

CITY OF NACOGDOCHES

CONCRETE PAVEMENT

PART ONE - GENERAL

1.1 General - This item shall consist of Portland Cement Concrete Pavement, with or without reinforcement, with or without monolithic curbs, constructed as herein specified and as shown on the plans on the prepared subgrade or other base course in conformity with the thickness and typical cross sections shown on the plans and to the lines and grades established by the Engineer.

PART TWO - PRODUCTS

2.1 Concrete - Concrete shall conform to the requirements for CLASS "A" CONCRETE as follows:

Min. Sacks Cement per Cubic Yard	Min. Comp. Strength 28 Day PSI	Max. Water Cement Ratio	Slump Range Inches	Coarse Aggregate Number	Fine Aggregate Number
5.0	3,000	7.0	1-3	1,2,3 or 4	1

The use of ready mixed concrete will be permitted for all concrete provided that the plant, truck mixers, agitators and mixing equipment conform to the requirements of the Texas Department of Transportation.

2.2 Joints - Boards for expansion joint filler and for contraction and longitudinal joints shall be of Redwood or Cypress timber. They shall be sound heartwood and shall be free from sapwood, knots, clustered birdseye, checks and splits. Boards that crack or shatter during installing and finishing operations will not be acceptable.

Asphalt impregnated joint board or preformed fiber material shall be of required size and uniform thickness. When used in transverse joints, it shall conform approximately to the shape of the finished pavement as shown on plans.

Ready mixed cold applied joint and crack sealer shall consist of a homogeneous blend of asphalt, rubber, inert filler and a suitable solvent or solvents. The material shall be a resilient, adhesive compound capable of effectively sealing properly cleaned joints in concrete pavement against the infiltration of moisture throughout repeated cycles of contraction and expansion and which will not be picked up by vehicle tires, particularly at summer temperatures. Joint sealants and fillers shall meet all requirements of TxDOT Standard Specification Item 433 "Joint Sealants and Fillers".

CITY OF NACOGDOCHES CONCRETE PAVEMENT

The Material when tested in accordance with Text Method Tex 525-C shall meet the following requirements:

Penetration:

At 77° F: (As received) 150 grams, 5 seconds, not less than 2.75 cm. (After evaporation of solvent) 200 grams, 60 seconds, not more than 2.20 cm.

At 32° F: (After evaporation of solvent) 200 grams, 60 seconds, not less than 2.20 cm.

Flow:

Not more than 0.5 cm.

Bond:

There shall be no cracking of the material or failure in bond between the material and the mortar test blocks during or at the end of five cycles.

2.3 Dowels - Approved load transmission devices for expansion and contraction joints shall consist of smooth, steel dowel bars of the size and type indicated on plans and shall be open hearth, basic oxygen or electric furnace steel conforming to the properties specified for grade 60 in ASTM Designation: A 615. The free end of dowel bars shall be smooth and free of shearing burrs.

When required by plans, one end of each dowel bar shall be encased in a approved cap having an inside diameter of 1/6 inch greater than the diameter of the dowel bar. The cap shall be of such strength, durability and design as to provide free movement of the dowel bar and shall be approved by the ENGINEER prior to use. One end of the cap shall be filled with a soft felt plug or shall be void in order to permit free movement of the dowel bar for a distance equivalent to 150 percent of the width of the joint used. The dowel caps and dowel bars shall be held securely in place by bar ties as shown on plans, or an approved equivalent thereof. Mechanical methods of implanting dowel bars in the plastic concrete may be used if approved by the ENGINEER.

Smooth dowel bars shall be coated with heavy grease on one end. Unless otherwise shown on the plans, steel reinforcing bars as required including the tie bars shall be open hearth, basic oxygen or electric furnace new billet steel of Grade 60 or Grade 40 for concrete reinforcement. Bars that require bending shall be Grade 40 conforming to requirements of ASTM Designation: A 615.

2.4 Curing - The membrane curing compound shall comply with the requirements of TxDOT Standard Specification Item 526 " Membrane Curing".

