CHAPTER 2D

PAVING

2D-01. GENERAL

a. Objective

The objective in constructing any pavement is to provide a pavement satisfying design criteria and possessing such uniform characteristics of quality that it will have maximum serviceable life with minimum maintenance. This objective may be achieved only through painstaking attention to each step in the construction of a pavement. This check list will call to your attention items requiring careful thought and consideration relative to preparation of sub-grade, construction of sub-base and base courses, priming of prepared base course, tacking bituminous binder course, and placement and finishing of the pavement surfacing.

b. Control Testing - General

(1) The determination of satisfactory materials on the basis of samples submitted prior to construction and the design of starting mixes for bituminous and portland cement concrete pavements is normally a function of a paving engineer.

(2) Modify concrete batch weights to maintain uniformity of grading and to adjust for free moisture on the aggregates.

(3) A project laboratory is usually equipped to conduct soils tests and to control mixing plant production. The inspector normally will not physically conduct tests but he must be familiar with the tests and significance of tests results.

(4) Minimum frequency of control testing is generally established by specifications and otherwise as good judgement dictates.

(5) Adequacy of processing, batching and/or mixing plants is normally determined through joint inspection by the QC/QA and the paving engineer.

(6) Confer with project laboratory, paving engineer, and your supervisor and agree on a form of liaison such that all concerned will be kept informed of test results, changes in character of materials, mix changes, behavior of mix, etc. During this conference, arrive at a clear understanding of the nature and scope of records, reports, and other construction data required as well as individual assignments for obtaining data, and preparation and submission of reports.

c. Contractor Proposals

(1) The specifications require the contractor to submit samples of soils, aggregates for pavement surfacing, bitumens, concrete curing compound, joint-sealing compounds, etc. for testing prior to use in the work.

(a) Be familiar with arrangements for testing the materials.

(b) See that materials are submitted far enough in advance so as not to delay construction.

(c) Know test results.

(d) Permit only tested and approved materials in the work.

(2) Obtain a copy of the minutes of all construction conferences from your supervisor and carefully review their contents.

(3) Check that all equipment used by the contractor has the approval of the Contracting Officer.

(a) Contracting Officer approvals of equipment constitute approval as to general adequacy only.

(b) Continued use of equipment during construction that does not produce acceptable work should not be permitted.

d. Changes in Plant Operation

(1) The inspector should be very cautious in making direct changes in any plant operation. If approval has been obtained through necessity, the following changes can be made:

(a) Modify bituminous mix hot bin weights to maintain grading and bitumen content within limits established by job mix formulae or revised formulae.

(b) Changes in gradations and/or proportions, if changed in the design mix.

(2) The possible cause or causes of deviations may be discussed with the contractor or plant superintendent to assist or give guidance, but be careful of instructions, directed or implied.

(3) If the contractor fails to operate in accordance with specification requirements or otherwise fails to operate in a manner to produce a satisfactory end product, your supervisor should be notified and recommendations made concerning appropriate action necessary.

2D-02. PREPARATION OF SUB-GRADE

a. Planning

(1) Have good knowledge of the project area including clearing, grubbing and stripping requirements, location and extent of cut and fill areas and nature of soils anticipated to be encountered.

(2) Is the planned order of work for handling, disposing and using excavated materials suitable?

(3) Determine that contractor layout of work complies with specification requirements. Be familiar with required grades of finished sub-grade.

(4) Be certain that all original ground surveys, necessary for use as a basis of payment to the contractor, are made in the project area, borrow areas, etc.

(5) Be thoroughly familiar with drainage features and all embedded items that may be existing or are to be installed below top of sub-grade

(6) Know requirements for soils and compacting for various features of the work in cut and fill areas.

(7) Is contractor-proposed order of work in clearing, grubbing, stripping, excavation, backfillinq, spoiling, embankment construction and compaction in cut areas proceeding in accordance with approval procedures, using approved equipment, with sufficient number of units, to accomplish the work in scheduled time?

b. Construction

(1) Are the materials encountered of the same soils classification as those indicated on the contract drawings? If not, notify your supervisor without delay so that appropriate action may be taken.

(2) Is suitable material from excavations being used to the maximum extent practicable?

(3) Is excavation being performed to provide drainage from the excavated area at all times, if natural drainage is possible?

(4) Are all pockets of soft, yielding or otherwise unsatisfactory material being removed and replaced with suitable material? If in doubt concerning removal of unsatisfactory material, consult your supervisor.

(5) Have ground surfaces to receive sub-grade embankment material been prepared?

(6) Are embankments being constructed in the specified layer thickness of suitable material and compacted?

(7) Are embankment surfaces (sub-grade) struck-off leveled and compacted to grade and surface smoothness tolerances?

(8) Are surfaces in cut areas being compacted with suitable equipment to obtain the specified depth and degree of compaction?

(9) During the compaction of each layer of embankment, check to see if the moisture content of the soil is being maintained at or near the optimum moisture content. If not, require drying by aeration or moistening by watering, as the case may be.

(10) Do prepared surfaces of cut areas (sub-grade) meet grade and surface smoothness tolerances?

(11) Is finished sub-grade protected from traffic or other operations until the sub-base or base is placed?

(12) Are subdrains required? If so, are they being installed at the required locations and grades?

(13) Is trench backfilling being performed as required, using satisfactory materials compacted in specified layer thickness?

(14) Is control testing of the sub-grade and sub-grade materials being performed in accordance with the minimum sampling schedule developed for the project?

(15) Do test results indicate that materials meet all specification requirements? If not, has action been taken to correct any deficiency? Where action has been taken to correct deficiencies revealed by tests, have retests been made, recorded and cross-referenced to test failure?

(16) Are all test results properly recorded on established reporting forms and adequate project records maintained?

2D-03. SUB-BASE AND BASE COURSES

a. Review Prior to Construction

(1) Review project specifications.

(a) Know requirements for the types of base course materials.

(b) Know the maximum and minimum compacted layer thicknesses permitted.

(c) Know the compaction requirements for each type of base course material.

(d) Know acceptable construction procedures.

(e) Know grade control and surface smoothness requirements.

(f) Check the Special Conditions of the specifications for items that may amplify or supplement the Technical Provisions.

(2) Review project drawings.

(a) Fix in your mind the type or types of base courses required for the various pavements involved.

(b) Know the location and extent of the various types of pavements.

(c) Know the total thickness of each base course type.

(d) Be familiar with grades to which the base courses are to be constructed.

(e) Be sure you are familiar with the location and nature of all utilities in place or to be constructed. You should plan to have offset reference stakes set so that position of utilities may be determined after embedment, if necessary.

(f) Know the nature and location of all drainage features.

(g) Know the location of all handholes, manholes, observation risers and other structures or features to be installed within the pavement area.

(3) Review proposed source or sources of base course material.

(a) Check with your supervisor on status of materials approval and obtain copies of approval letters.

(b) Tentative approval only is given on materials at their source. Final approval is based on tests of material in place and compaction. (c) Results of tests on samples submitted which were the basis for tentative approval.

(d) In general, ensure that select and sub—base materials are natural or bank—run materials which may be obtained from site excavations or from on-site or off—site borrow areas. Base materials are generally crushed and plant—processed materials.

(4) Inspect approved source or sources of material.

(a) If material is bank—run, be sure pit is stripped of all unsatisfactory material and that excavation will result in obtaining a uniformly acceptable material.

