

## SECTION 300 – BASES

### 300.00 Bases.

**General.** Before allowing any work within a materials source, the Project Inspector shall review the Special Provisions and source data shown on the source plat and confer with the district Source Manager to become acquainted with the requirements and stipulations relating to the operation and reclamation of the particular source. All provisions requiring special attention shall be brought to the attention of the Contractor. The source plat should be carefully studied to determine the area to be worked, location of aggregate and stripping stockpiles, location of haul roads and fences which must be relocated or maintained, etc. When changes are necessary, the District Materials Engineer should be advised. The source must be worked in a conservative manner and left with a neat appearance and in accordance with the reclamation plan.

**Aggregate Production and Materials Source Operations.** Prior to producing crushed aggregate, the materials source shall be stripped in accordance with [CA Section 207, Stripping Designated Source Material Deposits](#).

The materials source may be worked in several different ways. Trenching is used when the Materials Source is in layers and allows the Contractor to mix the material and push larger loads into the trap. If the pit is wet, it may be desirable to work the entire surface to allow the material to dry out. The Project Inspector should visually observe the materials source at least weekly to check for changes in appearance and gradation of the material, layers of clay or foreign material, excess moisture, and any other changes that might affect the quality of the crushed aggregate. In addition, the Inspector should verify that the Contractor has not moved to any unapproved areas of the materials source. The Inspector should also be alert for archaeological and paleontological evidence and report all findings to the Resident Engineer. The Contractor should move to a different part of the approved materials source until this evidence has been evaluated and clearance is given to work the area in question.

The actual setup and operation of the crusher is the Contractor's responsibility. The Project Inspector should never tell the Contractor how to set up or operate the equipment. He should, however, become familiar with the overall operation of the crusher plant so that a neat and accurate crusher layout sketch can be produced for the project records.

The Contractor is permitted to use surplus secondary screenings produced from the manufacture of one product in the manufacture of any other product provided the blended combination meets specifications. Surplus screenings remaining will then become the property of the State, if the source is State-owned. Surplus screenings previously stockpiled under other contracts are not to be used under the above provision without written approval from the Engineer.

When beneficial and approved by the Engineer, sand or granular material may be added to the crushed product. The sand or granular material shall be blended uniformly into the base aggregate at the plant when the aggregate is produced. Spreading sand and granular material over the top of the aggregate source will not be permitted.

The Project Inspector shall conduct, at a minimum, the number and type of tests required in the [ITD Quality Assurance Manual](#), Minimum Testing Requirements (MTR's), or the number and type of tests required if the project is a Quality Control/Quality Assurance type, or as directed in any fully executed related change order. Any time the tests indicate "borderline" material, the crusher foreman will be notified immediately. In the event the material fails to meet specifications, the Contractor shall be notified of such in writing and no more material shall be accepted until it again meets specifications. Test results will be checked daily with the crusher foreman. The crusher foreman will be provided with a copy of these results upon request.

As soon as a reasonably uniform material is being produced, the Inspector should test the unit weight of the material produced, and verify that it matches the unit weight used for the estimating basis on the plans. Refer to the ITD Quality Assurance Manual for methods to determine the unit weight. The Project Inspector shall report any differences between tested and estimated unit weights to the Engineer immediately.

The responsibility for the production of quality aggregates rests with the Contractor. The Project Inspectors must assure that all specification provisions are met.

After each day's crushing and hauling operation, the material weigh books must be totaled and checked. Normally, if the weigh person keeps an accurate running total on each book, the office person only needs to verify this total. The weigh person and office person will initial the books with their totals. These totals will constitute the independent check, providing they agree. The Project Inspector shall meet with the office person and weigh person to determine the reason for any discrepancies between the totals. All discrepancies shall be resolved within 24 hours. Each shift's weighing will be recorded in the ledger.

