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PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Requirements for asphalt mixing plants and equipment.

1.02 RELATED SECTIONS:

Section 31 00 00 - Earthwork

Section 32 11 23 - Mineral Aggregates

Section 32 12 16 - Asphalt Paving

Section 32 23 13.13 – Sub-grade Preparation for Asphalt Paving

Section 32 23 13 16 - Grade Adjustment for Utility Structures

PART 2 - PRODUCTS

2.01 USE OF RECYCLED MATERIAL:

A. Upon approval of the Engineer, the Contractor may have the option of utilizing asphalt concrete removed under the Contract, if any, or old asphalt concrete from an existing stockpile, or supplying all new Materials in the production of the asphalt concrete pavement, or any combination of the foregoing.

B. If removed from an existing stockpile, the old asphalt concrete used shall be uniform in gradation, asphalt content, and asphalt viscosity. If not from an identified and approved source, the Mineral Aggregates shall meet degradation and hardness requirements.

C. If the Contractor elects to use 20% or less of recycled Materials, the recycled Materials need not be uniform as long as the asphalt concrete meets the Specifications for the class that is specified.

D. Recycled Materials shall not be used in asphalt concrete Class D.

PART 3 – EXECUTION

3.01 GENERAL:

A. The Equipment used by the Contractor shall include scarifying, mixing, spreading, finishing and compacting Equipment, an asphalt distributor, and Equipment for heating asphalt Material, and shall be subject to approval by the Engineer before its use on the Work.

B. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing Equipment impractical, the paving may be done with other Equipment or by hand.

C. Spreading Equipment shall be self-propelled, supported on at least four pneumatic tires, with an approved device for accurately metering and distributing the Mineral Aggregate uniformly over the Roadway surface.

D. Brooms shall be motorized with a positive means of controlling vertical pressure.

E. Other Equipment necessary to acceptably perform the work as specified herein shall be subject to approval by the Engineer before its use on the Work.

F. Additional units shall be placed on the Work when, in the opinion of the Engineer, it is considered necessary in order to fulfill the requirements of these Specifications, or to complete the Work within the time specified.

G. Both the asphalt distributor and the self-propelled chip spreader shall be calibrated prior to their use to ensure applications within the specified coverage limits. Adjustment of the asphalt distributor spray bar height shall produce a triple lap of spray fans from bars with a 4 inch nozzle spacing and a double lap from bars having a 6-inch nozzle spacing.

H. The Contractor shall frequently check and adjust, if necessary, the height of the spray bar during asphalt application to insure the height above the pavement surface does not vary more than 1 inch as the truck load lightens.

3.02 REQUIREMENTS FOR ALL PLANTS:

A. Sufficient storage space shall be provided for each size of aggregate.

B. The different aggregate sizes shall be kept separated until they have been delivered to the cold elevator feeding the plant except that aggregate combined with recycled aggregate meeting the requirements of “Gradation - Recycled Asphalt Pavement And Mineral Aggregate” Paragraph of “Aggregates For Asphalt Paving” Article of Section 32 11 23 - Mineral Aggregates.

C. The storage yard shall be maintained neat and orderly and the separate stockpiles shall be readily accessible for sampling.

D. The asphalt plant shall have a minimum capacity rating by the manufacturer as follows:

1. For Projects involving 5,000 tons or more:

a. Batch plants - 2,000 lbs. per batch.

b. Continuous mix and rotary drum plants - 100 tons per hour.

2. For Projects involving less than 5,000 tons:

a. Batch plants - 1,000 lbs. per batch.

b. Continuous mix and rotary drum plants - 45 tons per hour.

F. Equipment for preparation of asphalt Material:

1. Tanks for the storage of asphalt Material shall be equipped to heat and hold the Material at the required temperatures.

2. The heating shall be accomplished by steam coils, electricity, or other acceptable means so that no flame shall be in contact with the tank.

3. The circulating system for the asphalt Material shall be designed to ensure proper and continuous circulation during the operating period.

4 Provision shall be made for measuring the asphalt in the storage tank and a valve shall be placed in either the supply line to the mixer or the storage tank for sampling the Material.

G. Feeder for drier or drum mixer:

1. The plant shall be provided with accurate mechanical means for uniformly feeding the aggregate into the drier so that uniform production and uniform temperature are maintained.

