

**DIVISION 4 BASES****SECTION 4-01 MINERAL AGGREGATES****4-01.1 DESCRIPTION**

Section 4-01 addresses Mineral Aggregate. This Work shall consist of constructing one or more layers of Mineral Aggregates upon a prepared Subgrade in accordance with these Specifications and in conformity with the lines, grades, depth, and typical cross-section shown in the Drawings or as established by the Engineer.

**4 01.2 MATERIALS**

Mineral Aggregate types shall meet the requirements of section 9-03. If the Contract allows and if the Contractor proposes to use Mineral Aggregates with recycled aggregates, see Section 4-02.

**4 01.3 CONSTRUCTION REQUIREMENTS**

Mineral Aggregates shall be uniformly spread upon the prepared subgrade to the depth, width, and cross-section shown in the Drawings. Unless addressed elsewhere in the Contract, construction methods used shall meet the applicable requirements of Sections 4-04.3

**4-01.4 MEASUREMENT**

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for in the Contract or here within.

**4-01.5 PAYMENT**

Unless included in other Bid items for payment, compensation for the cost necessary to complete the work described in Section 4-01 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "Mineral Aggregate, (Type)", per ton.
2. "Mineral Aggregate, (Type)", per cubic yard.

The Bid item price for "Mineral Aggregate, (Type)" shall include all costs for the work required of furnishing, hauling, stockpiling, placing, grading, and compacting the Mineral Aggregate or accepted crushed substitute.

3. **Other payment information.**

Unless included in other Bid items for payment, the Bid item price for backfill for walls shall include all costs for the work required by the cubic yard in place as determined by the neat lines indicated on the Drawings or Standard Plans where indicated with the following exception the volume of pipes and Structures will be deducted; however, volumes of pipes 6 inch inside diameter or less, and other minor structural features each less than one cubic yard will not be deducted.

Unless included in other Bid items for payment, payment for backfill for foundations, and for drains other than behind a wall, shall include all costs for the work required by the cubic yard in place as determined by the neat lines indicated on the Drawings or the Standard Plans. Payment for minor and local quantities of backfill for drains surrounding weep holes of 1 cubic yard or less shall be included in the Bid item price for concrete in place per Section 6-02.5 and no separate or additional payment will be made.

Unless included in other Bid items for payment, payment for drainage filter layer behind rock facings will be by the Bid item "Mineral Aggregate, (Type)" by the ton (see Section 2-13.5).

Payment for approved changes in the Type of Mineral Aggregate from that specified will be in accordance with Section 1-04.4.

**SECTION 4-02 MINERAL AGGREGATES WITH RECYCLED MATERIAL****4-02.1 DESCRIPTION**

Section 4-02 addresses all Mineral Aggregate with recycled Material and the substitution request for full or partial inclusion of recycled Material.

Mineral Aggregate with recycled Material shall meet the requirements of Section 9-03.18. If Mineral Aggregate with recycled Material are not specified per the Contract, the Contractor may submit written request for substitutions per Sections 1-06.1 and 1-05.3. See 4-02.2(2) for substitutions of Mineral Aggregates with recycled Material request requirements.

**4-02.2 MATERIALS**

Materials shall meet the requirements of the following section:

Aggregates	9-03
Recycled material	9 03.18

**4-02.2(1) MATERIALS – WITH RECYCLED AGGREGATES**

Mineral Aggregates with recycled Material including recycled portland cement concrete and recycled asphalt concrete shall meet the submittal requirements of Sections 1-05.3, 1-06.1, and 9-03.18(1).

Mineral Aggregates with recycled Material shall be referred to or will be specified as Mineral Aggregates (type)R; that is the numerical type shall be followed by the “R”. If a Mineral Aggregate is specified in the Contract as a type “R”, it shall contain a minimum of 75 percent of the maximum allowable recycled Material per Section 9-03.18 and will be considered a separate Bid item per the Bid Form. Note that type 1R and type 2R shall meet the requirements of crushed gravel Mineral Aggregates Type 1G and Type 2G (Sections 9-03.11 and 9-03.18).

**4-02.2(2) MATERIAL –RECYCLED AGGREGATES SUBSTITUTION REQUEST**

The Contractor may submit written request for substitutions per Sections 1-06.1 and 1-05.3. The Contractor may request substitutions of Mineral Aggregates with recycled Material including recycled portland cement concrete and recycled asphalt concrete meeting the requirements of Section 9-03.18 for Mineral Aggregate (Type) with the exceptions noted for each recycled Material.

