To:		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 96-030

Title: **RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT**

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Approved:

P. J. Clark, Deputy Chief Engineer, Design Division — Date: 5/8/96

This Engineering Instruction (EI), along with EI 96-029, supersedes EIs 90-33 and 90-09.

EFFECTIVE DATE:

The specifications transmitted by this EI are effective beginning with August 15, 1996 lettings. They will be Main Office inserts into contract documents.

TRANSMITTED SPECIFICATIONS:

1. Special Specification 18502.7596 M, "Rubblizing Existing PCC Pavement", and
2. Special Specification 18502.7596, "Rubblizing Existing PCC Pavement".

AFFECTED PAY ITEMS: Disapprove Item 18502.7590, Rubblizing Existing Portland Cement Concrete Pavement.

DESIGN CONSIDERATIONS:

1. It is essential to consult the Regional Geotechnical Engineer to ensure proper subsurface conditions exist before a rubblizing contract is progressed. If the material beneath the existing portland cement concrete (PCC) pavement is not strong or stable enough to support the rubblizing operation, or the water table is located near the subbase, conditions will arise that are expensive to address.

2. Rubblizing is appropriate under the following conditions:

   - A significant amount of thermal movement within the PCC pavement occurs at transverse slab cracks, rather than at transverse joints, and

     i. The presence of utilities precludes the use of cracking and seating, or

     ii. A flexible pavement widening is to be constructed adjacent to the existing pavement.

   Generally, when more than 25 percent of the pavement slabs have open cracks, a significant amount of thermal movement is occurring at cracks. If less than 25 percent of the pavement slabs have open cracks, rubblizing is generally not appropriate unless one or more of the following conditions exist.

- The pavement has extensive and severe full-depth spalling at joints and cracks. This spalling typically results from an adverse reaction between concrete mix components, not from reinforcing steel located too close to the surface. It is so pervasive that using spall repair items becomes cost prohibitive. This condition may exist with any severity and frequency of cracking.

- A combination of distresses exists that precludes the use of Cracking and Seating or Sawing and Sealing. This combination may include high severity joint faulting, separated transverse or longitudinal joints, and extensive spalling.

Consult the Regional Materials Engineer to ensure the appropriate pavement distresses exist to warrant the use of this item.

3. Include pay items within contract documents for the following:

- Installing underdrains. Consult the Regional Geotechnical Engineer for appropriate pay items, placement depth, and outlet locations. Drains must be located on both sides and along the entire length of the pavement to be rubblized. Provide positive outlets at maximum increments of 90 m (300 feet). Increments of 25 - 30 m (75 - 100 feet) are highly desirable.

- Milling existing asphalt overlays, if applicable. Complete this work in accordance with §490, Cold Milling.

- Sawcutting concrete pavement, if applicable. Longitudinal joint ties must be severed where rubblized pavement abuts PCC pavement to remain intact.

4. Include pay items and a detail for excavating the pavement and repairing the subbase/subgrade. These should be included even if the Regional Geotechnical Engineer indicates good subbase and subgrade conditions generally exist. This is because isolated areas of poor support are likely to exist within a rubblizing job. It is not practical to assess the entire subsurface to identify each area, so the plans should be prepared to address these areas as they are encountered in the field. For estimating purposes, it is reasonable to assume 5 percent of the rubblized area will need to be excavated, undercut, and replaced. This assumption may be revised as a region gains experience with the technique.

Consult the Regional Geotechnical Engineer to determine the excavation depth and replacement materials. Among the items likely to be recommended by the Regional Geotechnical Engineer for subgrade undercuts are Items 207.02, Geotextile Undercut, and 203.20, Select Granular Subgrade.

When selecting an item to replace excavated subbase, consider drainage, material availability, and costs. The following items may also be recommended by the Regional Geotechnical Engineer:

- Item 08304.019706, Crushed Stone Aggregate Subbase Course
- Item 304.03, Subbase Course, Type 2
- Item 304.05, Subbase Course, Type 4
- Item 304.02, Subbase Course Type 1

If Crushed Stone Aggregate Subbase Course is used to replace excavated subbase, provide additional positive drainage outlets within the material placement limits.