2 The feeder for blending sand, when required, shall be capable of providing a consistent, uniform flow in the amount designated in the Contract.

H. Plant screens, capable of screening all aggregate to the specified sizes and proportions and having normal capacities in excess of the full capacity of the mixer, shall be provided.

I. Bins:

1. The plant shall include storage bins of sufficient capacity to supply the mixer when it is operating at full capacity.

2 Bins shall be arranged to ensure separate and adequate storage of appropriate fractions of the aggregate.

3 Separate dry storage shall be provided for mineral filler when used and the plant shall be equipped to feed such Material into the mixer.

4. Each bin shall be provided with overflow pipes, sized and located to prevent Material backing up into other compartments or bins.

5. Each compartment shall be provided with an outlet gate, constructed so there shall be no leakage when closed. The gates shall close quickly and completely.

6. Bins shall be constructed so samples can be readily obtained.

7. Bins shall be equipped with adequate tell-tale devices to indicate the level of the aggregate in the bins at the lower quarter points.

J. Asphalt control unit:

1. Acceptable means, either by weighing or metering, shall be provided to obtain the proper amount of asphalt Material in the mix.

2. Means shall be provided for checking the quantity or rate of flow of asphalt Material into the mixer.

3. The asphalt may also be proportioned by a device which sprays the asphalt into the mixer through six or more nozzles, and which weighs or proportions the Material for each batch by a positive rotating meter which is calibrated in pounds.

a. The metering device shall have an established background of service and shall be approved by the Engineer.

K. Thermometric Equipment:

1. An armored thermometer of adequate range in temperature reading shall be fixed in the asphalt feed line at a suitable location near the charging valve at the mixer unit.

2. The plant shall also be equipped with either an approved dial-scale, a mercury actuated thermometer, an electric pyrometer, or other acceptable thermometric instrument placed at the discharge chute of the drier to automatically register or indicate the temperature of the heated aggregate.

3. This device shall be in full view of the plant operator.

4. The Engineer may require replacement of any thermometer with an acceptable temperature-recording apparatus for better regulation of the temperature of aggregate.

L. Dust collector:

1. The plant shall be equipped with a dust collector constructed to waste or return uniformly to the hot elevator all or any part of the Material collected.

2. When a baghouse is used for dust control, the Contractor shall be able to introduce the Material returned from the baghouse into the mixture at a uniform and continuous rate.

a. Accurate mechanical means shall be provided for uniformly feeding the fines into the aggregate stream.

b. To accomplish this, the Contractor shall provide a surge hopper with a holding capacity sufficient to accumulate the baghouse fines or shall have a variable speed mechanical feed interlocked to the plant which prevents any variance in feed into the aggregate stream.

c. Either method shall provide uniform and continuous return of the well-graded fine Materials and be provided with a method of withdrawing the surplus fines independently for disposal.

M. The plant burner fuel shall be restricted to the use of propane, butane, natural gas, methane, coal, No. 1 or No. 2 fuel oil, or other acceptable burner fuel submitted to and approved by the Engineer.

3.03 REQUIREMENTS FOR BATCH PLANTS:

A. The plant shall include a drier or driers which continuously agitate the aggregate during the heating and drying process, and be capable of preparing aggregates to specification requirements.

B. Weigh box or hopper:

1. The Equipment shall include a means for accurately weighing each size of aggregate in a weigh box or hopper suspended on scales and of ample size to hold a full batch without hand raking or running over.