**4-02.2(2)A SUBMITTAL REQUIREMENTS**

See Section 9-0-3.18(1)

**4-02.3 CONSTRUCTION REQUIREMENTS**

See Section 4-01.3

**4-02.4 MEASUREMENT**

See Section 4-01.4

**4-02.5 PAYMENT**

See Section 4-01.5

**SECTION 4-03 RESERVED**

**SECTION 4-04 BALLASTING AND CRUSHED SURFACING**

**4-04.1 DESCRIPTION**

Section 4-04 describes work consisting of constructing one or more courses of crushed aggregate Material upon an existing roadway surface, or upon a subgrade prepared in accordance with the provisions of Section 2-09 in conformity with the lines, grades, depth, and typical cross-sections shown in the Drawings or Standard Plans, as established by the Engineer, or as otherwise indicated in the Contract.

This work shall also consist of constructing one or more layers of gravel base upon a prepared subgrade in conformity with the lines, grades, depth, and typical cross-section indicated on the Standard Plans and otherwise indicated in the Contract.

**4-04.2 MATERIALS**

Materials shall meet the requirements in the following Sections:

<b>Dust Palliative</b>	Dust Palliative Oil CMS-2	9-02
<b>Roadway Ballast</b>	Mineral Aggregate Types 2 and 14	9-03
<b>Shoulder Ballast</b>	Mineral Aggregate Type 13	9-03
<b>Base Course</b>	Mineral Aggregate Type 2	9-03
<b>Crushed Surfacing</b>	Mineral Aggregate Type 1	9-03
<b>Maintenance Rock</b>	Mineral Aggregate Type 3	9-03
<b>Sand Filler</b>	Mineral Aggregate Type 11	9-03
<b>Dust Palliative Sand</b>	Mineral Aggregate Type 6	9-03
<b>Gravel Base</b>	Mineral Aggregate Type 17	9-03

The application of dust palliative with or without crushed surfacing shall be considered an oil mat treatment (Section 4-04). See Section 5-02 for bituminous surface treatment.

Crushed Gravel, Mineral Aggregates Type 1G and Type 2G shall not be used as a substitute for Mineral Aggregates Type 1 and Type 2 except as follows. Crushed gravel may be used in lieu of Crushed Rock, Mineral Aggregates Type 1 and Type 2 as a surface ballast course under the following conditions:

1. only when specified in the Contract for specific locations or uses; and
2. meets the requirements of Section 4-01.

Recycled concrete crushed to the requirements of Section 9-03 and proposed for pavement base or Subbase where wet conditions do not exist, will be permitted as a substitute for gravel base when approved by the Engineer, and shall meet the requirements of Section 4-01.

**4-04.3 CONSTRUCTION REQUIREMENTS****4-04.3(1) EQUIPMENT**

All equipment necessary for acceptable performance of this construction shall be on the Project Site and approved by the Engineer prior to beginning this work. If central mix plant methods are used, the central mixing plant shall comply with the following requirements:

1. The cold aggregate feeder shall be mechanically operated and adjustable to the extent necessary to provide a uniform and continuous flow of Materials. These Materials shall be deposited in an approved mixer with a sufficient amount of water being added to obtain the required density when spread and compacted. The water shall be weighed or metered, and dispensed through a device providing uniform dispersion across the mixer.
2. The mixing plant shall be provided with weighing or calibrating devices, feeders, provisions for sampling, and other devices and equipment so designed, coordinated, and operated to produce a uniform mixture, and to permit the sampling of the Materials before and after mixing. The mixer shall be kept in good condition, and mixing blades or paddles shall be of proper size, adjustment, and clearance to provide positive and uniform mixing of the mixture at all times.
3. The capacity of the plant and equipment furnished for the Work shall be adequate at all times to provide for efficient and continuous operations insofar as practical.

The minimum amount and type of heavy equipment considered necessary for the proper execution of the Work described herein shall meet or exceed the following:

- 1) One heavy duty self-propelled grader, of an approved type, equipped with scarifier, broom, and an adjustable blade not less than 8 feet long Capable of conforming to the indicated grade.
- 2) One 10-ton self-propelled three-wheel roller, one vibratory roller, or one pneumatic-tired roller. Roller wheels may be weighted if necessary to secure specified weight per linear inch of tire width. Vibratory rollers shall meet the requirements of Section 5-04.3(3)C.

Other combinations and types of equipment may be substituted for the above if approved by the Engineer. Additional equipment shall be supplied if required by the Engineer. Such equipment includes, but is not limited to, bottom-dump hauling equipment with transfer spreading facilities; self-propelled spreading and leveling machines; and spreader boxes equipped with wheels or so constructed as to preclude any damage to the subgrade or underlying courses.

The equipment used for the Work shall be subject to the Engineer's approval.

**4-04.3(2) SUBGRADE**

The subgrade shall be prepared as specified in Section 2-09 and shall be approved by the Engineer before placing ballast or surfacing Materials.

Gravel base shall be uniformly spread upon the prepared subgrade to the depth, width, and cross-section indicated on the Drawings.

