1410	1390
1760		1520	1510	1500	1490	1480	1460	1450	1440	1420	1410
1770		1540	1530	1510	1500	1490	1480	1470	1450	1440	1420
1780		1550	1540	1530	1520	1510	1490	1480	1470	1460	1440
1790		1570	1560	1540	1530	1520	1510	1500	1480	1470	1460
1800		1580	1570	1560	1550	1540	1530	1510	1500	1490	1470
1810		1600	1590	1570	1560	1550	1540	1530	1520	1500	1490
1820		1610	1600	1590	1580	1570	1560	1550	1530	1520	1510
1830		1620	1610	1600	1590	1580	1570	1560	1550	1540	1520
1840		1640	1630	1620	1610	1600	1590	1580	1570	1550	1540
1850		1650	1640	1630	1620	1610	1600	1590	1580	1570	1560
1860		1670	1660	1650	1640	1630	1620	1610	1600	1590	1570
1870		1680	1670	1660	1650	1640	1630	1620	1610	1600	1590
1880		1700	1690	1680	1670	1660	1650	1640	1630	1620	1610
1890		1710	1700	1690	1680	1680	1670	1660	1650	1640	1620
1900		1730	1720	1710	1700	1690	1680	1670	1660	1650	1640
1910		1740	1730	1720	1720	1710	1700	1690	1680	1670	1660
1920		1750	1750	1740	1730	1720	1710	1700	1690	1680	1670
1930		1770	1760	1750	1750	1740	1730	1720	1710	1700	1690
1940		1780	1780	1770	1760	1750	1740	1740	1730	1720	1710
1950		1800	1790	1780	1780	1770	1760	1750	1740	1730	1720
1960		1810	1810	1800	1790	1780	1780	1770	1760	1750	1740
1970		1830	1820	1810	1810	1800	1790	1780	1780	1770	1760
1980		1840	1840	1830	1820	1810	1810	1800	1790	1780	1770
1990		1860	1850	1840	1840	1830	1820	1810	1810	1800	1790
2000		1870	1860	1860	1850	1840	1840	1830	1820	1820	1810
2010		1890	1880	1870	1870	1860	1850	1850	1840	1830	1820
2020		1900	1890	1890	1880	1880	1870	1860	1860	1850	1840
2030		1910	1910	1900	1900	1890	1880	1880	1870	1870	1860
2040		1930	1920	1920	1910	1910	1900	1890	1890	1880	1870
2050		1940	1940	1930	1930	1920	1920	1910	1900	1900	1890
2060		1960	1950	1950	1940	1940	1930	1930	1920	1910	1910
2070		1970	1970	1960	1960	1950	1950	1940	1940	1930	1920
2080		1990	1980	1980	1970	1970	1960	1960	1950	1950	1940
2090		2000	2000	1990	1990	1980	1980	1970	1970	1960	1960
2100		2020	2010	2010	2000	2000	1990	1990	1980	1980	1970
2110		2030	2030	2020	2020	2010	2010	2010	2000	2000	1990
2120		2040	2040	2040	2030	2030	2030	2020	2020	2010	2010
2130		2060	2060	2050	2050	2040	2040	2040	2030	2030	2020

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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.6
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
2140	2070	2070	2070	2070	2060	2060	2060	2050	2050	2050	2040
2150	2090	2090	2080	2080	2080	2080	2070	2070	2070	2060	2060
2160	2100	2100	2100	2100	2090	2090	2090	2080	2080	2080	2070
2170	2120	2110	2110	2110	2110	2110	2100	2100	2100	2090	2090
2180	2130	2130	2130	2120	2120	2120	2120	2120	2110	2110	2110
2190	2150	2140	2140	2140	2140	2140	2130	2130	2130	2130	2120
2200	2160	2160	2160	2150	2150	2150	2150	2150	2150	2140	2140
2210	2170	2170	2170	2170	2170	2170	2170	2160	2160	2160	2160
2220	2190	2190	2190	2180	2180	2180	2180	2180	2180	2180	2170
2230	2200	2200	2200	2200	2200	2200	2200	2200	2190	2190	2190
2240	2220	2220	2220	2220	2220	2210	2210	2210	2210	2210	2210
2250	2230	2230	2230	2230	2230	2230	2230	2230	2230	2230	2220
2260	2250	2250	2250	2250	2250	2240	2240	2240	2240	2240	2240
2270	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260	2260
2280	2280	2280	2280	2280	2280	2280	2280	2280	2280	2270	2270
2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290
2300	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310
2310	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320
2320	2330	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340
2330	2350	2350	2350	2350	2350	2350	2350	2350	2360	2360	2360
2340	2360	2360	2370	2370	2370	2370	2370	2370	2370	2370	2370
2350	2380	2380	2380	2380	2380	2380	2380	2390	2390	2390	2390
2360	2390	2390	2400	2400	2400	2400	2400	2400	2400	2410	2410
2370	2410	2410	2410	2410	2410	2410	2420	2420	2420	2420	2420
2380	2420	2420	2430	2430	2430	2430	2430	2430	2440	2440	2440
2390	2440	2440	2440	2440	2440	2440	2450	2450	2450	2460	2460
2400	2450	2450	2460	2460	2460	2460	2460	2470	2470	2470	2470
2410	2460	2470	2470	2470	2470	2480	2480	2480	2480	2490	2490
2420	2480	2480	2490	2490	2490	2490	2490	2500	2500	2500	2510
2430	2490	2500	2500	2500	2510	2510	2510	2510	2520	2520	2520
2440	2510	2510	2510	2520	2520	2530	2530	2530	2540	2540	2540
2450	2520	2530	2530	2530	2540	2540	2550	2550	2550	2550	2560
2460	2540	2540	2540	2550	2550	2560	2560	2570	2570	2570	2570
2470	2550	2560	2560	2560	2570	2570	2580	2580	2590	2590	2590
2480	2570	2570	2570	2580	2580	2590	2590	2600	2600	2600	2610
