

## **SPECIFICATION 301 – SUBBASE COURSE**

### **301-1 DESCRIPTION**

**301-1.01 Scope** - This work shall consist of furnishing, placing and compacting a subbase course on a prepared subgrade in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical sections shown on the plans or established by the Engineer.

### **301-2 MATERIALS**

**301-2.01 Materials Requirements** - Material for subbase courses shall be a well graded granular soil-aggregate mixture classifiable as an A-1 or A-2-4 material as per AASHTO M 145, or a soil or soil-aggregate mixture having less than 6% passing the No. 200 sieve. The subbase material shall be free of any stone or rock fragments measuring over fifteen (15) centimeters in their greatest dimension. It shall also be free from vegetable matter, balls or lumps of clay and other deleterious substances; and shall be of such nature and gradation that it can be compacted readily to form a firm, stable subbase that can be fine graded to the required tolerances.

#### **301-2.02 Sampling and Testing**

- a. The Contractor shall advise the Engineer as to the exact location of the sources of the materials that he proposes to provide, at least four weeks in advance of their actual use. It shall be the Contractor's responsibility to ascertain that the materials from such sources meet the specification requirements.
- b. Throughout the construction operations, the Engineer will take random samples of the materials in place for testing. The Contractor shall have available for the use of the Engineer in taking samples of in-place material, a powered 4 in. auger capable of sampling to depths of at least 1.20 meters (4 feet) in accordance with the procedures of AASHTO T-203.

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- c. Sampling will be performed as follows:
  - 1. The subbase course will be divided into areas as follows:

ORIGINAL CONTRACT SUBBASE QUALITY	RATE OF SAMPLING AND TESTING
10,000 cubic meter or less	One sample per 400 square meters
10,001 to 50,000 cubic meter	One sample per 800 square meters
50,001 or more	One sample per 1,500 square meters

One random sample will be taken from each area segment and the test results of this sample taken as representative of the entire segment.

- 2. To avoid contamination of the sample by subgrade material, the boring will extend no deeper than 10 centimeters above the bottom of the subbase course.

- 3. If the sample of an area segment fails to meet the specification requirements, two additional random samples will be taken for testing. If these also fail, the reduction in unit price provisions determined as specified under Article 301-5.01 will be applied using the average value of the three (3) samples.

- 4. The Contractor may request further resampling and retesting at his expense in which case the samples will be increased to four per area segment. The price reduction formula will be applied using the average value of all the samples taken.

- d. When the plasticity index (PI) of the in-place material exceeds 10 but is not over 15, the material may be accepted at the discretion of the Engineer, but subject to a reduction in unit price determined in accordance with the procedure

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included under Section 301-5 of this specification. All in-place material with a PI in excess of 15 shall be removed and replaced with material meeting the specification requirements. Materials having less than 5% passing the No. 200 sieve will not be tested for plasticity index and the material will be acceptable for subbase provided it meets the other requirements specified in Article 301-2.01.

e. When the fraction of the in-place material passing the 200 sieve exceeds 35% but is not over 40%, the material may be accepted at the discretion of the Engineer but subject to a reduction in unit price determined in accordance with the procedure included under Section 301-5 of this specification. All in-place material with a fraction passing the 200 sieve in excess of 40 shall be removed and replaced with material meeting the specification requirements.

f. The reduction in unit price shall be applicable to the volume of in-place material that is determined to be outside the specification requirements as to PI or fraction passing the 200 sieve, or both. The Contractor may elect to remove any deficient material and replace it with material meeting the specification requirements at the Contractor's expense.

**301-2.03 On Site Material** - When the contract calls for a pay item of subbase course under this specification and material meeting the requirements of this specification is available within the roadway areas, the Contractor may obtain it from this source subject to the provisions of Article 104.08 of the General Provisions.