**Documentation for Pay Quantity.** Weigh tickets shall be written in accordance with [CA Subsection 109.01](#).

Material purchased on a weight basis will be weighed to the nearest 100 lbs. when the scale reads in pounds. If it reads in tons, the weight will be to the nearest 0.1 ton. The volume of trucks will be measured to the nearest 0.1 cubic yard. Quantities will be rounded to the nearest ton or cubic yard on the estimate.

**Reports.** During the crushing operation, the Project Inspector should review the acceptance testing computations on Form [ITD-0901](#), Daily Aggregate Data Sheet. Any shutdowns, delays, plant adjustments, conversations, or instructions given to the Contractor will be recorded in the diary. Any unusual conditions which develop in the materials source will also need to be noted in the diary. The weekly materials source observations will also be noted in the diary. When the project contains the Quality Assurance Special Provision see [CA Subsection 106.03](#) for instructions.

### **301.00 Granular Subbase.**

**General.** The material for granular subbase must meet the applicable requirements of [Section 703](#) of the Standard Specifications. Pre-stockpiled material must be well-located and properly stockpiled to guard against segregation and contamination.

Unless otherwise specified, the requirements for mixing, shaping, and compacting granular subbase are the same as for aggregate base. See CA [Subsection 303.00](#) below for details.

Compaction needs to follow closely behind the placing operation. There are basically two factors which influence the compaction: (1) moisture content of the material and (2) the compactive effort.

The moisture content at which compaction can be most easily obtained with the least compactive effort is the optimum moisture content. This generally ranges from about 5% to 7% for most granular subbases in Idaho except those containing volcanic type aggregates, which require more water.

Specifications provide for payment of moisture present at the time of weigh-in up to 7% in Granular Subbase material. Moisture in excess of 7% will be deducted from the pay quantity. Water added after weighing is not paid for. Regardless of the mixing method used, thorough and uniform distribution of the water must be obtained throughout the material. Moisture added to the surface only moistens the material near the surface. The material at the bottom of the layer does not receive the needed moisture; and, therefore, ultimate compaction will be less at that level. Water must be added to the surface to replace that lost by evaporation during processing.

The Contractor is free to choose the type of compaction equipment most adaptable to the material and work. Compaction shall continue until not less than 95% of the maximum density determined by [Idaho T-74](#) is obtained.

**Documentation for Pay Quantity.** Documentation of pay quantities shall be by weigh tickets. See CA [Subsection 300.00](#) above.

**Reports.** The required reports and corresponding form numbers are listed in the ITD [Quality Assurance Manual](#), Minimum Testing Requirements (MTR's). Test numbers shall run consecutively for compaction tests, starting with test number one. Test numbers shall not be repeated. Should it be necessary to retest an area with failing compaction tests, the retest shall be numbered with the same number as the failing test, followed by an alpha character to indicate a retest. When the project contains the Quality Assurance Special Provision see [CA Section 106.03](#) for instructions.

### 302.00 Emulsion Treated Base.

**General.** A conventional plant setup consists of a mixer, emulsified asphalt storage tank, metering pump and piping, equipment for feeding water and additives, controls for adjusting and monitoring the various components, a conveyer for feeding aggregate, and a spray bar for pre-wetting the aggregate. All aggregates used shall conform to [Section 703](#) of the Standard Specifications. The asphalt should be of the type and grade called for in the contract, and should meet the requirements of [Section 702](#) of the Standard Specifications.

**Mixing.** A high quality product requires a well-controlled plant. The operation should be carefully monitored at the aggregate feed, pre-wetting spray bar, and emulsified asphalt introduction locations. The mixing plant should permit variation in mixing times from 5-30 seconds.

Aggregates that are dry mixed with emulsified asphalt tend to be lifeless and difficult to handle. Aggregates with too much water become very fluid, making for difficulty in laying and compaction.

When adding water to the aggregate, the water and aggregate should be mixed prior to entering the mixer where the asphalt is added.

**Lay Down.** The emulsified asphalt base must be placed by an approved aggregate spreader. Paving machines can work. However, this type of mix is not as workable as plant mix.