CITY OF NACOGDOCHES

CONCRETE PAVEMENT

2.5 Equipment

2.5.1 General - All equipment necessary for the construction of this item shall be on the project and shall be approved by the ENGINEER as to condition before the CONTRACTOR will be permitted to begin construction operations on which the equipment is to be used. When approved by the ENGINEER in writing, a commercial or independently operated batching plant for measuring materials outside the limits of the project may be used.

2.5.1 Mixer - The mixer furnished may be either a paving mixer (operated at the site of the construction or centrally located), a stationary mixer (central mixer) or paving mixer (truck mounted) that will produce adequately mixed concrete meeting the specified requirements.

The size of the paving mixer shall not be less than that of a 27-E paver, as established by the Mixer Manufacturer's Bureau of the Associated General Contractors. Each truck mounted paving mixer shall be approved by the ENGINEER prior to use on the project.

Each mixer shall be equipped with a water measuring device so constructed that it will measure the water within one (1) percent of the total amount required for each batch. Unless the water is to be weighed, the water measuring equipment shall include an auxiliary tank with a capacity greater than that of the measuring tank, and from which the measuring tank will be filled by gravity flow. The measuring tank shall be open to the atmosphere and shall be so placed and constructed that the water for a batch can be discharged into a calibrated tank or weighing device for checking the accuracy of water measurement without seriously delaying the paving operations. The CONTRACTOR shall have a calibrated tank or weighing device available at all times at a location satisfactory to the ENGINEER.

2.5.3 Hauling Equipment - Batch hauling equipment for the transportation of measured materials from the batching plant to the mixer shall be equipped with tight covers and shall be used when directed by the ENGINEER to prevent excessive evaporation of moisture or any loss of material.

If a central mixer is used, concrete may be transported to the point of delivery in truck agitators or non-agitating trucks. If, in the opinion of the ENGINEER, any appreciable segregation or accumulation of excess water and/or mortar occurs on the surface of the concrete, this may be cause for rejection and this method of transporting the concrete to the point of delivery shall be suspended as directed by the Engineer.

2.5.4 Subgrade or Subbase Planer and Templates - Unless a stabilized subbase is provided, an approved subbase planer shall be provided,

CITY OF NACOGDOCHES CONCRETE PAVEMENT

mounted on visible rollers riding on the forms and having adjustable cutting blades which shall trim the subgrade to the exact section shown on the plans. The planer frame shall be heavy enough to remain on the forms at all times and shall be of such strength and rigidity that, under a test made by changing the support from the wheels to the center, it shall not develop a deflection of more than 1/8 inch. Tractive power equipment used to pull the planer shall not be such as to produce ruts or indentations in the subgrade.

When the slipform method of paving is to be used, the subgrade planer will be operated on a prepared track grade or controlled by an electronic sensor system operated from a "string line" that establishes the horizontal alignment and the elevation of the subbase.

A template for checking the contour of the subbase shall be provided and operated by the CONTRACTOR. The template shall rest upon the side forms and shall be of such strength and rigidity that, under a test made by changing the support to the center, it shall not show a deflection of more than 1/8 inch. It shall be provided with accurately adjustable rods projecting downward to the subgrade at one(1) foot intervals, and these rods shall be adjusted to the required cross section of the bottom of the slab when the template is resting upon the side forms. Where stabilized subbase is provided, use of a scratch template will be required.

2.5.5 Forms - Side forms shall be metal of approved cross-section. The preferred depth of the form shall be equal to the required edge thickness of the pavement. Forms with depth greater or less than the required edge thickness of the pavement will be permitted provided the difference between the form depth and the edge thickness is not greater than one(1) inch and further provided that forms of a depth less than the pavement edge are brought to the required edge thickness by securely attaching metal strips of approved section to the bottom of the form. Longitudinal hardwood strips not greater than one (1) inch in thickness may be used in lieu of metal strips.