### **301-3 CONSTRUCTION REQUIREMENTS**

#### **301-3.01 Placing and Spreading**

a. The material for subbase shall be delivered to the roadbed as a uniform mixture and shall be deposited in layers

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or windrows. Segregation shall be avoided and the material shall be free from pockets of coarse or fine material.

b. The layers or windrows of subbase material shall be shaped to such thickness that after watering, if required, and compacting, the completed subbase shall be in reasonably close conformity to the required grade, thickness and cross section and within the specified tolerances.

c. The subbase course material shall be placed and spread on the prepared subgrade and compacted in layers not exceeding 30 centimeters in loose thickness or as shown on the plans. The maximum loose layer thickness in confined areas, as defined by the Engineer, shall be 20 centimeters. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

d. No subbase course will be allowed to be placed on the subgrade until the latter is reasonably dry, graded as required and accepted by the Engineer.

e. If after a layer of subbase course material has been placed and spread, it is found to lack reasonable uniformity, it shall be thoroughly blade-mixed to its full depth by alternately blading the entire layer to the center and back to the edges of the road. Traveling mixers may be used in lieu of blade-mixing. If necessary, the material shall be watered during mixing to attain the required moisture content for proper compaction. When uniform, the material shall again be spread and shaped to the required cross section.

### **301-3.02      Compaction**

a. All subbase courses shall be constructed with moisture and density control.

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b. All subbase material shall be compacted to not less than 95% of maximum density which shall be determined by AASHTO T 180 Method D. Correction for coarse particles in the material being tested using AASHTO T 224 will be made when appropriate. However, when the subbase material being furnished is such as to retain 67% or more in the #4 sieve, then the compaction and density requirements shall be as specified for aggregate base course in Article 304-3.04 of Specification 304 - Aggregate Base Course, and paragraphs c., d. and e. below will not apply.

c. The subbase material shall have the moisture content required to obtain the specified density after compaction. The Contractor shall be responsible for determining the required moisture content and for controlling it within the proper limits as the work progresses. When water must be added to the material, it may be added on the lift or at the borrow pit. However, when added on the lift, it shall be applied with an approved pressure distributor. Water added shall be thoroughly incorporated into the material to attain uniform distribution.

d. When the moisture content of the material in a lift exceeds the required amount, the compaction shall be deferred until the material has dried to the proper amount. If necessary, the material shall be manipulated and aerated to attain the required moisture content.

e. The Engineer will, during the progress of the work, make such tests as he considers necessary to ascertain the density of each compacted layer. Tests will be made in accordance with AASHTO T 191, T 204, T 205, or T 238. If the density tests indicate that the obtained density is less than the required density, additional rolling, and moisture control if necessary, shall be performed by the Contractor until the specified density is obtained.

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- f. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform.
- g. Along walls, and at all places not accessible to the roller, the subbase course material shall be tamped thoroughly with mechanical tampers or compactors.
- h. Compaction and moisture control, whether adding or removing moisture, by whatever methods are used, shall be an obligation of the Contractor under this specification with the cost included in the contract unit price for the subbase course.

**301-3.03 Proof Rolling** - When called for in the contract and immediately prior to the final trimming of the subbase surface, all areas of subbase surface within the roadway limits that are indicated on the plans or ordered by the Engineer shall be proofrolled according to the requirements of Article 203-3.06 of Specification 203 - Excavation and Embankment.

### **301-3.04 Testing of the Finished Surface**

- a. After compaction, and proof rolling when included, the finished subbase surface shall conform so nearly to that required by the plans that it will nowhere vary by more than 1.5 centimeters when tested with a 3-meter straight edge applied parallel to, and perpendicular to, the centerline of the road. The Contractor shall provide a light weight aluminum straight edge for this testing as part of his obligations under this pay item. This testing tool will remain the property of the contractor.
- b. The finished surface shall be rolled as necessary to maintain a smooth, even, uniformly compacted subbase until

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any pavement or treatment that may be provided for in the same contract is placed thereon.

c. Such portions of the completed subbase course which are defective in finish, density or composition, or not complying in all respects to the requirements of these specifications and of the plans shall be corrected at the Contractor's expense, including any contamination or damage caused by the Contractor's operations or equipment.

### **301-4 METHOD OF MEASUREMENT**

**301-4.01 Subbase Course** - The quantity of subbase course to be paid shall be the number of cubic meters placed, compacted and accepted in final position computed from the payment lines shown on the plans or, where changes have been ordered, from the payment lines established by the Engineer.

