

SECTION 02234

RECYCLED CRUSHED CONCRETE BASE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Recycled crushed concrete base (RCCB) course.

1.02 UNIT PRICES

- A. Measurement of and payment for RCCB is on a square yard basis for properly installed material. Separate measurement will be made for each different required thickness of base course.

1.03 SYSTEM DESCRIPTION

- A. Provide RCCB with following performance:
 - 1. Minimum 5 percent cement.
 - 2. Minimum Compressive Strength: 650 psi at 7 days following TxDOT Tex-120-E.
 - 3. Prepare concrete product in an on- or off-site pug mill, or in an on- or off-site portable concrete mixer.
- B. Preliminary Design: Prepare preliminary mix for 4 cement ratios; 5, 6, 7 and 8 percent.
 - 1. Designate source of concrete for crushing. Follow Section 01410- Testing Laboratory Services for tests of concrete from source.
 - 2. Results of compression tests will be used by Engineer to select the final mix design.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of all sections and provisions of these specifications.
- B. Submit samples of crushed concrete, gravel, and soil binder for testing.
- C. Submit weight tickets, certified by supplier, for each delivery of crushed concrete and cement to mixing site.

- D. Submit manufacturer's description and characteristics for pug mill and associated equipment, mixer trucks, spreading machine, and compaction equipment for approval.

1.05 TESTS

- A. Follow Section 01410- Testing Laboratory Services.
- B. Test and analyze aggregate and binder products following TxDOT Tex-110-E.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Make stockpiles from layers of processed aggregate without segregation of materials. Load material by making successive vertical cuts through entire depth of stockpile.
- B. Store cement in weatherproof enclosures. Protect from ground dampness.

PART 2 PRODUCTS

2.01 PORTLAND CEMENT

- A. ASTM C150 Type I, II or III; bulk or sacked.

2.02 WATER

- A. Potable.

2.03 AGGREGATE

- A. Recycled Crushed Concrete: Material retained on the No. 40 Sieve, and durable coarse particles of crusher-run reclaimed cured Portland cement concrete, obtained from an approved source. Organic material is prohibited.
- B. Soil Binder (classified below): Meeting the following requirements when tested following TxDOT Tex-106-E:
 - 1. Maximum Liquid Limit: 35
 - 2. Maximum Plasticity Index: 10
- C. Mixed Aggregate and Soil Binder: Grading following Tex-101-E and Tex-110-E within the following limits:

Sieve	Percent Crushed Concrete Retained
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1-3/4"	0 to 10
No. 4	45 to 75
No. 40	55 to 80; classified as "Soil Binder"

1. Obtain prior permission from Director for use of additives to meet above requirements.

2.04 ASPHALTIC SEAL CURE

- A. Use following as Contractor's option to curing by sprinkling, at no additional cost or time.
- B. Cut-back asphalt: MC30 following Section 02511.
- C. Emulsified petroleum resin: EPR-1 Prime following Section 02511.

2.05 MATERIAL MIX AND MIXING EQUIPMENT

- A. Design mix for minimum compressive strength of 650 psi at 7 days following Tex-120-E unconfined compressive strength.
- B. Cement Ratio: Follow Paragraph 1.04 A. Increase cement content in one percent steps up to 8 percent maximum if compressive strength of design mix samples and field samples of installed product fail above test.
- C. Mix following Paragraph 1.04 A, with metering devices adding specified quantities of crushed concrete, cement, and water into mixer. Dry mix crushed concrete and cement to prevent cement balls from forming when water is added. Produce homogeneous and uniformly mixed product.

2.06 SOURCE QUALITY CONTROL

- A. Test following Section 01410.
- B. Designate single source of crushed concrete for work.
- C. Test for unconfined compressive strength following Test Method Tex-120-E as follows:
 1. Mold 3 samples each day or for each 1,000 tons of production.
 2. Compressive Strength: Average of 3 tests for each production lot.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Follow Section 01410- Testing Laboratory Services.
- B. Verify buried utility work is complete.
- C. Verify subgrade is ready to support imposed loads.
- D. Verify flatwork, foundations, projecting reinforcement and similar work interfacing to base is in place.
- E. Verify lines and grades are correct.

