

**ITEM 010410**

**Item 0104101 - RECONSTRUCT REINFORCED CONCRETE PAVEMENT BASE**

**Item 0104102 - CONSTRUCT NEW REINFORCED CONCRETE PAVEMENT BASE**

**DESCRIPTION**

Under item #0104101 this work shall include all materials, equipment, sawcutting and tools required for the excavation, removal and disposal of existing bituminous concrete surface, existing reinforced concrete base and existing sub-base materials to the proper depth as required for the reconstruction of an 8" reinforced concrete pavement base on a 6" processed traprock foundation where required on the plans or as designated by the Engineer.

Under item #0104102 this work shall include all materials, equipment, sawcutting and tools required for the excavation, removal and disposal of existing bituminous concrete surface, existing gravel base or sub-base materials to the proper depth as required for the construction of a new 8" reinforced concrete pavement base on a 6" traprock foundation where required on the plans or as designated by the Engineer.

In all cases, the new reinforced concrete pavement base shall be a minimum of 8" thick with 6" x 12" No. 4 welded wire mesh reinforcement constructed over a new 6" thick processed traprock foundation

**There will be no additional payment for dowels, processed traprock base, wire mesh, anchors, expansion joint material, or saw cutting required for the completion of this work.**

**REFERENCED ITEMS**

Items 0102601 and 0103702

**REQUIRED SUBMITTALS**

Material Certificate of Compliance:

Submit 5 copies of material certificate of compliance for concrete in accordance with the contract general requirements

**MATERIALS****1. CEMENT CONCRETE**

The cement shall be composed of Portland cement, fine and coarse aggregates and water mixed in the following proportions by weight:

**QUANTITIES PER CUBIC YARD****a.) Normal Mix (96 Hour Cure)**

Cement	550 lbs.
Sand (dry)	1,165 lbs.
Stone (dry) 1 1/4"	1,130 lbs.
Stone 3/4"	430 lbs.
Stone 1/2"	430 lbs.
Water (Max.)	31 gals.
Entrained Air	5%+1%
Slump (24-hour)	3 inches (max)
Strength (96 hours)	3000 psi (min.)

**b.) 48 Hour Cure**

Cement	650 lbs.
Sand (dry)	1,165 lbs.
Stone (dry) 1 1/4"	1,280 lbs.
Stone 3/4"	410 lbs.
Stone 1/2"	410 lbs.
Water (Max.)	31 gals.
Entrained Air	5%+1%
Slump (24-hour)	3 inches (max)
Strength (48 hours)	3000 psi (min.)

**c.) 24 Hour Cure**

Cement	750 lbs.
Sand	1,120 lbs.
Stone ( 1-1/4")	1,260 lbs.
Stone (3/4")	390 lbs.
Stone (1/2")	390 lbs.
Water	34 gals. (max.)
Air	5 percent ( $\pm$ 1%)
Slump	3 inches (max.)

Strength (24 hours) 3000 PSI (min.)

The proportions are based on the weights of cement and surface dry aggregates and on bulk specific gravity's of 2.65 for fine aggregate and 2.90 for coarse aggregate. Appropriate corrections shall be made for aggregates having appreciably different density.

2. **CEMENT**

All cement shall be Portland cement meeting the requirements of ASTM C-150-04 (or latest revision in effect at this time), Type II. If Type II is unavailable, special written permission from the Engineer will be required to substitute Type I cement. Cement shall be tested as specified in ASTM C-150-04

3. **SAND**

The fine aggregate shall be washed sand consisting of clean, hard, durable, uncoated particles of quartz rock free from soft or flaky material, loam or organic material or other injurious material. Fine aggregate shall contain not more than three percent of inorganic silt or clay (material passing No. 200 sieve) using ASTM C-117-03. Fine aggregate subjected to the test for organic impurities, ASTM C-40-04, and producing a color darker than the standard shall be rejected. Fine aggregate subjected to five cycles of the Soundness Test, ASTM C-88-99, shall have a loss of not greater than 10 percent when sodium sulfate is used or 15 percent when magnesium sulfate is used. If after the fine aggregate has been subjected to ten cycles of freezing and thawing AASHTO Method T-103-91, between the temperatures of -5° + 70°F, more than three percent of the aggregate retained on the No. 50 sieve passes the No. 50 sieve, the material may be rejected.