(b) If bank—run materials are to be stockpiled, check that stockpile area is cleared and leveled as required and that proposed methods of stockpiling are satisfactory.

(c) If material is plant processed, inspect plant and determine that processing, handling and stockpiling methods established will produce uniformly acceptable material at a rate to satisfy approved construction progress.

(5) Check all equipment brought on the job by the contractor.

(a) Be sure that specified and approved equipment types are available.

(b) An adequate number of units in good mechanical condition must be furnished to perform the work in accordance with approved construction progress schedules.

(6) Determine proposed procedures of handling high-quality base course materials.

(a) Some high quality base course materials are required to be furnished in two or more size groups and blended by means of a mixing process.

(b) Check that equipment for mixing is on hand and is adequate to produce acceptable material at a satisfactory rate.

(7) Determine that the necessary equipment is available for quality control of soils and for checking lines, grades and smoothness of base courses as they are constructed.

b. Construction

(1) Are the weather and temperature within the limitations specified?

(2) Inspection of pit or quarry operation

(a) Is the pit yielding material that will, with little or no question meet requirements for in—place and compacted base course?

(b) Are uniform materials resulting from the excavation and handling operations?

(c) Are unsuitable materials being wasted or otherwise handled to prevent using in the project?

(d) Is material being processed as necessary and do materials produced leave any question as to suitability?

(e) Check that method of stockpiling is controlled to minimize contamination and/or segregation.

(f) Are the base course materials being sampled at source in accordance with locally established procedures and are they being tested?

(g) If materials are not properly excavated, processed and/or handled, or if materials produced leave any question in your mind, have you taken steps to correct the difficulty?

(h) Check that pits and/or quarries are left in a satis-factory condition.

(3) Test embankments may be required.

(a) Check for this requirement, as in some cases, proce-dures and equipment required are established on the basis of test embankment a.

(b) If required, be sure test embankment is constructed and determination of procedures has been made prior to full scale placement of base courses.

(c) Know procedures and equipment required by results of tests of the test embankment.

(4) Hauling equipment.

(a) Do not permit vehicles to continually follow in the same tracks in areas to be paved.

(b) Spread out the tracking over the area insofar as possible.

(c) See that hauling equipment complies with General Safety Requirements.

(d) Determine if backup alarms are required; if so, they must be provided and maintained in operating condition.

(5) Check methods being employed to spread the material.

(a) Methods differ for different types of base courses.

(b) Spreading must be carefully controlled to minimize segregation.

(6) Check method of mixing.

(a) Check method specified.

(b) Check equipment used.

(c) Check result being obtained.

(7) Check to see that base and sub—base materials do not become mixed.

(8) Check thickness of layers. Do they meet limitations on maximum and minimum layer thicknesses?

(9) Check compaction of each layer of sub-base and/or base course.

(a) Is approved equipment used and is uniformity and complete coverage of the area attained?

(b) Watch for change in types of materials in that different types of materials are best handled and compacted with certain types of equipment and different compactive effort.

(c) Check equipment for conformance with specification requirements.

(d) If approved equipment types or procedures do not produce the specified results, consult your supervisor.

(10) Check for ruts or soft yielding spots produced during rolling. Has proper action been taken to correct such weak spots either through stabilization procedures or removal and replacement of materials?

(11) Is water being added to the base course material or is the material being aerated to obtain optimum moisture content and maximum compaction?

(a) Compaction increases strength of most soils. However, some soil types lose strength when compacted or may have other unusual characteristics.

(b) Your specifications will adequately cover any special procedures necessary for the soil type used.

(12) Be alert for poorly compacted material near manholes or other embedded items and along rows or grade stakes. It may be necessary to move or reset grade stakes.

(13) Check each layer of material in place to determine compliance with thickness, density and crown requirement,

(14) Check the elevation crown, and surface smoothness of the completed sub—base and base courses.

(15) Check that sampling of in place materials has been done in accordance with minimum sampling requirements and that test results are suitable, Verify with QA tests.

(16) If failure to meet specification requirements is indicated by a test or tests, has the area involved been determined and immediate appropriate action taken to correct the deficiency? Evaluate density tests daily, verify with QA tests.

(17) Require the specified width of shoulder be placed and compacted along with and at the edges of each layer of sub-base and base course.

(18) Is grade control being performed by the contractor, and has the contractor*s work been spotchecked by a Government survey party?

(19) Proof-rolling base courses and tops of sub-base is necessary for some portions of flexible pavements. Check proof-rolling requirements.

(20) Check that the edges of sub-base and base courses or shoulders are being treated as specified. Check requirements for forms.

(21) Check for adequate maintenance of sub-base courses.

2D-04. BITUMINOUS PRIME AND TACK COATS

a. Advance Planning

(1) Review project plans and specifications.

(a) Know the grades of bitumen specified for the prime and tack coat.

(b) Know the quantity limitations of bitumen application for both the prime and tack coats.

(c) Know requirements for sampling, testing, and approval of the bitumens.

(d) Know application requirements and limitations.

(e) Know methods of measurement of and payment for application of prime and tack coats.

(2) Determine proposed sources of bitumens. Determine that test samples have been submitted, tested, and approved as required.

(3) Check contractor*s equipment.

(a) Does distribution equipment conform to requirements for proper heating and circulation of bitumen, for control of spreading rate and uniformity of application, and for measuring and indicating devices?

(b) Is specified power equipment available and in good operating condition for the cleaning of surfaces to be primed or tacked?

(c) Know requirements for equipment that will be needed to store materials.

(4) Check with field laboratory to insure that base course to be primed or pavement course to be tacked has met all test requirements.

(5) Inspect base course and/or pavement course to be sure it is clean and free of foreign material or free water.

(6) Check temperature and weather outlook to be certain that the bitumens will be applied in accordance with specified weather limitations.

b. Application

(1) Is the area to be primed well defined by using strong lines to insure sufficient primed area with true lines and neat edges?

(2) Is surface ready to receive primer or tack?

(a) Is it cleaned of objectionable substances.

(b) Is it too wet or too dry for primer?

(3) Check weigh bills and delivery tickets to be sure that the required and approved bitumen is being applied.

(4) Make continuous check on functioning of distributor.

(a) Is rate of bitumen application as specified?

(b) Does the amount of prime applied completely seal the surface voids of base courses without a surplus remaining on the surface after the curing period?

(c) Does the amount of tack applied appear to be sufficient for bonding but not in excess of the minimum necessary for bonding?

(d) Is application of bitumen uniform?

(e) Take prompt corrective actions in the event of unsatisfactory distribution.

(5) Check to insure that the bitumens have adequately cured in the minimum time or whether additional time is necessary for proper curing.

(6) Is the primed or tacked area being protected prior to and during paving operations?

(7) Record quantities of bitumens used each day.

(8) Check that proper protection is provided to keep bitumen off posts, guard rails, and other roadside structures during spreading operations.

(9) Are junctions satisfactory?

2D-05. BITUMINOUS PAVEMENT

a. Initial Checks

(1) See that adequate fire protection is provided.

(2) Review project plans and specifications.

(a) Know the specification requirements for aggregates, aggregate handling, mixes, mixing plant, and hauling, placing and rolling equipment.

(b) Know construction procedures for spreading and rolling of the mix and preparation of joints.

(c) Know requirements for grade control and surface smoothness.

(d) Be thoroughly familiar with physical location of pavements, thickness and number of pavement courses required, and finished pavement grades.

(3) Aggregate submissions and mix designs

(a) Has approval of proposed materials and development of the starting job-mix formulae been made?