**4-04.3(3) MIXING**

Unless otherwise specified in the Contract, the Contractor may use either, or both, of the following described methods:

1. **Central Plant Mix Method:** The surfacing Material and water shall be mixed in an approved mixing plant as described in Section 4-04.3(1). The completed mixture shall be a thoroughly mixed combination of proportioned Materials and water, uniform in distribution of particle sizes and moisture content. A mixture containing water in excess of the proportion established by the Engineer will not be accepted.
2. **Road Mix Method:** After Material for each layer of surfacing has been placed, the Material shall be mixed until uniform throughout by motor graders or other equipment approved by the Engineer. Water to facilitate mixing and compacting shall be added in amounts acceptable to the Engineer.

**4-04.3(4) PLACING AND SPREADING**

On street areas to be paved with asphalt concrete pavement, crushed surfacing shall be placed to a compacted depth of 6 inches.

Spreading of the first course of surfacing or ballasting shall begin at points nearest to the point of loading and successive courses shall begin at points farthest from the point of loading. Each course shall be constructed continuously from the beginning point of the course. The first course of surfacing or ballasting Material shall be placed on the entire available subgrade before placing the succeeding course. If the Engineer deems it necessary, a succeeding course shall be placed over a section of a previously placed course before the final completion (Physical Completion Date) of that course.

Crushed surfacing, base course and top course shall be constructed in layers not to exceed 4 inches in depth. Ballast shall be constructed in layers with each layer not to exceed 6 inches in depth.

Each layer of surfacing and ballasting Material shall be placed and spread by equipment approved for use by the Engineer. The surfacing and ballasting shall be spread by any method that results in an even distribution of these Materials upon the roadway without perceptible separation in gradation. The Material shall be spread and screeded to a depth and surface uniformity which permits compaction to a reasonably true line, grade, depth, course, and cross section without further shaping.

Should there occur during any stage of the placing and spreading operation a separation of the coarser from the finer Materials, causing, in the opinion of the Engineer, serious lack of uniformity in the grading, the Contractor shall immediately, upon request of the Engineer, make such changes in the method of handling the Material which prevents separation.

There shall be a distance of not less than 1 block nor more than 1/2 mile between the construction of any two courses of surfacing or ballast. Uniform gradations of Mineral Aggregates shall be used for surfacing on roadways.

Before placing any layer, the preceding layer shall be properly bound, and all floating or loose stone shall be removed from the surface.

#### **4-04.3(5) SHAPING AND COMPACTION**

Following spreading and shaping of each layer, the layer shall be compacted to a minimum 95 percent of the maximum density determined in accordance with Section 2-11 before the next succeeding layer of surfacing or pavement is placed.

When necessary, a mist or spray of water shall be applied to replace moisture lost by evaporation should the Engineer determine inadequate moisture is evident. Each completed layer shall have a smooth, bound, uniform surface true to the line, grade, and cross-section indicated on the Drawings, or as established by the Engineer.

#### **4-04.3(6) RESERVED**

#### **4-04.3(7) MISCELLANEOUS REQUIREMENTS**

The surface of each layer of surfacing Material shall be maintained true to line, grade, and cross-section by blading, watering or aerating as required, and rolling until placing the next succeeding course or the final paving surface. The first course of surfacing Material shall be placed on all available subgrade before placing the next overlay course. There shall be a distance of not less than one hundred feet between the construction of any two courses of surfacing or ballast.

Should irregularities develop in any layer surface during or after compaction, they shall be remedied by loosening the surface and correcting the defects after which the entire area including the surrounding surface shall be thoroughly re-compacted. The completed surface shall be true to line, grade, and crown before proceeding with the surfacing or final paving.

#### **4-04.3(8) WEATHER LIMITATIONS**

When, in the opinion of the Engineer, the weather is such that acceptable results cannot be obtained, the Contractor shall suspend operations until the weather is favorable. No surfacing materials shall be placed in snow or on a soft, muddy, or frozen subgrade.

#### **4-04.3(9) HAULING**

Hauling equipment shall be routed over the roadway in a manner to be most effective in the compacting of the surfacing. Hauling over any of the surfacing in the process of construction will not be permitted when, in the opinion of the Engineer, hauling adversely impacts the roadway.

#### **4-04.3(10) HOURS OF WORK**

See Section 1-08.1(4).

#### **4-04.3(11) SHOULDER BALLAST**

Shoulder ballast shall not be placed until the abutting pavement has been completed. Shoulder ballast shall be placed through a spreader box in one lift. Processing of the shoulder ballast course on the roadway will not be permitted. Compaction shall be accomplished by making a minimum of three passes over the aggregate with a vibratory compactor of a type acceptable to the Engineer. The density requirements of Section 4-04.3(5) shall not apply.