The length of form sections shall not be less than ten (10) feet and each section shall provide for staking in position with not less than three pins. Flexible or curved forms of wood or metal of proper radius shall be used for curves of 200-foot radius or less. Forms shall be of ample strength and shall be provided with adequate devices for secure setting so that when in place they will withstand, without visible springing or settlement, the impact and vibrating of the spreading and finishing machinery. In no case shall the base be less than eight (8) inches or more in height. The forms shall be free from warps, bends, or kinks, and shall be sufficiently true to provide a reasonably straight edge on the concrete and the top of each form section, and when tested with a straight edge shall conform to the requirements specified for the surface of the completed pavement. Sufficient forms shall be provided for satisfactory prosecution of the work.

CITY OF NACOGDOCHES CONCRETE PAVEMENT

Outside curb forms shall be of wood or metal of section satisfactory to the ENGINEER, straight, free of warp, and shall be a depth at least equal to the depth of the curb. They shall be mounted on the paving forms and securely attached thereto and maintained in true position during the placing of the concrete.

2.5.6 Concrete Spreader - Use of a concrete spreader shall be required and it shall be a self-propelled machine having sufficient power and traction to spread and strike off concrete without slippage on the forms. It shall be equipped with a power driven device for spreading the concrete uniformly between the forms. The spreading device may be either a reciprocating blade, a screw conveyor or a belt conveyor. The spreader shall be capable of striking off the surface of the concrete between the forms in the longitudinal direction of the slab at any required elevation.

2.5.7 Slipform Paver - This paver shall be equipped with a longitudinal transangular finishing adjustable to crown and grade. The float shall extend across the pavement practically to the side forms and/or edge of slab. A "String line" shall be used to provide grade control for the paver, unless otherwise shown on the plans.

2.5.8 Mechanical Vibratory Equipment - All concrete place for pavement shall be consolidated by approved mechanical vibrators operated ahead of the transverse finishing machine and designed to vibrate the concrete internally and/or from the surface. Vibratory members shall extend across the pavement, practically to, but shall not come in contact with, the side forms. Mechanically operated vibrators shall be mounted in such manner as to not interfere with the transverse or longitudinal joints.

The pavement vibrators shall not be used to level or spread the concrete but shall be used only for purposes of consolidation. The vibrators shall not be operated for more than fifteen (15) seconds while the machine upon which they are installed is standing still.

Approved hand manipulated mechanical vibrators shall be furnished in the number required for provision of proper consolidation of the concrete along forms, at joints and in areas not covered by mechanically controlled vibrators. These vibrators shall be sufficiently rigid to insure control of the operating position of the vibrating head.

2.5.9 Finishing Equipment - The transverse finishing machine shall be provided with two (2) screeds accurately adjusted to the crown of the pavement, shall be power driven and mounted in a substantial frame equipped to ride on the forms, and shall be so designed and operated as to strike off and consolidate the concrete.

CITY OF NACOGDOCHES CONCRETE PAVEMENT

Where hand finishing is permitted under this specification, the CONTRACTOR shall provide a strike template and tamping template both of four(4) by ten(10) inch lumber or equivalent metal section and at least two(2) feet longer than the width of the pavement. Both templates shall conform to the crown section of the pavement, and the tamp, if of wood, shall have a steel face not less than 3/8 inch in thickness. The CONTRACTOR shall also provide a longitudinal float of approved design and not less than fourteen (14) feet in length.

The CONTRACTOR shall furnish, operate and maintain at least two(2) standard ten(10) foot steel straightedges.

The CONTRACTOR shall furnish a sufficient number of bridges equipped to ride on the forms and span the pavement for finishing operations and for the installation and finishing of joints. All necessary finishing and edging tools shall be furnished as may be required to complete the pavement in accordance with the plans.

PART THREE - EXECUTION

3.1. Preparation of Subgrade - Where stabilized subbase is not provided the subgrade shall be excavated as required, all unstable or otherwise objectionable material removed, and all holes, ruts and depressions filled with approved material. Rolling and sprinkling shall be performed when and to the extent directed, and the road bed shall be completed to or above the plane of the typical sections shown on the plans and the lines and grades approved by the ENGINEER. Material excavated in the preparation of the subgrade shall be utilized in the construction of adjacent shoulders and slopes, and any additional material required for the completion of the sections shall be secured from sources indicated on the plans or designated by the ENGINEER. Drainage of the roadbed shall be maintained at all times.

