

SECTION 31

ASPHALT CONCRETE - GENERAL

31.1 DESCRIPTION

A. General

These specifications include general requirements that are applicable to all types of asphalt pavements of the hot mix type, irrespective of gradation of aggregate, kind and amount of asphalt material, or pavement use. Exceptions to the general requirements are indicated in the specific requirements for each class.

This work consists of one or more courses of asphalt mixture constructed on the prepared foundation in accordance with these specifications and the specific requirements of the class under contract.

B. Related Work

- Section 32 - Asphalt Concrete - Class E
- Section 33 - Asphalt Concrete - Class G
- Section 34 - Asphalt Concrete - Class S
- Section 35 - Prime, Tack, and Flush Seal Coats
- Section 37 - Asphalt Surface Treatment
- [Section 39 - Cold Mix Asphalt Concrete](#)
- [Section 40 - Portland Cement Concrete Pavement](#)
- [Section 41 - Utility Trench Resurfacing](#)
- Section 115 - Aggregates for Asphalt Concrete
- Section 116 - Aggregates for Asphalt Surface Treatments
- Section 118 - Asphalt Material

31.2 MATERIALS

A. Composition of Mixtures

The asphalt concrete shall be composed of a mixture of aggregate and asphalt. The several aggregate fractions shall be combined in such proportions that the resulting mixture meets the gradation requirements of the specifications.

The operation of the plant shall not commence until the Contractor has furnished the Engineer, in writing, a job mix formula established by a certified testing laboratory meeting the criteria for the class of asphalt concrete specified. After the job mix formula is established, the mixture shall conform within the range of tolerances for that class of asphalt concrete.

The job mix formula testing for each class of asphalt concrete used shall be updated annually by a certified testing laboratory at the beginning of the construction season and used for that construction season only.

A change in sources of materials will require a new job mix formula to be established before the new material is used. When unsatisfactory results or other conditions make it necessary, the Engineer may require the Contractor to furnish a new job mix formula, as established by a certified testing laboratory.

B. Aggregates

Aggregates shall meet the applicable requirements of Section 115.

C. Asphalt

Asphalt, of the type specified in the job mix formula, shall meet the applicable requirements of Section 118 or as called for in the Detailed Specification.

31.3 CONSTRUCTION REQUIREMENTS

A. Weather and Seasonal Limitations

Asphalt concrete shall **only** be constructed **or placed** when the underlying surface **material** is dry and unfrozen. Asphalt concrete shall not be placed when weather conditions prevent proper handling, compaction, or finishing. Temperature and seasonal limitations are as follows **except as allowed by the Engineer**:

MINIMUM AIR TEMPERATURES AND SEASONAL LIMITATIONS

Compacted Thickness	Surface Course		Subsurface Course & Shoulder Courses		
	Min. Temp.	Min. Temp. (Seasonal Limits)	Min. Temp.	(Seasonal Limits)	(Seasonal Limits)
1 in. or Less	45° F	May 1 to Oct 15	Nov. 1	40° F	None
Over 1 in. to 2 in.	40° F	May 1 to Oct 15	Nov. 1	35° F	None
Over 2 in. to 3 in.	35 F	May 1 to Oct 15	Nov. 1	32 F	
	None		None		

B. Equipment:

1. Requirements for All Plants

The central plant for mixing the mineral aggregate and asphalt may either be of the batch, continuous, or drum mix type. Batch or continuous type shall have at least two (2) storage bins, protected from the weather and of sufficient capacity to furnish the necessary amount of mineral aggregate materials when operating at the calibrated capacity of the plant. The bin capacity shall be so proportioned as to insure adequate storage of the hot, dried, and screened mineral aggregate

divided on the one-fourth (1/4) inch sieve, or other sieve size agreed upon. Each compartment shall have an overflow pipe that prevents any diversion of excess material into other compartments.

Vibrators shall be provided to prevent bridging or arching of the contents in the bins. Adequate and convenient facilities shall be provided to obtain representative aggregate samples from each bin. When material filler or hydrated lime additive is required, a separate bin and feed system shall be provided to store and accurately and uniformly proportion the required quantity into the mixture.