2. The gate shall close tightly so that no Material is allowed to leak into the mixer while a batch is being weighed.

C. Asphalt control:

1. The Equipment used to measure the asphalt Material shall be accurate to ±0.5%.
2. The asphalt bucket shall be a non-tilting type with a loose sheet metal cover. The capacity of the asphalt bucket shall be at least 15% in excess of the weight of asphalt Material required in any batch.
3. The asphalt bucket, its discharge valve or valves and spray bar shall be adequately heated.
4. The length of the discharge opening or spray bar shall be not less than 75% of the length of the mixer and it shall discharge directly into the mixer.
5. Steam jackets, if used, shall be efficiently drained and all connections shall be constructed so they do not interfere with the efficient operation of the asphalt scales.
6. The plant shall have an adequately heated quick-acting, non-drip, charging valve located directly over the asphalt Material bucket.
7. The indicator dial shall have a capacity of at least 15% in excess of the quantity of asphalt Material used in a batch.
8. The controls shall be constructed so they may be locked at any dial setting and automatically reset to that reading after the addition of asphalt Material to each batch.
9. The dial shall be in full view of the mixer operator.
10. The flow of asphalt Material shall be automatically controlled so it will begin when the dry mixing period is over.
11. All of the asphalt Material required for one batch shall be discharged in not more than 15 seconds after the flow has started.
12. The size and spacing of the spray bar openings shall provide a uniform application of asphalt Material the full length of the mixer.
13. The section of the asphalt line between the charging valve and the spray bar shall be provided with a valve and outlet for checking the meter when a metering device is substituted for an asphalt Material bucket.

D. Mixer:

1. The batch mixer shall be an acceptable type capable of producing a uniform mixture meeting the requirements of these Specifications.
2. If not enclosed, the mixer box shall be equipped with a dust hood to prevent loss of dust.
3. Clearance of the blades from all fixed and moving parts shall not exceed 1 inch unless the maximum diameter of the aggregate in the mix exceeds 1½ inches, in which case the clearance shall not exceed 1½ inches.

E. Mixing time:

1. The plant shall be capable of regulation of the mixing time as specified in this Section in 5 second increments.

F. Automatic controls:

1. All Projects using a batch mixer involving 5,000 tons or more of asphalt concrete shall conform to the following provisions.

2. The proportioning and timing devices shall be automatic to the extent that the only manual operation required for the proportioning and mixing of Materials for one batch shall be a single operation of a switch or starter.

3. The mixing plant shall be equipped with automatic weight proportioning devices to monitor and control the weights of the several components of aggregates and of the asphalt, plus timing lock devices to monitor and control the position of the aggregate weigh hopper dump gate, the asphalt bucket discharge valve, and the mixer discharge gate.

4. Withdrawal from the aggregate bins and the discharge of the weigh hopper shall be so interlocked that the weigh hopper cannot discharge until the required quantity of aggregate from each bin has been deposited therein.

   a. The weigh hopper may be a single compartment, individual weight control type, or of the divided compartment, preset volume type.

   b. When the single compartment, individual weight control type is used, the automatic scale weight system shall discharge and weigh Material from one bin at a time.

   c. When the preset volume weigh hopper is used, the automatic control system shall check the total weight of each aggregate batch and provision shall be made to allow the Engineer to check easily and quickly the individual aggregate weights at any time.

5. The timing lock devices shall be actuated by the opening of the aggregate weigh hopper dump gate. They shall lock the asphalt bucket discharge valve until preset dry mixing time is expired and shall lock the mixer discharge gate throughout the preset dry and wet mixing periods. The control of the timing shall be flexible and capable of being set at intervals of not more than 5 seconds throughout cycles up to 60 seconds.

6. The dials of the timing locks and automatic weighing controls shall be so arranged that the time interval and mass proportion controls may be locked by the Engineer.

3.04 REQUIREMENTS FOR CONTINUOUS MIX PLANTS:

A. Aggregate proportioning:

1. The plant shall include a means for accurately proportioning each size of aggregate.

2. The plant shall have a feeder mounted under each compartment bin.

3. Each compartment bin shall have an accurately controlled individual gate to form an orifice for volumetrically measuring the Material drawn from each compartment.

4. The feeding orifice shall be rectangular with one dimension adjustable by positive mechanical means provided with a lock.

5. Indicators shall be provided for each gate to show the respective gate opening in inches.

6. The feeder belt or drive system shall be adjustable to various speeds and calibrated with various gate openings for the Material to be used.

B. Weight calibration of aggregate feed:

1. The plant shall include a means for calibration of gate openings by weighing test samples.

2. Provision shall be made so that Materials fed out of individual orifices may be bypassed to individual test boxes.

3. The plant shall be equipped to conveniently handle individual test samples weighing not less than 200 pounds.

C. Synchronization of aggregate feed and asphalt Material feed:

1. Acceptable means shall be provided to afford positive interlocking control between the flow of aggregate from the bins and the flow of asphalt Material from the meter or other proportioning device.

2. This control shall be accomplished by interlocking mechanical means or by any other positive method acceptable to the Engineer.