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the pavement is placed and shall be kept thoroughly wetted down sufficiently in advance of placing any pavement to insure its being in a firm and moist condition for at least two (2) inches below the prepared surface. Sufficient subgrade shall always be prepared in advance to insure satisfactory prosecution of the work. No equipment or hauling shall be permitted on the prepared subgrade, except by special permission of the ENGINEER, which will be granted only in exceptional cases and only where suitable protection in the form of two (2) ply timber mats or other approved materials is provided.

3.2 Placing and Removing Forms - The subgrade under the forms shall be firm and cut true to grade so that each form section when placed with be firmly in contact for its whole length and base width, and exactly at the established grade. Any subgrade under the forms below established grade shall be corrected, using suitable material, placed, sprinkled and rolled as directed. Forms shall be staked with at least three (3)

CITY OF NACOGDOCHES CONCRETE PAVEMENT

pins of each ten (10) foot section. A pin shall be placed at each side of every joint. Form sections shall be tightly joined and keyed to prevent relative displacement. Forms shall be cleaned and oiled each time they are used. Conformity of the grade and alignment of forms shall be checked immediately prior to placing concrete, and all necessary corrections made by the CONTRACTOR. Where any form has been disturbed or any subgrade becomes unstable, the form shall be reset and rechecked. In exceptional cases, the ENGINEER may require suitable stakes driven to the grade of the bottom of the forms to afford additional support. Sufficient stability of forms to support the equipment operated thereon and to withstand its vibration without springing or settlement shall be required. If forms settle and/or deflect over 1/8 inch under finishing operations, paving operations shall be stopped and the forms shall be reset to line and grade.

Forms shall remain in place for not less than eight (8) hours after the concrete has been placed. They shall be carefully removed in such a manner that little or no damage will be done to the edge of the pavement. Any damage resulting from this operation shall be immediately repaired. After the forms have been removed, the ends of all joints shall be cleaned, and any honeycombed areas pointed up with approved mortar. Immediately after pointing is complete, the form trench, if used, shall be filled with earth from the shoulders in such a manner as to shed water from rainfall or curing away from the edge of the pavement. Upon completion of the required curing, the subgrade or shoulders adjacent to the pavement shall be placed in condition to maintain drainage.

3.3 Concrete Mixing and Placing

3.3.1 Mixing - The concrete shall be mixed in a mixer conforming to requirements. Ready Mix concrete may be used for mixing concrete for pavement. The aggregates, mineral filler if required, cement and water shall be measured separately, introduced into the mixer and mixed for a period of not less than fifty (50) seconds nor more than ninety (90) seconds, measured from the time the last aggregate enters the drum to the time discharge of the concrete begins. The required water shall be introduced into the mixing drum during the first fifteen (15) seconds of mixing. The entire contents of the drum shall be discharged before any materials of the succeeding batch are introduced.

If a central mixer is used, the concrete shall be discharged into the specified hauling equipment and delivered to the road site. If truck agitators are used, the concrete shall be continuously agitated at not less than one (1) nor more than six(6) rpm as directed by the ENGINEER.

3.3.2 Placing - Unless otherwise shown on the plans the concrete may be placed by using forms or by use of a slipform paver. Any concrete not placed as herein prescribed within thirty (30) minutes after mixing shall be rejected and disposed of as directed except as provided otherwise herein. Except by specific written authorization of the ENGINEER, concrete shall not be placed when the temperature is below 50°F and falling but may be placed when the temperature

CITY OF NACOGDOCHES

CONCRETE PAVEMENT

is above 45°F and rising, the temperature being taken in the shade and away from artificial heat.