When selecting an item to replace excavated rubblized PCC, it is important to consider providing permeable material to ensure water is allowed to escape the rubblized layer. Rubblized PCC is considered more permeable than standard subbases. Therefore, a dam may be created in the rubblized layer if a standard subbase is used as a replacement material for rubblized PCC. Replace excavated PCC pavement with the following items, in order of preference:

- Item 403.12, Asphalt Concrete - Type 2 Base Course
- Item 08304.019706, Crushed Stone Aggregate Subbase Course

5. Include a detail for constructing widenings, if applicable. Refer to Chapter 3 of The Highway Design Manual. It is highly desirable to place a permeable yet stable material that extends from the existing pavement structure to the ultimate drain location. This material must be at least as deep as the existing subbase. Use Crushed Stone Aggregate Subbase Course, if available, as a subbase in the widened area. If this material is not available, consult the Regional Geotechnical and Materials Engineers for an acceptable replacement.

   The widening must be constructed to the existing pavement elevation before rubblizing. The top 125 mm (5 inches) of the widening must be Item 403.11, Asphalt Concrete - Type 1 Base Course, when it is brought to the existing pavement elevation. This surface may then support the rubblizing equipment or maintain traffic.

6. Include a detail for reconstructing shoulders, if applicable. Construct shoulders to the existing pavement elevation before rubblizing. If a shoulder will be used to maintain traffic, the top 125 mm (5 inches) of the shoulder must be Item 403.11, Asphalt Concrete - Type 1 Base Course, when it is brought to the existing pavement elevation.

   If a shoulder is not needed to maintain traffic, consult the Regional Geotechnical Engineer for items used to prepare or re-establish shoulder cross slope, if necessary. In this case, the first 1 m (40 inches) adjacent to the lane\shoulder interface needs to be shaped before rubblizing to provide a level operating surface for the equipment. Continue overlay courses across the shoulder width when paving. In any case, ensure the design allows water to escape the pavement structure.

7. If applicable, include a detail to remove curbs within 1 m (40 inches) of the lane\shoulder interface before rubblizing. This will provide a level operating surface for the equipment. Install underdrains and construct this area to the existing pavement elevation as described in 5 or 6 above depending on its ultimate use. If curbs are to be replaced, construct this area to the existing pavement elevation using any granular material as a temporary measure to support the equipment. After rubblizing, remove the granular material as required to replace the curb and place widening or shoulder courses if needed.

8. The rubblizing item cost is likely to decrease if the Contractor is allowed to rubblize with few interruptions. Consider this in the maintenance and protection of traffic plan. Where possible, completely detour traffic from the pavement or to the opposite lanes of a divided highway.

CONSTRUCTION CONSIDERATIONS:

1. Instruct the Contractor to install underdrains at least 2 weeks before rubblizing begins. It is highly desirable to install underdrains as far in advance of rubblizing as possible. Rubblizing will be less effective if the subbase is saturated. Provide positive outlets at maximum increments of 90 m (300 feet). Increments of 25 - 30 m (75 - 100 feet) are highly desirable.

2. Establish a test section approximately 300 m (1000 feet) long. Instruct the Contractor to rubblize a portion of the test section in accordance with the specification using Contractor-recommended initial settings. This first portion should be approximately 75 m (250 feet) long and 300 mm (1 foot) wider than the first overlay course. When the first portion is complete, instruct the Contractor to stop rubblizing.

   Select a 10 m^2 (10 square yard) area from a rubblized mid-slab area for excavation. Instruct the Contractor to excavate the selected area. Ensure the pavement has been rubblized full-depth by visually inspecting the excavated material. An acceptable rubblized area meets the following requirements:

   - Surface pieces with top sizes less than or equal to those identified in the specification,
   - Full-depth rubblization with a maximum top size of 450 mm (18 inches) anywhere in the rubblized layer, and
   - Does not permanently deform during rubblizing.

   A highly effective rubblized area meets the top size requirements and has a similar gradation throughout the rubblized PCC depth with very few pieces larger than 200 mm (8 inches) in any dimension. A well rubblized area meets the specification top size requirements and may have isolated pieces larger than 300 mm (1 foot) at the bottom of the PCC.

