

Subsection 4.05 Flexible Base

I. Scope: This item provides a foundation course composed of flexible base.

II. Materials: Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications. Notify the ODR or Engineer of the proposed material sources and of changes to material sources. The ODR may sample and test project materials at any time throughout the duration of the project to assure specification compliance. Use Tex-100-E for material definitions.

A. Aggregate: Furnish aggregate of the type and grade shown on the plans and meeting the requirements of Table 1. Each source must meet Table 1 requirements for liquid limit, plasticity index, and wet ball for the grade specified. Do not use additives such as but not limited to lime, cement or fly ash to modify aggregates to meet the requirements of Table 1.

**Material Requirements
Table 1**

Property	Test Method	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Master gradation sieve size (% retained)	Tex-110-E				As shown on plans	
2-1/2 in.				0		0
1-3/4 in.		0-10	0-10	0-10		0-5
7/8 in.		10-35	10-35	-		10-35
3/8 in.		30-65	30-65	-		35-65
No. 4		45-75	45-75	45-75		45-75
No. 40		65-90	65-90	50-85		70-90
Liquid Limit, max ¹	Tex-104-E	40	40	40	As shown on the plans	35
Plasticity Index, max ¹	Tex-106-E	10	10	12	As shown on the plans	10
Plasticity Limit, min ¹			As shown on the plans			
Wet ball mill, % max	Tex-116-E	40	40	-	As shown on the plans	40
Wet ball mill, % max Increase passing the No. 40 sieve		20	20	-		20
Min. compressive strength, psi	Tex-117-E				As shown on the plans	
Lateral pressure 0 psi		35	-	-		-
Lateral pressure 3 psi		-	-	-		90
Lateral pressure 15 psi		175	-	-		175

¹Determine plastic index in accordance with ASTM D427 (linear shrinkage) when liquid limit is unattainable as defined in ASTM D4318.

1. Material Tolerances: The ODR may accept material if no more than 1 of the 5 most recent gradation tests has an individual sieve outside the specified limits of the gradation. No one single test may exceed the allowable limit by more than 2 points.

2. Material Types: Do not use fillers or binders unless approved. Furnish the type specified on the plans in accordance with the following:

a) **Type A:** Crushed stone produced and graded from oversize quarried aggregate that originates from a single, naturally occurring source. Do not use gravel or multiple sources.

a) **Type B:** Crushed or uncrushed gravel. Blending of 2 or more sources is allowed.

Type C. Crushed gravel with a minimum of 60% of the particles retained on a No. 4 sieve with 2 or more crushed faces as determined by Tex-460-A, Part 1. Blending of 2 or more sources is allowed.

Type D: Type A material or crushed concrete. Crushed concrete containing gravel will be considered Type D material. Crushed concrete must meet the requirements in Subsection 4.05.II.E “Recycled Material (including crushed concrete) Requirements”, and be managed in a way to provide for uniform quality. The ODR may require separate dedicated stockpiles in order to verify compliance.

Type E: Caliche.

(1) Recycled Materials: Recycled asphalt pavement (RAP) and other recycled materials may be used. Request approval to blend 2 or more sources of recycled materials. Provide recycled materials that have a maximum sulfate content of 3,000 ppm when tested in accordance with Tex-145-E, including crushed concrete, the final product will be subject to the requirements of Table 1 for the grade specified. Certify compliance with DMS-11000, “Evaluating and Using Nonhazardous Recyclable Materials Guidelines,” for Contractor furnished materials. In addition, recycled materials must be free from reinforcing steel and other objectionable material and must have at most 1.5% deleterious material when tested in accordance with Tex-413-A. For RAP, do not exceed a maximum percent loss from decantation of 5.0% when tested in accordance with Tex-406-A. Test RAP without removing the asphalt. Remove Contractor-owned recycled materials from the project and dispose of them in accordance with federal, state, and local regulations before project acceptance.