2490	2580	2590	2590	2590	2600	2600	2610	2610	2610	2620	2620
2500	2600	2600	2600	2610	2610	2620	2620	2630	2640	2640	2640
2510	2610	2610	2620	2620	2630	2630	2640	2650	2650	2650	2660
2520	2620	2630	2630	2640	2640	2650	2660	2660	2670	2670	2670
2530	2640	2640	2650	2650	2660	2670	2670	2680	2680	2680	2690
2540	2650	2660	2660	2670	2680	2680	2690	2690	2700	2700	2710
2550	2670	2670	2680	2680	2690	2700	2700	2710	2720	2720	2720
2560	2680	2690	2690	2700	2710	2710	2720	2730	2730	2730	2740

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1280	1270	1260	1250	1230	1220	1210	1200	1180	1170	1160	
1290	1280	1270	1260	1240	1230	1220	1210	1200	1180	1170	
1300	1290	1280	1270	1260	1240	1230	1220	1210	1190	1180	
1310	1300	1290	1280	1270	1250	1240	1230	1220	1200	1190	
1320	1310	1300	1290	1280	1260	1250	1240	1230	1220	1200	
1330	1320	1310	1300	1290	1270	1260	1250	1240	1230	1210	
1340	1330	1320	1310	1300	1290	1270	1260	1250	1240	1220	
1350	1340	1330	1320	1310	1300	1280	1270	1260	1250	1240	
1360	1350	1340	1330	1320	1310	1300	1280	1270	1260	1250	
1370	1360	1350	1340	1330	1320	1310	1290	1280	1270	1260	
1380	1370	1360	1350	1340	1330	1320	1310	1290	1280	1270	
1390	1380	1370	1360	1350	1340	1330	1320	1300	1290	1280	
1400	1390	1380	1370	1360	1350	1340	1330	1320	1300	1290	
1410	1400	1390	1380	1370	1360	1350	1340	1330	1310	1300	
1420	1410	1400	1390	1380	1370	1360	1350	1340	1330	1310	
1430	1420	1410	1400	1390	1380	1370	1360	1350	1340	1320	
1440	1430	1420	1410	1400	1390	1380	1370	1360	1350	1340	
1450	1440	1430	1420	1410	1400	1390	1380	1370	1360	1350	
1460	1450	1440	1430	1420	1410	1400	1390	1380	1370	1360	
1470	1460	1450	1440	1430	1420	1410	1400	1390	1380	1370	
1480	1470	1460	1450	1440	1430	1420	1410	1400	1390	1380	
1490	1480	1470	1460	1450	1440	1430	1420	1410	1400	1390	
1500	1490	1480	1470	1460	1450	1440	1430	1420	1410	1400	
1510	1500	1490	1480	1470	1460	1450	1440	1430	1420	1410	
1520	1510	1500	1490	1480	1470	1470	1460	1450	1440	1420	
1530	1520	1510	1500	1490	1490	1480	1470	1460	1450	1440	
1540	1530	1520	1510	1510	1500	1490	1480	1470	1460	1450	
1550	1540	1530	1520	1520	1510	1500	1490	1480	1470	1460	
1560	1550	1540	1530	1530	1520	1510	1500	1490	1480	1470	
1570	1560	1550	1550	1540	1530	1520	1510	1500	1490	1480	
1580	1570	1560	1560	1550	1540	1530	1520	1510	1500	1490	
1590	1580	1570	1570	1560	1550	1540	1530	1520	1510	1500	
1600	1590	1580	1580	1570	1560	1550	1540	1530	1520	1510	
1610	1600	1590	1590	1580	1570	1560	1550	1540	1530	1520	
1620	1610	1600	1600	1590	1580	1570	1560	1550	1550	1540	
1630	1620	1610	1610	1600	1590	1580	1570	1570	1560	1550	
1640	1630	1620	1620	1610	1600	1590	1580	1580	1570	1560	
1650	1640	1640	1630	1620	1610	1600	1600	1590	1580	1570	
1660	1650	1650	1640	1630	1620	1610	1610	1600	1590	1580	
1670	1660	1660	1650	1640	1630	1620	1620	1610	1600	1590	
1680	1670	1670	1660	1650	1640	1640	1630	1620	1610	1600	
1690	1680	1680	1670	1660	1650	1650	1640	1630	1620	1610	
1700	1690	1690	1680	1670	1660	1660	1650	1640	1630	1620	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
1710	1700	1700	1690	1680	1670	1670	1660	1650	1640	1640	1640
1720	1710	1710	1700	1690	1690	1680	1670	1660	1660	1660	1650
1730	1720	1720	1710	1700	1700	1690	1680	1670	1670	1670	1660
1740	1730	1730	1720	1710	1710	1700	1690	1680	1680	1680	1670
1750	1740	1740	1730	1720	1720	1710	1700	1700	1690	1690	1680
1760	1750	1750	1740	1730	1730	1720	1710	1710	1700	1700	1690
1770	1760	1760	1750	1740	1740	1730	1720	1720	1710	1710	1700
1780	1770	1770	1760	1760	1750	1740	1740	1730	1720	1720	1710
1790	1780	1780	1770	1770	1760	1750	1750	1740	1730	1730	1720
1800	1790	1790	1780	1780	1770	1760	1760	1750	1740	1740	1740
1810	1800	1800	1790	1790	1780	1770	1770	1760	1750	1750	1750
1820	1810	1810	1800	1800	1790	1780	1780	1770	1770	1770	1760
1830	1820	1820	1810	1810	1800	1800	1790	1780	1780	1780	1770
1840	1830	1830	1820	1820	1810	1810	1800	1790	1790	1790	1780
1850	1840	1840	1830	1830	1820	1820	1810	1800	1800	1800	1790
1860	1850	1850	1840	1840	1830	1830	1820	1820	1810	1810	1800
1870	1860	1860	1850	1850	1840	1840	1830	1830	1820	1820	1810
1880	1870	1870	1860	1860	1850	1850	1840	1840	1830	1830	1820
1890	1890	1880	1870	1870	1860	1860	1850	1850	1840	1840	1840
1900	1900	1890	1890	1880	1870	1870	1860	1860	1850	1850	1850
1910	1910	1900	1900	1890	1890	1880	1870	1870	1860	1860	1860
1920	1920	1910	1910	1900	1900	1890	1890	1880	1870	1870	1870
1930	1930	1920	1920	1910	1910	1900	1900	1890	1890	1890	1880
1940	1940	1930	1930	1920	1920	1910	1910	1900	1900	1900	1890