   At this time, little information exists regarding optimum rubblized gradations and long-term overlay performance for various gradations and traffic levels, however, we can offer some guidelines:

   - If pieces larger than 450 mm (18 inches) exist at the bottom of the rubblized pavement in a rubblized area meeting the other two acceptance criteria, instruct the Contractor to increase the impact energy, reduce the travel speed, or change the shoe width in an attempt to reduce their size. If needed, use other portions of the test section to evaluate different equipment settings.
   - Rubblizing effectiveness increases with decreasing top size at the bottom of the rubblized layer. Always attempt to have the Contractor maximize rubblizing effectiveness within the test section. For production rubblizing, select the combination of settings that produces the most effectively rubblized areas.
   - If the rubblized surface pattern significantly changes during production rubblizing from what was achieved in the test section, re-establish test sections and test pits to determine if more effective rubblizing can be obtained. We recommend continuous inspection of the rubblizing operation to ensure the most effective rubblizing pattern is being consistently obtained as determined by top size and deformation.
   - The top sizes identified above and in the specification are based on current experience. If the Contractor has persistent problems meeting a top size requirement but the rubblized pavement does not deform, minor allowances may be made on top size requirements.

If desired, Regional and Main Office Materials and Geotechnical personnel are available to help the Engineer determine the most effective and acceptable rubblized pavement for the project.

3. The shoulder or widening adjacent to a lane to be rubblized must be stable, generally level, and constructed to the existing pavement elevation before rubblizing to support the rubblizing equipment. If this area will ultimately be a widening, or is needed to maintain traffic during rubblizing, the top 125 mm (5 inches) must be Item 403.11, Asphalt Concrete - Type 1 Base Course. When compacting the rubblized pavement, ensure the Contractor overlaps the asphalt\rubblized pavement interface to obtain a well-compacted interface.

   If a shoulder is not needed to maintain traffic during rubblizing, re-establish the cross slope within 1 m (40 inches) of the lane/shoulder interface, if necessary, by filling and compacting shoulder depressions greater than 50 mm (2 inches) deep or by grading. Use items identified on the plans. Continue overlay courses across the shoulder width when paving.

4. Allow the Contractor to re-rubblize or jackhammer surface pieces exceeding the allowable top size in isolated areas (less than 1 m or 1 yard long) near cracks and joints and leave the material in place. These larger pieces may be left in place because they do not result from an unstable subbase. They typically result from proximity to free edges and/or voids.

5. Instruct the Contractor to remove areas of poor support identified during rubblizing, repair the subbase and/or subgrade, and replace rubblized PCC. Areas of poor support typically consist of rubblized pieces being pushed into the subbase or permanent rutting and deformation of the rubblized surface. If not removed and repaired, areas of poor support will deteriorate at a faster rate than well-supported areas. These areas are often associated with older pavements (pre-1960) built to bridge poor soils, low areas with poor drainage, or areas with water tables near the subbase. Consult the Regional Geotechnical Engineer to determine replacement materials and thicknesses. Rubblizing equipment; which uses high frequency, low amplitude impacts; tends to draw water vertically into the pavement subbase, causing failure.

6. Before compacting the rubblized surface, instruct the Contractor to fill depressions greater than 25 mm (1 inch) deep with CA1 or CA2 coarse aggregate in accordance with the specification. The purpose of this operation is to effectively compact the rubblized pavement and to provide a uniform surface for the designed overlay.

CONTACT:

Questions concerning these specifications should be directed to Bill Cuerdon of the Materials Bureau's Field Engineering I office at (518) 457-5956.

ITEM 18502.7596 M - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

DESCRIPTION: The Contractor shall rubblize and compact an existing portland cement concrete (PCC) pavement, including PCC shoulders, within the limits shown on the plans (or within revised limits established by the Engineer in writing) before placing an overlay.

MATERIALS:

Coarse Aggregate, Type CA1 or CA2 (Table 501-2) ..... §703-02

EQUIPMENT REQUIREMENTS:

Rubblizing Equipment: A resonant frequency pavement breaking unit capable of producing a minimum impact energy of 2.7 kJ at a rate of 44 impacts per second. The unit must provide adjustable impact energy, travelling speed, and breaking shoe size.