Should the mix be difficult to lay, an adjustment of either the emulsion, water ratio, or the mixing time may make it more workable.

Emulsified asphalt bases may be laid in lifts up to 0.5 feet thick. However, compaction and curing proceed much quicker with course thickness of 2 to 3 inches. The emulsion should break after the mix has been laid. Because of this and the high moisture content, it may be necessary to wait for some of the moisture to evaporate, allowing the mixture to develop sufficient stability to support rollers.

**Documentation for Pay Quantity.** Emulsion Treated Base: by Weigh Tickets: see CA [Subsection 300.00](#) above. Emulsified Asphalt for Emulsion Treated Base: see CA [Subsection 400.00](#) of this manual.

Whenever material is wasted or it becomes necessary to make deductions from pay quantities, documentation should be prepared on the day the deduction occurs and be clearly identified as a deduction.

The asphalt content of wasted or unacceptable loads of emulsion treated base is computed from the asphalt content of the mix. Show computations on the weigh ticket or diary. Asphalt deduction tickets shall cover variations in delivery loading certificate weights. Separate weigh tickets must be used for emulsion treated base and asphalt if each is a separate pay item.

Deductions will be entered in the ledger with proper reference to tickets. Diaries should record:

- Instructions to the Contractor
- Asphalt deliveries and corrections to invoices, if any
- Mix or emulsified asphalt wasted or rejected and reasons (with reference to deduction tickets.)
- Daily emulsified asphalt tank measurements and computations of actual oil content

- Depth checks and calculations of spread rates
- Calibrations and equipment inspections
- Scale checks
- Weight of rollers
- All information pertinent to the operation.

Final quantities shall be to the nearest Ton for emulsion treated base course.

**Reports.** The required reports and corresponding form numbers are listed in the ITD [Quality Assurance Manual](#), Minimum Testing Requirements (MTR's). Test numbers shall run consecutively for compaction tests, starting with test number one. Test numbers shall not be repeated. Should it be necessary to retest an area with failing compaction tests, the retest shall be numbered with the same number as the failing test, followed with an alpha character to indicate a retest. When the project contains the Quality Assurance Special Provision see [CA Section 106.03](#) for instructions.

### 303.00 Aggregate Base.

**General.** All material must be produced within the specification limits to ensure a uniform product on the roadway. Pre-stockpiled material must be well-located and properly stockpiled to guard against segregation and contamination.

The specifications outline the four acceptable methods used for mixing and placing aggregate base.

Uniform mixing of aggregate and water is vital to a well-constructed base. Moist and dry areas will cause a variation in the compacted depth. This can result in a varying compacted density and an uneven surface.

Compaction needs to follow closely behind the placing operation. There are basically two factors which influence the compaction: (1) moisture content of the material and (2) the compactive effort.

The moisture content at which compaction can be most easily obtained with the least compactive effort is the optimum moisture content. This generally ranges from about 5% to 7% for most aggregate bases in Idaho except bases containing volcanic type aggregates, which require more water.

Specifications provide for payment of moisture present at the time of weigh-in up to 7% in aggregate base course material. Moisture in excess of 7% will be deducted from the pay quantity. Water added after weighing is not paid for. Regardless of the mixing method used, thorough and uniform distribution of the water must be obtained throughout the material.

Moisture added to the surface only moistens the material near the surface. The material at the bottom of the layer does not receive the needed moisture; and, therefore, ultimate compaction will be less at that level. Water must be added to the surface to replace that lost by evaporation during processing.

The Contractor is free to choose the type of compaction equipment most adaptable to the material and work. Compaction shall continue until not less than 95% of the maximum density determined by either [Idaho T-74](#) or [AASHTO T-180, Method D](#), is approved.

**Documentation for Pay Quantity.** Documentation of pay quantities shall be by weigh tickets. See CA [Subsection 300.00](#) above.