1950	1950	1940	1940	1930	1930	1920	1920	1910	1910	1910	1900
1960	1960	1950	1950	1940	1940	1930	1930	1920	1920	1920	1910
1970	1970	1960	1960	1950	1950	1940	1940	1930	1930	1930	1920
1980	1980	1970	1970	1960	1960	1950	1950	1950	1940	1940	1940
1990	1990	1980	1980	1970	1970	1970	1960	1960	1950	1950	1950
2000	2000	1990	1990	1980	1980	1980	1970	1970	1960	1960	1960
2010	2010	2000	2000	1990	1990	1990	1980	1980	1970	1970	1970
2020	2020	2010	2010	2010	2000	2000	1990	1990	1980	1980	1980
2030	2030	2020	2020	2020	2010	2010	2000	2000	2000	2000	1990
2040	2040	2030	2030	2030	2020	2020	2010	2010	2010	2010	2000
2050	2050	2040	2040	2040	2030	2030	2030	2020	2020	2020	2010
2060	2060	2050	2050	2050	2040	2040	2040	2030	2030	2030	2020
2070	2070	2060	2060	2060	2050	2050	2050	2040	2040	2040	2040
2080	2080	2070	2070	2070	2060	2060	2060	2050	2050	2050	2050
2090	2090	2080	2080	2080	2070	2070	2070	2070	2060	2060	2060
2100	2100	2090	2090	2090	2090	2080	2080	2080	2070	2070	2070
2110	2110	2100	2100	2100	2100	2090	2090	2090	2080	2080	2080
2120	2120	2110	2110	2110	2110	2100	2100	2100	2090	2090	2090
2130	2130	2120	2120	2120	2120	2120	2110	2110	2110	2110	2100

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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	1	2	3	4	5	6	7	8	9	10
2140	2140	2140	2140	2130	2130	2130	2120	2120	2120	2120	2110
2150	2150	2150	2150	2140	2140	2140	2140	2130	2130	2130	2120
2160	2160	2160	2160	2150	2150	2150	2150	2140	2140	2140	2140
2170	2170	2170	2170	2160	2160	2160	2160	2150	2150	2150	2150
2180	2180	2180	2180	2170	2170	2170	2170	2170	2160	2160	2160
2190	2190	2190	2190	2180	2180	2180	2180	2180	2170	2170	2170
2200	2200	2200	2200	2190	2190	2190	2190	2190	2180	2180	2180
2210	2210	2210	2210	2200	2200	2200	2200	2200	2200	2190	2190
2220	2220	2220	2220	2220	2210	2210	2210	2210	2210	2200	2200
2230	2230	2230	2230	2230	2220	2220	2220	2220	2220	2220	2210
2240	2240	2240	2240	2240	2230	2230	2230	2230	2230	2230	2220
2250	2250	2250	2250	2250	2240	2240	2240	2240	2240	2240	2240
2260	2260	2260	2260	2260	2260	2250	2250	2250	2250	2250	2250
2270	2270	2270	2270	2270	2270	2260	2260	2260	2260	2260	2260
2280	2280	2280	2280	2280	2280	2270	2270	2270	2270	2270	2270
2290	2290	2290	2290	2290	2290	2290	2280	2280	2280	2280	2280
2300	2300	2300	2300	2300	2300	2300	2300	2290	2290	2290	2290
2310	2310	2310	2310	2310	2310	2310	2310	2310	2300	2300	2300
2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2310	2310
2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2320
2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340
2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360
2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370
2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380
2390	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390
2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400
2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410
2420	2420	2420	2420	2420	2420	2420	2420	2420	2420	2420	2420
2430	2430	2430	2430	2430	2430	2430	2430	2430	2430	2440	2440
2440	2440	2440	2440	2440	2440	2440	2440	2440	2450	2450	2450
2450	2450	2450	2450	2450	2450	2450	2450	2460	2460	2460	2460
2460	2460	2460	2460	2460	2460	2460	2470	2470	2470	2470	2470
2470	2470	2470	2470	2470	2470	2470	2480	2480	2480	2480	2480
2480	2480	2480	2480	2480	2480	2490	2490	2490	2490	2490	2490
2490	2490	2490	2490	2490	2490	2500	2500	2500	2500	2500	2500
2500	2500	2500	2500	2500	2510	2510	2510	2510	2510	2510	2510
2510	2510	2510	2510	2510	2520	2520	2520	2520	2520	2520	2520
2520	2520	2520	2520	2520	2530	2530	2530	2530	2530	2530	2540
2530	2530	2530	2530	2530	2540	2540	2540	2540	2540	2550	2550
2540	2540	2540	2540	2550	2550	2550	2550	2550	2550	2560	2560
2550	2550	2550	2550	2560	2560	2560	2560	2560	2570	2570	2570
2560	2560	2560	2560	2570	2570	2570	2570	2570	2580	2580	2580

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D	D	11	12	13	14	15	16	17	18	19	20
1280		1140	1130	1120	1100	1090	1070	1060	1040	1020	1010
1290		1160	1140	1130	1110	1100	1080	1070	1050	1040	1020
1300		1170	1150	1140	1120	1110	1100	1080	1060	1050	1030
1310		1180	1160	1150	1140	1120	1110	1090	1080	1060	1040
1320		1190	1180	1160	1150	1130	1120	1100	1090	1070	1060
1330		1200	1190	1170	1160	1150	1130	1120	1100	1080	1070
1340		1210	1200	1190	1170	1160	1140	1130	1110	1100	1080
1350		1220	1210	1200	1180	1170	1150	1140	1120	1110	1090
1360		1230	1220	1210	1190	1180	1170	1150	1140	1120	1110