Concrete shall be placed only on approved subgrade or subbase and unless otherwise indicated on the plans, the full width of the pavement shall be constructed monolithically. The concrete shall be deposited on subgrade or subbase in such manner as to require as little rehandling as possible. Where hand spreading is necessary, concrete shall be distributed to the required depth by use of shovels. The use of rakes will not be permitted. Workers will not be permitted to walk in the concrete with any earth or foreign material on their boots or shoes. The placing of concrete shall be rapid and continuous.

Concrete shall be distributed to such depth that, when consolidated and finished, the slab thickness required by the plans will be obtained at all points and the surface shall not, at any point, be below the established grade. Special care shall be exercised in placing and spreading concrete against forms and at all joints to prevent the forming of honeycombs and voids.

Concrete for the monolithic curbs shall be the same as for the pavement and, if carried back from the paving mixer, shall be placed within twenty (20) minutes after being mixed. It may be placed while the pavement concrete is still plastic. When sawed joints are used, curbs shall be doweled as shown on the plans and poured after sawing. Curbs doweled on and placed separately may be placed with an extrusion machine.

3.3.3 Reinforcing Steel and Joint Assemblies - All reinforcing steel, including steel wire fabric reinforcement, tie bars, dowel bars and load transmission devices used in accordance with plan provisions shall be accurately placed and secured in position in accordance with details shown on plans. Reinforcing bars shall be securely wired together at alternate intersections, following a pattern approved by the ENGINEER, and at all splices, and shall be securely wired to each dowel intersected. When wire fabric is used, it replaces only the longitudinal and transverse bars and shall be securely wired together at all splices and to each dowel intersected. The bars shall be installed in the required position by the method and device shown on plans or by approved method permitted. If this method of placement provides inadequate, the work shall be completed using conventional methods.

3.3.4 Construction Joints - Intentional stoppage of the placing of the concrete shall be at either an expansion joint or at a weakened plane joint, if load transmission devices are specified.

3.4 Joints

3.4.1 General - All transverse and longitudinal joints when required in the pavement shall be of the type or alternate type shown on the plans and shall be constructed at required location, on required alignment, in required relationship

CITY OF NACOGDOCHES CONCRETE PAVEMENT

to tie bars and joint assemblies, and in accordance with details shown on the plans. Such stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position.

Careful workmanship shall be exercised in the construction of all joints to insure that the concrete sections are completely separated by an open joint or by the joint materials and to insure that the joints will be true to the outline indicated.

3.4.2 Expansion Joints - Transverse expansion joints shall be formed perpendicular to the centerline and surface of the pavement and shall be constructed in accordance with the sequence of operations shown on plans. After the transverse finishing machine and before the longitudinal finishing machine has passed over the joint, the CONTRACTOR shall test the joint filler for correctness of position and make any required adjustment in position of the filler and shall install the joint seal space form in accordance with the plans. After removal of the joint seal form as required by the plans, the joint seal space above the joint filler shall be thoroughly sandblasted or machine routed to remove all projecting concrete, laitance, dirt or foreign matter. The concrete faces of the joint seal space shall be left true to line and section throughout the entire length of the joint. The joint faces shall be clean and dry at the time joint sealing filler is placed. The pavement adjacent to the joint shall be left free of joint sealing material. The joint seal space shall be exactly above and not narrower than the joint filler with no concrete overhangings.

3.4.3 Weakened Plane Joints - Weakened plane joints shall consist of transverse contraction joints and longitudinal joints and shall be formed or sawed as specified on the plans. When the joints are sawed, the saw shall be power driven, shall be manufactured especially for the purpose of sawing concrete, and shall be capable of performing the work. Saw blades shall be designed to make a clean smooth cut having a width and depth of cut as detailed on the plans. Tracks adequately anchored, chalk, string line or other approved methods shall be used to provide true alignment condition and the CONTRACTOR shall keep a standby power saw on the project at all times when concrete operations are under way.

If membrane curing is used, the portion of the seal which has been disturbed by sawing operations, shall be restored by the CONTRACTOR by spraying the areas with additional curing seal.