Alternate equipment may be submitted to the Director, Materials Bureau, for approval consideration. Such a submission is not cause for a time extension as provided in §108-04.

Compaction equipment: Must meet the requirements of §203-3.12B, except that vibratory compaction of subgrade and subbase courses will not be allowed in repair areas.

CONSTRUCTION DETAILS: All Construction Details shall be performed by the Contractor unless stated otherwise.

Preparation: Before rubblizing, perform the following as indicated on the contract plans or as ordered by the Engineer:

- Install functional underdrains a minimum of 2 weeks before rubblizing begins.
- Remove existing hot-mix asphalt (HMA) overlays or overlay patches having areas greater than 10 m^2. Those less than 10 m^2 may remain in place during rubblizing.
- Sawcut the longitudinal joint to sever ties if the area to be rubblized abuts concrete pavement which is to remain intact.
- Construct stable, generally level, shoulders or widenings to the existing pavement elevation. These areas are needed to provide operating room and support for the rubblizing equipment. They may be used to maintain traffic if the top 125 mm are Item 403.11, Asphalt Concrete - Type 1 Base Course.

Test Sections: Select initial impact energy, shoe size, and travelling speed. The Engineer will then designate a 300 m test section within the rubblizing payment limits. Rubblize 75 m of the test section using the initial settings. Operate the rubblizing equipment longitudinally (parallel to the centerline), beginning at one longitudinal free edge and progressing with continuous coverage toward the opposite free edge. A longitudinal free edge is the lane\shoulder interface for pavements with flexible shoulders and the outer shoulder edge for pavements with PCC shoulders.

If the Engineer determines that an acceptable rubblizing pattern has resulted from using the initial settings, begin production rubblizing using those settings. If an acceptable rubblizing pattern is not obtained, vary the settings and resume until an acceptable pattern is obtained as determined by the Engineer. An acceptable rubblizing pattern consists of the following:

- Surface pieces having a maximum top size of 150 mm in the largest dimension. The only exception to this top size is immediately adjacent to free edges (lane\shoulder interface or shoulder edge, transverse joints, or slab crack) where the maximum allowable top size is 300 mm,
- Full-depth rubblized pavement with a maximum top size of 450 mm at the bottom of the rubblized layer, and
- The rubblized pavement does not permanently deform under repeated passes of the equipment.

The Engineer will designate a 10 m^2 area as a test pit from a rubblized area of the test section having an acceptable surface gradation. Excavate the designated rubblized pavement. The Engineer will determine if rubblizing is full-depth and if top size requirements at the bottom of the rubblized pavement are met. If rubblizing is not full-depth, or the top size is exceeded, vary the settings and resume until acceptable rubblizing is obtained as verified by additional test pits selected by the Engineer. Replace PCC pavement excavated from the test pits as indicated on the contract plans or as ordered by the Engineer. The Engineer may, at any time, establish additional test sections and/or test pits if the surface gradation indicates unacceptable results are being obtained.

Production Rubblizing: Begin production rubblizing after the test section has been successfully rubblized. Operate the rubblizing equipment longitudinally, beginning at a longitudinal free edge, or where directed by the Engineer, and progressing with continuous coverage toward the opposite free edge. Rubblize across the entire pavement width or in increments, such as one lane at a time, as indicated in the contract documents or as established by the Engineer.

If rubblizing is done incrementally across the pavement width for traffic maintenance, the first rubblized increment must be at least 300 mm wider than the first overlay course. If compatible with the maintenance and protection of traffic plan as determined by the Engineer, extend the rubblizing 1 m beyond the width of the first overlay course. If the 1 m extension is established, do not operate the rubblizing equipment on the first overlay course during later rubblizing stages.

Achieve continuous coverage with successive passes of the rubblizing equipment. Overlapping passes are permitted. Rubblized areas within 1 m of free edges having surface pieces larger than specified may be re-rubblized or jackhammered until top size requirements are met. Areas requiring full-depth removal and replacement are as ordered by the Engineer.