(b) Review and become familiar with aggregate and mix test data developed at time of approval.

(4) Aggregate storage facilities

(a) Make sure the required separate stockpiles are provided.

(b) Check preparation of area proposed for stockpiling of aggregates to insure against contamination of aggregates.

(c) Review stockpiling methods on transferring facilities. Check for segregation, contamination and/or intermixing of the different aggregate sizes.

(5) Check bituminous liquids storage facilities.

(a) Is storage tank capacity sufficient for at least a one days run?

(b) Are pipe lines and fittings insulated?

(c) Are storage tanks equipped with heating facilities?

(d) Has a system been provided for circulation of bituminous liquids between the storage tank and the mixer?

(6) Batching and mixing plant

(a) Check type of plant that contractor proposes against type specified. Some of the following items may not apply specifically to the type of automatic or semiautomatic plant being used.

(b) Check aggregate dryers for capacity and control of moisture conditions of the materials, aggregate discharge temperature measuring devices, and capability for changing slope and rotation speed.

(c) Check condition and operation of hot aggregate screens. Damaged screens should be replaced. Screen sizes used should maintain a reasonable uniform distribution between the several hot bins.

(d) Make sure that a sufficient number of cold bins are provided.

(e) Check hot bins for capacity and condition.

1. Are at least three compartments provided, and does each have an accurate weigh—box and a control gate?

2. Are the partitions free of openings that would allow run—through of material from one bin to another?

3. Have overflow pipes been installed in each bin compartment to prevent overflow of material from one bin to another?

4. Has provision been made for accurately and safely sampling hot bin materials?

(f) Check accuracy of aggregate weighing or proportioning devices. Have separate adjustments been provided to proportion each aggregate bin?

(g) Check bitumen weighing or volumetric-measurement devices and test calibrations for accuracy. Has provision been made for positive control of temperature of the bituminous material?

(h) Check calibration of mineral filler proportioning device.

(i) Check dust collector and method of handling dust.

(j) Check thermometric equipment provided for measurement of bituminous liquids and hot aggregate temperatures.

(k) Check mixer unit.

1. Is mixer of at least the minimum capacity and in satisfactory operating condition?

2. Has provision been made for properly heating the mixer?

3. Check blade clearances. If a continuous-mix plant is employed, are blades adjustable and reversible?

4. Have the time lock, for control of mixing time, and the batch counter been provided and do these devices function properly?

(1) Check pug mill discharge hopper.

1. Check capacity.

2. Is the discharge hopper positioned at the proper height for the transportation equipment?

3. Check ability to completely dump all of the mix.

(m) Check all safety features of the plant for compliance with contract safety requirements. Check for guards over belts, gears, chains, pulleys, projections, rotating parts, etc. Check the insulating of hot piping.

(7) Transporting, placing and finishing equipment

(a) Check trucks that are hauling mix.

1. Are truck beds tight, clean and smooth?

2. Have suitable covers been provided to protect the mix?

3. Have facilities been provided for cleaning the inside of truck bodies and coating with a minimum amount of a concentrated solution of hydrated lime and water?

4. If long hauls are contemplated, have the truck bodies been insulated to insure that delivery temperatures of mix are within the range specified?

(b) Check spreader.

1. Inspect for overall condition and freedom from obvious damage or fault.

2. Stringline screed for correct alignment. Slight camber in the order of 1/8—inch is recommended on front screed.

3. Check for indented and irregular area. This is a sign of a defective spreader.

4. Check functioning of screed heating system.

5. Inspect tamping bar for wear and proper movement and clearance from screed.

6. Inspect hopper, bar—feeders, distributor screws and similar devices for ability to prevent segregation.

7. Check controls for speed of motion and guidance.

(c) Check rollers.

1. Determine that the minimum number and types of rollers required have been provided.

2. Check roller weights.

3. Inspect roller wheels for smoothness. Check scrapers, sprinklers and water spreading pads for even wetting of wheel surfaces.

4. Check operation of rollers for range of speeds and capability for changing direction smoothly.

5. Inspect pneumatic-tired rollers for tire sizes, number of tires, tire pressures, tracking, weights, and wetting devices to properly moisten the tire surfaces. If not self- propelled, be sure towing unit is adequate and smooth-tired.

(d) Check handtools.

1. Necessary and specified lutes, rakes, shovels and other hand tools must be available.

2. Equipment for maintaining small tools in a hot condition must be provided.

3. Material and equipment must be on hand for painting cold joints.

(8) Sampling schedule for materials and mixes.

(a) Check that previous arrangements made to sample and test bituminous liquids, aggregates and plant mixes in schedule are in force.

(b) Similarly, check that samples of the completed pavement are obtained and tested.

(9) Plant dry runs and test sections

(a) Plant dry runs are considered desirable and in some cases are specified. This operation consists of placing the batching plant in operation, filling the aggregate hot bins and obtaining aggregate samples. It permits observation of general plant operation and the checking of cold aggregate proportioning and resulting hot aggregate separation prior to producing mix.

(b) Prior to full scale paving operations, it may be required that a quantity of mixture be produced to construct a test section. Observe all operations in connection with the test section as this is the basis of final determination of adequacy of materials, equipment and construction procedures.

b. Paving Operations

(1) General — Placing and finishing operations for hot and cold paving mixtures are essentially the same, except that the control of temperatures on delivery and during rolling is not required for cold mixtures.

(2) Layout

(a) Check the contractor*s operation at the beginning of placement.

(b) Has he started at the highest lane in the area, and is he moving in the direction of the main traffic flow?

(c) Is the operation laid out so as to maintain a uniform surface?

(d) Will the lanes be placed so the joints will have required texture, density and smoothness?

(e) Have the necessary stringlines been established?

(f) Stringline parallel to centerline of full pavement width should be used to align first lane. Pavement must be laid parallel to the centerline and excessive edge irregularities should not be tolerated.

(3) Production control

(a) Control of the production of bituminous mixtures is usually the responsibility of the Project Control Laboratory. The inspector should be familiar with the laboratory facilities, test methods, control tests, and records maintenance.

(b) Test methods to be followed are incorporated in the project specification by reference to appropriate Federal, Corps of Engineers, ASTM, etc. standards. Copies of all standards, together with current Corps of Engineers manuals, should be on

file in the Project Engineer office and available to you for reference.

(4) Placement of Mix

(a) Check temperature of mixture (hot-mix) as delivered. Specifications prescribe minimum acceptable placing temperatures for hot-mix. Reject mixtures arriving at the spreader having temperatures less than the specified minimum.

(b) See if weather limitations are being met.

(c) Appearance of mixture should be noted as indication of properly batched and mixed material. See Plate No. 1 for common types of mix imperfections and probable causes.

(d) Plant Inspector should be notified immediately if mix is found unsatisfactory for any reason.

1. Reject any unsatisfactory mix delivered and instruct contractor to suspend placing operations until necessary corrections are made.

2. Report such action to your supervisor immediately.

3. Record details of suspension of operation in the project log.

(e) Hopper surfaces, tamper, screed, and other contact surfaces of spreader will be maintained in a clean condition.

(f) Set screed on board of approximate thickness of new pavement at start of run (or lanes), or start off previously placed lane.

(g) Check adjustment of screeds to lay course of desired thickness; make further adjustments if course thickness varies excessively.

(h) Screed contour will be straight on rear (trailing) edge, crowned approximately 1/8-inch on front (leading) edge.