3.4.4 Contraction Joints - Transverse contraction joints shall be formed or sawed joints perpendicular to the centerline and surface of the pavement and shall be constructed by the method, and in the sequence of operations, as shown on the plans. Where sawed joints are used, contraction joints shall be sawed as soon as sawing can be accomplished without damage to the pavement and before forty-eight (48) hours after the concrete has been placed, the exact time to

CITY OF NACOGDOCHES CONCRETE PAVEMENT

be approved by the ENGINEER. All joints shall be completed before placing concrete in succeeding lanes and before permitting traffic to use the pavement.

3.4.5 Longitudinal Joints - Longitudinal joints shall be of the type or alternate types shown on the plans and shall be constructed of specified materials in accordance with provision of the plans. Longitudinal joints shall be constructed accurately to required lines, shall be perpendicular to the pavement surface at the joint, and the pavement surface over and adjacent to the joint shall be finished as specified.

Longitudinal joints shall be sawed as soon as sawing can be accomplished without damage to the pavement. Sawing shall not cause damage to the pavement and the groove shall be cut with a minimum of spalling. No traffic (including construction traffic) shall be permitted on the pavement until the longitudinal joint is cut.

3.4.6 Joint Sealer Material - After the joints in the hardened concrete have been thoroughly cleaned to the satisfaction of the ENGINEER, the material shall be installed into each joint by means of a powered, concrete joint sealing machine capable of continuously feeding the compound under pressure into the joint in such a way as to fill it solidly. The extruding nozzle tip of the sealing machine shall be of such design as to fill the joint opening uniformly from the bottom to the top in a neat and workmanlike manner. The joints shall be completely filled.

3.4.7 Joint Filler Boards - Boards shall be anchored as indicated by the plans.

3.4.8 Curbs - The curb shall be constructed in lengths equal to the adjoining pavement slab lengths and expansion joints shall be provided in the curb opposite each transverse expansion joint in the pavement. Expansion joint material shall be of the same thickness, type and quality as specified for the pavement and shall be of the section as shown for the curb. All expansion joints shall be carried through the curb.

When sawed joints are provided for the pavement, the curb shall be sawed as all transverse joints are being sawed to provide bond for the curb, deformed dowel bars shall be placed as indicated on the plans while the pavement concrete is still plastic. The concrete for the monolithic curb shall be placed within forty-five (45) minutes after placement of the pavement slab.

Weakened Plane joints can be formed in monolithic curbs at a spacing to coincide with the joints in the concrete pavement. When the concrete is sufficiently set, the joint on the face of curb shall be grooved with an approved type of grooving tool.

A finish coat of mortar shall be applied on the exposed surfaces of the monolithic curbs. The mortar shall be composed on one (1) part of Portland

CITY OF NACOGDOCHES CONCRETE PAVEMENT

cement and two (2) parts of fine aggregate. A mortar coat will not be required for extruded curbs.

The curb face, lower radius and tip of curb shall be plastered with sand cement mortar. The mortar shall be applied with a template or "mule" made to conform to the curb dimensions shown on the plans. All exposed surfaces of the curb shall be finished with a steel trowel and brushed to smooth and uniform surface.

3.5 Spreading and Finishing

3.5.1 Machine Finishing - All concrete pavement shall be finished mechanically with approved power-driven machines, except as herein provided. Hand finishing will be permitted on the transition from a crowned section to a superelevation section without crown on curves, and on straight line superelevation sections less than 300 feet in length. Hand finishing will also be permitted on that portion of a widened pavement outside the normal pavement width, on sections where the pavement width is not uniform, or required monolithic widths are greater than that of available finishing machines.

Machine finishing of pavement shall include the use of power driven spreaders, power driven vibrators, power driven transverse strike-off, and screed, or such alternate equipment as may be substituted and approved.

All concrete pavement shall be consolidated by a mechanical vibrator. As soon as the concrete has been spread between the forms, the approved mechanical vibrator shall be operated to consolidate the concrete and remove all voids. Hand manipulated vibrators shall be used for areas not covered by the mechanical vibratory unit.