Uneven or Poor Subbase Support: The Engineer will identify areas of uneven or poor subbase and/or subgrade support encountered during rubblizing. These areas are generally characterized by large rubblized pieces away from free edges, permanent rutting or deformation under repeated passes of the equipment, and/or rubblized pieces being driven into the subbase.

ITEM 18502.7596 M - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

Where directed by the Engineer, excavate the rubblized pavement, subbase, and/or subgrade. Replace these areas as indicated on the contract plans or as directed by the Engineer. When HMA is used to replace rubblized pavement, use a minimum of two lifts of approximately equal compacted thickness. Compact HMA lifts in accordance with §401-3.12, Compaction. Compact subgrade and subbase courses in accordance with §203-3.12, Compaction, except vibratory compactors will not be allowed to compact these courses in repair areas.

Pavement Hardware: Wire fabric reinforcement, bar reinforcement, load transfer devices, joint ties, joint sealant material, and expansion material shall remain in place with the following exceptions. First, any reinforcement exposed at the surface as a result of rubblizing or compaction must be cut flush with the surface and removed from the site. Second, loose sealant material and expansion material must be removed from the site after rubblizing. Loose material can be easily lifted without disturbing the rubblized surface. Cut loose material from embedded material that would disturb the rubblized surface if pulled out.

Compaction: Fill surface depressions 25 - 75 mm deep with CA1 Coarse Aggregate. Fill deeper depressions with CA1 or CA2 Coarse Aggregate. Compact the complete width of rubblized pavement and any longitudinal asphalt\rubblized pavement interface in accordance with §203-3.12, Compaction. A longitudinal asphalt\rubblized pavement interface typically results when a widening is constructed or a shoulder is used to maintain traffic. The Engineer may require additional passes of the compaction equipment if the compacted rubblized pavement is disturbed before paving or coarse aggregate is used to meet tolerance requirements described below.

Tolerance: The compacted surface shall meet a 20 mm in 5 m tolerance before paving. If, in the opinion of the Engineer, the pavement has not been rubblized and compacted to this tolerance based on visual observation, he or she may test the surface with a 5 m straightedge or stringline placed normal or parallel to the pavement centerline on any portion of the pavement. Correct variations exceeding 20 mm using CA1 coarse aggregate. Obtain final cross slope through the use of HMA courses.

Traffic Maintenance: Ensure rubblizing and first overlay course placement are completed within the traffic maintenance plan timeframe. Do not maintain traffic on a rubblized pavement before placing the first overlay course. If it rains between rubblizing and paving, delay paving until a surface dry condition exists as determined by the Engineer. The first HMA overlay course shall have a compacted thickness of 75 -100 mm for traffic maintenance. Maintain crossovers, ramp crossings, and access points as detailed in the contract documents or as ordered by the Engineer.

METHOD OF MEASUREMENT:

The Engineer will compute the number of square meters of rubblized pavement from the payment lines shown on the plans or from revised limits established in writing before performing the work. No deduction will be made for minor areas not rubblized at catch basins, manholes, water valves, etc. Measurement for payment shall include areas where rubblized pavement was removed and replaced in accordance with the "Construction Details" provisions of this specification.

ITEM 18502.7596 M - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

BASIS OF PAYMENT:

In the unit price bid per square meter, include the cost of furnishing all labor, materials, and equipment necessary to rubblize, compact, dig all test pits, jackhammer, fill depressions, remove reinforcing steel and debris, and maintain the compacted condition of the rubblized pavement before placing overlays.

Pay for the following under their respective items: Maintenance and protection of traffic, milling HMA, underdrains, sawcutting longitudinal joint ties, constructing widenings, reconstructing shoulders, excavating areas of poor support, correcting the subbase and\or subgrade, replacing excavated pavement, and overlay courses.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
18502.7596 M	Rubblizing Existing Portland Cement Concrete Pavement	Square Meter

ITEM 18502.7596 - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

DESCRIPTION: The Contractor shall rubblize and compact an existing portland cement concrete (PCC) pavement, including PCC shoulders, within the limits shown on the plans (or within revised limits established by the Engineer in writing) before placing an overlay.