#### **4-04.3(12) APPLICATION OF DUST PALLIATIVE**

Completed crushed rock surfacing courses shall be given two or more applications of dust palliative oil. Dust palliative oil shall be CMS-2 and shall be uniformly applied by an approved pressure-type distributor at the rate of 0.3 gallons of oil per square yard of surface to be treated. Before succeeding applications of dust palliative oil are applied, the preceding application shall have thoroughly dried.

Dust palliative oil shall not be applied upon a wet surface nor when the temperature is below 60°F.

The Contractor shall furnish and place Mineral Aggregate Type 6 sand on newly oiled streets to prevent tracking of oil onto adjacent surfaces. The Contractor shall be prepared to apply additional sand to areas where oil remains on the surface due to poor surface penetration.

#### **4-04.3(13) RESURFACING OF OIL MAT AND GRAVEL STREETS**

The surface of existing oil mat and graveled streets shall be scarified and bladed to a minimum width of 21 feet, unless indicated otherwise in the Contract, until it has a uniform grade and cross section with a 3-inch to 5-inch crown at the center line. No attempt shall be made to apply oil to the street surface disturbed by construction operations without first scarifying and blading the entire roadway. Preparation work on the street surface shall produce a smooth, crowned surface, without residual ripples, ridges, or irregularities as determined by the Engineer. All stones, lumps, broken concrete or asphalt, bricks, or other deleterious material that will not pass a 3-inch standard sieve size shall be removed. All wood, peat, organic matter, or other deleterious matter shall also be removed prior to the application of the crushed surfacing. In shaping the

existing surfacing, all Material that may have been displaced by traffic, or by other means, shall be bladed into the newly formed surfacing section.

Crushed Surfacing, Mineral Aggregate Type 1, shall be applied only after the newly prepared street surface has been approved by the Engineer. Crushed surfacing shall then be spread to a minimum depth of 2 inches by any method that results in an even distribution of the Material upon the roadway without perceptible separation in gradation. Where separation does occur, correction shall be made according to Section 4-04.3(4). During or after spreading operations, the newly spread crushed surfacing shall be shaped by blading to conform to the depth, line, grade, and cross section indicated on the Drawings. The Contractor shall comply with the requirements of Section 1-07.5 regarding the control of dust and pollutants.

After final grading has been completed and approved by the Engineer, dust palliative oil shall be applied as specified in Section 4-04.3(12). Prior to opening the newly oiled streets to traffic, warning signs shall be placed at locations on all routes leading to the freshly oiled roadways. These signs shall say "Caution - Fresh Oil", be of a size and Material with adequately sized lettering and bordering meeting the requirements for "Warning Signs" of the City of Seattle Traffic Control Manual for In-Street Work, and shall remain at the locations until the oiled roadway is accepted by the Engineer. "No Parking" signs, if used, shall be removed at the end of day where areas have been covered with rock. See Sections 1-07.23 and 1-10.

#### 4-04.4 MEASUREMENT

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs herein this Section.

Crushed rock surfacing, top course and base course; ballast; and gravel base will be measured by the ton.

"Mineral Aggregate, (Type)" for gravel base will be measured by the ton.

#### 4-04.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 4-04 will be made at the Bid item price Bid only for the Bid item listed or referenced as follows:

1. "Dust Palliative", per gallon.

The Bid item price for "Dust Palliative" shall include all costs for the work required to furnish and place dust palliative.

2. **Other payment information.**

Payment for Mineral Aggregate of the Type specified shall be in accordance with Section 4-01.5.

If the Engineer directs the Contractor to change the Type of Mineral Aggregate from that specified, then any change in compensation resulting from the change will be in accordance with Section 1-09.4. Additional payment for Contractor requested changes in Mineral Aggregate Type which are approved by the Engineer will not be made.

### SECTION 4-05 FULL DEPTH ASPHALT PAVEMENT RECYCLING

#### 4-05.1 DESCRIPTION

Section 4-05 describes work consisting of recycling existing pavement by a technique in which existing full depth asphalt pavement and a predetermined portion of the underlying Materials are pulverized, blended, mixed, and compacted resulting in a uniformly mixed base course. Increased stabilization is obtained by mixing with additives. A final wearing surface of asphalt concrete per Section 5-04 shall follow.

#### 4-05.1A SUBMITTAL

At least 10 Working Days prior to intended use, the Contractor shall submit a mix design to the Engineer in accordance with Section 1-05.3. This mix design shall indicate the amount of each additive applied per square yard of pulverized surface area to obtain the desired mix proportion with the pulverized Materials to the depth indicated on the Drawings. Laboratory analyses of, and the locations of, sample borings in the area to be treated will be provided in the Contract.

#### 4-05.2 MATERIALS

Materials shall meet the requirements of the following sections:

Portland Cement	9-01
Asphalt Emulsion	9-02
Mineral Aggregate	9-03
Water	9-25

Lime shall be a hydrated (not agricultural) lime.

