ODOT spec for gravel road installation.

It can be found online here:

http://www.dot.state.oh.us/Divisions/ConstructionMgt Specifications/2008CMS/300/304.htm#a_304_04

ITEM 304 AGGREGATE BASE

304.01 Description
This work consists of furnishing, placing, and compacting one or more courses of aggregate, including furnishing and incorporating all water required for compacting, on a prepared surface.

304.02 Materials
Furnish materials conforming to 703.17.

304.03 Prior to Spreading
The Engineer will sample the Contractor’s stockpile to determine the initial moisture content to be used for compaction. The Engineer will develop a moisture-density curve according to Supplement 1015.

Use material that is reasonably uniform with moisture. Use a moisture content not less than -2 percent of optimum moisture prior to spreading. Add water to the stockpiles to meet this moisture requirement. Handle the material in a manner to minimize segregation. If segregation occurs, thoroughly mix or regrade the stockpile.

304.04 Spreading
Spread the material on the prepared surface. Do not spread on frozen material. Do not use graders or dozers without spreader boxes to spread the material except as outlined below.

Spread the material such that it minimizes segregation and requires minimal blading or manipulation. The Department may perform in place gradation testing in areas that are visually segregated according to Supplement 1090.

The Contractor may use hand-placing methods, dozers or graders when the total area of the material is 2000 square yards (1700 m²) or less or in small areas where self propelled spreading machines are impractical. Small areas include lane widths less than 12 feet (3.7 m) or lengths less than 1000 feet (305 m). Do not exceed a compacted lift thickness of 6 inches (200 mm) when using 10 to 12-ton (9 to 11 metric tons) vibratory rollers. Do not exceed a maximum compacted lift thickness of 4 inches (100 mm) when these vibratory rollers are not used.

The Contractor may elect to use a lighter roller if the centrifugal force exceeds the minimum weight. In all cases, submit documentation proving the minimum weight requirements are met.

Place the material in two or more approximately equal lifts when the specified compacted thickness exceeds 8 inches (200 mm).

Place the material with self-propelled spreading machines capable of placing the material true to line and grade. Spreading machines such as spreader boxes or pavers are allowed. The Contractor may use dozers without spreader boxes or graders, but the Department will take in place gradation tests according to Supplement 1090.

The Contractor may use hand-placing methods when the total area of the material is 2000 square yards (1700 m²) or less, or in small areas where machine spreading is impractical. The Department will not take in place gradation tests in these small areas.

The Department may test for in place gradation after spreading but before compaction testing according to Supplement 1090.

304.05 Compaction
The Department will measure the compaction according to Supplement 1015.

Add water to the material or dry the material to bring it to within +/- 2 percent of optimum moisture prior to the compaction operation. Maintain this moisture range during all compaction operations. The Engineer will determine the percentage of moisture to apply or to be dried from the material. Uniformly apply the water or dry the material throughout the lift and in a manner that does not soften or disturb the lower courses. Reduce the moisture content if the material becomes unstable during the compaction operations.

Compact each lift of material immediately after the spreading operations. Depending on the lift thickness used, use vibratory rollers with a minimum weight or centrifugal force of 10 or 12 tons (9 to 11 metric tons). The Contractor may use light rollers or vibratory equipment in small areas as specified in 304.04 or when
heavier rollers are not practical. Approved compaction equipment may consist of vibratory rollers, static rollers, or vibratory equipment.

At the beginning of the compaction operation, construct a short test section. The Engineer will determine the density requirements according to Supplement 1015. Use a minimum compactive effort of eight passes to construct the test section. Use and adjust the vibration on the vibratory rollers to maximize the density and stability.

The Engineer will use 98 percent of the test section maximum dry density for the acceptance of the production material. Use at least the same number of passes and compactive effort used to obtain the test section maximum density for the production material. At a minimum, use eight passes in the production area. The Engineer may reduce the minimum passes if the passes are detrimental to compaction.

Construct a new test section when the material changes or when the supporting materials change appreciably. The Engineer may check the production material density before or after the finishing operations.

Maintain the surface of each lift during the compaction operations in such a manner that the surface texture is reasonably uniform and the aggregate material is firmly keyed.

Cover the Item 304 Aggregate Base with the next layer of pavement before the end of the construction season. If the aggregate base is not covered up, then assume all liability for the contamination, damage and instability for the base, subgrade and underdrains.

Provide drainage and maintain the material according to 203.04.A.

304.06 Finished Surface. Ensure that the finished surface does not vary more than 3/8 inch (10 mm) from a 10-foot (3 m) straightedge parallel to the centerline or more than 1/2 inch (13 mm) from a template conforming to the required cross-section. Furnish straightedges, templates, or other devices satisfactory to the Engineer, and check the surface for conformance with these requirements.

All work must be performed within the tolerances of 304.06. Do not construct the 304 at a consistent depth below the required minimum compacted depth thickness. When the depth is found to be less than the required depth, provide the Engineer with a written corrective action plan for approval.

304.07 Method of Measurement. The Department will measure Aggregate Base by the number of cubic yards (cubic meters) computed from the profile grade and typical sections, compacted in place.

Where variable depth is specified, the Department will measure the number of cubic yards (cubic meters) of aggregate by conversion from weight on the following basis:

<table>
<thead>
<tr>
<th>Material</th>
<th>lb/yd³</th>
<th>kg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushed stone</td>
<td>4000</td>
<td>2375</td>
</tr>
<tr>
<td>Crushed gravel</td>
<td>4000</td>
<td>2375</td>
</tr>
<tr>
<td>Crushed slag, 90 lb/ft³ (1450 kg/m³)[1]</td>
<td>3600</td>
<td>2140</td>
</tr>
<tr>
<td>Crushed slag, 90 to 100 lb/ft³ (1450 to 1600 kg/m³)[1]</td>
<td>4000</td>
<td>2375</td>
</tr>
<tr>
<td>Crushed slag more than 100 lb/ft³ (1600 kg/m³)[1]</td>
<td>4500</td>
<td>2670</td>
</tr>
<tr>
<td>Granulated slag</td>
<td>2800</td>
<td>1660</td>
</tr>
</tbody>
</table>

[1] Based on average dry rodded weight of standard size of slag aggregates on record at the Laboratory. The conversion factors listed are the long gradation weights. These numbers are based on the dry rodded weights of No. 67, 57, or 8 gradation. The Department will determine slag weights based on weights obtained from the original source.

The Department will verify that the moistures of the delivered material are less than 2 percent above saturated surface dry (SSD). If the moisture is greater than 2 percent above SSD, then the Department will calculate the number of cubic yards (cubic meters) based on the dry density and dry weight.

The Department will determine the pounds per cubic yard (kilograms per cubic meter) for aggregate mixtures by using 100 percent of the test section maximum dry density obtained in 304.05.

Items 304 and 411

Method of testing: Compaction and Moisture