The central mixing plant shall be equipped with a dust collector. The device shall be operated to eliminate or conserve the dust necessary to meet gradation limits.

The central mixing plant shall be equipped with a dryer or driers, which continuously agitate the mineral aggregate during the heating and drying process. The dryer or driers shall be capable of preparing aggregates needed to operate the calibrated capacity of the plant.

Burner fuel used for production of asphalt concrete shall be propane, butane, natural gas, Grade 1 fuel oil, Grade 2 fuel oil, Grade 4 fuel oil (light), Grade 5 fuel oil (light or heavy). Fuel oil heavier than Grade 2 shall meet the requirements of ASTM D396. Recycled oils, RF04, RF05L, RF05H may be used provided they meet the requirements of ASTM D6448. The Contractor shall certify that each load of fuel meets the applicable ASTM specification. Recycled fuel oils and fuel oil heavier than Grade 2 shall be properly preheated and shall be efficiently burned. Production of mix shall be stopped, if flameouts or signs of incomplete combustion occur.

A pyrometer or other thermometric instrument shall be installed in the supply line between the storage tank and the discharge point in the plant to indicate the temperature of asphalt. The mixing plant shall not operate unless the thermometric instruments are in place and working properly. The plant shall be equipped with satisfactory weighing or volumetric equipment. The equipment shall provide devices that will permit easy readjustment of any working part that may get out of adjustment.

Asphalt storage tanks shall be kept level. Accurate calibration charts shall be furnished to the Engineer and shall show the quantity of material contained in a tank at each inch increment of depth. A suitable measuring device to obtain the depth of material shall be provided. Storage tanks shall be capable of uniformly heating the material, under effective and positive control to the temperature requirements. Heating shall be accomplished by steam coils, electricity, or other means, so that the flame will not come in direct contact with the heating tank. The circulating system for the asphalt shall be of adequate size to insure proper and continuous circulation during the entire operating period. [An accurate thermometer must be installed in the tank so the temperature can be monitored.](#)

Bins for hot mix storage shall be constructed so that mix drawn from the bins will meet all of the specified requirements of the mixture.

2. Specific Requirements for Continuous Type Mixing Plants

The plant shall include a continuous mixer capable of adequately heating and producing a uniform mixture. The discharge hopper shall be equipped with dump gates, which will permit rapid and complete discharge of the mixture. The paddles shall be adjustable for angular position on the shafts and reversible to retard the flow of the mix. The clearance between the paddles and the mixer liner shall not exceed one (1) inch.

The proportioning device (gradation unit) for mineral aggregate shall be equipped with accurately controlled gates or orifices for volumetrically measuring the material as it is fed by a conveyor to the mixer and constructed so the flow of aggregates can be accurately determined and positively controlled. A cut-off system shall automatically stop the mixing operation when the level of the aggregate in any bin is less than fifteen (15) inches above the apron feeder. An accurate revolution counter shall be provided on a plant drive, which is interlocked with the conveyor to the mixer and shall be easily accessible for reading.

Bypass gates for obtaining test samples shall be provided for calibration of gate openings. The volumetric proportioning device for the asphalt shall be a positive displacement-metering pump with a satisfactory nozzle arrangement in the mixer. The operating speed of the pump shall be synchronized with the flow of mineral aggregate to the mixer by an automatic interlocking control. The device shall be easily and accurately adjustable to vary the rate of asphalt delivered to the mixer so the mixture will be uniformly proportioned. An accurate meter showing the input of asphalt to the mixer from the pump will be required.

A recording pyrometer shall be mounted in the discharge end of the mixer, and daily charts of contiguous mix temperature readings shall be submitted to the Engineer. The pyrometer shall be of a type and at a location that is easily accessible for readings.

3. Specific Requirements for Batch Type Mixing plants

The batch mixer shall be capable of producing a uniform mixture, and the mixer box shall be equipped to prevent loss of dust. The clearance between the paddles and the mixer liner shall not exceed one (1) inch.