Fine aggregate shall be uniformly graded to meet the following gradation requirements:

Sieve Size/ Total Percent Passing

3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100
100	95-100	80-100	50-85	25-60	10-30	2-10

The above gradation represents the extreme limits of material passing the sieves. Not more than 40 percent shall be retained between any two consecutive sieves and the fineness modules shall not be less than 2.3, and

not more than 3.1. If the fineness modules of the fine aggregate varies more than 0.20 from the value of the representative sample of the source being used, the material may be rejected.

**4. STONE**

The coarse aggregate shall be crushed traprock consisting of clean, hard, tough, durable fragments of uniform quality rock. It shall be free of soft disintegrated pieces, dirt, organic or other injurious material and shall contain not more than one percent crushed dust by weight. Coarse aggregate subject to five cycles of the Soundness Test, ASTM C-88-99, shall have a loss not greater than seven percent when sodium sulfate is used or ten percent when magnesium sulfate is used. Loss abrasion, ASTM C-131-03, shall not be more than 40 percent .

WOVEN WIRE A.S.T.M. SIEVES  
TOTAL PERCENT PASSING

SIEVE SIZES	NORMAL SIZES OF STONE			
	2"	1 1/4"	3/4"	1/2"
2 1/2"	100			
2"	95-100			
1 1/2"	35-70	100		
1 1/4"	0-25	90-100		
1"	0-10	35-70	100	
3/4"		0-25	90-100	
1/2"		0-5	20-50	90-100
3/8"			0-20	25-50
#4			0-5	0-8
#8				0-3

**5. WATER**

For use in concrete must be clean and free from objectionable impurities. In general, water from City mains shall be used.

**6. AIR ENTRAINING AGENT**

The air entraining agent used to produce the required percentage of entrained air shall be the "Darex" or equal manufactured by Grace Construction Products and shall meet the requirements of ASTM C-260-01. The agent shall be added at the same time as the mixing water. Prior to

adding the agent, the material producer shall discuss and recommend the appropriate "Darex" product for the purpose intended.

7. **ACCELERATOR**

Only when ordered by the Engineer a calcium chloride solutions (one pound of calcium chloride per quart of solution) shall be added to the concrete at the rate of one quart of solution per bag of cement as part of the mixing water.

8. **SLUMP**

The slump of the concrete upon discharge from the truck at the job site shall not exceed 3".

2. **REINFORCING**

Welded wire mesh shall be plain finish, 6" x 12", No. 4 gage welded steel wire conforming to ASTM A-82-01, ASTM A-497-02, (AASHTO M32-03). The weight of material shall not be less than 44 pounds per 100 square feet. Wire mesh shall be provided in flat sheet form only.

Dowels for expansion joint shall conform to the material requirements of item 0102601

Anchors for construction joints shall be 5/8" diameter dowel bars forged from ASTM A-615-04 grade deformed 60 steel reinforcing rod with 5/8" threaded splicer with nailing flange. Anchors shall be DB-SAE splicers as manufactured by the Richmond Screw Anchor Company, or approved equal.

3. **FOUNDATION**

Process traprock shall conform to the material requirements of item 0103702.

**CONSTRUCTION METHODS**

All existing concrete pavement base adjacent to new concrete shall be cut with a concrete saw and the cut shall extend only to the top of the existing reinforcing wire mesh. The concrete below this reinforcement shall be removed with a pavement breaker. The existing reinforcing wire mesh shall be tied to the newly placed reinforcing wire mesh prior to placement of new concrete. In situations where this is not practical or reinforcing wire mesh is not present, anchors shall be provided in lieu of wire mesh. Anchors shall be DB-SAE splicers as manufactured by the

Richmond Screw Anchor Company or approved equal with hooked 5/8" dowel bars forged from ASTM A-615-04 Grade 60 deformed rebar material (steel). Splicer to be 5/8" and threaded with nailing flange. Saw cutting for the full depth of the concrete base will be allowed if anchors are utilized exclusively in each repair location. No additional payment will be made for saw cutting under any circumstances.

**1. MIXING AND TRANSPORTING CONCRETE**

All concrete shall be plant-mixed or transit-mixed. If the concrete is mixed at the plant, it shall be transported to the job in truck mounted drum-type mixer agitators. Concrete shall be discharged from the truck at the job site not more than 1 1/2 hour after water is introduced into the batch.

Measuring, batch in, mixing, agitation and transporting of the concrete shall be as specified in AASHTO "SPECIFICATIONS FOR READY MIXED CONCRETE" M157-97, latest revision.