#### 4-05.3 CONSTRUCTION REQUIREMENTS

##### 4-05.3(1) EQUIPMENT

The Contractor has the option to use whatever equipment can effectively pulverize and blend the Materials. The equipment to be used shall have the Capability of introducing liquid additives uniformly and accurately.

The mixing equipment shall be equipped with a foot per minute indicator which is integral with the variable speed pump controller ensuring that asphalt emulsion can be added only when the machine is moving.

The metering system shall include a totalizer so that the amount of asphalt emulsion used during any given period can be read directly and shall also include a gallons per minute gauge to indicate the instantaneous flow rate during the mixing operation.

Equipment acceptable to the Engineer for both pulverizing and mixing is the CMI RS-500 Reclaimer / Stabilizer or approved equal.

The compaction equipment shall be a vibratory roller compactor weighing a minimum 15 tons.

#### **4-05.3(2) CONSTRUCTION METHOD**

##### **4-05.3(2)A REMOVAL OF OBSTACLES**

Before the asphalt pavement reclamation process begins, existing utility castings within the pavement area to be reclaimed shall be temporarily removed and the opening securely covered so that the pavement reclamation process does not adversely impact the existing utility and the existing utility does not adversely impact the reclamation equipment. Existing utility castings which cover any Structure connected to the SPU water distribution or water transmission system shall require the notification specified in Section 1-07.28 item 5. The depth of removal shall provide adequate unobstructed clearance between the top of the temporary utility cover and the existing pavement surface to accommodate the pavement reclamation operation. The temporary cover for the utility opening shall have sufficient strength and shall be adequately secured to the exposed utility opening to withstand the stresses of the reclamation process. The location of existing utilities which have had castings removed and then covered shall be "tied in" so that after reclamation, the covered utility can be located and reinstalled to finished grade.

All other obstacles identified on the Drawings shall be removed as necessary.

See Sections 1-07.16(1) and 1-07.28 item 17 regarding the survey monumentation, witness monument, re-monumentation, and notifications required.

##### **4-05.3(2)B PULVERIZATION**

The existing pavement and base Material shall be pulverized and blended to the depth indicated on the Drawings so the entire mass of Material shall be uniformly graded. The pulverized Material shall have a minimum 95% passing the 1-1/2 inch sieve size. Material gradation may vary due to local aggregates and conditions; however, acceptance of the pulverized Material will be based on visual inspection by the Engineer. The Contractor shall remove all rock larger than 3 inches and all deleterious material as defined in Section 9-03.1. The pulverizing operation shall be completed prior to the mixing operation. If any pulverized section is to be temporarily opened to traffic, it shall first be shaped and compacted as approved by the Engineer.

##### **4-05.3(2)C ADDITIVES, MIXING AND COMPACTING**

Portland cement or lime, if required as an additive to the emulsion treated base, shall be lightly dusted onto the pulverized surface at a uniform rate of application. The application of Portland cement or lime shall be prior to the application of asphalt emulsion and the mixing operation.

The emulsified asphalt shall be uniformly distributed and mixed with the pulverized Material and any imported Material as specified. The mixing operation may be accomplished by using either the same equipment used for the pulverizing operation or a separate machine designed for in-place continuous mixing. Regardless of which method is used, a positive displacement variable speed pump and control system Capable of metering the emulsion application rate to a tenth of a gallon per square yard shall be used.

The application rate of the emulsified asphalt shall be expressed in gallons per square yard. This rate shall be calculated from the designated percent of emulsion based on the dry unit weight of the unmixed in-place Material as determined by the Engineer.

The mixing operation shall be completed in continuous segments. Each segment shall be processed and compacted by the end of each Day and be ready to open to traffic.

Density of the compacted Material acceptable to the Engineer will be determined as follows:

After each pass of the vibratory roller, nuclear densometer readings of the compacted Material will be taken to the depth indicated on the Drawings. These nuclear densometer readings will be taken at several locations so as to determine a relationship indicating "Measured Density" vs. "Number of Passes" of the vibratory roller. When the change in density readings between successive passes of the roller at a given test location increases by less than 2% of the previous density reading at that same location then the compaction of the Material at that location will be considered acceptable.

##### **4-05.3(2)D FINAL SURFACE PREPARATION**

The emulsion treated base shall be allowed to cure for a minimum of 10 Days prior to the application of the wearing surface. The length of time necessary for proper curing may vary dependent on the weather and environmental conditions.

#### **4-05.4 MEASUREMENT**

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1.09.1 Measurement of Quantities unless otherwise provided for by individual measurement paragraphs herein this Section.

Measurement for "Reset Casting for Pavement Recycling" will be per each.

Measurement for "Full Depth Pavement Recycling" will be by the square yard of existing asphalt pavement pulverized, to the depth and within the limits specified on the Drawings.

Measurement for "Portland Cement for Pavement Recycling" will be by the ton of Portland cement applied to the surface of pulverized pavement as specified.