The transverse finishing machine shall first be operated to compact and finish the pavement to the required section and grade, without surface voids. The machine shall be operated over each area as many times and at such intervals as directed. At least two (2) trips will be required and the last trip over a given area shall be a continuous run of not less than forty (40) feet. After completion of finishing with the transverse finishing machine a transverse drag float may be used.

The consistency of the concrete as placed should allow the completion of all finishing operations without the addition of water to the surface. When field conditions are such that additional moisture is needed for the final concrete surface finishing operation, the required water shall be applied to the surface by fog spray only and shall be held to a minimum.

After finishing is complete and the concrete still workable, the surface shall be tested for trueness with an approved ten (10) foot steel straightedge. The straightedge shall be operated from the side of the pavement, placed

CITY OF NACOGDOCHES CONCRETE PAVEMENT

parallel to the pavement centerline and passed across the slab to reveal any high spots or depressions. The straightedge shall be advanced along the pavement in successive stages of not more than one-half its length. Practically perfect contact of the straightedge with the surface will be required, and the pavement shall be leveled to this condition, in order to insure conformity with the surface test required below, after the pavement has fully hardened. Any correction of the surface required shall be accomplished by adding concrete if required and by operating the longitudinal float over the area. The surface test with the straightedge shall then be repeated.

For one-lane pavement and uniform widening, the equipment for machine finishing of concrete pavement shall be as directed by the ENGINEER but shall not exceed the requirements of these specifications.

After completion of the straightedge operation, as soon as construction operations permit, texture shall be applied with 1/8 inch wide metal tines with clear spacing between the tines being not less than 1/4 inch nor more than 1/2 inch. If approved by the ENGINEER, other equipment and methods may be used, provided that a surface texture meeting the specified requirements is obtained. The texture shall be applied transversely. It is the intent that the average texture depth resulting from the number of tests directed by the ENGINEER be not less than 0.060 inch with a minimum texture depth of 0.050 inch for any one (1) test when tested in accordance with Test Method Tex 436-A. Should the texture depth fall below that intended, the finishing procedures shall be revised to produce the desired texture.

3.5.2 Hand Finishing - Hand finishing shall be restricted to only those conditions provided for above and upon specific authorization by the ENGINEER. When hand finishing is permitted, the concrete shall be struck off with an approved strike-off screed to such elevation that when consolidated and finished the surface of the pavement shall conform to the required section and grade. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction the work is progressing, maintaining the template in contact with the forms, and maintaining a slight excess of material in front of the cutting edge. The concrete shall then be tamped with an approved tamping template to compact the concrete thoroughly and eliminate surface voids and the surface screeded to required section.

After completion of a strike-off, consolidation and transverse screeding, a hand operated longitudinal float shall be operated to test and level the surface to the required grade.

Workers shall operate the float from approved bridges riding on the forms and spanning the pavement. The longitudinal float shall be held in contact with the surface and parallel to the centerline and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete

CITY OF NACOGDOCHES CONCRETE PAVEMENT

shall be placed, if required, and screeded, and the float shall be used to produce a satisfactory surface. Care shall be exercised to keep the ends of the float from digging into the surface of the pavement. After a section has been smoothed so that the float maintains contact with the surface at all points in being passed from one side to the other, the bridges may be moved forward half (1/2) the length of the float and the operations repeated. Other operations and surface tests shall be as required for machine finishing.

3.5.3 Surface Test - After the concrete has been placed twelve (12) hours or more, the ENGINEER will test the surface of the pavement with a ten (10) foot straightedge placed parallel to the centerline. Unless specified otherwise, the surface shall not vary from the straightedge by more than 1/16 inch per foot from the nearest point of contact, and in no case shall the maximum ordinate from a ten (10) foot straightedge to the pavement greater than 1/8 inch. Any high spots causing a departure from the straightedge in excess of that specified shall be ground down by the CONTRACTOR to meet the surface test requirements. Where the texture of the pavement is removed by extensive grinding, the texture shall be restored by grooving the concrete to meet the surface finishing specifications.