**301-4.02 Proof Rolling** - Proof rolling of the subbase course, when included in the contract, shall be measured as provided in Article 203-4.06 of Specification 203 - Excavation and Embankment.

### **301-5 BASIS OF PAYMENT**

#### **301-5.01 Subbase Course**

a. The volume of compacted subbase course material, determined as provided above, will be paid for at the contract unit price, which price and payment will be full compensation for all the materials, labor, equipment, tools and incidentals necessary to complete this item.

b. If the in-place subbase material is subject to a reduction in unit price as per Section 301-2 of this specification, the following formula will apply to compute the price reduction:

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$$PR = (PI - 10) 10 + (F - 35) 10$$

where:

PR = Percentage reduction in unit price.

PI = Plasticity index of deficient in-place material.

F = Percentage by weight of the fraction of the deficient material passing the 200 sieve.

The “PI” portion of the above formula will be omitted when the plasticity index of the material is 10 or less. Similarly, the “F” portion of the formula will be omitted when the fraction of the material passing the No. 200 sieve amounts to 35% or less. Also, in no case will the total price reduction, PR, exceed 90% of the unit price.

**301-5.02 Proof Rolling** - When called for in the contract, proof rolling of the subbase course will be paid for as provided in Section 203-5 of Specification 203 - Excavation and Embankment.

**301-5.03** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Subbase Course.....	Cubic Meter



## **SPECIFICATION 304 – AGGREGATE BASE COURSE**

### **304-1 DESCRIPTION**

**304-1.01 Scope** - The work shall consist of furnishing, placing and compacting one or more courses of aggregate base and filler, if required, on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

### **304-2 MATERIALS**

#### **304-2.01 Aggregate**

- a. The aggregate for base course shall consist of hard, durable particles of crushed or natural gravel or crushed stone meeting the requirements of Section 703-4 of Specification 703 – Aggregates.
- b. The aggregate shall meet any of the gradings given in Table 703-4 under Section 703-4 of Specification 703 – Aggregates, unless a specific grading is called for in the contract documents.
- c. If filler material in addition to that present in the aggregate is necessary for meeting the grading requirement or for satisfactory bonding of the material, it shall be uniformly blended with the base course material at the screening and crushing plant or on the road.

#### **304-2.02 Sampling and Testing**

- a. The Contractor shall advise the Engineer as to the exact location of the source of aggregates which he proposed to use. It shall be the Contractor's responsibility to ascertain that the materials from such source meet the specification requirements. The Engineer will take random samples of materials incorporated into the project in its final position after the material has been compacted to specification

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requirements for testing for conformance with the specified quality and grading requirements. The sampling frequency for the aggregate base course will be as follows:

1. A sample shall be obtained at random for every 200 cubic meters of the in-place aggregate base course material incorporated into the project so as to verify its compliance with the grading requirements included in this specification.
  2. Additionally, a sample shall be obtained at random for every 5,000 cubic meters of the in-place aggregate base course material incorporated into the project so as to verify its compliance with the quality requirements included in this specification.
- b. The Authority reserves the right to further sample and test all aggregate base course materials incorporated in the project so as to verify its compliance with contract requirements.
- c. When an aggregate base course material fails to conform to the requirements indicated in this specification, the Contractor will have the option to request retesting of said material. Said retesting will be conducted as follows:
1. Two additional samples will be taken at random by the Authority in the lot represented by the failing sample. The average of the original and the two new test results will be used for acceptance purposes. If the average of the three (3) samples fails, the reduction in unit price determined in article 304-5 will be applied using the average of the three (3) results.
  2. The Contractor may request further resampling and retesting at his expense in which case the samples will be increased to four (4). The price reduction

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formula will be applied using the average test value of all samples taken (4 samples).

d. Aggregate base course materials that fail to meet specification requirements following placement shall be removed at the Contractor's expense and shall be replaced by acceptable material. When the plasticity index (PI) of the in-place aggregate base course material exceeds 6 but is not greater than 10, the material may be accepted at the discretion of the Authority but subject to a reduction in unit price as described in article 304-5.