3.02 PREPARATION

- A. Have sufficient products and equipment on hand to expeditiously apply base.

3.03 MIXING

- A. Maintain moisture content of mixture between optimum and 10 percent above optimum.

3.04 PLACEMENT

- A. Do not mix and place cement stabilized base under following conditions:
 - 1. When temperature is below 40 degrees F and falling. Base may be placed when temperature taken in shade and away from artificial heat is above 35 degrees F and rising.
 - 2. When precipitation is falling or is forecast to fall before initial set takes place.
- B. Place base on prepared subgrade in uniform layers of 8 inches or less to produce thickness indicated on Drawings. Do not dump material in piles or windrows.
- C. Place mixture with approved spreading machine. Spread to eliminate planes of weakness or pockets of nonuniformly graded material resulting from hauling and dumping operations.
- D. Provide approximately vertical construction joints between fresh base and base in place 4 hours or longer. Form joint with a temporary header or make vertical cut of in-place base immediately before placing fresh base.
- E. Make cold joints at centerline of head-to-head parking stalls.
- F. Place base so that projecting reinforcing steel from curbs remain at approximate center of base. Provide proper bond between reinforcement and base.

3.05 COMPACTION

- A. Start compaction maximum 3 hours after start of moist mixing. Compact loose mixture with approved tamping rollers until entire depth is uniformly compacted. Do not allow base to mix with underlying material.
 - 1. Do not rework uncompacted material which has sat for more than 30 minutes.
 - 2. Complete compaction within 6 hours from start of moist mixing.
- B. Correct irregularities or weak spots immediately by replacing material and recompacting.
- C. Apply water to maintain moisture between optimum and 5 percent above optimum moisture.
- D. Remove and reconstruct sections where average moisture content exceeds ranges specified at time of final compaction.
- E. Finish by blading surface to final grade after compacting final course. Seal with approved pneumatic tired rollers or flat wheel rollers which are sufficiently light to prevent surface hair line cracking. Rework and recompact at areas where hairline cracking develops.
- F. Compact to minimum density of 95 percent of modified Proctor density, following TxDOT Tex -114-E, at a moisture content of treated material between optimum and 5 percent above optimum.
- G. Maintain surface to required lines and grades throughout operation.

3.06 CURING

- A. Moist cure for minimum of 72 hours before adding pavement courses. Prevent construction traffic on base for minimum 3 days, except light vehicles used to maintain proper cure are permitted on base after initial set or as permitted by the Director.
- B. Use sprinkling or, at Contractor's option, apply following curing membrane as soon as initial set begins, using approved light-weight self-propelled pressure distributor:
 - 1. MC30: 0.1 gallon per square yard.
 - 2. EPR-1 Prime: 0.15 gallon per square yard.

3.07 TOLERANCES

- A. Completed Surface: Smooth and conform to typical section and established lines and grades.
- B. Top Surface of Base Course: Plus or minus 1/4 inch in cross section or in 16 foot length.

3.08 FIELD QUALITY CONTROL

- A. Test following Section 01410- Testing Laboratory Services.
- B. A minimum of one core will be taken at random locations per 1,000 linear feet per lane of roadway or 1000 square yards of base to determine in-place depth.
- C. Contractor may, at Contractor's own expense, request additional cores in the vicinity of cores indicating nonconforming in-place depths. If the average of the tests falls below the required depth, place and compact additional material at no cost to the Owner.
- D. Perform compaction tests following TxDOT Tex-114-E at a random location near each depth determination core. Rework and recompact areas failing compaction requirements.
- E. Fill cores and density test sections with new and properly mixed, placed and compacted base product.

3.09 PROTECTION

- A. Maintain base in proper condition until completion of work. Repair defects immediately by replacing base to full depth.
- B. Curing membrane may remain in place at areas where surface courses or other base courses are applied.

END OF SECTION