1370		1250	1230	1220	1210	1190	1180	1160	1150	1130	1120
1380		1260	1240	1230	1220	1200	1190	1180	1160	1150	1130
1390		1270	1260	1240	1230	1220	1200	1190	1170	1160	1140
1400		1280	1270	1250	1240	1230	1210	1200	1190	1170	1160
1410		1290	1280	1270	1250	1240	1230	1210	1200	1180	1170
1420		1300	1290	1280	1260	1250	1240	1220	1210	1200	1180
1430		1310	1300	1290	1280	1260	1250	1240	1220	1210	1190
1440		1320	1310	1300	1290	1270	1260	1250	1230	1220	1210
1450		1340	1320	1310	1300	1290	1270	1260	1250	1230	1220
1460		1350	1340	1320	1310	1300	1290	1270	1260	1250	1230
1470		1360	1350	1330	1320	1310	1300	1280	1270	1260	1240
1480		1370	1360	1350	1330	1320	1310	1300	1280	1270	1260
1490		1380	1370	1360	1350	1330	1320	1310	1300	1280	1270
1500		1390	1380	1370	1360	1350	1330	1320	1310	1290	1280
1510		1400	1390	1380	1370	1360	1350	1330	1320	1310	1290
1520		1410	1400	1390	1380	1370	1360	1340	1330	1320	1310
1530		1430	1410	1400	1390	1380	1370	1360	1340	1330	1320
1540		1440	1430	1420	1400	1390	1380	1370	1360	1340	1330
1550		1450	1440	1430	1420	1400	1390	1380	1370	1360	1340
1560		1460	1450	1440	1430	1420	1400	1390	1380	1370	1360
1570		1470	1460	1450	1440	1430	1420	1400	1390	1380	1370
1580		1480	1470	1460	1450	1440	1430	1420	1410	1390	1380
1590		1490	1480	1470	1460	1450	1440	1430	1420	1410	1390
1600		1500	1490	1480	1470	1460	1450	1440	1430	1420	1410
1610		1520	1510	1500	1490	1470	1460	1450	1440	1430	1420
1620		1530	1520	1510	1500	1490	1480	1470	1450	1440	1430
1630		1540	1530	1520	1510	1500	1490	1480	1470	1460	1440
1640		1550	1540	1530	1520	1510	1500	1490	1480	1470	1460
1650		1560	1550	1540	1530	1520	1510	1500	1490	1480	1470
1660		1570	1560	1550	1540	1530	1520	1510	1500	1490	1480
1670		1580	1570	1560	1560	1550	1540	1530	1520	1500	1490
1680		1590	1590	1580	1570	1560	1550	1540	1530	1520	1510
1690		1610	1600	1590	1580	1570	1560	1550	1540	1530	1520
1700		1620	1610	1600	1590	1580	1570	1560	1550	1540	1530

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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
1710	1630	1620	1610	1600	1590	1580	1570	1560	1550	1540	
1720	1640	1630	1620	1610	1600	1600	1590	1580	1570	1560	
1730	1650	1640	1630	1620	1620	1610	1600	1590	1580	1570	
1740	1660	1650	1640	1640	1630	1620	1610	1600	1590	1580	
1750	1670	1660	1660	1650	1640	1630	1620	1610	1600	1590	
1760	1680	1680	1670	1660	1650	1640	1630	1620	1620	1610	
1770	1700	1690	1680	1670	1660	1650	1650	1640	1630	1620	
1780	1710	1700	1690	1680	1670	1670	1660	1650	1640	1630	
1790	1720	1710	1700	1690	1690	1680	1670	1660	1650	1640	
1800	1730	1720	1710	1710	1700	1690	1680	1670	1660	1660	
1810	1740	1730	1730	1720	1710	1700	1690	1690	1680	1670	
1820	1750	1740	1740	1730	1720	1710	1710	1700	1690	1680	
1830	1760	1760	1750	1740	1730	1730	1720	1710	1700	1690	
1840	1770	1770	1760	1750	1750	1740	1730	1720	1710	1710	
1850	1780	1780	1770	1760	1760	1750	1740	1730	1730	1720	
1860	1800	1790	1780	1780	1770	1760	1750	1750	1740	1730	
1870	1810	1800	1790	1790	1780	1770	1770	1760	1750	1740	
1880	1820	1810	1810	1800	1790	1790	1780	1770	1760	1760	
1890	1830	1820	1820	1810	1800	1800	1790	1780	1780	1770	
1900	1840	1840	1830	1820	1820	1810	1800	1800	1790	1780	
1910	1850	1850	1840	1830	1830	1820	1810	1810	1800	1790	
1920	1860	1860	1850	1850	1840	1830	1830	1820	1810	1810	
1930	1870	1870	1860	1860	1850	1850	1840	1830	1830	1820	
1940	1890	1880	1870	1870	1860	1860	1850	1840	1840	1830	
1950	1900	1890	1890	1880	1870	1870	1860	1860	1850	1840	
1960	1910	1900	1900	1890	1890	1880	1870	1870	1860	1860	
1970	1920	1910	1910	1900	1900	1890	1890	1880	1870	1870	
1980	1930	1930	1920	1920	1910	1900	1900	1890	1890	1880	
1990	1940	1940	1930	1930	1920	1920	1910	1910	1900	1890	
2000	1950	1950	1940	1940	1930	1930	1920	1920	1910	1910	
2010	1960	1960	1960	1950	1950	1940	1940	1930	1920	1920	
2020	1980	1970	1970	1960	1960	1950	1950	1940	1940	1930	
2030	1990	1980	1980	1970	1970	1960	1960	1950	1950	1940	
2040	2000	1990	1990	1990	1980	1980	1970	1970	1960	1960	
2050	2010	2010	2000	2000	1990	1990	1980	1980	1970	1970	
2060	2020	2020	2010	2010	2000	2000	2000	1990	1990	1980	
2070	2030	2030	2020	2020	2020	2010	2010	2000	2000	1990	
2080	2040	2040	2040	2030	2030	2020	2020	2020	2010	2010	
2090	2050	2050	2050	2040	2040	2040	2030	2030	2020	2020	
2100	2070	2060	2060	2060	2050	2050	2040	2040	2040	2030	
2110	2080	2070	2070	2070	2060	2060	2060	2050	2050	2040	
2120	2090	2090	2080	2080	2070	2070	2070	2060	2060	2060	
2130	2100	2100	2090	2090	2090	2080	2080	2080	2070	2070	