(i) Check spreader operation frequently to prevent overloading and spilling, segregation, irregularity in alignment, and grade.

(j) Check rate of feed of mixture from hopper, operation of distributing devices, and screed adjustment and take corrective measures promptly when irregularities in thickness, surface smoothness or width of laid mixture are found.

(k) Check irregular spots.

1. Rakers will level off any irregular spots, but avoid excessive raking.

2. Do not permit raked out material to be cast over the fresh surface.

3. See that all course particles unavoidably raked out to the surface are removed from the mat.

PROBABLE CAUSES OF DEFICIENCIES IN HOT PLANT MIX PAVING MIXTURES

ITEM

1. AGGREGATE SCALES OUT OF ADJUSTMENT
2. BRIDGING OF HOT AGGREGATE IN BIN
3. BITUMEN SCALES OUT OF ADJUSTMENT
4. LACK OF PROPER WEIGHING BY OPERATOR
5. FAULTY PUG MILL DUMP GATE
6. BITUMEN TEMPERATURE TOO HIGH
7. DRUM FEED NOT UNIFORM
8. IMPROPER DRYER OPERATION
9. TOO LITTLE BITUMEN
10. TOO MUCH BITUMEN
11. SAMPLING METHOD NOT UNIFORM
12. EXCESSIVE MOISTURE CONTENT OF AGGREGATE
13. BIN OVERFLOW PIPES NOT FUNCTIONING
14. LEAKY BINS
15. SEGREGATION OF AGGREGATES IN BIN
16. MIXING TIME NOT UNIFORM
17. MINERAL FILLER FEED NOT UNIFORM
18. AGGREGATE TEMPERATURE TOO HIGH
19. TEMPERATURE MECHANISM OUT OF ADJUSTMENT
20. IMPROPER FEED OF AGGREGATES TO DRYER
21. OVERRATED DRYER CAPACITY
22. FAULTY SCREEN OPERATION
23. OVERLOADED PUG MILL
24. IMPROPER SET ON PUG MILL
25. BITUMEN AND AGGREGATE FEED OUT OF ADJUSTMENT
26. BITUMEN PUMP NOT FUNCTIONING PROPERLY
27. NOT SUFFICIENT HOT AGGREGATE IN STORAGE BIN
28. AGGREGATE GATES NOT PROPERLY SET

TYPES OF DEFICIENCIES THAT MAY BE ENCOUNTERED IN PRODUCING HOT PLANT MIX PAVING MIXTURES

TYPES OF HOT MIX TROUBLE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
BITUMEN CONTENT FAILS TO CHECK JOB-MIX FORMULA	X		X	X	X				X	X	X		X	X		X	X			X				X	X	X	X	X
GRADATION FAILS TO CHECK JOB-MIX FORMULA		X		X	X						X		X	X	X		X			X		X		X	X		X	X
POORLY MIXED LOADS					X	X										X							X	X				
FAT, RICH MIXTURES	X		X	X	X	X				X	X			X			X			X					X	X		X
LEAN OR BURNED MIXTURES	X		X	X	X	X		X	X		X			X				X	X	X					X	X		X
MIXTURE TEMPERATURE FAILS TO CHECK JOB MIX						X	X	X										X	X		X							
SMOKING LOADS							X	X										X	X	X								
STEAMING LOADS							X	X				X							X	X	X							
OVERWEIGHT OR UNDERWEIGHT LOADS		X	X	X	X														X									
LACK OF UNIFORMITY OF MIXTURES IN LOADS		X	X	X	X	X			X	X		X	X	X	X	X	X		X	X	X	X	X	X	X		X	X

ITEMS 6 TO 23 INCL ARE APPLICABLE TO ALL TYPES PLANTS ITEMS 1 TO 5 INCL AND ITEMS 24 TO 28 INCL ARE APPLICABLE TO BATCH PLANTS AND VOLUMETRIC PLANTS RESPECTIVELY

TYPES OF HOT PLANT MIX PAVING MIXTURE DEFICIENCIES AND PROBABLE CAUSES PLATE NO 1

(1) Preparation and placing of paving mixture at joints should be checked to insure well-bonded and dense joint areas and even surfaces after rolling. Lane widths and layout of longitudinal joints for multiple course pavements must be planned so that joints of completed pavement courses will break by at least one foot.

(m) Stop placement of paving mixture when weather conditions preclude laying of pavement in a satisfactory manner. It is customary to permit loads in transit to be placed unless conditions are so severe that satisfactory results appear unattainable. Loads wet excessively by rain should be rejected.

(n) Record of location of truck loads should be kept so that identity can be correlated with in-place samples subsequently taken for tests.

(o) Keep weigh tickets of material placed as a basis for payments and to account for rejected loads.

p Check yield twice daily by measuring area of lanes laid and comparing with weigh tickets of material delivered.

(q) Check roller operation and rolling procedures.

1. Rollers and rolling requirements are specified. Determine the precise rolling pattern and method to be followed during placement of the required strip. Check requirements for vibratory rollers.

2. Are rollers being operated within specified speed range, do they reverse without back lash, and are drum scraping and wetting devices functioning to keep wheels clean and moist?

3. Keep rollers moving; do not permit them to stand on freshly placed mix. Make sure the rollers make the required overlap.

4. Rubber tired rollers are effective only on warm mixture; such rolling is not effective when the pavement temperature is below 130” F.

5. Roll longitudinal joints while the mix is hot to produce a tight, well-bonded joint.

6. Straightedge check for surface smoothness compliance, after the first roller coverage.

a. The time to correct smoothness and grades is when rolling first begins.

b. To correct depressions, loosen material by raking to a depth of ½-inch and add necessary hot material by shoveling and raking.

c. To correct humps, loosen by raking to a depth below final grade, remove excess material and rake smooth.

7. Check for compliance with smoothness requirements immediately following completion of tandem rolling. Take necessary corrective action.

8. Surface checking and movement of the mat on the first or second pass of the roller may be caused by one or more factors illustrated in Plate No. 2 attached. Check base course surface for loose fines, moisture or excessive primer, and the binder course surface for cleanliness and excessive tack coat.

9. Transverse and longitudinal cracks occurring under rolling usually result from soft base conditions but may be a result of inadequate control of mix temperatures and mix proportioning. Removal and replacement of pavement and base courses are generally necessary in the case of soft base conditions.

10. Check final finish of pavement to assure that voids or scars are not left in the pavement surface.

(r) Strict adherence to the grade and surface tolerances for all courses is mandatory. Take corrective actions if deficiencies exist.

(s) Spot check daily finish grade and smoothness of pavement as a guide to continuing operations. Determine that complete grade and surface smoothness checks are made and recorded by Government personnel.

(t) Finish shoulder adjacent to finished pavement as soon as possible.

(u) Safety requirements should be rigidly enforced. Watch for unnecessary smoking, fires, and open flames. See that the necessary respirators are used around toxic fumes.

(v) Check for special requirements.

1. Check requirements for joints between old pavements and new ones, or for cutting into old pavements. Cold joints require different treatment than hot joints.

2. Check requirement for any special treatment required at edges of pavement.

3. Check requirements for any patching of existing pavements.

c. Check Sampling and Testing - Although the plant control laboratory is responsible for control, the inspector has certain related responsibilities and must be familiar with sampling and testing procedures to determine that the pavement is properly constructed. The frequency of a complete coverage series of teats during a production run normally will be one set of samples for about each 200 tons produced. A complete coverage series will normally include the following, but additional or repeated tests may be required:

(1) Specific readings for temperatures of bitumen and aggregate on discharge from hot bins or dryer.