e. Aggregate base course materials that fail to meet specification requirements following placement shall be removed at the Contractor's expense and shall be replaced by acceptable material. When the liquid limit (LL) of the in-place aggregate base course material exceeds 25 but is not greater than 30, the material may be accepted at the discretion of the Authority but subject to a reduction in unit price as described in article 304-5.

f. Aggregate base course materials that fail to meet specification requirements following placement shall be removed at the Contractor's expense and shall be replaced by acceptable material. When the grading of the in-place aggregate base course material fails to conform to the requirements of Table 703-4, section 703-4 of specification 703 – Aggregates by not more than +/- 2.0 percent, the material may be accepted at the discretion of the Authority but subject to a reduction in unit price as described in article 304-5.

### **304-3 CONSTRUCTION REQUIREMENTS**

#### **304-3.01 Preparation of Surface**

a. The subgrade or subbase on which the base course is to be placed shall have been completed and the surface finished in accordance with the requirements of Specification 203, 204 or

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301 as applicable. Immediately before placing base course material, the subgrade or subbase shall be checked as to conformity with grade and cross section.

b. No base course shall be placed on the subgrade or subbase unless it is reasonably dry and free from impounded water, and the surface finish accepted by the Engineer.

### **304-3.02 Placing**

a. The base course material shall be spread on the prepared surface and compacted in layers not exceeding 15 centimeters in thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

b. Placing shall be from spreader boxes or from vehicles equipped to distribute the material in a uniform layer or windrow without segregation of size. The layer or windrow shall be of such size that when spread and compacted, the layer shall have the required thickness. Spreading may be by motor grader.

### **304-3.03 Mixing and Spreading**

a. If after the layer of base course material has been placed and spread as indicated above, it is found that it is not uniform, it shall be thoroughly mixed to its full depth by means of power graders, traveling mixers or other mixing equipment approved by the Engineer. During the mixing, water shall be added in the amount necessary to provide the optimum moisture content for compaction.

b. When mixed, the material shall be spread smoothly to a uniform thickness and in the case of the top course, to the cross section shown on the plans. Spreading and compaction shall be completed within 24 hours after mixing.

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- c. Filler material, when added on the roadbed, shall be thoroughly mixed into the aggregate layer as in paragraph a. above.

### **304-3.04      Compaction**

- a. Immediately following spreading and smoothing, each layer shall be compacted to its full width. Compaction effort shall continue until the base aggregate material reaches a density of at least 83 percent of its solid volume density. The solid volume density of the aggregate shall be computed on the basis of its bulk specific gravity as determined by AASHTO T 84 and T 85, and the dry weight of the aggregate. The in-place density of the compacted aggregate base shall be determined by the use of AASHTO T 191, T 205 or T 238.
- b. The surface of each layer shall be maintained during the compaction operations in such a manner that a uniform texture is produced and the aggregate firmly keyed. If required, water shall be uniformly sprinkled over the base materials during compaction in the amount necessary for proper consolidation.
- c. Any irregularities or depressions that develop under rolling shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform.
- d. Along curbs, headers, and walls, and at all places not accessible to the roller, the base course material shall be thoroughly compacted with mechanical tampers.

### **304-3.05      Thickness Requirements**

- a. The thickness of the completed base course shall not vary by more than 1.25 centimeters from that called for in the plans. Test holes shall be dug, at the discretion of the Engineer, at the center and sides of the base course to determine if its compacted thickness is within the allowed tolerance. Any areas

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not within the allowable tolerance shall be corrected by removing or adding material as necessary and shaping and compacting it as specified.

b. The Contractor shall refill the test holes in such manner as to leave the finished surface compacted, smooth and uniform, to the satisfaction of the Engineer.

### **304-3.06 Surface Finish Requirements**

a. The finished surface of the base course shall conform so nearly to that required by the plans that it will nowhere vary by more than 1.25 cm. when tested with a 3-meter straightedge. Straightedges shall be furnished by the Contractor at no extra cost and shall remain the property of the Contractor.

b. Any areas where the surface variation exceeds the 1.25 centimeter tolerance shall be reworked by the Contractor until the variation falls within this limit.

c. The finished surface shall be rolled as necessary to maintain a smooth, even, uniformly compacted base until any surface or treatment that may be provided for in the same contract is placed thereon.