Measurement for "Lime for Pavement Recycling" will be by the ton of hydrated lime applied to the surface of the pulverized pavement as specified.

Measurement for "Emulsified Asphalt for Pavement Recycling" will be by the ton of emulsified asphalt used during the mixing process as specified.

#### 4-05.5 PAYMENT

Compensation for the cost necessary to complete the work described in Section 4-05 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. **"Reset Casting for Pavement Recycling"**, per each.

The Bid item price for "Reset Casting for Pavement Recycling" shall include all costs for the work required to temporarily remove utility casting and sufficient upper portion of collar and leveling material as necessary; securely place a temporary cover, and replace permanent casting, and collar and leveling material.

2. **"Full Depth Pavement Recycling"**, per square yard.

The Bid item price for "Full Depth Pavement Recycling" shall include all costs for the work required to furnish the equipment and pulverize the existing asphalt pavement to the depth and to the limits indicated on the Drawings, to apply and mix the additives to the depth indicated on the Drawings; to grade, shape and compact; and apply fog seal. The application of water as necessary, will be considered incidental to this Bid item and no separate payment will be made.

3. **"Portland Cement for Pavement Recycling"**, per ton

The Bid item price for "Portland Cement for Pavement Recycling" shall include all costs for the work required to furnish and apply the Portland cement to the pulverized surface.

4. **"Lime for Pavement Recycling"**, per ton.

The Bid item price for "Lime for Pavement Recycling" shall include all costs for the work required to furnish and apply the lime to the pulverized surface.

5. **"Emulsified Asphalt for Pavement Recycling"**, per ton.

The Bid item price for "Emulsified Asphalt for Pavement Recycling" shall include all costs for the work required to furnish and apply the emulsified asphalt.

### SECTION 4-06 ASPHALT TREATED BASE

#### 4-06.1 DESCRIPTION

##### 4-06.1(1) GENERAL

Section 4-06 describes work consisting of one or more courses of asphalt treated base placed on the subgrade in accordance with these Specifications and in conformity with the lines, grades, thickness, and typical cross-sections indicated in the Contract.

##### 4-06.1(2) DEFINITION

**Asphalt Treated Base (ATB):** a compacted course of base Material which has been weatherproofed and stabilized by treatment with an asphalt binder.

#### 4-06.2 MATERIALS

Materials shall meet the requirements of the following Sections:

Asphalt	9-02
Anti-Stripping Additive	9-02
Aggregates	9-03

The grade of paving asphalt shall be PG 64-22 meeting the requirements of Section 9-02.1(4).

#### 4-06.3 CONSTRUCTION REQUIREMENTS

##### 4-06.3(1) ASPHALT MIXING PLANT

Asphalt mixing plants for asphalt treated base shall meet the following requirements:

1. **Heating:** The plant shall be Capable of heating the aggregates to the required temperature.
2. **Proportioning:** The mixing plant shall be Capable of proportioning the aggregates to meet the specified requirements, and of producing asphalt at the rate specified by the Engineer. If the aggregates are supplied in two or more sizes, means shall be provided for proportioning or blending the different sizes of aggregates to produce Material meeting the specified gradation and other requirements.
3. **Mixing:** The mixer shall be Capable of producing a homogeneous mixture of uniformly coated aggregates meeting the specified requirements.

**4-06.3(2) PREPARATION OF AGGREGATES**

Aggregates for ATB shall be heated to a temperature between the limits of 350°F and 375°F, unless the Contract specifies otherwise.

**4-06.3(2)A MIX DESIGN**

The mix design requirements for asphalt treated base shall be as specified in the Contract.

**4-06.3(3) HEATING OF ASPHALT MATERIAL**

Heating of asphalt Material at the mixing plant shall comply with Section 5-04.3(2).

Heating of asphalt binder shall comply with Section 5-04.3(5).

**4-06.3(4) MIXING**

Asphalt treated base shall be mixed as specified in the Contract.

**4-06.3(5) HAULING EQUIPMENT**

Hauling equipment for asphalt treated base shall conform to the requirements of Section 5-04.3(3)A.

**4-06.3(6) SPREADING AND FINISHING****4-06.3(6)A GENERAL**

Asphalt treated base shall be spread with a spreading machine equipped with a stationary, vibratory, or oscillating screed or cut-off device, subject to the approval of the Engineer. The Engineer's approval of the equipment will be based on a demonstration that the finished product meets all requirements specified. Automatic controls are not required.

The temperature of the mixture at the time compaction is achieved shall be a minimum of 185°F.

When the total depth of ATB exceeds 3 inches, the ATB Material shall be placed in two or more equal courses with each not to exceed 3 inches in thickness.

**4-06.3(6)B SUBGRADE PROTECTION COURSE**

The Contractor shall place the first course of ATB as a protection for the prepared subgrade as soon as possible after the subgrade has been completed.