WEST VIRGINIA DIVISION OF HIGHWAYS
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 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	11	12	13	14	15	16	17	18	19	20
2140	2110	2110	2100	2100	2100	2100	2090	2090	2080	2080	2080
2150	2120	2120	2120	2110	2110	2110	2100	2100	2100	2100	2090
2160	2130	2130	2130	2120	2120	2120	2120	2110	2110	2110	2110
2170	2140	2140	2140	2140	2130	2130	2130	2120	2120	2120	2120
2180	2160	2150	2150	2150	2150	2140	2140	2140	2130	2130	2130
2190	2170	2160	2160	2160	2160	2150	2150	2150	2150	2140	2140
2200	2180	2180	2170	2170	2170	2170	2160	2160	2160	2160	2160
2210	2190	2190	2190	2180	2180	2180	2180	2170	2170	2170	2170
2220	2200	2200	2200	2190	2190	2190	2190	2190	2180	2180	2180
2230	2210	2210	2210	2210	2200	2200	2200	2200	2200	2200	2190
2240	2220	2220	2220	2220	2220	2210	2210	2210	2210	2210	2210
2250	2230	2230	2230	2230	2230	2230	2220	2220	2220	2220	2220
2260	2250	2240	2240	2240	2240	2240	2240	2230	2230	2230	2230
2270	2260	2260	2250	2250	2250	2250	2250	2250	2250	2240	2240
2280	2270	2270	2270	2260	2260	2260	2260	2260	2260	2260	2260
2290	2280	2280	2280	2280	2270	2270	2270	2270	2270	2270	2270
2300	2290	2290	2290	2290	2290	2290	2280	2280	2280	2280	2280
2310	2300	2300	2300	2300	2300	2300	2300	2300	2290	2290	2290
2320	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310	2310
2330	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320
2340	2340	2340	2330	2330	2330	2330	2330	2330	2330	2330	2330
2350	2350	2350	2350	2350	2350	2350	2340	2340	2340	2340	2340
2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360
2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370
2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380
2390	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390	2390
2400	2400	2400	2400	2400	2400	2400	2400	2410	2410	2410	2410
2410	2410	2410	2420	2420	2420	2420	2420	2420	2420	2420	2420
2420	2430	2430	2430	2430	2430	2430	2430	2430	2430	2430	2430
2430	2440	2440	2440	2440	2440	2440	2440	2440	2440	2440	2440
2440	2450	2450	2450	2450	2450	2450	2450	2450	2460	2460	2460
2450	2460	2460	2460	2460	2460	2460	2470	2470	2470	2470	2470
2460	2470	2470	2470	2470	2470	2480	2480	2480	2480	2480	2480
2470	2480	2480	2480	2490	2490	2490	2490	2490	2490	2490	2490
2480	2490	2490	2500	2500	2500	2500	2500	2500	2500	2510	2510
2490	2500	2510	2510	2510	2510	2510	2510	2520	2520	2520	2520
2500	2520	2520	2520	2520	2520	2520	2530	2530	2530	2530	2530
2510	2530	2530	2530	2530	2530	2540	2540	2540	2540	2540	2540
2520	2540	2540	2540	2540	2550	2550	2550	2550	2550	2560	2560
2530	2550	2550	2550	2560	2560	2560	2560	2560	2570	2570	2570
2540	2560	2560	2560	2570	2570	2570	2570	2580	2580	2580	2580
2550	2570	2570	2580	2580	2580	2580	2590	2590	2590	2590	2590
2560	2580	2590	2590	2590	2590	2600	2600	2600	2600	2610	2610

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 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1280		990	970	950	930	910	890	870	850	830	810
1290		1000	980	970	950	930	910	890	870	850	820
1300		1010	1000	980	960	940	920	900	880	860	840
1310		1030	1010	990	970	950	940	920	900	870	850
1320		1040	1020	1000	990	970	950	930	910	890	870
1330		1050	1030	1020	1000	980	960	940	920	900	880
1340		1060	1050	1030	1010	990	980	960	940	920	900
1350		1080	1060	1040	1030	1010	990	970	950	930	910
1360		1090	1070	1060	1040	1020	1000	980	960	950	920
1370		1100	1090	1070	1050	1030	1020	1000	980	960	940
1380		1120	1100	1080	1070	1050	1030	1010	990	970	950
1390		1130	1110	1100	1080	1060	1040	1030	1010	990	970
1400		1140	1120	1110	1090	1070	1060	1040	1020	1000	980
1410		1150	1140	1120	1100	1090	1070	1050	1030	1020	1000
1420		1170	1150	1130	1120	1100	1080	1070	1050	1030	1010
1430		1180	1160	1150	1130	1110	1100	1080	1060	1040	1020
1440		1190	1180	1160	1140	1130	1110	1090	1080	1060	1040
1450		1200	1190	1170	1160	1140	1120	1110	1090	1070	1050
1460		1220	1200	1190	1170	1150	1140	1120	1100	1090	1070
1470		1230	1210	1200	1180	1170	1150	1130	1120	1100	1080
1480		1240	1230	1210	1200	1180	1170	1150	1130	1110	1100
1490		1250	1240	1230	1210	1190	1180	1160	1150	1130	1110
1500		1270	1250	1240	1220	1210	1190	1180	1160	1140	1120
1510		1280	1270	1250	1240	1220	1210	1190	1170	1160	1140
1520		1290	1280	1260	1250	1230	1220	1200	1190	1170	1150
1530		1310	1290	1280	1260	1250	1230	1220	1200	1180	1170
1540		1320	1300	1290	1280	1260	1250	1230	1210	1200	1180
1550		1330	1320	1300	1290	1270	1260	1240	1230	1210	1200
1560		1340	1330	1320	1300	1290	1270	1260	1240	1230	1210