(2) Samples from each hot bin for gradation tests and moisture determinations.

(3) Samples of bituminous mixture after discharge from pug-mill.

TYPE OF PAVEMENT IMPERFECTIONS THAT MAY BE ENCOUNTERED IN LAYING HOT PLANT MIX PAVING MIXTURE \ PROBABLE CAUSES OF IMPERFECTIONS IN FINISHED PAVEMENTS	EXCESSIVE PRIMECOAT	IMPROPER PROPORTIONING	UNSATISFACTORY BATCHES IN LOAD	POOR HANDWORK BEHIND SPREADER	EXCESSIVE SEGREGATION IN LAYING	INADEQUATE ROLLING	POOR SPREADER OPERATION	MIXTURE TOO HOT OR BURNED	MIXTURE TOO COLD	ROLLING MIXTURE WHEN TOO HOT	ROLLING MIXTURE WHEN TOO COLD	POORLY GRADED MIXTURE	UNSTABLE BASE COURSE	FAULTY ALLOWANCE FOR COMPACTION	ROLLER STANDING ON HOT PAVEMENT	MIXTURE TOO COARSE	LACK OF BITUMEN IN MIXTURE	EXCESS OF BITUMEN IN MIXTURE	INADEQUATE CROSS ROLLING	NOT CUT BACK TO UNIFORM THICKNESS	EXCESSIVE MOISTURE IN MIXTURE
BLEEDING	X		X															X			
BROWN, DEAD APPEARANCE								X									X				X
POOR SURFACE TEXTURE		X	X		X							X				X					
ROUGH UNEVEN SURFACE		X	X	X	X	X	X		X	X	X		X		X				X		
UNEVEN LATERAL JOINTS				X					X					X						X	
UNEVEN LONGITUDINAL JOINTS				X			X		X		X			X						X	
ROLLER MARKS						X					X								X		
PUSHING		X	X					X	X	X		X						X			X
WAVES				X			X		X	X					X						
CRACKING		X	X		X				X		X	X				X	X				
HONEYCOMB		X	X	X	X		X		X							X					
DISTORTION				X		X	X			X			X						X		
TEARING OF SURFACE DURING LAYING			X				X		X								X				
RICH OR FAT SPOTS		X	X															X			

TYPES OF HOT PLANT MIX PAVEMENT IMPERFECTIONS AND PROBABLE CAUSES PLATE NO. 2

(4) A series of compaction tests (not less than four specimens per test) of the bituminous mixture sample for the determination of Marshall stability, flow, voids (total mix), voids (filled with asphalt), and unit weight.

(5) An asphalt cement extraction test on the sample of bituminous mixture.

(6) At the completion of determinations in the complete test series, the laboratory posts results on trend wall charts. These charts should be reviewed frequently by the inspector.

(7) Plant control laboratory personnel will frequently inspect batching and mixing operations for accuracy.

(8) Sufficient cores (4 inches in diameter) or sawed samples for determining thickness, density and composition should be taken and tested daily to determine conformance with the specification requirements. One-half the number of all density samples should be taken at a joint, so that the joint is approximately in the center of the sample to be tested. Corrective measures in rolling and placing methods will be taken immediately in the event density of samples does not conform to specification requirements. Check the specifications for nondestructive test methods such as the Nuclear Density Meter Test.

(9) Exchange of information and test data between placing inspector and field laboratory will be made promptly. Coordination between the inspector, the technician and the paving engineer or his equivalent is a must.

(10) A test section or sections is required to be constructed before full scale paving operations are started for airfield pavements; test sections will be constructed as required by the project specifications. Full scale paving may be started only when inspection, sampling and testing of the test section indicates satisfactory procedures and results. Any unsatisfactory test section constructed in an area of the permanent work should be removed and replaced.

2D-06. SPECIAL APPLICATIONS OF ASPHALT

a. Check for special applications of asphalt such as for athletic facilities or special use material such as epoxy asphalt. A manufacturer*s technical representative may be required at the site during mixing and laydown.

b. Check for gradation requirements and special mixes.

c. Check for special density and smoothness requirements.

d. Check for color coating.

(1) Check curing time of bituminous surface prior to applying coloring.

(2) Check rate of application of color coating.

(3) Check material being applied for required characteristics.

(4) Check application of line paint.

(5) Check for crazing, peeling, and bleeding of asphalt through the coatings.

(6) Check for testing requirements.

2D-07. CONCRETE PAVEMENT

a. Items to Check Prior to Beginning of Pavement

(1) Review plans and specifications.

(a) Become familiar with location, extent and grades of all pavement features.

(b) Become familiar with requirements for survey control.

(c) Know required thicknesses of pavement and the required jointing system. Become familiar with the various types of joints required.

(d) Know location and nature of embedded items within and below the pavement and of all structures within the pavement.

(e) Know requirements for materials, plant and equipment.

(f) Know specified construction procedures.

(g) Determine the number of test specimens required. Review test specimen curing procedure.

(2) Materials

(a) Acceptance or approval of cement, air-entraining admixtures, concrete curing compounds and joint-sealing compounds is based on tests of samples taken at origin of shipment. Each shipment to a project is inspected at origin and sealed or otherwise identified as accepted material. Determine through your supervisor that sources of materials have been proposed by the contractor and that arrangements have been made for sampling and testing.

(b) When above-mentioned materials arrive on site, check approvals and identifications to be certain that materials have been shipped from pre-tested stock.

(c) Determine that proper storage facilities for the above-mentioned materials have been provided.

(d) Check on concrete aggregate.

1. Have samples been submitted for acceptance tests and mix designs in accordance with specification requirements? Contractor sampling must be witnessed by a Government representative.

2. study aggregate approvals as available and be familiar with the source and type of aggregate and results of tests on samples submitted.

3. Determine that the aggregate storage area has been prepared to avoid inclusion of foreign material with the aggregate and that the area is graded to provide drainage.

4. Give particular attention to initial aggregate shipments to determine that the materials furnished are similar in every respect to samples submitted for approval.

(e) Check to see that miscellaneous materials, such as reinforcements, tie bars, dowels, joint fillers, and water have been approved.

(f) Check requirement for the contractor*s obtaining approval of the design mix for the concrete which he will use. Make sure that exact proportions of materials composing the concrete mix have been approved.

(3) Batching plant

(a) Inspect plant for general overall compliance with specification requirements.

(b) Is the plant capable of batching at the minimum rate or at a rate consistent with proposed construction progress? Can the plant maintain the accuracy required?

(c) Check aggregate bins or compartments for condition and size. Is the arrangement of the bins and provisions for loading the bins such that there will he no intermixing of the various aggregate sizes?

(d} Check linkages of weighing devices for condition, cleanliness and freedom of movement.

(e) Check cement and aggregate scales for accuracy.

(f) Has provision been made for interlocking batching controls.

(g) Check recorders and their operation.

(h) If a central mix plant is employed, check water batcher for accuracy of batching and interlock of filling and discharge valves; also check air-entraining admixture dispenser.

(i) Have facilities been provided for obtaining samples of aggregate from each bin?

(j) Does the plant conform to all safety requirements?

(4) Concrete mixing plant

(a) Check mixers for general condition, cleanliness, blade wear and mixing capacity.

(b) Are timing devices provided on stationary mixers and are they interlocked with the discharge mechanism?