B. Water: Water usage shall conform to Subsection 3.04 “Requirements for Water Usage.”

C. Material Sources: Expose the vertical faces of all strata of material proposed for use when non-commercial sources are used. Secure and process the material by successive vertical cuts extending through all exposed strata. The ODR reserves the right to inspect the pit location at any time throughout the project to ensure compliance with all material processing and handling requirements. Any observed or documented mishandling of materials in the pit or stockpile may be cause for rejection of that source, at the discretion of the ODR. All cost for sampling and acceptance testing required as a result of rejecting the material source shall be the responsibility of the Contractor.

III. Equipment

D. Compaction: Provide machinery, tools, and equipment necessary for proper execution of the work. Provide rollers in accordance with Subsection 4.27 “Rolling”.

E. Pulverization Equipment: Provide pulverization equipment that :

3. Cuts and pulverizes material uniformly to the proper depth with cutters that plane to a uniform surface over the entire width of the cut,
4. Provides a visible indication of the depth of cut at all times, and
5. Uniformly mixes the materials.

IV. Construction: Construct each layer uniformly, free of loose or segregated areas, and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans. Stockpile base material temporarily at an approved location before delivery to the roadway. Build stockpiles in layers no greater than 2 feet thick. Stockpiles must have a total height between 10 feet and 16 feet. After construction and acceptance of the stockpile, loading from the stockpile for delivery is allowed. Load by making successive vertical cuts through the entire depth of the stockpile. Do not add or remove material from temporary stockpiles that require sampling and testing before delivery. The Contractor will perform additional sampling and testing required as a result of adding or removing material. Haul approved flexible base in clean trucks. Deliver the required quantity to each 100 foot station or designated stockpile site. Prepare stockpile sites as directed. When delivery is to the 100 foot station, manipulate in accordance with the applicable Items.

F.Preparation of Subgrade or Existing Base: Remove or scarify existing asphalt concrete pavement in accordance with Subsection 4.30, “Removing Treated and Untreated Base and Asphalt Pavement.” Shape the subgrade or existing base to conform to the typical sections. Base material shall not be laid upon frozen

subgrade. Curb and Gutter shall be constructed and cured sufficiently prior to base being placed against Curb and Gutter. When new base is required to be mixed with existing base, deliver, place, and spread the new flexible base in the required amount per station. Manipulate and thoroughly mix the new base with existing material to provide a uniform mixture to the specified depth before shaping. Correct soft spots.

G. Placing: Spread and shape flexible base into a uniform layer with an approved spreader the same day as delivered. Construct layers to the thickness shown on the plans. Maintain the shape of the course. Control dust by sprinkling. Correct or replace segregated areas as directed, at no additional expense to the City. Flexible base shall be laid and compacted in courses no less than 4 inches or no more than 6 inches. Place successive base courses and finish using the same construction methods required for the first course.

H. Processing Existing Base: Before scarifying, clean the existing base of objectionable materials by blading, brooming or other methods, unless otherwise shown on the plans. Perform this work in accordance with applicable Subsections.

1. Types of Work:

- a) **Type A:** Scarifying only.
- b) **Type B:** Scarifying, salvaging, and stockpiling.
- c) **Type C:** Scarifying and reshaping.
- d) **Type D:** Refinishing.

2. Scarifying: Loosen and break existing base material, with or without existing asphaltic concrete pavement. Remove or scarify existing asphalt concrete pavement in accordance with Subsection 4.25, "Removing Treated and Untreated Base and Asphalt Pavement," when shown on the plans. Scarify existing material for its full width, unless otherwise shown on the plans. Break material into particles of not more than 2-1/2 inches.

3. Salvaging: Remove the existing base material and stockpile. Perform salvage operations while maintaining proper drainage. Remove scarified material and keep material free of contamination.

4. Replacing: Before replacing salvaged material, prepare subgrade as shown on the plans. Proof roll in accordance with Subsection 4.31 "Proof Rolling," when shown on the plans. Correct soft spots as directed.

Return and rework salvaged base material, with or without additional new base, on the prepared roadbed. Deposit salvaged material on the prepared subgrade and sprinkle, blade, and shape the base to conform to typical sections shown on the plans. When shown on the plans, place new base material and uniformly mix with salvaged material. Correct, or remove and replace, segregated material with satisfactory material as directed.