The surface of the subgrade protection layer when constructed on a grading project shall conform to grade and smoothness requirements that apply to the subgrade upon which it is placed.

**4-06.3(6)C FINISH COURSE**

The final surface course of the asphalt treated base, excluding shoulders, shall not deviate at any point more than 3/8-inch from the bottom edge of a 10-foot straightedge laid on the surface in any direction on either side of the roadway crown. Failure to meet this requirement shall necessitate corrective measures acceptable to the Engineer to achieve the required tolerance, at no expense to the Owner.

When Portland cement concrete pavement is placed on asphalt-treated base, the surface tolerance of the asphalt-treated base shall be such that no elevation lies above the plan grade minus the specified plan depth of Portland cement concrete pavement. Prior to placing the Portland cement concrete pavement, any such irregularities shall be brought to the required tolerance by grinding or other means approved by the Engineer, at no expense to the Owner.

**4-06.3(7) COMPACTION AND DENSITY**

The method of compaction shall be as specified in Section 5-04.3(9).

The density of the asphalt treated base shall be not less than 80 percent of the maximum theoretical density established for the mix by WSDOT Test Method 705. The frequency of these tests shall be at the discretion of the Engineer, but in no case shall it be less than one control lot for each normal Day's production. The use of equipment which results in damage to the Materials or produces defective work will not be permitted.

**4-06.3(8) ANTI-STRIPPING ADDITIVE**

An anti-stripping additive (Section 9-02.4) shall be added to the asphalt Material when directed by the Engineer.

**4-06.3(9) RESERVED****4-06.4 MEASUREMENT**

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs herein this Section.

Asphalt treated base will be measured by the ton.

**4-06.5 PAYMENT**

Compensation for the cost necessary to complete the work described in Section 4-06 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. "Pavement Base, Asphalt Treated (ATB)", per ton.

The Bid item price for "Pavement Base, Asphalt Treated (ATB)" shall include all costs for the work required in Section 4-06 and not otherwise provided for separately and necessary to furnish and construct the asphalt treated base on a prepared subgrade to the lines, grades, and cross sections required.

2. "Anti-Stripping Additive", payment will be in accordance with Section 1-09.4.
3. **Other payment information.**

Payment for roadway excavation and subgrade preparation including excavation and disposal of unsuitable Material shall be in accordance with applicable Specification Sections.

## SECTION 4-07 FULL DEPTH PAVEMENT RECLAMATION

### 4-07.1 DESCRIPTION

Section 4-07 describes work consisting of pulverizing the existing asphalt concrete pavement and a portion of the underlying base Material to the depth and width indicated on the Drawings; grading the pulverized roadway in reasonably close conformance with the slopes and the grades indicated on the Drawings; adding Portland cement and water at the specified rates; in-place mixing of the pulverized roadway Materials and additives to the depth specified; regrading in conformance with the slopes and grades indicated on the Drawings; and compacting the mixed stabilized base as specified. A portion of the bottom section of pulverized base Material shall not be mixed with Portland cement.

### 4-07.1(1) SUBMITTAL

At least 10 Working Days prior to intended use, the Contractor shall submit a mix design to the Engineer in accordance with Section 1-05.3. This mix design shall indicate the amount of each additive applied per square yard of pulverized surface area to obtain the desired mix proportion with the pulverized Materials to the depth indicated on the Drawings. Locations of borehole soil samples taken within the existing area of proposed pavement reclamation, and descriptions of sampled soils will be provided in the Contract.

### 4-07.2 MATERIALS

Materials shall meet the requirements of the following sections:

Portland Cement	9-01
Aggregate	9-03
Joint Filler and Sealants	9-04
Curing Materials and Admixtures	9-23
Water	9-25

### 4-07.3 CONSTRUCTION REQUIREMENTS

#### 4-07.3(1) EQUIPMENT

Equipment acceptable to the Engineer for both pulverizing and mixing is the CMI RS-500 Reclaimer / Stabilizer or approved equal. The Contractor shall submit information describing the equipment to be used for this Work shall be submitted to the Engineer at least 5 Working Days in advance.

The compaction equipment shall be a vibratory roller compactor weighing a minimum 15 tons.

#### 4-07.3(2) CONSTRUCTION METHOD

##### 4-07.3(2)A PULVERIZING

The Contractor shall pulverize existing pavement and underlying base course Materials to the width and depth indicated on the Drawings. The Contractor shall make as many passes as necessary to blend all pulverized Materials to the width and depth indicated on the Drawings. The blended Material shall conform to the following gradation:

Sieve Size	Percent Passing (by weight)
1-1/2 Inch Square Opening	100 - 96%

Acceptance of the gradation will be based on visual inspection of the Engineer. The blended Material shall be shaped and rolled to allow for temporary use of traffic, as necessary. Shaping shall be continued until a uniform roadway section is developed. The surface shall be within 0.10± feet of the finished grade and the Materials shall have a uniform and consistent gradation. All rocks larger than 3 inches and all other deleterious Material shall be removed and disposed of.