Batch plants shall be fully automatic to the extent that the only manual operation required will be for the proportioning of one batch utilizing a single actuation switch or starter.

The automatic unit shall include a timing unit to automatically control the measuring, mixing, and dumping processes through a central control.

The automatic unit shall be self-contained. If the unit is affected by vibration, it shall be set on the ground or mounted on a vibration-free surface.

The automatic unit shall be capable of performing the following operations in the proper sequence and time interval:

- a. The automatic process control in conjunction with the timing unit shall automatically dump preset weights of the materials into the pugmill or mixer in proper time sequences.
- b. When the materials are low in supply, a cutoff system shall automatically stop the weighing process until the quantity of material required for one batch is available. In lieu of this requirement, the automatic control unit shall be equipped with an over-under weight control device, which automatically stops the weighing process when the weight of a component in the batch varies from the preset weight by more than the following listed tolerances:

Aggregate Components.....	± 1.5% of total batch weight
Mineral Filler.....	± 0.5% of total batch weight
Asphalt.....	± 0.3% of total batch weight

- c. The mixer cannot be emptied until the end of the preset mixing time.
- d. The automatic control unit shall prevent the introduction of mix ingredients into the mixer while the dump gate is open.
- e. The asphalt and the aggregate measuring processes shall be controlled by separate sets of components contained within the automatic unit and shall be capable of performing both processes simultaneously.
- f. The weight or volume of the asphalt introduced into the batch, shall be indicated by the dial pointer.
- g. The unit shall be capable of converting the control of the measuring and mixing processes from automatic to manual operation at any time.

In conjunction with the automatic unit, a time lock device shall be used which is capable of controlling the operations of a complete mixing cycle. The weigh-box gate shall lock after charging the mixer and until the closing of the mixer gate at the completion of the cycle. The asphalt bucket or the volumetric control shall lock throughout the dry mixing period, and the mixer gate shall lock throughout the dry and wet mixing periods. The dry mixing period shall be the interval of time between the opening of the weigh box gate and the start of the application of asphalt. The wet mix period shall start at the beginning of the application of asphalt and shall end when the mixer gate is opened.

The control of the timing shall be flexible and capable of being set at intervals of five (5) seconds or less throughout a total cycle of not less than three (3) minutes.

A mechanical batch counter shall be installed as part of the timing device to register the release of the batch. Spring-less dial or beam scales, accurate to one-half (1/2) of one percent (1%) of the net load, are required on all batch plants.

Where the asphalt is weighed, scales or weights shall be attached to the bucket in a manner that will accurately weigh the amount of asphalt going into the mixer. A tilting bucket will not be permissible. Weighing or measuring equipment shall be sealed or locked in place and periodically checked by the Engineer to secure the required accuracy in the mix.

A recording pyrometer shall be mounted in the discharge chute of the dryer. Daily charts of continuous aggregate temperature readings may be required to be submitted to the Engineer. The pyrometer shall be of a type and at a location that is easily accessible for reading without difficulty.

4. Specific Requirements for Drum Mix Plants

The dryer drum shall be designed to uniformly heat, coat, and mix the materials without burning or adversely affecting the mixture.

- a. The component aggregates shall be processed, stockpiled, and proportioned as provided herein.
- b. The aggregate and asphalt shall be fed simultaneously into the dryer to uniformly heat, mix, and coat the aggregate.
- c. The aggregate feed system into the dryer shall provide positive control of the aggregate feed that can be easily and accurately calibrated. The rate of feed shall be continuously monitored, by belt scale or other device, displayed for the plant operator, and interlocked with the asphalt metering mechanism. Provisions for obtaining representative samples of the combined aggregate prior to its introduction into the dryer shall be provided.
- d. The asphalt metering mechanism shall provide positive control of the rate asphalt is introduced into the mixture and shall respond instantaneously to variation in the aggregate feed rate that would alter the established asphalt content. The mechanism shall be easily and accurately adjustable for change in the rate of asphalt delivered.
- e. A pyrometer or other thermometric instrument shall be installed in the supply line between the storage tank and the discharge point in the dryer to accurately indicate the temperature of the asphalt.
- f. The system shall be equipped with automatic burner controls regulated by temperature sensing of either the mixture at point of discharge from the dryer drum or the stack temperature.