5. Stockpiling: Store salvage base material at a location shown on the plans. Prepare stockpile sites by removing and disposing of trash, wood, stumps, vegetation, and other objectionable materials as directed. Deliver salvaged material and construct stockpiles as directed.

6. Reshaping: Rework scarified base material with or without additional new base material, mix and shape scarified base to conform to the typical sections shown on the plans. When shown on the plans, furnish new base material, and uniformly mix with scarified material before shaping. Do not disturb the underlying subgrade. Correct, or remove and replace, segregated material with satisfactory material as directed.

7. Refinishing: Blade existing base surface to remove irregularities.

I. Compaction: Compact using density control. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. When necessary, sprinkle the material in accordance with Subsection 4.32, "Sprinkling. Begin rolling longitudinally at the sides and proceed towards the center, overlapping on successive trips by at least 1/2 the width of the roller unit. On superelevated curves, begin rolling at the low side and progress toward the high side. Offset alternate trips of the roller. Operate rollers at a speed between 2 and 6 mph as directed. Rework, recompact, and refinish material that fails to meet or that loses required moisture, density, stability, or finish before the next course is placed. Continue work until specification requirements are met. Perform the work at no additional expense to the City.

1. Ordinary Compaction: Correct irregularities, depressions, and weak spots immediately by scarifying the areas affected, adding or removing approved material as required, reshaping, and recompacting.

2. Density Control: Compact to at least 100% of the maximum density determined by Tex-113-E. Maintain moisture during compaction within +/- 2 percentage points of the optimum moisture content as determined by Tex-113-E. Measure the moisture content of the material in accordance with Tex-103-E during compaction daily and report the results the same day to the ODR. Do not achieve density by drying the material after compaction. The ODR or Engineer will determine roadway density and moisture content of completed sections in accordance with Tex-115-E. The ODR may accept the section if no more than 1 of the 5 most recent density tests is below the specified density and the failing test is no more than 3 pcf below the specified density..

J. Finishing: After completing compaction, clip, skin, or tight-blade the surface with a maintainer or subgrade trimmer to a depth of approximately 1/4 inch. Remove loosened material and dispose of it at an approved location. Seal the clipped surface immediately by rolling with a pneumatic tire roller until a smooth surface

is attained. Add small increments of water as needed during rolling. Shape and maintain the course and surface in conformity with the typical sections, lines, and grades. Correct grade deviations greater than 1/4 inch in 16 feet measured longitudinally or greater than 1/4 inch over the entire width of the cross-section in areas where surfacing is to be placed. Correct by loosening, adding, or removing material. Reshape and recompact in accordance with Section 4.05.IV.C, "Compaction." Finished base will be swept with a Power Broom or other acceptable means at the discretion of the ODR if deemed necessary before subsequent courses are applied

K. Curing: Cure the finished section until the moisture content is at least 2 percentage points below optimum or as directed before applying the next successive course or prime coat.

V. Measurement. Work and accepted material as prescribed for flexible base will be measurement will be by a unit of square yards of surface area of the flexible base, in place, for a specified thickness and shall be measured from toe of gutter to toe of gutter.

VI. Payment. The work performed and materials furnished in accordance with this Subsection and measured as provided under "Measurement" will be paid for at the unit price bid for the types of work shown below. All types of working base will be paid by the square yard. No additional payment will be made for thickness or width exceeding that shown on the typical section or provided on the plans for cubic yard in the final position or square yard measurement. Sprinkling and rolling, will not be paid for directly but will be subsidiary to this Subsection. When proof rolling is shown on the plans or directed, it will be paid for in accordance with Subsection 4.26, "Proof Rolling." Where subgrade is constructed under this Contract, correction of soft spots in the subgrade will be at the Contractor's expense. Where subgrade is not constructed under this contract, correction of soft spots in the subgrade will be paid in accordance with pertinent Subsections of by Article 10.1.1, "Change Orders" in the Uniform General Conditions for City of Amarillo Civil Construction Contracts. . This price is full compensation for furnishing materials, temporary stockpiling, assistance provided in stockpile sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials, spreading, blading, mixing, shaping, placing, compacting, reworking, finishing, correcting locations where thickness is deficient, curing, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

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