##### 4-07.3(2)B DISTRIBUTING ADDITIVES

After the pulverizing and initial shaping and rolling operations are completed, additives shall be placed on the roadway surface for mixing with underlying roadway Materials to the depth indicated on the Drawings. The Portland cement shall be distributed onto the prepared roadway surface at a rate to obtain the approved mix design proportions after mixing and blending water shall be applied to the roadway surface at a rate such that the moisture content of the mixed Material does not exceed the optimum moisture content for the mixed Material by more than 2%.

Portland cement and water shall not be placed so far ahead of the mixing equipment such that the soil-cement pavement base cannot be mixed, graded, and compacted within 90 minutes after placement of the Portland cement and water. Traffic shall not be permitted on the treated surface for a minimum of 3 Days to allow for curing.

See Section 2-12 regarding watering except payment for water shall be in accordance with Section 4-07.5.

#### **4-07.3(2)C MIXING**

The mixing operation shall consist of thoroughly mixing the distributed additives with the pulverized Materials to the total combined depth indicated on the Drawings. The mixing equipment shall be the same equipment used for the pulverizing. The Contractor shall be prepared to provide additional additives or cross mixing or both, as determined by the Engineer, to localized areas to achieve a property mixed base. All rocks and Material larger than 3 inches which are exposed by the mixing operation shall be removed by the Contractor. Traffic shall not be permitted on the treated surface for a minimum of 3 Days to allow for curing.

#### **4-07.3(2)D FINAL GRADING, COMPACTING, AND CURING**

The mixed and stabilized roadway Material shall be final graded and compacted within 90 minutes after the addition of Portland cement and water. The finished grade shall be as indicated on the Drawings.

Density of the compacted soil-cement acceptable to the Engineer will be determined as follows:

After each pass of the vibratory roller, a nuclear densometer reading of the compacted Material will be taken to the depth indicated on the Drawings. These nuclear densometer readings will be taken at several locations so as to determine a relationship indicating "Measured Density" vs. "Number of Passes" of the roller. When the change in density readings between successive passes of the roller at a given test location increases by less than 2% of the previous density reading at that same location, then the compaction of the Material at that location will be considered acceptable.

The completed base course shall be allowed to cure for a minimum of 3 Days before allowing traffic access. The compacted soil cement shall not be allowed to dry. The Contractor may use the water truck or may use any other method of supplying water to keep the finished surface moist and prevent lost of moisture from the treated Material. The Contractor shall apply a tack coat of as soon as practical after final compaction in accordance with Section 5-04.3(4)B4. The HMA Class asphalt wearing course shall be applied as soon as practicable after the 3 Day-curing period and before opening the treated pavement to traffic.

#### **4-07.3(2)E PATCHING AND CORRECTION OF DEFECTS**

Any areas in the completed and stabilized base which appear non-uniform in any way including: segregation of aggregates; insufficient or excessive Portland cement or water; insufficient compaction; or an improper surface tolerance shall be removed and reprocessed, or replaced at the Engineer's direction.

#### **4-07.4 MEASUREMENT**

Bid items of Work completed pursuant to the Contract will be measured as provided in Section 1-09.1, Measurement of Quantities, unless otherwise provided for by individual measurement paragraphs herein this Section.

Measurement for "Full Depth Pavement Reclamation" will be by the square yard.

Measurement for "Portland Cement for Pavement Reclamation" will be by the ton.

Measurement for "Water" will be by the 1,000 gallons (Mgal).

#### **4-07.5 PAYMENT**

Compensation for the cost necessary to complete the work described in Section 4-07 will be made at the Bid item prices Bid only for the Bid items listed or referenced as follows:

1. **"Full Depth Pavement Reclamation"**, per square yard.

The Bid item price for "Full Depth Pavement Reclamation" shall include all costs for the work required to perform full depth Pavement reclamation, except for the cost of Portland cement and water as provided in this Section. Payment for the tack coat shall be considered incidental to the Bid item "Full Depth Pavement Reclamation" and no separate or additional payment will be made therefore.

2. **"Portland Cement for Pavement Reclamation"**, per ton.

The Bid item price for "Portland Cement for Pavement Reclamation" shall include all costs for the work required to furnish and apply Portland cement as specified In Section 4-07.

3. **"Water"**, per 1,000 gallons (Mgal).

The Bid item price for "Water" shall include all costs for the work required to furnish and apply the water as required in Section 4-07.

4. **Other payment information.**

All costs associated with obtaining a hydrant use permit shall be considered incidental to the various Bid items comprising the Work and no separate or additional payment will be made. See Section 2-12.5.