- g. Production shall be limited to the rate required to obtain satisfactory aggregate coating and a uniform mixture meeting job mix temperature requirements.
 - h. The mixture shall be conveyed from the dryer discharge to a storage bin for loading into haul units. The storage bin shall be designed and charged in a manner, which prevents segregation of the mix.
5. Pavers

Self-propelled pavers shall be equipped with a sufficient capacity hopper having a bottom conveyer, an activated screed or activated strike-off assembly, heated if necessary, and is capable of laying specified lane widths. The paver shall provide an accurate, smooth, uniform-textured spread and provide preliminary compaction of the mixture.

An attachment shall be provided on the paver that will place a satisfactory beveled edge on the mat if called for on the plans.

Pavers shall be equipped so that the height and transverse slope of the screed may be manually controlled. They shall be capable of depth adjustments from three-quarters (3/4) inch to not more than three (3) inches and width adjustments to spread the mixture in strips of less than ten (10) feet in width, in steps of one (1) foot or less, to a minimum width of eight (8) feet. They shall be equipped with blending or joint leveling devices for smoothing and adjusting all longitudinal joints between adjacent strips of courses of the same thickness.

6. Rollers

Rollers for compacting the asphalt concrete shall be of the self-propelled type, capable of producing a smooth surface finish.

The number and weight of rollers furnished shall be sufficient to compact the mix to the required density while it is in a workable condition.

Rollers shall be equipped to prevent "pickup" on the tires or drums. Provisions for uniform moistening of the drums or tires with water or water detergent solution or suitably enclosing the roller to prevent heat loss from the tires may be required. The use of fuel oil or other petroleum solvents to prevent "pickup" will not be permitted. Measures shall be taken to prevent oil, grease, or fuels from being dropped on the mat surface.

The rollers shall be capable of being reversed smoothly, **without shoving or tearing the asphalt concrete**, and there shall be no excessive lost motion in the steering mechanism.

C. Preparation of the Mineral Aggregate

- 1. Proportioning for Continuous and Batch Plants:

If blending of aggregates is required, separate bins or stockpiles shall be provided. Extreme care shall be exercised to keep these materials separated until they are delivered in their proper proportions onto the feeder leading to the dryer. Spreading or dumping filler, sand, or crushed rock over the tops of gravel pits, stockpiles, or in hoppers at the crushing plants will not be permitted.

The aggregates for the mixture shall be uniformly dried and heated to the mix temperature specified, without visible unburned fuel or carbon residue on the aggregate when discharged from the dryer. The mineral aggregate shall be screened into at least two (2) fractions dividing on the one-fourth (1/4) inch sieve, or other size agreed upon, and conveyed into separate compartments ready for proportioning and mixing. The hot elevator and screens shall be enclosed to prevent wind loss of fines.

Mineral filler shall be fed proportionately to the aggregate just prior to and during its introduction into the mixer and shall not pass through the gradation unit. Crushed rock screenings used as mineral filler shall be added separately to the cold feed into the dryer.

2. Cold-Feed Proportioning

The Contractor may elect to control aggregate proportioning at the cold feed in lieu of separation, storage, and recombination of the hot aggregate, contingent on the following requirements:

- a. Mineral aggregate shall be furnished for cold-feed proportions in at least two (2) general component aggregate sizes, coarse and fine aggregate. Coarse aggregate is defined as primarily the fraction on a No. 4 sieve. Fine aggregate is defined as primarily the fraction passing a No. 4 sieve.
- b. Component aggregate materials shall be stockpiled separately. Stockpiles of the component aggregate materials shall be maintained during mix production and the cold-feed mechanism charged uniformly from the stockpiles. Charging directly from pits, crusher, or screening plants will not be permitted.
- c. In batch-type mixing plants, the discharge shall be from one bin only into the center of the weight hopper. The amount of aggregate stored in the bin at any one time shall not exceed one batch in weight.
- d. It shall be the Contractor's responsibility to furnish component aggregate that, when combined the resulting gradation consistently meets specified gradation and job mix requirements. Failure to maintain production meeting these requirements will require immediate correction or suspension of the mode of control for aggregate proportioning.
- e. Each individual component required to make up the combined aggregate shall be fed on the conveyor into the dryer through a separate positive feed

control that can be easily and accurately calibrated. The feed shall be easily adjustable and shall maintain a constant and uniform flow throughout the range of its calibration.

D. Preparation of the Mixture:

Before delivery to the project, the aggregate shall be satisfactorily mixed with the asphalt at the central mixing plant. The amount of asphalt used will be in accordance with the job mix formula.

The mixing plant shall be operated using automatic controls. Manual operation will be permitted when automatic controls fail; however, the Contractor shall restore automatic operation within twenty-four (24) working hours.

The aggregates shall be combined in the plant in the proportionate amounts necessary to meet the required job mix formula. The asphalt shall be measured or gauged and introduced into the mixer in the proportionate amount and at the temperature established by the job mix formula. The temperature viscosity relationship of the asphalt furnished will be used as a guide for establishing the asphalt application temperature.

In batch plants, the mineral aggregate shall be mixed dry for a minimum of five (5) seconds, after which, hot asphalt shall be applied in a manner that will obtain uniform coating of particles.

After the required aggregate and asphalt have been introduced into the mixer, the materials shall be mixed until the aggregate is completely and uniformly coated and a thorough distribution of the asphalt throughout the aggregate is secured. The Contractor shall furnish the Engineer a wet mixing time for batch and continuous type plants for each type of aggregate used, as determined by a certified testing laboratory. Continuous mixing plants shall be operated at full, calibrated capacity. Throttling back to reduce production rate will not be permitted.

When hot mix storage bins are used, storage of the mix shall be limited to a maximum of thirty (30) hours.

E. Transportation and Delivery of the Mixture

The mixture shall be transported from the plant to the point of use in pneumatic-tired vehicles. The boxes of the vehicles shall be tight, clean, and smooth. Boxes shall be cleaned only with lime water, soap, or a detergent solution. Oil, diesel fuel, or other petroleum solvents shall not be used. **No material shall be used which could adversely affect the asphalt concrete.** Excess solution in the box shall be disposed of before the vehicle is loaded.

Operations between the times of sunset and sunrise shall be permitted only when approved by the Engineer.

When directed by the Engineer, each load shall be covered with a satisfactory tarpaulin.

F. Tacking, Spreading, and Compacting

The surface on which the asphalt concrete is to be placed, including all vertical contact faces, shall be tacked in accordance with Section 35, unless otherwise shown on the plans or directed by the Engineer. The tack coat shall be allowed a cure period, as determined by the Engineer, prior to asphalt concrete placement.

Asphalt concrete, shall be placed by self-propelled pavers. Handwork is permissible in inaccessible or odd-shaped areas.

A shoe attachment ~~should~~ ~~may~~ be used to match the longitudinal joint(s) on the final paver pass(es) of the top lift unless otherwise directed by the Engineer.

The "temperature of mixture on delivery to the road (or construction site)" shall be the temperature of the mix just prior to placement.

Spot leveling and repair of the existing surface with asphalt concrete will be required in advance of the paver laid courses as designated by the Engineer. Potholes and areas of localized disintegration shall be cleaned of loose material, squared, tacked, leveled with asphalt concrete, and compacted by methods satisfactory to the Engineer. Spot leveling may be blade laid in lifts not exceeding three (3) inches of uncompacted depth. Compaction shall be by five (5) complete coverages as stated in the Specified Roller Coverage method, except a steel-face roller will not be required. Continuous and uniform operation shall be maintained. Trucks shall be available for continuous operation of the plant. Paver operation shall be uniform and consistent with the production at the plant. Stops and starts shall be restricted to a minimum.