3.6 Curing

3.6.1 General - All concrete pavement shall be cured by protecting it against loss of moisture for a period of not less than seventy-two (72) hours from the beginning of curing operations. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured in accordance with the requirements specified.

3.6.2 Membrane Curing - Immediately after the finishing of the pavement has been completed and after the free surface moisture has disappeared, the pavement shall be sprayed uniformly with a curing compound. Should the film of compound be damaged from any cause before the expiration of seventy-two (72) hours after original application, the damaged portions shall be repaired immediately with additional compound. Unless otherwise specified on the plans, membrane curing shall be used when the concrete (except that concrete to be used as a base) is placed with a slipform paver.

3.7 Protection of Pavement and Opening to Traffic.

3.7.1 Protection of Pavement - The CONTRACTOR shall erect and maintain the barricades required by plans and such other standard and approved devices as will exclude public traffic and traffic of his employees and agents from the newly placed pavement for the periods of time hereinafter prescribed. Portions of the roadway or crossings of the roadbed required to be maintained open for use by traffic shall not be obstructed by the above-required barricades. Crossings of the pavement

CITY OF NACOGDOCHES CONCRETE PAVEMENT

required by the plans, or by construction sequence, during the time prior to opening to traffic as herein specified, shall be provided with an adequate and substantial bridge, approved by the ENGINEER.

3.7.2 Opening Pavement to Traffic - The pavement shall be closed to all traffic, including vehicles of the CONTRACTOR, until the concrete is at least seven(7) days old.

At the end of the seven (7) day period and as long thereafter as ordered by the ENGINEER, and is so desired by the CONTRACTOR, the pavement may be opened for use by vehicles of the CONTRACTOR provided the gross weight (vehicle plus load) of such vehicles does not exceed 14,000 pounds. Such opening, however, shall in no manner relieve the CONTRACTOR from his responsibility of his warranty of the work. On those sections of the pavement thus opened to traffic, all joints shall first be sealed, the pavement cleaned and earth placed against the pavement edges before permitting vehicles thereon.

After the concrete in any section of pavement is fourteen (14) days old, or as long thereafter as ordered by the ENGINEER, such section or pavement may be opened to all traffic as required by plans or when so directed by the ENGINEER. On those sections of the pavement thus opened to traffic, all joints shall first be sealed, the pavement cleaned, earth placed against the pavement edges and all other work performed as required for the safety of traffic.

3.8 Penalty for Deficient Pavement Thickness

3.8.1 The unit bid price will be reduced ten percent (10%) per each 1/4 inch in thickness.

PART FOUR - MEASUREMENT AND PAYMENT

4.1. Measurement - Concrete pavement will be measured by the square yard of surface area of completed and accepted work. The surface area will be construed to also include that portion of the pavement slab extending beneath the curb.

When "monolithic curb" is required, its measurement will be by the linear foot complete in place.

4.2 Payment - The completed and accepted work performed and materials furnished, as prescribed by this item will be paid for at the unit price bid for "Concrete Pavement (Class "A" Concrete)" and for "Monolithic Curb" or the adjusted unit price for pavement of deficient thickness as provided under "Penalty for Deficient Thickness" which price shall be full compensation for sawcutting, jackhammering, removals, excavation, utilizing and/or disposing of all excavated materials, cleaning and compacting the base or subgrade, for shaping and fine grading, furnishing and

CITY OF NACOGDOCHES
CONCRETE PAVEMENT

applying of water, mortar, adhesives or other material, including reinforcing and dowel bars, if required, for furnishing, loading and unloading, storing, hauling and handling all ingredients and materials, including all freight and royalties involved, for mixing, placing, finishing, cleaning and sealing joints and curing all concrete, for furnishing all materials for sealing joints and placing joints and joint filler material in proper position, and for all manipulations, labor, equipment, appliances, tools and traffic provisions, and incidentals necessary to complete the work.