**2. REINFORCING**

- a. Longitudinal wires for wire mesh shall be spaced 6" on centers and transverse wires spaced 12" on centers.

The wire mesh shall be placed 4"± 1/2" above the bottom surface of the concrete. Adjacent pieces of mesh shall be lapped at least 8". The mesh shall be placed so that wires spaced 6" apart are parallel to curbs and traffic lanes.

**3. JOINTS**

(1.) Longitudinal Joints

When constructing or reconstructing concrete pavement for the entire width of traveled way, a longitudinal construction joint will be required to accommodate traffic during construction.

Joints shall be neatly formed and shall be a butt type joints, with anchors placed at the mid point of the slab. Abutting slabs at longitudinal joints shall be tied together with anchors spaced 2 foot on center. Anchors shall be DB-SAE splicers as manufactured by the Richmond Screw Anchor Company or approved equal with hooked 5/8" dowel bars forged from ASTM A-615-04 Grade 60 deformed rebar material (steel). Splicer to be 5/8" and threaded

with nailing flange. Saw cutting for the full depth of the concrete base will be allowed if anchors are utilized exclusively in each repair location. No additional payment will be made for saw cutting under any circumstances. If the construction phasing allows a pour from curb to curb, a longitudinal control joint shall be cut along the centerline in accordance with the requirements for transverse control joints.

(2.) Transverse Control Joints

Transverse control joints shall be placed every forty feet (40') or as otherwise indicated on the plans or ordered by the Engineer. Joints shall be a depth of one third the depth of the slab and a minimum width of one quarter inch (1/4"). The following methods are acceptable for the formation of joints:

- a). Formed grooves shall be made by depressing an approved tool or device into the plastic concrete. The tool or device shall remain in place until the concrete has attained its initial set and shall then be removed without disturbing adjacent concrete.
- b). Sawed joints shall be created by sawing grooves in the surface of the pavement with an approved concrete saw. After each joint is sawed, the saw cut and adjacent concrete surface shall be thoroughly cleaned.

Sawing of the joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling, usually 4 to 24 hours. All joints shall be sawed before uncontrolled shrinkage cracking occurs. If necessary, the sawing operations shall be carried on both day and night, regardless of weather conditions. A standby saw shall be available in the event of breakdown. Sawing shall be discontinued if a crack develops ahead of the saw. In general, all joints shall be sawed in sequence. If extreme conditions make it impracticable to prevent erratic cracking by early sawing, the contraction joint groove shall be formed prior to initial set of concrete, as provided above.

(3.) Transverse Construction Joints

Transverse construction joints shall be placed whenever the placing of concrete is suspended for more than 30 minutes or when new concrete base is to be constructed adjacent to the existing concrete base. When a joint falls

within 5 feet of a utility structure, adjust the location to fall on the center of round structures and at or between the corners of rectangular structures.

Joints shall be neatly formed and should be a butt type joint with anchors placed at the midpoint in the slab. Anchors shall be DB-SAE splicers as manufactured by the Richmond Screw Anchor Company or approved equal with hooked 5/8" dowel bars forged from ASTM A-615-04 Grade 60 deformed rebar material (steel). Splicer to be 5/8" and threaded with nailing flange. Saw cutting for the full depth of the concrete base will be allowed if anchors are utilized exclusively in each repair location. No additional payment will be made for saw cutting under any circumstances.

(4). Transverse Expansion Joints

Transverse expansion joints will be required at 120 foot intervals along the roadway centerline and/or in the locations called for on the plans. 5/8" x 24" round steel dowels shall be placed along the entire joint at 2' O.C. spacing. Prior to pouring of concrete slabs, dowels shall be placed 4" up from the bottom of the slabs to be poured, and one end of the dowel shall be coated or dipped in hot 60-70 penetration asphalt cement, viscosity grade AC-20, conforming to the requirements of AASHTO M20-70. Dowels shall be intermediate grade steel conforming to AASHTO M-31-03, and ASTM A-615A. No. 8 deformed steel bars will not be accepted as dowels. Expansion joint material shall be non-extruding pre-molded joint material consisting of cork granule base in a watertight asphalt binder between two layers of asphalt impregnated paper. The expansion joint material is to be 3/4" thick and extend the entire width of the slab to be poured. Expansion joint fillers shall be placed 1/4" below the surface of the concrete. Expansion material shall meet AASHTO Specification M33-99.