Laydown operations shall proceed from the center to the shoulders of the roadbed surface. The center joints of succeeding lifts shall be offset approximately six (6) inches. The center joint of the top lift shall be located on centerline. Longitudinal joints other than at the lane lines will not be permitted in the top lift. In curb and gutter sections, laydown may proceed from the gutter line to the centerline when directed.

Transverse joints of the final lift shall be formed by cutting back, with a saw on the previous run, to expose the full depth of the course. When finished, the transverse joint of all lifts shall have a uniform texture and comply with the straight edge requirement. Waste material resulting from forming joints and temporary ramps shall be removed and disposed of.

Excessive pulling or segregation of the mix shall warrant suspension of operations.

Immediately after the mix has been placed and any surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling to the specified density requirements for the class of asphalt concrete designated. The in-place density shall

be determined by the use of a nuclear density testing machine. Test frequency shall be as specified in Section 31. J. herein.

Rollers shall be operated at a slow, uniform speed not to exceed five (5) miles per hour. Unless otherwise permitted by the Engineer, static steel-faced rollers shall be operated with the drive wheel nearest the paver. When abutting a previously laid lane and when breakdown rolling is being accomplished with a steel-faced roller, the longitudinal joint shall be rolled first by operating the roller on the finished lane with approximately six (6) inches of the roller projecting on the new lane.

The surface of each lift shall be free of waves and other irregularities. The surface of the final lift shall be checked with a ten (10) foot straight edge, furnished by the Contractor. The variation of the surface from the straight edge between any two (2) contact points shall not exceed two hundredth (0.02) foot. The crown, on all lifts, as indicated by checking with a ten (10) foot straight edge, shall be within four hundredth (0.04) foot of specified crown in any ten (10) foot length.

There shall be an attempt to correct irregularities ~~shall be corrected~~ before the temperature of the asphalt mix drops below 175 F. The longitudinal profile can ~~only~~ be improved by using a grinder with diamond blades mounted on a horizontal shaft and other methods when approved by the Engineer. Areas that have been ground shall not be left smooth or polished, but shall have a uniform texture equal in roughness to the surrounding un-ground asphalt concrete. Grinding shall be day lighted to the outside edge of the pavement. Ground surfaces shall be flushed sealed. ~~while the material is still hot.~~ Under no circumstances shall operations continue when it becomes evident final rolling is not producing a smooth, uniform, compacted surface free from roller marks and other irregularities.

As a normal sequence, rolling shall be longitudinal, commencing at the outer edges of the mat and progressing toward the center in straight, parallel strips, overlapping at least six (6) inches.

Rollers shall proceed straight-forward and return in the same path. Turning the rollers to position them for the next pass shall occur at a point where the pavement temperature has cooled sufficiently to resist damage. The Contractor shall vary the points of reversal to prevent a transverse crease.

In order to prevent deformation, rollers shall not stand idle on any part of the mat, which has not been completed and cooled sufficiently to resist deformation.

The beveled edge shall be compacted by methods satisfactory to the Engineer during the breakdown or intermediate rolling.

The mix shall be compacted on the road by one of the following methods. Unless otherwise specified in the contract, the Specified Density Method shall be used.

1. Specified Density Method

The mix shall be compacted to the density specified for the class of asphalt concrete designated. The percent of density shall be based on the maximum specific gravity of the test specimens prepared in the field in accordance with SD 312. The compacted density of the asphalt concrete shall be as determined by SD 311.

Compaction of mix placed on entrances to residences or businesses and intersecting road approaches shall be compacted by the Specified Roller Coverage Method.

Density of asphalt concrete in place shall be in accordance with SD 311. Rolling shall be completed before the temperature of the in-place mix drops below one hundred and eighty (180) degrees.

2. Specified Roller Coverages

The mix shall be compacted by at least four (4) complete coverages with pneumatic-tired rollers and at least one (1) complete coverage with steel faced rollers.

Breakdown rolling may be accomplished by steel-faced rollers when approved by the Engineer.