3. A warning device shall be provided to alert the plant operator any time the level of Material in any one bin is so low that uniform feed is discontinued.

D. Mixer:

1. The plant shall include a continuous mixer of an acceptable type, adequately heated and capable of producing a uniform mixture meeting the requirements of these Specifications.

2. It shall be equipped with a discharge hopper with dump gates which permit rapid and complete discharge of the mixture.

3. The paddles shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix.

4. The mixer shall have a manufacturer’s plate giving the net volumetric contents of the mixer at the several heights inscribed on a permanent gauge.

5. Charts shall be provided showing the rate of feed of aggregate per minute for the aggregate being used.

3.05 REQUIREMENTS FOR ROTARY DRUM PLANTS:

A. The plant shall have a feeder capable of uniformly introducing the aggregate into the drum.

1. The aggregate feeder shall be synchronized with the asphalt Material feed.

2. Acceptable means shall be provided to afford positive interlocking control between each aggregate cold feed bin, aggregate feed, and the asphalt feed so the plant automatically activates a warning device if the feed of either aggregate or asphalt is interrupted.

B. The plant shall have the mixing capability to provide a uniform mixture meeting the requirements of these Specifications.

C. The asphalt Material feed shall have positive recording capabilities so the amount of asphalt incorporated into the mix during any given period of time may be read directly.

3.06 SCREENLESS PLANTS:

A. If the Contractor elects to produce aggregate in accordance with "Gradation - Recycled Asphalt Pavement And Mineral Aggregate" Paragraph of Section 32 11 23 – Mineral Aggregates, then "Plant screens,…" and "Bins" Paragraphs of "Requirements For All Plants" Article of this Section will not be required provided the completed mixture meets the Specifications as listed in "Proportions Of Materials For Asphalt Concrete" Article of Section 32 11 23 – Mineral Aggregates, for the class of mix being produced.

3.07 HAULING EQUIPMENT:

A. Trucks used for hauling asphalt concrete mixtures shall have tight, clean, smooth metal beds that have been thinly coated with a minimum amount of paraffin oil, or other acceptable material to prevent the mixture from adhering to the beds.

B. Each truck shall have a cover of canvas or other suitable material of sufficient size to protect the mixture from the weather.

C. When dump truck beds are sprayed with oil, the excess oil shall be drained prior to filling with the asphalt mixture.

1. For hopper trucks, the conveyer shall be in operation during the process of oiling the bed.

D. Unless specified otherwise in the Contract, the asphalt concrete mixture shall leave the mixing plant at a temperature between 260°F and 350°F, and when deposited as part of the Pavement Structure, shall have a minimum temperature of 250°F.

3.08 ASPHALT PAVERS:

A. Asphalt pavers shall be self-contained, power-propelled units, provided with an activated screed or strike-off assembly, heated if necessary, and capable of spreading and finishing courses of asphalt plant mix Material in lane widths applicable to the specified typical section and thicknesses shown on the Drawings.

B. The screed or strike-off assembly shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, segregating, or gouging the mixture.

1. Any bolt-on or hydraulic extensions shall produce the same results including ride, density, and surface texture as the screed or strike off assembly.

2. Hydraulic extenders without screeds, augers, and vibration shall not be used in the Traveled Way.

C. When laying mixtures, the paver shall be operated at a uniform forward speed consistent with the plant production rate and roller train capacity to result in a continuous operation.

1. The auger speed and flight gate opening shall be adjusted to coordinate with the operation.

D. The paver shall be equipped with automatic screed controls with sensors for either or both sides of the paver.

1. The controls shall be capable of sensing grade from an outside reference line, sensing the transverse slope of the screed, and providing automatic signals which operate the screed to maintain the desired grade and transverse slope.

2. The sensor shall be constructed so it operates from a reference line or a multi-footed ski-like arrangement.

E. The transverse slope controller shall be capable of maintaining the screed at the desired slope within ± 0.1%.

F. The paver shall be equipped with automatic feeder controls, properly adjusted to maintain a uniform depth of Material ahead of the screed.

G. Manual operation will be permitted in the construction of irregularly shaped and minor areas.

1. These areas may include, but are not limited to, gore areas, road approaches, left-turn channelizations, and tapers.

H. When specified in the Contract, reference lines will be required for both outer edges of the Traveled Way for each main line Roadway for vertical control.