### **304-4 METHOD OF MEASUREMENT**

**304-4.01** Aggregate base course, including filler, will be measured by the cubic meter of material in place in the completed course, computed on the basis of the thickness shown on the plans. No additional thickness over that shown on the plans will be considered for measurement.

### **304-5 BASIS OF PAYMENT**

**304-5.01** The volume of compacted base course material, determined as provided above, placed, compacted and accepted will be paid for at the contract unit price per cubic meter of the class and

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grading called for in the contract documents. Such price and payment will be full compensation for furnishing and placing all materials, including any necessary filler and water, and for all labor, equipment, tools and incidentals necessary to complete the work as specified.

**304-5.02** If the in-place aggregate base course material is subjected to a reduction in unit price as per article 304-2.02 of this specification, the following formula will apply to compute the price reduction:

$$PR = (PI-6)*10 + (LL-25)*10 + G$$

PR = Percentage reduction in unit price.

PI = Plasticity Index of deficient in-place material.

LL = Liquid Limit of deficient in-place material.

G = 10 percent reduction in unit price when grading in any of the sieves exceeds the limits stated in Table 703-4, but is within the tolerances indicate in article 304.202 f. The 10 percent reduction in unit price will only be applied once per each sample.

The “PI” portion of the above formula will be omitted when the plasticity index of the in-place aggregate base course material is 6 or less. The “LL” portion of the above formula will be omitted when the liquid limit of the in-place aggregate base material is 25 or less. The “G” portion of the above formula will be omitted when the grading of the in-place aggregate base course material meets the requirements of table 703-4. Also, in no case the total percentage deduction, PR, exceed 90 percent of the contract unit price for aggregate base course.

**304-5.02** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Aggregate Base Course.....	Cubic Meter

**SPECIFICATION 305 – LEAN CONCRETE BASE**

**305-1 DESCRIPTION**

**305-1.01 Scope** - This work shall consist of constructing a lean concrete base in accordance with these specifications and in conformity with the lines, grades, dimensions and typical sections shown on the plans or established by the Engineer.

**305-2 MATERIALS**

**305-2.01** Lean concrete shall consist of a mixture of portland cement, fine and coarse aggregates, and water. Air entraining, water reducing, set retarding or superplasticizer chemical admixtures may be added at the option of the contractor but subject to the prior approval of the Engineer.

**305-2.02** The following materials shall meet the applicable requirements of the specifications indicated:

<u>Material</u>	<u>Specification</u>
Portland Cement .....	701-1
Fine Aggregate .....	703-1
Curing Materials .....	711-1
Air Entraining Admixtures .....	711-2
Chemical Admixtures .....	711-3
Water .....	712-1

**305-2.03 Coarse Aggregate** - Shall conform to the requirements of Article 703-2 of Specification 703 -Aggregates but subject to the following:

- a. Aggregate shall be of designated sizes 2” to 1”, 1 1/2” to 3/4” or 1” to No. 4, at the option of the Contractor, shown in Table 703-2 but the grading distributions shown in this table are only suggested and not mandatory, provided the limiting maximum and minimum size values are complied with. However, once a designated size and grading is



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selected, it shall not be changed without the Engineer's written approval.

- b. The maximum percentage of wear when tested as per AASHTO T 96 shall not exceed 45.
- c. The minimum polishing value requirement does not apply.

**305-2.04 Proportioning of Concrete** - The Contractor shall design the lean concrete mix in accordance with all the applicable requirements of Article 501-2.07 of Specification 501 - Portland Cement Concrete Pavement except that it shall provide for a minimum compressive strength of 1000 psi at 28 days.

**305-2.05 Sampling and Testing** - The sampling and testing for determining compliance with the specification requirements will be as provided in Article 501-2.08 modified as follows:

- a. Sampling frequency for compressive strength testing shall be one set of six (6) specimens for each 500 square meters of lean concrete base or fraction thereof, placed each day, for testing at 7 and 28 days.
- b. No wash test will normally be made except when otherwise determined by the Engineer.