(c) Are truck mixers, if permitted, equipped with accurate revolution counters?

(d) Are batch-counters provided?

(e) Check water batcher for accuracy.

(f) Check air-entraining admixture dispenser.

(5) Check paving equipment and tools.

(a) Is all paving equipment on the job and in good operating condition?

(b) Have the machines been adjusted and checked for accuracy of strike—off, screeding, and floating?

(c) Do the vibrators comply with specification requirements?

(d) Check hand tools such as edging tools, hand floats, and straight edges for required dimension and condition.

(e) Are all necessary materials and equipment on hand for curing the pavement?

(f) Is all necessary equipment for construction or forming of all types of joints on hand and in good condition?

(g) Is adequate equipment on hand for sealing joints?

(h) Has the contractor provided and set up adequate facilities for making and curing test beams?

(6) Check base course surface preparation as follows:

(a) Is approved equipment being operated in a manner to properly fine-grade the base course?

(b) Is the base course prepared to produce a smooth, compacted surface conforming to grade and smoothness requirements?

(c) Is the base course surface being maintained in a firm, moist condition?

(d) If paving is carried on during cold weather, is the base course being properly protected against freezing and have you checked to insure that base materials are entirely free of frost when concrete is placed?

(e) Is base preparation and form setting being performed sufficiently in advance of concrete placement? Note minimum specification requirement.

(7) Prior to setting forms, determine that the surface of the base course has been constructed to or slightly above required grade and that the material meets all test requirements.

(8) Check forms.

(a) Are the forms identical in all respects to the form or forms approved for use on the work?

(b) Are the forms free of warps, bends, and/or kinks and are they free of battered top surfaces and distorted faces and/or bases? Remove damaged form sections from the project.

(c) Check forms as they arrive on the job site. Straightedge tops and vertical faces of forms after setting for deviations. Sight along forms to detect major deviations from true alignment.

(d) Check dimensions, position and securing of the metal keyway forms. Keyways must be exactly as detailed on the contract drawings.

(e) Does the base of each form section have full bearing for its entire length and width on fully compacted material?

(f) Be sure that form pins are of adequate length, are properly wedged in the pin pockets, and that they are free from mushroomed heads.

(g) Check locking devices between form sections for secureness and freedom from looseness or play.

(h) Determine that forms have been set to required grades. If correction of grade is necessary, remove form sections, adjust the grade and thoroughly recompact base material prior to resetting forms.

(i) Properly clean and oil forms after each use.

(j) Set forms well in advance of paving operations.

(9) Check grade surfaces between forms.

(a) Check to see that sub—grade, base course, or filter course is free of foreign matter, waste concrete, cement, loose aggregate or other debris.

(b) Check contractor*s scratch template and template operation to assure that the rods are obtaining the required results.

(c) Check the prepared surface with the approved scratch template immediately ahead of the paving operation.

(d) Check the setting of the rods on the scratch template to insure that proper thickness of concrete will be obtained.

(10) Check embedded items.

(a) Are dowels provided of the required diameter (or diameters) and length (or lengths)?

(b) Are dowels clean, straight, and smooth with ends free from burrs or distortion?

(c) Is the dowel basket and/or expansion joint assembly identical to the basket approved for the project?

(d) Have means been provided for anchoring the dowel assembly securely in its required position?

(e) Has a template been provided for checking dowel position?

(f) If reinforcing steel is required, check type, dimension and cleanliness. Also check spacing, clearance, and method of securing in place during the paving operation.

(g) Check tie-down anchors and, if grounding electrodes are required, see that they meet the specified resistances.

(h) Check all other embedded items for location and proper installation.

(11) Check area and grade control.

(a) Determine that adequate plans for area and grade control have been formulated by the contractor and that plans have been made for checking the contractor*s control of the grades of the concrete as placed.

(b) Be sure that control is set up to maintain pavement joint alignment.

(c) Determine that all utility lines within a paved area have been properly referenced so their position may be readily re—established if necessary.

b. Inspections During Paving

(1) Batch plant

(a) Check identifications of cement shipments received to determine that it is tested and approved material.

(b) Check temperature of cement.

(c) Check handling and storage of cement for complete protection from exposure to moisture. Be sure that older cement is used first and that any cement in storage for more than four months is retested and approved prior to use.

(d) Make weight checks of bag cement.

(e) Check aggregate and aggregate handline as follows:

1. Check stockpiling methods to insure that segregation or contamination of materials is not occurring. Operation of bulldozers or hauling equipment on stockpiles is not permitted.

2. Observe and test aggregate for grading, moisture content, and cleanliness to determine acceptability, possible changes in quality and major differences from materials originally submitted as representative and approved.

3. Check handling of aggregate into the batch plant bins to see that there is no spillage or mixing of the different aggregate sizes, and that there is no other undesirable material.

(f) Compare batch volume with computed volume for the day*s run. Report significant variations to your supervisor.

(g) Make periodic checks of cement and aggregate scales for accuracy and proper operation. Make similar checks of water batchers and air-entraining agent dispensers if the plant includes these facilities.

(h) Check batch counters and recorders for accuracy of recording and otherwise satisfactory operation.

(i) Check mix design computations. Adjust for aggregate surface moisture and size of batch employed.

(j) Check scale settings for each material batched.

(k) If a central mixing plant is employed, check mixers for mixing efficiency, rate of drum rotation, mixing time and proper setting and operation of locking devices to provide the required mixing time.

(1) Check batch plant and related equipment and its operation for compliance with all safety requirements.

(2) Paving operations

(a) Check placing, spreading and vibration of concrete as follows:

1. Slow down or stop placement of concrete if for any reason subsequent operations lag behind sufficiently to affect the quality of the concrete.

2. Be sure that concrete placement and vibration in the vicinity of embedded items is performed in such manner that they will not be disturbed. Transverse dowel assemblies should be covered carefully so as not to disturb the cage position.

3. Adjust spreader to strike-off concrete at a level such that when vibrated, the proper amount of concrete will remain for finishing.

4. In the case of reinforced pavement, adjust spreader to strike-off concrete at the proper depth.

5. Check that protection is provided on the newly placed slab when the spreader is operated on a previously constructed slab. Make sure the slab is strong enough to support traffic.

6. Check operation of vibrators for effectiveness in consolidating the concrete. Check frequency of vibration and that they are operated at proper depth and that vibration is completely effective including vibration along the forms. Do not allow vibration in one location for more than 20 seconds duration.

7. See that an extra vibrator, or sufficient parts for replacing and repairing a vibrator, is maintained on the job.

8. Prevent workmen from unnecessarily walking in fresh concrete.

(b) Check embedded items as follows:

1. Reinforcing steel, if required, must be of required size and spacing, properly cleaned and set in the required position.

2. Reinforcing steel mats must be lapped. He certain that the reinforcing is not extended through a pavement joint.

3. Is one end of each dowel painted and greased?

4. Are the dowel assemblies being maintained in correct position and alignment during placement and finishing operations?

(c) Check machine finishing as follows:

1. Periodically check adjustments of the transverse and longitudinal finishing machines on the slipform paver. Need for change of adjustments may be determined by visual observations and straightedge and/or string-line checks of the pavement surface left by the machines.

2. Forward screed of transverse finisher should carry a uniform roll of concrete of about 4 to 8 inches in diameter; rear screed should carry a uniform roll of concrete of about 2 inches in diameter.