MATERIALS:

Coarse Aggregate, Type CA1 or CA2 (Table 501-2) ..... §703-02

EQUIPMENT REQUIREMENTS:

Rubblizing Equipment: A resonant frequency pavement breaking unit capable of producing a minimum impact energy of 2000 foot-pounds at a rate of 44 impacts per second. The unit must provide adjustable impact energy, travelling speed, and breaking shoe size.

Alternate equipment may be submitted to the Director, Materials Bureau, for approval consideration. Such a submission is not cause for a time extension as provided in §108-04.

Compaction equipment: Must meet the requirements of §203-3.12B, except that vibratory compaction of subgrade and subbase courses will not be allowed in repair areas.

CONSTRUCTION DETAILS: All Construction Details shall be performed by the Contractor unless stated otherwise.

Preparation: Before rubblizing, perform the following as indicated on the contract plans or as ordered by the Engineer:

- Install functional underdrains a minimum of 2 weeks before rubblizing begins.
- Remove existing hot-mix asphalt (HMA) overlays or overlay patches having areas greater than 12 square yards. Those less than 12 square yards may remain in place during rubblizing.
- Sawcut the longitudinal joint to sever ties if the area to be rubblized abuts concrete pavement which is to remain intact.
- Construct stable, generally level, shoulders or widenings to the existing pavement elevation. These areas are needed to provide operating room and support for the rubblizing equipment. They may be used to maintain traffic if the top 5 inches are Item 403.11, Asphalt Concrete - Type 1 Base Course.

Test Sections: Select initial impact energy, shoe size, and travelling speed. The Engineer will then designate a 1000 foot test section within the rubblizing payment limits. Rubblize 250 feet of the test section using the initial settings. Operate the rubblizing equipment longitudinally (parallel to the pavement centerline), beginning at one longitudinal free edge and progressing with continuous coverage toward the opposite free edge. A longitudinal free edge is the lane\shoulder interface for pavements with flexible shoulders and the outer shoulder edge for pavements with PCC shoulders.

ITEM 18502.7596 - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

If the Engineer determines that an acceptable rubblizing pattern has resulted from using the initial settings, begin production rubblizing using those settings. If an acceptable rubblizing pattern is not obtained, vary the settings and resume until an acceptable pattern is obtained as determined by the Engineer. An acceptable rubblizing pattern consists of the following:

- Surface pieces having a maximum top size of 6 inches in the largest dimension. The only exception to this top size is immediately adjacent to free edges (lane\shoulder interface or shoulder edge, transverse joints, or slab crack) where the maximum allowable top size is 12 inches,
- Full-depth rubblized pavement with a maximum top size of 18 inches at the bottom of the rubblized layer, and
- The rubblized pavement does not permanently deform under repeated passes of the equipment.

The Engineer will designate a 12 square yard area as a test pit from a rubblized area of the test section having an acceptable surface gradation. Excavate the designated rubblized pavement. The Engineer will determine if rubblizing is full-depth and if top size requirements at the bottom of the rubblized pavement are met. If rubblizing is not full-depth, or the top size is exceeded, vary the settings and resume until acceptable rubblizing is obtained as verified by additional test pits selected by the Engineer. Replace PCC pavement excavated from the test pits as indicated on the contract plans or as ordered by the Engineer. The Engineer may, at any time, establish additional test sections and/or test pits if the surface gradation indicates unacceptable results are being obtained.

Production Rubblizing: Begin production rubblizing after the test section has been successfully rubblized. Operate the rubblizing equipment longitudinally, beginning at a longitudinal free edge, or where directed by the Engineer, and progressing with continuous coverage toward the opposite free edge. Rubblize across the entire pavement width or in increments, such as one lane at a time, as indicated in the contract documents or as established by the Engineer.

If rubblizing is done incrementally across the pavement width for traffic maintenance, the first rubblized increment must be at least 1 foot wider than the first overlay course. If compatible with the maintenance and protection of traffic plan as determined by the Engineer, extend the rubblizing 40 inches beyond the width of the first overlay course. If the 40 inch extension is established, do not operate the rubblizing equipment on the first overlay course during later rubblizing stages.

Achieve continuous coverage with successive passes of the rubblizing equipment. Overlapping passes are permitted. Rubblized areas within 40 inches of free edges having surface pieces larger than specified may be re-rubblized or jackhammered until top size requirements are met. Areas requiring full-depth removal and replacement are as ordered by the Engineer.

