

Section 304. RUBBLIZING PORTLAND CEMENT CONCRETE PAVEMENT

304.01 Description. Work consists of shattering a reinforced or non-reinforced Portland cement concrete (PCC) pavement to construct a rubblized base. Disposal of all excess and unsuitable material shall be according to subsection 205.03.P.

304.02 Materials. Filler aggregate shall meet the following requirements.

Dense-Graded Aggregate 21AA 902

304.03 Construction.

A. **Equipment.** Suppress dust generated from the pavement shattering operation with an approved water system. Two general types of equipment may be used to rubblize the pavement:

1. Self-contained, self-propelled pavement breaking machine that uses a resonant frequency to produce low amplitude breaking force of approximately 2000 pounds at an impact rate of not less than 44 blows per second;
2. Self-contained, self-propelled pavement breaking machine with multiple impact hammers directly adjacent to each other. Each hammer shall be capable of lifting and falling in an independent, adjustable, random sequence and to vary the force of impact. Each individual hammer shall not exceed 1200 pounds in weight, except wing-hammer weights shall not exceed 1500 pounds. The breaking width may vary from 3 to 14 feet. The number of hammers and their spacing arrangement may vary depending on the desired width of each rubblizing pass.

B. **Preparation Work.** The following work activities must be completed prior to commencing pavement rubblizing.

1. A relief joint shall be saw cut full depth where the rubblizing abuts concrete pavement remaining in place or being removed for other purposes.
2. Any pavement widening or shoulders shall match the elevation of the adjacent pavement to be rubblized.
3. Construction of the drainage system for the new pavement structure, including the outlet endings, shall be completed.
4. Remove any pavement designated on the plans, or as directed by the Engineer, over utilities or pipes with less than 18 inches of granular material cover, as measured from the bottom of the pavement to the top of the utility or pipe. Extend the limits for pavement removal 3 feet beyond each edge of the utility or pipe. The removal area shall be backfilled with 21AA filler aggregate (maximum 6 inch lift) and thoroughly compacted. Removal of any concrete pavement shall be paid for separately as Pavement Removal.

5. All loose joint materials and HMA patching materials can be removed, but the resulting voids shall not be filled with filler aggregate prior to rubblizing. Patching material shall not be removed if the resulting void depth impedes the ability of the equipment to fracture the concrete.

C. **Quality Control Checks.** The following checks shall be performed by the Contractor to assure the specified rubblizing requirements are being achieved. Documentation of these check items shall be provided to the Engineer on the day checks are performed.

1. At the initiation of and during rubblizing, establish, demonstrate and document capability of the equipment, including the machine's speed and impact frequency, to achieve the required result.
2. At a minimum frequency of once per lane per 1500 feet, inspect the rubblized pavement to determine whether the reinforcement is de-bonded and the specified particle size has been achieved as described in section 304.03.F.2. An inspection site should avoid areas containing a transverse joint or working crack. When inspecting above the reinforcement, the removal of rubblized material shall be by manual methods only. Once de-bonding of the reinforcement is determined, mechanized equipment may be used to facilitate inspection below the reinforcement. Inspection sites shall be restored with filler aggregate and compacted. The Engineer may adjust the inspection frequency depending on results.
3. The completed finished surface shall have a uniform appearance without unbroken strips of pavement, exposed reinforcement, or visible joint filler and HMA patching material.

D. **Compaction.** Before the HMA mixture is placed, the rubblized pavement shall be uniformly compacted by both vibratory steel-wheeled and pneumatic-tired rollers in the following sequence:

1. One pass with a vibratory roller
2. One pass with a pneumatic-tired roller
3. Two passes with a vibratory roller. To ensure compaction, the second pass shall be conducted on the same day that the HMA pavement is placed and timed to occur just before the paving operation.

A pass is defined as down and back in the same path. Each roller shall have a nominal gross weight of not less than 10 tons. Vibratory rollers shall be operated in the maximum vibration mode. Rollers shall be operated at a speed not to exceed 6 feet per second.

When required to aid in compaction, water shall be uniformly applied just before the third roller pass at a maximum rate of 6 units per lane mile.

The finished surface, after compaction, shall be within a level grade tolerance of ± one inch before placing the HMA pavement. Voids and depressions shall be filled with filler aggregate and compacted.

- E. **Miscellaneous.** Vehicular traffic will not be allowed on the rubblized pavement before the HMA pavement is placed, except as required by the Engineer to maintain traffic. Portions of the rubblized pavement used for crossroad or ramp traffic shall be maintained in a compacted state.

In part-width construction areas, rubblize to a distance not less than 18 inches beyond centerline or lane line.

- F. **Acceptance Criteria.** The PCC pavement shall be completely shattered full-depth, in a uniform manner by rubblizing. The Engineer will use the following criteria to accept the rubblizing work.

1. The reinforcement, if present, has been de-bonded from the concrete to allow the pavement to function as an unbound aggregate base.
2. The non-reinforced PCC pavement is reduced to unbound particles with a nominal diameter of less than 8 inches. When reinforcement is present, the nominal diameter for particles above the reinforcement ranges from 2 to 5 inches. Sporadic particles exceeding 8 inches are allowable below the reinforcement if de-bonding of the reinforcement in the vicinity of the particle is verified. No oversized particles are present at the surface for any PCC pavements.
3. All exposed reinforcement at the surface has been removed by cutting it off below the surface. Embedded reinforcement can remain in place.
4. The compacted surface has no visible remains of joint sealant or HMA patching material. After rubblizing, resulting voids have been filled with filler aggregate and compacted.
5. Concrete pavement patches, if present, were rubblized as specified in item 2.
6. Any cracks having a nominal width of greater than 1/4 inch at the surface and joints are no longer distinguishable.
7. The underlying base or subgrade has not been displaced.

304.04 Measurement and Payment.

Contract Item (Pay Item)	Pay Unit
Rubblized Pavt	Square Yard
Filler Aggregate, LM	Cubic Yard
Water	Unit
Steel, Hand Pick	Pounds
Saw Cut, Rubblize	Foot

- A. Payment for **Rubblized Pavt** shall include the cost of performing all required quality control work items, furnishing labor, materials, and equipment necessary to rubblize, suppress dust, remove joint fillers and patching material, break down or remove and dispose of oversized pieces of rubblized pavement, and compact and maintain the compacted condition of the rubblized pavement until the HMA pavement is placed.
- B. **Filler Aggregate, LM** shall be measured based on hauling unit dimensions and load count, prior to placement and compaction. Payment for **Filler Aggregate, LM** shall include the cost of producing, delivering, placing, leveling, and compacting the aggregate at required locations in the rubblized pavement.
- C. **Water** shall be measured in 1000 gallon increments (units). Payment includes all costs for procuring, hauling and placing on the rubblized pavement.
- D. Payment for **Steel, Hand Pick** will include cutting exposed steel, then loading, hauling, and disposing of the steel, and immediate restoration of any disturbed rubblized concrete.
- E. **Saw Cut, Rubblize** includes cutting a relief joint full depth where the rubblizing abuts concrete pavement remaining in place or begin removed for other purposes.