1. Horizontal control utilizing the reference line will be permitted.

2. The grade and slope for intermediate lanes shall be controlled automatically from reference lines or by means of a multi-footed ski and a slope control device.

3. When the finish of the grade prepared for paving is superior to the established tolerances, and, when in the opinion of the Engineer, further improvement to the line, grade, cross-section, and smoothness can best be achieved without the use of the reference line, a multi-footed ski-like arrangement may be substituted subject to the continued approval of the Engineer.

4. After paving the first lane, a joint matcher may be used subject to the approval of the Engineer.

5. The use of the reference line shall be reinstituted immediately whenever the Contractor fails to maintain a superior pavement, or rhythmic undulations

occur, or the surface smoothness of the course being paved fails to meet the requirements for wearing course.

6. The reference line may be removed after the completion of the first course of asphalt concrete if the Contractor demonstrates acceptable thickness and finished surface control.

7. Failure to continue acceptable thickness and finished grade control may require reinstallation of the reference line at the Contractor's sole expense.

I. The Contractor shall furnish and install all pins, brackets, tensioning devices, wire, and accessories necessary for acceptable operation of the automatic control Equipment.

1. The Contractor shall submit samples of the above items along with the methods and procedures to the Engineer for approval at least 5 Working Days prior to installation.

3.09 ROLLERS:

A. Rollers shall be self-propelled pneumatic-tired or smooth-wheeled rollers, each weighing not less than 10 tons.

B. Rollers shall be of the steel wheel, vibratory, or pneumatic tire type, in good condition, capable of reversing without backlash, and shall be operated at speeds slow enough to avoid displacement of the mixture.

C. The number and weight of rollers shall be sufficient to compact the mixture as required in this Section.

D. The use of Equipment which results in excessive crushing of the aggregate will not be permitted.

E. Rollers producing pickup, washboard, uneven compaction of the surface or other undesirable results will be rejected by the Engineer.

F. The following shall apply to the various types of rollers:

1. Vibratory Rollers

a. A variable amplitude will be required, with at least 2 settings.

b. A variable frequency with a 2,000 VPM minimum.

c. The maximum rate of travel under vibration shall be limited to 3 mph.

d. Pneumatic propulsion on Surface Courses shall be limited to smooth tires that do not leave visible tracks.

2. Pneumatic Tired Rollers

a. The maximum rate of travel shall be limited to 5 mph.

b. Skirts shall be firmly affixed to the perimeter of the roller and shall uniformly extend to within 1 inch of the pavement surface.

3. Steel Wheel Rollers

a. The maximum rate of travel shall be limited to 4 mph.

3.10 PLANERS:

A. Planing shall be by the cold planing method only.

B. Equipment shall be subject to the Engineer's approval prior to use. Equipment shall be maintained in good working condition while in use.

1. The storage of Equipment and volatile Material shall be off-street and in compliance with Seattle Fire Department regulations.

C. Cold planers shall be milling type Equipment capable of cutting at least a 5 foot chord to a depth of 4 inches in one pass.

1. Smaller planers may be used for cutting around utility castings and making taper cuts for butt joints.

D. For mainline cold planing operations, the Equipment shall have automatic controls with sensor for either or both sides of the Equipment capable of sensing the proper grade from an outside reference line.

1. The automatic controls shall also be capable of maintaining the desired transverse slope.

2. The sensor shall be so constructed that it operates from a reference line or multi-footed ski-like arrangement.

3. The transverse slope controller shall be capable of maintaining the screed at the desired slope within ± 0.1%.

3.11 DISTRIBUTORS:

A. The distributor shall have a capacity of not less than 1,000 gallons, and shall be so designed, equipped, maintained, and operated that asphalt Material of an even heat shall be uniformly applied at the required rate.

B. It shall be equipped with a 10-foot spray bar with extensions, pressure pump and gauge, volume gauge so located as to be observed easily by the Engineer from the ground, a tachometer to control accurately the speed and spread of asphalt.

C. It shall be equipped with two thermometers, one installed permanently in the tank to indicate temperatures of the asphalt at all times.

D. The power for operating the pressure pump shall be supplied by a power unit which provides a uniform spray from each of the nozzles across the spray bar and extensions.

END OF SECTION