Self-propelled pneumatic-tired rollers shall cover an overall surface width of at least sixty (60) inches and furnish a minimum rolling pressure of two hundred fifty (250) pounds per inch of roller width.

Self-propelled, tandem, smooth steel rollers (two [2] steel drums operating in the same track) shall furnish a minimum rolling pressure of two hundred seventy-five (275) pounds per inch of roller width.

Rolling shall proceed on the mat as soon as laydown is completed. Completion of rolling on any segment shall not lag behind the laydown more than one thousand (1000) feet. During periods of cool weather, this maximum distance between laydown and final rolling shall be reduced as directed by the Engineer. Compaction to a specified density will not be required; however, additional roller coverages may be required in order to obtain a smooth surface finish.

When directed, the Contractor shall cool, saw, and remove an undamaged six (6) inch square sample or a seven (7) inch diameter round sample from an area designated and repair the hole to the satisfaction of the Engineer.

Rolling between the times of sunset and sunrise shall be permitted only when approved by the Engineer.

G. Asphalt Patching

Asphalt replacement for utility storm sewer or similar work shall comply with the requirements herein and as follows:

1. Minimum Patch Depth

Unless specified otherwise, all permanent asphalt patches shall be placed to a minimum depth of five (5) inches. Should existing pavement depths be greater than five (5) inches, the permanent patch shall match the depth of the existing pavement or as directed by the Engineer.

2. Minimum Patch Width

Minimum patch width shall be six feet or the initial saw width for the proposed trench width plus two feet (one foot on each side of the initial saw cut), whichever is greater. (See Section 41)

All mainline, permanent patches equal to or greater than eight feet in width and longer than 40 feet shall be placed with a paving machine. The use of Layton pavers is prohibited.

3. Surface Tolerance

The patch surface shall be tested with a ten foot straightedge. The maximum permissible surface deviation shall be one-quarter inch in ten feet. The measurements will be made parallel to traffic and up to within one foot of the edge of the existing pavement. Deviation within one foot of the existing pavement shall be no greater than that measured on the adjacent existing pavement.

Areas that exceed the permissible deviation shall be subject to corrective action as directed by the Engineer.

Any corrective measures shall produce a structurally sound, smooth riding surface.

4. Concrete streets with asphalt overlays shall be replaced as described in Section 40. Asphalt overlay thickness shall match existing thickness and shall extend at least six (6) inches beyond edges formed by new and existing concrete paving.

The asphalt shall be tapered at a maximum 10:1 slope longitudinally on each side of any drainage pans and on any areas of existing streets where the overlay begins or ends.

The edges of the new asphalt overlay patch shall be tapered to meet the gutter lip as indicated on the standard detail sheet in the plans.

Under certain conditions where localized ponding problems exist on the existing pavement, the Engineer may require the Contractor to overlay all the way to the face of the curb.

5. If hot-mix asphalt will not be available for a significant period, the Contractor shall place a temporary cold mix patch or overlay as directed by the Engineer.

The Engineer shall determine if placement of the cold mix is necessary. The cold mix shall conform to Section 39.

When hot-mix asphalt becomes available, the Engineer will issue written notice to the Contractor to begin placing the pavement asphalt within ten (10) working days of receiving the notice.

6. Measurement and payment for the asphalt patching shall be in accordance with the section pertaining to the class of asphalt concrete being bid.

Measurement and payment for cold mix shall be in accordance with Section 39, COLD MIX ASPHALT.

H. Maintenance

The Contractor shall be responsible for the maintenance of the work during construction and until final acceptance. Maintenance shall include protection and repair of the prepared base course, tack coat, wearing surface mat, shoulders, and seal course. Rich or bleeding areas, breaks, raveled spots, or other nonconforming areas in the wearing surface or base shall be corrected during such maintenance period.

I. Traffic Control

Allowing traffic to travel over the roadway will not be permitted until the surface has been thoroughly compacted and cooled sufficiently to resist marking or distortion.