1570		1360	1340	1330	1320	1300	1290	1270	1260	1240	1220
1580		1370	1360	1340	1330	1310	1300	1290	1270	1250	1240
1590		1380	1370	1360	1340	1330	1310	1300	1280	1270	1250
1600		1390	1380	1370	1350	1340	1330	1310	1300	1280	1270
1610		1410	1390	1380	1370	1350	1340	1330	1310	1300	1280
1620		1420	1410	1390	1380	1370	1350	1340	1330	1310	1300
1630		1430	1420	1410	1390	1380	1370	1350	1340	1330	1310
1640		1440	1430	1420	1410	1390	1380	1370	1350	1340	1320
1650		1460	1450	1430	1420	1410	1390	1380	1370	1350	1340
1660		1470	1460	1450	1430	1420	1410	1400	1380	1370	1350
1670		1480	1470	1460	1450	1430	1420	1410	1400	1380	1370
1680		1490	1480	1470	1460	1450	1440	1420	1410	1400	1380
1690		1510	1500	1490	1470	1460	1450	1440	1420	1410	1400
1700		1520	1510	1500	1490	1470	1460	1450	1440	1420	1410

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
1710	1530	1520	1510	1500	1490	1480	1460	1450	1440	1420	
1720	1550	1530	1520	1510	1500	1490	1480	1460	1450	1440	
1730	1560	1550	1540	1530	1510	1500	1490	1480	1470	1450	
1740	1570	1560	1550	1540	1530	1520	1500	1490	1480	1470	
1750	1580	1570	1560	1550	1540	1530	1520	1510	1490	1480	
1760	1600	1590	1580	1570	1550	1540	1530	1520	1510	1500	
1770	1610	1600	1590	1580	1570	1560	1550	1530	1520	1510	
1780	1620	1610	1600	1590	1580	1570	1560	1550	1540	1520	
1790	1630	1620	1610	1600	1590	1580	1570	1560	1550	1540	
1800	1650	1640	1630	1620	1610	1600	1590	1580	1560	1550	
1810	1660	1650	1640	1630	1620	1610	1600	1590	1580	1570	
1820	1670	1660	1650	1640	1630	1620	1610	1600	1590	1580	
1830	1680	1680	1670	1660	1650	1640	1630	1620	1610	1600	
1840	1700	1690	1680	1670	1660	1650	1640	1630	1620	1610	
1850	1710	1700	1690	1680	1670	1670	1660	1650	1640	1620	
1860	1720	1710	1710	1700	1690	1680	1670	1660	1650	1640	
1870	1740	1730	1720	1710	1700	1690	1680	1670	1660	1650	
1880	1750	1740	1730	1720	1710	1710	1700	1690	1680	1670	
1890	1760	1750	1740	1740	1730	1720	1710	1700	1690	1680	
1900	1770	1770	1760	1750	1740	1730	1720	1710	1710	1700	
1910	1790	1780	1770	1760	1750	1750	1740	1730	1720	1710	
1920	1800	1790	1780	1780	1770	1760	1750	1740	1730	1720	
1930	1810	1800	1800	1790	1780	1770	1770	1760	1750	1740	
1940	1820	1820	1810	1800	1790	1790	1780	1770	1760	1750	
1950	1840	1830	1820	1820	1810	1800	1790	1780	1780	1770	
1960	1850	1840	1840	1830	1820	1810	1810	1800	1790	1780	
1970	1860	1860	1850	1840	1830	1830	1820	1810	1800	1800	
1980	1870	1870	1860	1850	1850	1840	1830	1830	1820	1810	
1990	1890	1880	1870	1870	1860	1850	1850	1840	1830	1820	
2000	1900	1890	1890	1880	1870	1870	1860	1850	1850	1840	
2010	1910	1910	1900	1890	1890	1880	1870	1870	1860	1850	
2020	1930	1920	1910	1910	1900	1890	1890	1880	1870	1870	
2030	1940	1930	1930	1920	1910	1910	1900	1900	1890	1880	
2040	1950	1950	1940	1930	1930	1920	1920	1910	1900	1900	
2050	1960	1960	1950	1950	1940	1940	1930	1920	1920	1910	
2060	1980	1970	1970	1960	1950	1950	1940	1940	1930	1920	
2070	1990	1980	1980	1970	1970	1960	1960	1950	1950	1940	
2080	2000	2000	1990	1990	1980	1980	1970	1960	1960	1950	
2090	2010	2010	2000	2000	1990	1990	1980	1980	1970	1970	
2100	2030	2020	2020	2010	2010	2000	2000	1990	1990	1980	
2110	2040	2030	2030	2030	2020	2020	2010	2010	2000	2000	
2120	2050	2050	2040	2040	2030	2030	2030	2020	2020	2010	
2130	2060	2060	2060	2050	2050	2040	2040	2030	2030	2020	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	21	22	23	24	25	26	27	28	29	30
2140	2080	2070	2070	2070	2070	2060	2060	2050	2050	2040	2040
2150	2090	2090	2080	2080	2080	2070	2070	2070	2060	2060	2050
2160	2100	2100	2100	2090	2090	2090	2080	2080	2080	2070	2070
2170	2120	2110	2110	2100	2100	2100	2100	2090	2090	2090	2080
2180	2130	2120	2120	2120	2110	2110	2110	2110	2100	2100	2100
2190	2140	2140	2130	2130	2130	2120	2120	2120	2120	2110	2110
2200	2150	2150	2150	2140	2140	2140	2130	2130	2130	2130	2120
2210	2170	2160	2160	2160	2150	2150	2150	2150	2150	2140	2140
2220	2180	2180	2170	2170	2170	2170	2160	2160	2160	2160	2150
2230	2190	2190	2190	2180	2180	2180	2180	2170	2170	2170	2170
2240	2200	2200	2200	2200	2190	2190	2190	2190	2180	2180	2180
2250	2220	2210	2210	2210	2210	2210	2210	2200	2200	2200	2200
2260	2230	2230	2230	2220	2220	2220	2220	2220	2210	2210	2210
2270	2240	2240	2240	2240	2230	2230	2230	2230	2230	2230	2220
2280	2250	2250	2250	2250	2250	2250	2250	2240	2240	2240	2240
2290	2270	2270	2260	2260	2260	2260	2260	2260	2260	2250	2250
2300	2280	2280	2280	2280	2270	2270	2270	2270	2270	2270	2270
2310	2290	2290	2290	2290	2290	2290	2290	2290	2280	2280	2280