**Reports.** The required reports and corresponding form numbers are listed in the ITD [Quality Assurance Manual](#), Minimum Testing Requirements (MTR's). Test numbers shall run consecutively for compaction tests, starting with test number one. Test numbers shall not be repeated. Should it be necessary to retest an area with failing compaction tests, the retest shall be numbered with the same number as the failing test, followed by an alpha character to indicate a retest. When the project contains the Quality Assurance Special Provision see [CA Section 106.03](#) for instructions.

### **304.00 Reconditioning.**

**General.** It will usually be necessary to blade the shoulder slopes to remove weeds, sod, roots, and other objectionable material prior to scarifying and pulverizing the existing base and surfacing. If additional base material is required, it shall be thoroughly mixed with existing materials and spread to form a uniform base. Blading and watering should continue during the rolling operation to assure both a smooth surface and uniform moisture content throughout the mixture.

Although the plans do not generally contain a profile for a reconditioned section, it may be necessary to establish grades in curb and gutter sections, at railroad crossings and at bridge approaches.

**Documentation for Pay Quantity.** The diary shall be used to verify the activity, date, and location of the work. Transit or final re-measure notes will be required to verify the length of the reconditioned section. Tickets ([ITD-0072](#)) will be issued for all water intended for payment. Diaries should record placement, tank measurements, inspection to verify quantities, etc. Cross-section notes or three-dimensional measurements will be required to verify the quantity of excavation of soft spots.

Reconditioning will be measured to the nearest linear foot and reported to the nearest 0.01 station or mile on the final estimate. The reconditioning water quantity shall be computed to the nearest 0.1 MG, and rounded off to the nearest whole unit on the final estimate. The soft spot excavation quantities, as well as soft spot repair, shall be computed and reported to the nearest whole unit.

**Reports.** The required reports and corresponding form numbers are listed in the ITD [Quality Assurance Manual](#), Minimum Testing Requirements (MTR's). Test numbers shall run consecutively for compaction tests, starting with number one. Test numbers shall not be repeated. If it is necessary to retest an area which fails compaction, the retest shall have the same number as the failing test, followed with an alpha character to indicate a retest. When the project contains the Quality Assurance Special Provision see CA [Section 106.03](#) for instructions.

### 306.00 Rolling.

**General.** The specifications list three types of rollers in detail: Steel, Pneumatic-Tire, and Vibratory. If end results are specified, the Contractor may use any roller type to accomplish compaction. If end results are not specified, the Contractor's rolling equipment must meet the specifications for each roller type. The specifications also allow the use of miscellaneous rollers which must be approved by the Engineer.

When end results are not specified, such as plant mix compaction, the rollers must be inspected prior to use to determine compliance with specifications. This inspection should be recorded in the diary. Items such as roller weight, tire pressures, drum or tire width, dynamic forces, vibrations per minute, tire size, etc. must all be checked for compliance.

Adequate rollers must be available to handle the work being performed by the Contractor. Roller speed must be controlled. Rollers should operate at speeds of from 3 to 5 mph unless otherwise specified or directed. Certain items of work require specific rollers, such as plant mix leveling courses require a pneumatic type roller. The Inspector should check that rollers are of the proper type, in satisfactory condition, and meet the minimum roller requirements before work commences. The Contractor should furnish manufacturer's specifications and ratings to determine the capability of a roller.

Ample material has been provided to the districts on vibratory rollers. All Inspectors involved with vibratory rollers should be familiar with current literature on vibratory rolling. Vibratory rollers have many capabilities. Improper use of vibratory rollers, however, can do more harm than good. Project personnel should check to assure that vibratory rollers are being operated properly.

The specifications include phrases that incorporate wording about rollers such as "passes" and "coverages" which are defined below.

- A. Roller Pass: A roller pass is the passing of the roller unit over an area (roller width) in one direction one time.
- B. Roller Coverage: A roller coverage is the rolling of the entire width of pavement (roadway) one time including roller overlap.

Generally, rolling is not paid for separately, but as incidental to other bid items.

**307.00 Open-Graded base.** See Standard Specifications [Section 307](#) for requirements.