3. If transverse finishing machine produces a slurry ahead of the screed after the first pass, concrete mix should be adjusted. Slight reduction of water will often correct this condition.

4. Transverse finishing machine should leave the concrete surface at proper grade and essentially to proper smoothness.

(d) Check hand finishing as follows:

1. Use hand-manipulated floats sparingly. Hand floating should be necessary only to remove local surface irregularities.

2. Majority of hand-finishing should be performed with straightedges. Straightedge is not a heavy-duty cutting tool. Its purpose is to remove minor surface irregularities and score marks.

3. Check all straightedges for trueness.

4. Check surface of plastic concrete with a straightedge including check across longitudinal joints as straightedge finishing is completed. Surface of plastic concrete must fit straightedge without deviation except at crowns and other planned breaks in grade.

5. Final surface finish is generally required to be produced by burlap dragging.

6. Timing of burlap dragging is important to produce the required surface texture Drag when most of surface sheen has disappeared but while the concrete at the surface is in a plastic state.

7. Be sure the burlap drag is constructed and operated as required and that it is kept moist and clean.

8. Joints requiring hand tooling should be carefully formed. Check that edging tools are of required dimension and that the edging tool is not tilted during tooling of the joint or otherwise improperly manipulated to result in surface irregularities at the joint.

9. Do not permit use of soupy mortar to fill out depressions along joints during hand tooling; use fresh concrete.

10. Check that all spillage of grout and concrete on adjacent concrete surfaces is cleaned up immediately. Particularly

watch for removal of mortar accumulations on radius and sides of that part of a longitudinal joint formed in the previously placed, adjacent lane.

11. Eliminate tool marks by burlap dragging along joint with a small, hand-operated drag.

12. Filler-type or sawed transverse contraction joints are generally required. It is important to insert or cut the joint at the correct time.

13. Install filler strip of filler type joint exactly as specified. Check that the filler strip as installed is properly aligned, is vertical, and is set flush with or slightly below the pavement surface.

14. Carefully observe finishing in the vicinity of the filler-type joint and immediately after finishing, check across the joint with a straightedge. If depressions are found, fill out with freshly mixed concrete and refinish the surface.

15. Recommend inserting nails in the center of the filler strip at each side of the lane to assure continuous joint alignment and positively locating filler strip at the time of subsequent sawing.

16. Re-check pavement with a straightedge upon completion of finishing while concrete is plastic and make necessary corrections.

17. Dowel transverse construction joints as required for a properly aligned and smooth joint.

(e) Check curing as follows:

1. Make sure that effective curing is maintained for at least seven days.

2. Check to see that unhardened concrete is always protected from rain and flowing water.

3. Make sure that the necessary materials and equipment for the curing are on the job prior to beginning the paving operation. See that necessary stand-by equipment is also at the site.

4. Check that curing procedures are suited to prevailing climatic conditions.

5. Make sure the method of curing used provides complete and continuous protection of the concrete against cracking.

6. When forms are used, check within one hour after removal to see that sides of slabs are protected.

7. Check the initial curing for proper method, timely application and duration.

8. Check final curing for type of covering used, method of applying the covering, and wetting of surface before the application of one of the optional covering specified.

a. Check weight of burlap and lap of edges.

b. Check the wetting operation.

c. Check method of holding down the waterproof paper covering and the cementing or taping operation. Make sure continuous cover with completely closed joints is provided.

d. Rechecks required for timely repairs to damaged coverings.

e. Check application of curing compound. The compound is not to be sprayed on a dry surface and must be applied at the proper time.

f. Check machine used to apply membrane. It should be automatic, self—propelled, able to provide continuous and uniform coverage of compound of the same consistency.

g. Check for overlap coverage to assure that two—coat application is being obtained and the coverage is no more than 200 square feet per gallon for both coats.

h. Carefully check for any discontinuities, pin holes or abrasions and have these surfaces recoated immediately.

i. Check that joints to receive joint sealing are protected from membrane curing.

9. Check for any special requirements for curing concrete placed during cold weather.

(f) Pavement Protection — See that curing compound or covering is protected during the curing period. Check on the erection and maintaining of barricades to exclude all unnecessary traffic from the pavement for at least 14 days after the concrete paving.

(g) Jointing of old pavement to new.

1. Check the conditions for continuous bond between old pavement and freshly placed pavement.

2. Check surface against which the new material is to be placed. It should be clean and properly coated with the material specified.

c. Inspections Subsequent to Paving

(1) Form removal — Do not permit removal of forms until maximum time after placement has elapsed. See that proper care is exercised to prevent injury to the concrete by form removal.

(2) Sawed contraction joints

(a) Determine that sufficient equipment is on hand and that satisfactory provisions have been made to carry on the sawing operation day or night as necessary.

(b) Determine that alignment of joint is properly established prior to sawing to assure straight and continuous joints.

(c) Determine proper time for sawing by field trial. Sawing should be performed as soon as the concrete may be cut

without excessive tearing and raveling of the concrete and without undercutting or washing at the sides of the cut.

(d) Check width and depth of cut.

(e) Thoroughly flush saw cut and adjacent concrete surface with water immediately after each cut is made.

(f) Insert cord to prevent entry of foreign objects into cut until widened.

(g) Examine concrete surface in vicinity of planned joint location prior to sawing. If an uncontrolled crack has occurred, do not permit sawing of the joint. Discontinue sawing if crack forms ahead of the cut during the sawing operation.

(h) See that curing coverings removed to permit sawing are replaced immediately after each joint is sawed.

(i) If curing compound is used, check to see that joints are cured as specified and that curing compound does not enter the joint.

(3) Joint sawing

(a) Saw filler type joints to width and minimum depth required. Carefully examine sides of cut to be certain that all traces of the filler strip have been removed.

(b) Check to see that all joints, longitudinal and transverse, are sawed out to the required joint dimensions prior to joint sealing.

(4) Joint cleaning

(a) Check joint cleaning operation for required performance and sequence in preparation for joint sealing.

(b) Check to see that concrete saws, saw blades, sand blasting equipment and sand, air compressors, air nozzles and accessory small tools are available, suitable, and in good working condition.

(c) Check sand blasting operation to insure that the proper nozzle or nozzles are used and that they are positioned and aligned to obtain satisfactory results.

(d) Carefully examine final results to determine that the joint walls, joint bottoms, and ½-inch of adjacent pavement surfaces have been thoroughly cleaned and the joint is free of all foreign materials that would prevent bonding of the joint sealer to the concrete.

(5) Joint sealing

(a) Determine that the correct type of joint sealing compound and the specified equipment for the joint sealer employed is being used. Sampling and testing may be required.

(b) Do not permit sealing of joints under weather conditions outside specification limitations unless by waiver in writing from the Contracting officer.

(c) Check that sealers are heated when required. If two component sealants are used, check that proportions in place are correct. Have contractor read and follow instructions on pails without exception. Check that placing equipment is suitable for materials used.

(d) Nozzle for sealer application must be of such dimension that it can be inserted well into the joint groove to effect filling the groove from the bottom up without formation of voids.

(e) Fill the joints to within 1/4-inch + 1/8-inch of the pavement surface. Remove excess and spilled material from the pavement surface and waste.

(f) Maintain complete records of the sealing operation.

(6) Check surface smoothness of hardened concrete.

(a) Is the contractor straightedging the finished pavement in the specified manner and within the specified time?

(b) Check to see that the contractor is taking required action to correct deviations outside smoothness tolerances.