2320	2310	2300	2300	2300	2300	2300	2300	2300	2300	2300	2300
2330	2320	2320	2320	2320	2310	2310	2310	2310	2310	2310	2310
2340	2330	2330	2330	2330	2330	2330	2330	2330	2330	2330	2320
2350	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340	2340
2360	2360	2360	2360	2350	2350	2350	2350	2350	2350	2350	2350
2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370
2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380
2390	2390	2390	2390	2390	2390	2390	2390	2400	2400	2400	2400
2400	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410	2410
2410	2420	2420	2420	2420	2420	2420	2420	2420	2420	2420	2420
2420	2430	2430	2430	2430	2430	2430	2440	2440	2440	2440	2440
2430	2440	2450	2450	2450	2450	2450	2450	2450	2450	2450	2450
2440	2460	2460	2460	2460	2460	2460	2460	2460	2460	2470	2470
2450	2470	2470	2470	2470	2470	2470	2480	2480	2480	2480	2480
2460	2480	2480	2490	2490	2490	2490	2490	2490	2490	2490	2500
2470	2490	2500	2500	2500	2500	2500	2500	2500	2510	2510	2510
2480	2510	2510	2510	2510	2510	2510	2520	2520	2520	2520	2520
2490	2520	2520	2520	2530	2530	2530	2530	2530	2530	2540	2540
2500	2530	2530	2540	2540	2540	2540	2540	2550	2550	2550	2550
2510	2550	2550	2550	2550	2550	2550	2560	2560	2560	2560	2570
2520	2560	2560	2560	2570	2570	2570	2570	2570	2580	2580	2580
2530	2570	2570	2580	2580	2580	2580	2580	2590	2590	2590	2600
2540	2580	2590	2590	2590	2590	2590	2600	2600	2600	2610	2610
2550	2600	2600	2600	2600	2610	2610	2610	2610	2620	2620	2620
2560	2610	2610	2610	2620	2620	2620	2620	2630	2630	2640	2640

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1280		790	760	740	720	690	660	640	610	580	550
1290		800	780	760	730	710	680	650	620	600	570
1300		820	790	770	750	720	690	670	640	610	580
1310		830	810	780	760	740	710	680	660	630	600
1320		850	820	800	780	750	730	700	670	640	620
1330		860	840	810	790	770	740	720	690	660	630
1340		870	850	830	810	780	760	730	710	680	650
1350		890	870	840	820	800	770	750	720	690	670
1360		900	880	860	840	810	790	760	740	710	680
1370		920	900	870	850	830	800	780	750	730	700
1380		930	910	890	870	840	820	800	770	740	720
1390		950	930	900	880	860	840	810	790	760	730
1400		960	940	920	900	870	850	830	800	780	750
1410		980	960	930	910	890	870	840	820	790	770
1420		990	970	950	930	910	880	860	830	810	780
1430	1000	980	960	940	920	900	870	850	830	800	
1440	1020	1000	980	960	940	910	890	870	840	820	
1450	1030	1010	990	970	950	930	910	880	860	830	
1460	1050	1030	1010	990	970	940	920	900	870	850	
1470	1060	1040	1020	1000	980	960	940	910	890	870	
1480	1080	1060	1040	1020	1000	980	950	930	910	880	
1490	1090	1070	1050	1030	1010	990	970	950	920	900	
1500	1110	1090	1070	1050	1030	1010	990	960	940	920	
1510	1120	1100	1080	1060	1040	1020	1000	980	960	930	
1520	1140	1120	1100	1080	1060	1040	1020	1000	970	950	
1530	1150	1130	1110	1090	1070	1050	1030	1010	990	970	
1540	1160	1150	1130	1110	1090	1070	1050	1030	1010	980	
1550	1180	1160	1140	1120	1110	1090	1060	1040	1020	1000	
1560	1190	1180	1160	1140	1120	1100	1080	1060	1040	1020	
1570	1210	1190	1170	1150	1140	1120	1100	1080	1050	1030	
1580	1220	1210	1190	1170	1150	1130	1110	1090	1070	1050	
1590	1240	1220	1200	1190	1170	1150	1130	1110	1090	1070	
1600	1250	1230	1220	1200	1180	1160	1140	1120	1100	1080	
1610	1270	1250	1230	1220	1200	1180	1160	1140	1120	1100	
1620	1280	1260	1250	1230	1210	1190	1180	1160	1140	1120	
1630	1290	1280	1260	1250	1230	1210	1190	1170	1150	1130	
1640	1310	1290	1280	1260	1240	1230	1210	1190	1170	1150	
1650	1320	1310	1290	1280	1260	1240	1220	1210	1190	1170	
1660	1340	1320	1310	1290	1270	1260	1240	1220	1200	1180	
1670	1350	1340	1320	1310	1290	1270	1260	1240	1220	1200	
1680	1370	1350	1340	1320	1310	1290	1270	1250	1240	1220	
1690	1380	1370	1350	1340	1320	1300	1290	1270	1250	1230	
1700	1400	1380	1370	1350	1340	1320	1300	1290	1270	1250	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
1710	1410	1400	1380	1370	1350	1340	1320	1300	1280	1270	
1720	1430	1410	1400	1380	1370	1350	1330	1320	1300	1280	
1730	1440	1430	1410	1400	1380	1370	1350	1330	1320	1300	
1740	1450	1440	1430	1410	1400	1380	1370	1350	1330	1320	
1750	1470	1460	1440	1430	1410	1400	1380	1370	1350	1330	
1760	1480	1470	1460	1440	1430	1410	1400	1380	1370	1350	
1770	1500	1480	1470	1460	1440	1430	1410	1400	1380	1370	
1780	1510	1500	1490	1470	1460	1440	1430	1410	1400	1380	
1790	1530	1510	1500	1490	1470	1460	1450	1430	1420	1400	
1800	1540	1530	1520	1500	1490	1480	1460	1450	1430	1420	
1810	1560	1540	1530	1520	1510	1490	1480	1460	1450	1430	