(5). Sealing Joints

All control and expansion joints shall be filled with joint-sealing material before the pavement is opened to traffic and as soon after completion of the curing period as is feasible. Just before sealing, each joint shall be thoroughly cleaned of all foreign material, and joint faces shall be clean and surface-dry when seal is applied. The joint seal material shall be applied hot and shall be stirred during heating to prevent localized overheating and shall be AC-20. The sealing material shall be applied to each joint opening as directed by the Engineer. The joint filling shall be done without spilling material on the exposed surfaces of the concrete. Any excess material on the surface of the concrete shall be removed immediately and the pavement



surface cleaned. The use of sand or similar material to cover the seal shall not be permitted. Joint-sealing material shall not be placed when the air temperature in the shade is less than 50 degree F., unless approved by the Engineer.

4. **PLACING OF CONCRETE**

The concrete shall be discharged and placed in a manner which will prevent separation of coarse aggregate and mortar. Concrete shall always be placed starting at the low end of the section and working upgrade.

Before placement of the concrete, the subbase shall be thoroughly moistened. This shall be done far enough in advance of placement to allow absorption of water to a depth of at least 1", leaving a moist but not muddy surface.

The finished thickness of the concrete base shall be at least 8". The concrete shall be placed to a uniform cross section consistent with the proposed cross slope and flush with existing concrete base.

The time elapsing from the time water is added to the mix until the concrete is placed shall not exceed 90 minutes. In hot weather, the maximum allowable time may be reduced by the Engineer.

5. **CURING CONCRETE**

1). Normal Condition

All cement concrete shall be cured. The surface of the concrete shall be covered immediately after the initial set in such a manner that the surface is not damaged and shall be kept covered for at least the minimum cure time for the concrete mix being used. Enough cover material shall be placed to cover the edges after forms have been removed.

Covering shall be burlap or cotton mats kept saturated, waterproof double-sheet asphalt cemented Kraft paper reinforced in both directions, meeting ASTM specifications C-171-03.

Kraft paper, if used, shall be lapped at least 12", the lap and edges of the paper shall be securely weighted down with continuous planks, piles of earth or other material to keep edges down tight. Rocks and stones shall not be used. Before reusing paper covers, they shall be checked for tears, or

holes and shall be repaired. Covers which have become unserviceable will be rejected by the Engineer.

**NOTE:** No liquid membrane-forming compound will be allowed for curing.

## **2. Cold Weather Protection**

When concrete is being placed and the air temperature may be expected to drop below 35 degree F, such concrete shall be protected by first covering as specified in (a) above, upon which cover shall be placed a layer of hay or straw, 6" to 8" in thickness, over which another layer of paper or mats shall be spread and the edges of these covers shall be firmly fastened in place. The protecting material shall remain in place for such time as the Engineer may direct, and any concrete incurred by frost action shall be removed and replaced at the contractor's expense.

## **6. USE OF NEW CONCRETE**

Bituminous concrete binder shall not be placed until the concrete has reached a strength of 3000 p.s.i. Vehicular traffic and construction equipment shall be excluded from the concrete surface until the specific cure time has taken place. Any damage to the pavement from traffic or any other causes shall be repaired by the contractor at his own expense. Concrete cylinder testing will be used to determine the strength of concrete. Testing will be coordinated and paid for by the contractor.

## **METHOD OF MEASUREMENT**

This work will be paid for at the contract unit price per square yard for "RECONSTRUCT REINFORCED CONCRETE PAVEMENT BASE" OR "CONSTRUCT NEW REINFORCEMENT CONCRETE PAVEMENT BASE" completed and accepted, including all equipment, materials, tools, labor and incidental expenses thereto.

## **BASIS OF PAYMENT**

This item shall be paid for at the contract unit price per square yard for "RECONSTRUCT REINFORCED CONCRETE PAVEMENT BASE" OR "CONSTRUCT NEW REINFORCED CONCRETE PAVEMENT BASE" completed and accepted which price shall include all materials, equipment, tools, labor, and incidental work required for the excavation, removal and disposal of existing bituminous concrete surface, concrete base or existing flexible base materials, and subbase materials and the excavation and repair or construction of an 8" reinforced concrete pavement base.

There will be no additional payment for the installation of wire mesh, processed traprock base, dowels, anchors, expansion joint material, and saw cutting that is required unless otherwise specified.

<u>PAY ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
0104101	Reconstruct Reinforced Concrete Pavement Base	SY
0104102	Construct New Reinforced Concrete Pavement Base	SY