**305-2.06 Basis of Acceptance** - The acceptability of the quality of the lean concrete furnished and placed by the Contractor will be determined as provided in Article 501-2.09 modified as follows:

- a. Paragraph "d" on polishing value does not apply.
- b. Paragraph "f" is amended as follows:

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1. The average of all sets of six consecutive tests (moving average) shall equal or exceed the specified compressive strength of 1,000 psi.
  2. No individual test (average of cylinders set) shall fall below the specified compressive strength by more than 250 psi.
- c. In paragraph “g” the specified compressive strength shall read 1,000 psi.
- d. Paragraph “h” and “i” are amended to read 250 psi instead of 500 psi.
- e. Paragraph “j” is amended as follows:
1. Three cores shall be taken for each 500 square meters of lean concrete base classified as deficient on the basis of the cylinder tests.
  2. The lean concrete base will be considered acceptable as to compressive strength, with no penalty, if the average of all cores is at least 850 psi and no single core test value is less than 750 psi.

### **305-3 CONSTRUCTION REQUIREMENTS**

**305-3.01 General** - The construction procedures and equipment shall meet all the applicable requirements of Section 501-3 modified and supplemented by the following articles under this section.

#### **305-3.02 Subgrade or Subbase Preparation**

- a. The subgrade or subbase to receive the lean concrete base, immediately prior to placing the lean concrete base thereon, shall conform to compaction and elevation tolerances specified for the material involved, shall be free of loose or

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extraneous material, and shall be uniformly moist but without any free standing water.

b. Areas of the subgrade or subbase on which lean concrete is to be placed which are lower than the grade established by the Engineer shall be filled with lean concrete at the Contractor's expense.

### **305-3.03 Placing**

a. Unless otherwise required by the plans, lean concrete base shall be placed in not less than 3.65 M (12') widths separated by longitudinal contact joints. Contact joints are those made by placing fresh concrete against hardened concrete.

b. Lean concrete base constructed monolithically in widths greater than 7.30 M (24') shall be constructed with a longitudinal weakened plane joint offset not more than 0.90 M nor less than 0.30 M from the centerline of the width being constructed.

c. The longitudinal weakened plane joints shall be constructed by the insert method using continuous strips of plastic or other material which will not react adversely with, or bond to, the concrete; by sawing; or by other methods acceptable to the Engineer. The minimum width of these joints shall be 3 mm. and their depth shall be equal to or greater than one quarter of the depth of the lean concrete base.

d. When a portland cement concrete pavement is to be placed over a lean concrete base, no longitudinal contact joints or longitudinal weakened plane joints shall be located within 30 cms. of the planned longitudinal joints in the concrete pavement.

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### **305-3.04 Transverse Joints**

- a. Transverse contraction joints are not required in lean concrete bases.
- b. Transverse construction joints shall be formed whenever there is an interruption of more than one hour in the placement of the lean concrete mixture. Construction joints shall be built in accordance with the requirements of Article 501-3.11d. except that load transfer dowels are not required.

### **305-3.05 Surface Finishing** - The surface of the lean concrete base shall be finished as specified in Article 501-3.12 except that:

- a. Lean concrete base to be surfaced with portland cement concrete pavement shall not be textured but shall be finished to a smooth surface, free of porous areas and of mortar ridges and other projections before curing compound is applied.
- b. Lean concrete base to be surfaced with bituminous concrete shall be textured with drag strips of burlap, a broom, or a spring steel tine device which will produce transverse scoring in the finished surface.
- c. Edging with an edging tool at forms and joints is not required.

### **305-3.06 Surface Test** - The finished surface shall not show high or low spots in excess of 1.25 cm in 3 meters when tested with a 3-meter straightedge. High spots shall be ground to within the specified tolerance. Low areas may be accepted provided they are filled with material from the subsequent pavement course at the Contractor's expense.

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### **305-3.07 Curing**

- a. Lean concrete base shall be cured with pigmented curing compound in accordance with the requirements of Article 501-3.14b.
- b. When the lean concrete base is to be surfaced with portland cement concrete pavement, a second application of curing compound at the rate of not less than one gallon per 15 square meters of base shall be applied just prior to placing the pavement to act as a bond breaker.