Uneven or Poor Subbase Support: The Engineer will identify areas of uneven or poor subbase and/or subgrade support encountered during rubblizing. These areas are generally characterized by large rubblized pieces away from free edges, permanent rutting or deformation under repeated passes of the equipment, and/or rubblized pieces being driven into the subbase.

ITEM 18502.7596 - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

Where directed by the Engineer, excavate the rubblized pavement, subbase, and/or subgrade. Replace these areas as indicated on the contract plans or as directed by the Engineer. When HMA is used to replace rubblized pavement, use a minimum of two lifts of approximately equal compacted thickness. Compact HMA lifts in accordance with §401-3.12, Compaction. Compact subgrade and subbase courses in accordance with §203-3.12, Compaction, except vibratory compactors will not be allowed to compact these courses in repair areas.

Pavement Hardware: Wire fabric reinforcement, bar reinforcement, load transfer devices, joint ties, joint sealant material, and expansion material shall remain in place with the following exceptions. First, any reinforcement exposed at the surface as a result of rubblizing or compaction must be cut flush with the surface and removed from the site. Second, loose sealant material and expansion material must be removed from the site after rubblizing. Loose material can be easily lifted without disturbing the rubblized surface. Cut loose material from embedded material that would disturb the rubblized surface if pulled out.

Compaction: Fill surface depressions 1 - 3 inches deep with CA1 Coarse Aggregate. Fill deeper depressions with CA1 or CA2 Coarse Aggregate. Compact the complete width of rubblized pavement and any longitudinal asphalt\rubblized pavement interface in accordance with §203-3.12, Compaction. A longitudinal asphalt\rubblized pavement interface typically results when a widening is constructed or a shoulder is used to maintain traffic. The Engineer may require additional passes of the compaction equipment if the compacted rubblized pavement is disturbed before paving or coarse aggregate is used to meet tolerance requirements described below.

Tolerance: The compacted surface shall meet a ¾ inch in 16 feet tolerance before paving. If, in the opinion of the Engineer, the pavement has not been rubblized and compacted to this tolerance based on visual observation, he or she may test the surface with a 16 foot straightedge or stringline placed normal or parallel to the pavement centerline on any portion of the pavement. Correct variations exceeding ¾ inches using CA1 coarse aggregate. Obtain final cross slope through the use of HMA courses.

Traffic Maintenance: Ensure rubblizing and first overlay course placement are completed within the traffic maintenance plan timeframe. Do not maintain traffic on a rubblized pavement before placing the first overlay course. If it rains between rubblizing and paving, delay paving until a surface dry condition exists as determined by the Engineer. The first HMA overlay course shall have a compacted thickness of 3 - 4 inches for traffic maintenance. Maintain crossovers, ramp crossings, and access points as detailed in the contract documents or as ordered by the Engineer.

METHOD OF MEASUREMENT:

The Engineer will compute the number of square yards of rubblized pavement from the payment lines shown on the plans or from revised limits established in writing before performing the work. No deduction will be made for minor areas not rubblized at catch basins, manholes, water valves, etc. Measurement for payment shall include areas where rubblized pavement was removed and replaced in accordance with the "Construction Details" provisions of this specification.

ITEM 18502.7596 - RUBBLIZING EXISTING PORTLAND CEMENT CONCRETE PAVEMENT

BASIS OF PAYMENT:

In the unit price bid per square yard, include the cost of furnishing all labor, materials, and equipment necessary to rubblize, compact, dig all test pits, jackhammer, fill depressions, remove reinforcing steel and debris, and maintain the compacted condition of the rubblized pavement before placing overlays.

Pay for the following under their respective items: Maintenance and protection of traffic, milling HMA, underdrains, sawcutting longitudinal joint ties, constructing widenings, reconstructing shoulders, excavating areas of poor support, correcting the subbase and\or subgrade, replacing excavated pavement, and overlay courses.

Payment will be made under:

ITEM NO.	ITEM	PAY UNIT
18502.7596	Rubblizing Existing Portland Cement Concrete Pavement	Square Yard