1820	1570	1560	1550	1530	1520	1510	1490	1480	1460	1450	
1830	1580	1570	1560	1550	1540	1520	1510	1500	1480	1470	
1840	1600	1590	1580	1560	1550	1540	1530	1510	1500	1480	
1850	1610	1600	1590	1580	1570	1550	1540	1530	1510	1500	
1860	1630	1620	1610	1590	1580	1570	1560	1540	1530	1520	
1870	1640	1630	1620	1610	1600	1590	1570	1560	1550	1530	
1880	1660	1650	1640	1620	1610	1600	1590	1580	1560	1550	
1890	1670	1660	1650	1640	1630	1620	1600	1590	1580	1570	
1900	1690	1680	1670	1650	1640	1630	1620	1610	1600	1580	
1910	1700	1690	1680	1670	1660	1650	1640	1620	1610	1600	
1920	1720	1710	1700	1690	1670	1660	1650	1640	1630	1620	
1930	1730	1720	1710	1700	1690	1680	1670	1660	1640	1630	
1940	1740	1730	1730	1720	1710	1690	1680	1670	1660	1650	
1950	1760	1750	1740	1730	1720	1710	1700	1690	1680	1670	
1960	1770	1760	1760	1750	1740	1730	1720	1710	1690	1680	
1970	1790	1780	1770	1760	1750	1740	1730	1720	1710	1700	
1980	1800	1790	1780	1780	1770	1760	1750	1740	1730	1720	
1990	1820	1810	1800	1790	1780	1770	1760	1750	1740	1730	
2000	1830	1820	1810	1810	1800	1790	1780	1770	1760	1750	
2010	1850	1840	1830	1820	1810	1800	1800	1790	1780	1770	
2020	1860	1850	1840	1840	1830	1820	1810	1800	1790	1780	
2030	1870	1870	1860	1850	1840	1840	1830	1820	1810	1800	
2040	1890	1880	1870	1870	1860	1850	1840	1830	1830	1820	
2050	1900	1900	1890	1880	1870	1870	1860	1850	1840	1830	
2060	1920	1910	1900	1900	1890	1880	1870	1870	1860	1850	
2070	1930	1930	1920	1910	1910	1900	1890	1880	1870	1870	
2080	1950	1940	1930	1930	1920	1910	1910	1900	1890	1880	
2090	1960	1960	1950	1940	1940	1930	1920	1910	1910	1900	
2100	1980	1970	1960	1960	1950	1940	1940	1930	1920	1920	
2110	1990	1980	1980	1970	1970	1960	1950	1950	1940	1930	
2120	2000	2000	1990	1990	1980	1980	1970	1960	1960	1950	
2130	2020	2010	2010	2000	2000	1990	1990	1980	1970	1970	

WEST VIRGINIA DIVISION OF HIGHWAYS
 CONTRACT ADMINISTRATION DIVISION
 DENSITY OF MINUS 19 MM MATERIAL WITH SPECIFIC GRAVITY OF 2.7
 PERCENT OF PLUS 19 MM MATERIAL

D	D	31	32	33	34	35	36	37	38	39	40
2140	2030	2030	2020	2020	2010	2010	2000	2000	1990	1980	
2150	2050	2040	2040	2030	2030	2020	2020	2010	2010	2000	
2160	2060	2060	2050	2050	2040	2040	2030	2030	2020	2020	
2170	2080	2070	2070	2060	2060	2050	2050	2040	2040	2030	
2180	2090	2090	2080	2080	2070	2070	2060	2060	2050	2050	
2190	2110	2100	2100	2090	2090	2090	2080	2080	2070	2070	
2200	2120	2120	2110	2110	2110	2100	2100	2090	2090	2080	
2210	2140	2130	2130	2120	2120	2120	2110	2110	2100	2100	
2220	2150	2150	2140	2140	2140	2130	2130	2120	2120	2120	
2230	2160	2160	2160	2150	2150	2150	2140	2140	2140	2130	
2240	2180	2180	2170	2170	2170	2160	2160	2160	2150	2150	
2250	2190	2190	2190	2190	2180	2180	2180	2170	2170	2170	
2260	2210	2210	2200	2200	2200	2190	2190	2190	2190	2180	
2270	2220	2220	2220	2220	2210	2210	2210	2210	2200	2200	
2280	2240	2230	2230	2230	2230	2230	2220	2220	2220	2220	
2290	2250	2250	2250	2250	2240	2240	2240	2240	2240	2230	
2300	2270	2260	2260	2260	2260	2260	2260	2250	2250	2250	
2310	2280	2280	2280	2280	2270	2270	2270	2270	2270	2270	
2320	2290	2290	2290	2290	2290	2290	2290	2290	2280	2280	
2330	2310	2310	2310	2310	2310	2300	2300	2300	2300	2300	
2340	2320	2320	2320	2320	2320	2320	2320	2320	2320	2320	
2350	2340	2340	2340	2340	2340	2340	2330	2330	2330	2330	
2360	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	
2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	2370	
2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	2380	
2390	2400	2400	2400	2400	2400	2400	2400	2400	2400	2400	
2400	2410	2410	2410	2410	2410	2410	2410	2410	2420	2420	
2410	2430	2430	2430	2430	2430	2430	2430	2430	2430	2430	
2420	2440	2440	2440	2440	2440	2440	2440	2450	2450	2450	
2430	2450	2460	2460	2460	2460	2460	2460	2460	2460	2470	
2440	2470	2470	2470	2470	2470	2480	2480	2480	2480	2480	
2450	2480	2480	2490	2490	2490	2490	2490	2500	2500	2500	
2460	2500	2500	2500	2500	2510	2510	2510	2510	2510	2520	
2470	2510	2510	2520	2520	2520	2520	2530	2530	2530	2530	
2480	2530	2530	2530	2530	2540	2540	2540	2540	2550	2550	
2490	2540	2540	2550	2550	2550	2550	2560	2560	2560	2570	
2500	2560	2560	2560	2560	2570	2570	2570	2580	2580	2580	
2510	2570	2570	2580	2580	2580	2590	2590	2590	2600	2600	
2520	2580	2590	2590	2590	2600	2600	2600	2610	2610	2620	
2530	2600	2600	2610	2610	2610	2620	2620	2620	2630	2630	
2540	2610	2620	2620	2620	2630	2630	2640	2640	2640	2650	
2550	2630	2630	2640	2640	2640	2650	2650	2660	2660	2670	
2560	2640	2650	2650	2650	2660	2660	2670	2670	2680	2680	