(c) If rubbing is performed to correct minor deviations during curing period, flush rubbed area with water and continue effective curing without delay.

(d) Straightedge-check the finished surface for acceptance or rejection of the pavement.

(e) If subsequent grinding of deficient pavement is approved, determine that limitations on area corrected by grinding are not exceeded.

(7) Finished-grade checks -Normally, finished-grade surveys will be made by a Resident Engineer staff survey party. The inspector should be familiar with survey results as he will be responsible for assuring work is corrected in the event deficiencies are found.

(8) pavement-thickness checks - Pavements will be checked for thickness by means of coring. The coring program normally is set up and performed by the project laboratory but, as in the case of grade-checks, the inspector should be familiar with results.

(9) Pavement deficiencies and corrections.

(a) When pavement areas are removed for replacement, check adjacent pavement or damage such as cracking, breakage of concrete at the edges, and damage to keyways or other load—transfer devices. Such damage may necessitate further concrete removal and/or correction of load-transfer consult your supervisor on such cases.

(b) Replacement slabs shall conform to minimum dimensional requirements and otherwise conform to all specification requirements.

(c) Most random cracks occurring in pavements may be repaired. If there is no provision in the contract for repair of

such cracks, check with your supervisor. Be sure that specified and/or proper equipment is issued and that repair methods are very carefully followed in every detail,

d. Control Tests. These tests are the responsibility of the contractor*s quality control laboratory. Quality assurance testing or joint testing in the contractor*s laboratory will also be required.

(1) Aggregate

(a) Run sieve analysis of aggregate size at least twice daily for a full day*s paving operation.

(b) Test for surface moisture at start of paving and periodically during each day*s operation depending on changes in moisture condition.

(c) Organic-impurities test (color test) for each shipment of sand, or more frequently if deemed necessary.

(d) Specific-gravity test about weekly, or when visual check indicates a change in the material.

(2) Concrete

(a) Supervise the making of test specimens by the contractor. Take specimens at about 4-hour intervals. Determine slump, entrained-air content and temperature of concrete from same sample.

(b) Make and record periodic slump or Kelly Ball penetration tests and entrained air tests during the day. Frequency should be consistent with uniformity of mix.

(c) Measure and record ambient air and concrete temperatures at hourly intervals.

(d) Determine that test specimens are cured and tested in strict accordance with standard procedures.

2D-08. CONCRETE SIDEWALKS. CURBS AND GUTTERS

a. General — The construction of concrete sidewalks, curbs and gutters, in general, requires the same steps in inspection as a large scale paving operation to assure quality construction.

b. Sub-Grade and Base Course

(1) Check in-place materials and/or fill materials for bearing quality and compactibility, especially over utility trenches.

(2) Check results of rolling for firmness of compacted sub-grade Check compaction with density tests as required.

(3) Check sub—grade for grade and cross—section. If sub—grade is prepared to receive concrete directly, check grade and cross—section with required template resting on side forms.

(4) If a base course is required, check materials, compaction, and surface grade and cross-section for conformity with requirements.

(5) Check moisture content of sub-grade prior to concrete placement.

c. Forms. Concrete Placement. Finishing and Curing

(1) Check forms for condition, cleanliness, rigidity and conformity with required dimension of the structure.

(2) Check form setting including full bearing of form bases on prepared sub-grade or base course, securing forms in place, adequacy of clamps, braces and spreaders as applicable, provision for removable form sections, adequacy of forms for curb returns and alignment and grade.

(3) Check location, grade, and dimensions between forms.

(4) Check the oiling of the forms and the time the forms are to be removed.

(5) Check availability and adequacy of materials required to form contraction and/or expansion joints. Check location and spacing of joints.

(6) Check to see that concrete mix employed is the mix designed for the work being performed. Check slump and entrained-air content of the concrete.

(7) Check placement and consolidation of concrete to insure that segregation does not occur and that honeycomb does not result.

(8) Observe forming of contraction and expansion joints for proper installation and finishing of the exposed joint edges.

(9) Check that exposed surfaces are finished by required methods.

(10) Inspect tops and faces of curbs, surfaces of gutters and surfaces of sidewalks for conformity with surface smoothness and shape requirements.

(11) Assure that an approved curing method is employed and that the curing is performed in accordance with the method, and that curing is started immediately after the finishing operations. Check that curing is continuous for the required curing period.

(12) verify protection of concrete against damage during backfill or other operations. Damaged concrete shall be repaired and/or removed and replaced as required.

(13) Check cleaning and sealing of expansion joints in curbs and gutters, and expansion and contraction joints in sidewalks. Clean joints thoroughly immediately prior to sealing and fill joints with approved material using approved equipment. Require cleaning of surfaces where spillage has occurred or excess sealer has been applied.

2D-09. PATCHING CONCRETE PAVEMENT WITH EPOXY

a. Materials

(1) Check both coarse and fine aggregate for conformance with requirements.

(2) See that epoxy—resin has been approved and that the proper type is being used for the atmospheric temperature conditions.

(3) verify other miscellaneous materials such as those to be used in curing, the Portland Cement, air—entraining admixture, joint—sealing materials and water.

b. Storage

(1) Check aggregates to assure no breakage, segregation, or contamination by foreign material.

(2) Check the Epoxy storage area to see that it will be in compliance with requirements. Also check to see that the material has been maintained at a temperature between 70 and 85 degrees F. for 48 hours prior to use.

(3) Check for cement being maintained dry.

c. Mix

(1) Check for approval of mix.

(2) Check to make sure that control can be maintained.

(3) Continue to check result of mix for workability and strength.

d. Equipment

(1) Check for approval of all equipment which will be used in the operation.

(2) Check to assure that the equipment is being maintained in good working condition.

e. Preparation for Placement

(1) Check the removal of existing pavement to the depth specified and to a depth where surface to be paved will be sound and free of un-weathered concrete.

(2) Check sandblasting procedures when this operation is necessary.

(3) Check for removal of all joint filler and sealants which will prevent bond between concrete and the patch.

(4) Assure that necessary fiberboard fillers are used to prevent the closing of any existing joints.

(5) In order to provide adequate bonding of old and new surfaces prior to placing of epoxy, check that the surface has been blasted with both a high-pressure water jet and an air jet to remove free water.

(6) Observe the application of a thin film of epoxy resin grout on the freshly cleaned surface.

(a) Verify mixing of material for the grout.

(b) Check safety of the operation. Require full face shields, coveralls, and protective cream on workmen, and check adequacy of fire protection.

(c) Check thickness of film.

(d) Check number of coats.

f. Placing: Check the following:

(1) Batching and mixing of materials.

(2) That the initial epoxy grout is still tacky when fresh concrete is placed.

(3) Handling and the placing of the concrete.

(4) Atmospheric and material temperatures.

(5) Consolidation of concrete.

(6) Making the necessary tests.

(7) Finishing and curing.

(8) Finished grade and alignment of joints to see that they match the grade and alignment of the adjoining surface.

(9) For protection of patched areas.

(10) The resealing of joints as required.

g. Safety

(1) See that all workmen are provided with:

(a) Rubber or neoprene gloves.

(b) Face shields or goggles.

(c) Protective creams.

(2) Insure that manufacturer*s recommendations are followed.

(3) Fire extinguishers should be provided during the epoxy mixing operations.

(4) Assure proper ventilation when using epoxy in enclosed area.

(5) Avoid contact with skin and follow treatment/emergency methods recommended by manufacturer.