**305-3.08 Sealing of Joints and Cracks** - The sealing of joints and cracks in lean concrete base is not required. However, occasionally, due to environmental conditions or to lengthy delays in placing the pavement, wide cracks may develop in the lean concrete base. Where such cracks exceed 6 mm and a P.C. concrete pavement is to be placed, a 15 cm. wide strip of light roofing felt shall be placed over such wide cracks before placing the P.C. pavement to prevent reflective cracking.

### **305-3.09 Protection of Lean Concrete Base**

- a. The Contractor shall maintain and protect the lean concrete base until it is covered by the succeeding pavement course.
- b. No equipment and vehicles, other than those indicated below, shall be permitted on the base for 14 days. The Contractor shall remove and replace at his expense any base areas damaged by vehicles and equipment using the base prior to completing the 14 day curing period. Earth ramps and appropriate barricades to prevent traffic encroachments shall be constructed to control and facilitate the movement of traffic across the base.

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c. Where the succeeding pavement course is a portland cement concrete pavement, the slip form paver or the form traveling spreading and finishing machines may operate on the lean concrete base after 7 days of curing have elapsed but the base shall not be used as a haul road for loaded trucks until the full 14 days of curing have elapsed.

### **305-3.10 Thickness Tolerances**

a. The lean concrete base will be sampled and tested for compliance with the specified thickness in accordance with the requirements of Article 501-3.19 except that the thickness deficiency for which no penalty applies is increased to 1.0 centimeters.

b. Areas deficient in thickness between 1.0 and 2.5 centimeters may be corrected by increasing the depth of the surface course at the Contractor's expense. In such cases no penalty deduction applies to the base course.

c. Areas deficient in thickness by more than 2.5 cm. shall be removed and replaced or corrected as directed by the Engineer, at the Contractor's expense.

d. Areas with thickness of lean concrete base exceeding the plan thickness by more than 1 cm. shall be subject to removal of the excess material.

### **305-4 METHOD OF MEASUREMENT**

**305-4.01** Lean concrete base will be measured by the square meter complete in place and accepted. The width for measurement will be the width of the base shown on the typical cross sections in the plans and any additional widening where called for, or as otherwise directed in writing by the Engineer. The length will be measured horizontally along the centerline of each roadway or ramp.

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### **305-5 BASIS OF PAYMENT**

**305-5.01** The accepted quantities of lean concrete base measured as provided in paragraph 305-4.01 above will be paid for at the contract unit price per square meter. Such price and payment shall be full compensation for furnishing, placing, finishing and curing the concrete and for all materials, equipment, tools, labor, and incidentals necessary to complete the work as required by the plans and specifications; provided, however, that base found to be deficient in thickness and/or strength and allowed to remain in place will be paid for at a reduced unit price determined as follows:

- a. Where the average thickness of the lean concrete base, determined as provided in Article 3.10 above, is deficient by more than 5 mm. but not more than 25 mm. the reduction in unit prices, if applicable, will be computed in accordance with the following formula:

$$R = 3.6D$$

where R = Percentage reduction in unit price.

D = Deficiency in mm. in the thickness of the concrete pavement in excess of 5 mm.

- b. Where the compressive strength of the concrete is deficient but it is allowed to remain under the provisions of Article 305-2.06, the reduction in unit price will be computed in accordance with the provisions of Article 601-5.05 of Specification 601 - Structural Concrete, but no deduction will be made for deficiency in average core strength of 150 psi or less as per paragraph 305-2.06e.
- c. The percentage reductions in unit price for thickness and compressive strength deficiencies will be cumulative but will not exceed 90 percent of the contract unit price for any deficient concrete allowed to remain in place.

**SPECIFICATION 305 – LEAN CONCRETE BASE**

d. Where the deficiency in thickness of the lean concrete base is in excess of 25 mm. but it is allowed to remain in lieu of removal and replacement, payment for such deficient area retained will be limited to 10 percent of the contract unit price, unless corrected by additional thickness of surface course at the Contractor’s expense.

e. No additional payment over the contract unit price will be made for any lean concrete base which has an average thickness in excess of that shown on the plans or a strength in excess of that specified.

**305-5.02** Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Lean Concrete Base.....	Square Meter