Where traffic is to be maintained by means of part-width construction, the Contractor shall control traffic by the use of identified flaggers. The Contractor shall schedule work so traffic will not be inconvenienced by long one-way lanes.

J. Density Tests/Frequency

The Contractor shall submit the following test data for each class of asphalt concrete:

One (1) Standard Density at the start of work and each time the mix or source of material is changed;

One (1) in-place, non-destructive (nuclear gauge) density test per day per 200 ton lot of mainline paving mix;

One (1) in-place, non-destructive (nuclear gauge) density test per day per 250 square yards of patching.

These tests will not be paid for directly, but shall be understood to be subsidiary work pertaining to the several classes of asphalt concrete, except when there is a bid item for asphalt compaction testing, per each test included in the Bidder's Proposal or as otherwise specified in the detailed specifications.

In addition to this testing, the Contractor may be required to remove and test in-place asphalt concrete to determine field densities by sawing or coring samples from areas to be determined by the Engineer.

These field asphalt core density tests will be measured in accordance with Section 31.4C - Compaction Samples and paid for in accordance with Section 31.5C.

All sampling and testing shall be done by certified testing laboratory personnel, and all test results shall be submitted to the Engineer.

Failing density tests shall result in an adjustment of the warranty period and the contract unit price in accordance with the following table for all classes of asphalt concrete:

Amount of Deviation:	0% to -1%	-1% to -2%	-2% to -3%	-3% to -4%
Amount of Deduction:	0% to 5%	5% to 10%	10% to 20%	20% to 30%
Additional Warranty Period:	1 year	2 years	3 years	4 years

Note: The amount of deviation shall be the difference between the specified density and the average of all densities for that class of asphalt concrete if this average is less than the specified density.

The City reserves the right to order additional tests. The Contractor shall pay for those additional tests that fail to meet specified density, and the City will pay for those additional tests that do meet the specified density.

The Engineer or his representative shall be present for all field sampling and lab testing performed for the Contractor. Failure to notify the City of pending sampling or testing could result in rejection of submitted data and re-testing by in-place methods.

All required data shall be received by the Engineer before payment for pavement exceeds seventy-five percent (75%) of the total quantity.

31.4 METHOD OF MEASUREMENT

A. Asphalt Concrete Mat for Incidental Paving

Asphalt Concrete Mat for Incidental Paving will be measured to the nearest one-tenth (0.1) ton. The mixture of mineral aggregate and asphalt for mat will be weighed after mixing, and no deduction will be made for the weight of the asphalt included in the mixture.

B. Asphalt Concrete, Various Classes

Asphalt Concrete, Various Classes will be measured to the nearest one-tenth (0.1) ton, material weight. The mixture of mineral aggregate and asphalt for mat will be weighed after mixing, and no deduction will be made for the weight of the asphalt included in the mixture.

Deduction will not be made for material removed from temporary approaches.

C. Compaction Samples

The measurement of core samples will be by actual count of those samples ordered and accepted by the Engineer for testing purposes.

31.5 BASIS OF PAYMENT

- A. The accepted quantities of asphalt concrete mat for incidental paving will be paid for at the contract price per ton, complete, in place, subject to deductions noted herein. Contractor shall provide Engineer with *valid* weigh tickets for asphalt concrete mat, furnished and installed. If there is no bid item for asphalt concrete mat, the price for such shall be included in and paid for as Asphalt Concrete, Various Classes. Weigh tickets shall be delivered to the Engineer within 48 hours of placement. Tickets delivered after 48 hours will not be valid and will not be paid.

B. Asphalt Concrete, Various Classes

The accepted quantities of Asphalt Concrete, Various Classes, will be paid for at the contract price per ton, complete, in place, subject to deductions noted herein. Contractor shall provide Engineer with valid weigh tickets for asphalt concrete, furnished and installed. Weigh tickets shall be delivered to the Engineer within 48 hours of placement. Tickets delivered after 48 hours will not be valid and will not be paid for.

- C. Compaction core samples, where required, will be paid for at the contract price per each.

END OF SECTION