

**TECHNICAL SPECIFICATIONS**

# **STREET IMPROVEMENTS**

**GRADING  
PAVING & BASE COURSE  
CONCRETE SIDEWALKS, DRIVEWAYS, CURB & GUTTER**



**CITY OF SANFORD  
SANFORD, NORTH CAROLINA**

# **TECHNICAL SPECIFICATIONS**

## **STREET IMPROVEMENTS**

### **GENERAL**

The contractor shall furnish all labor, plant, materials, equipment, and all else required to construct the street improvements as shown on the plans and as called for in the specifications. The Engineer will furnish the Contractor with benchmark and baseline information necessary to stake out the work according to the plans and specifications. The Contractor shall furnish all stakes, templates, surveys, and lines required. Finished work, in all cases, shall conform with lines and grades as shown on the approved plans or as revised by the Engineer.

### **I. GRADING**

#### **Scope of Work**

Grading shall consist of the removal and satisfactory disposal of all material excavated within the limits specified including unsuitable subgrade material and replacement with satisfactory materials, and for the formation, compaction, and shaping of all embankments, shoulders, slopes, intersections, approaches, and subgrades to conform to the typical cross section and to the lines and grades shown on the plans. Grading work shall also include the removal and proper disposal of all stripping, fence, trees, hedge rows, pipes, walls, steps, and old surfaces within the construction area.

#### **A. EXCAVATION**

##### **1. Classification of Excavation**

The classification of all material excavated shall be as follows:

- a) Unclassified excavation shall include all material excavated within the designated limits not otherwise classified as borrow excavation.
- b) Borrow excavation shall include that material excavated from areas other than those designated as directed by the Engineer.

## 2. Construction Methods

- a) General - After all stumps, vegetable matter, and other obstructions have been removed from the limits of the work, the Contractor shall proceed with the excavation and disposal of material at such locations and in such sequence as the Engineer may approve.

All suitable material removed from the excavation shall be used as far as practical in the formation of embankments, subgrade, shoulders, and areas back of curbs, and at such other places as directed.

- b) Disposal of Excess Material - All material in excess of that required on the street in which the material is being excavated shall be hauled to any other street or public area designated by the Engineer within one mile measured along the shortest practical route. After all excess material has been removed in this manner to the satisfaction of the Engineer, the Contractor shall, when practical, deposit any remaining excess material on the private property of property owners abutting the street being improved at the request of the property owners. All remaining excess shall be disposed of by the Contractor as approved by the Engineer.
- c) Stripping - On streets being improved, the Contractor shall strip any stabilized surface as directed by the Engineer and stock pile the materials at places designated by the Engineer within one mile measured along the shortest practical route from the street being improved. Where practical, the Engineer may direct the Contractor to salvage the stabilizing material and place on the street being improved after the subgrade has been completed.
- d) Rock - When rock is encountered it shall be excavated to subgrade, except where the rock is under curbs and gutters. In these instances the rock shall be excavated at least six inches (6") below the subgrade, and the resulting space backfilled with suitable material specified by the Engineer and thoroughly compacted. Excavated rock shall not be used for the construction of embankments.
- e) Slopes - All cut and fill slopes shall be shaped and finished to conform to the typical cross section shown on the plans. The tops of cut slopes shall be rounded and shaped with the slope of the adjacent ground surface. The bottoms or toes

of embankment slopes shall be shaped uniformly with the natural ground surface. Where cut and fill slopes intersect, the slopes shall be adjusted to make a uniform connection. Wherever there are trees or other objects which, in the opinion of the Engineer, should be preserved, adjustments shall be made in the slopes as directed. All sloping work shall be done in proper sequence with the other operations of the work, and the degree of finish may be obtained by means of mechanical equipment, hand labor, or such other methods that will provide a satisfactory standard of work.

- f) Embankments - Only suitable materials shall be used in the construction of embankments and backfill. Before embankment is started, all unsuitable material such as brush, rubbish, sod, logs, stumps, roots, or similar substances shall be removed from the natural ground. All portions of the surface of the street upon which an embankment is to be placed shall be thoroughly plowed or scarified and all cleavage planes broken up before placing the embankment.

In embankment construction the materials shall be deposited and spread in successive, uniform layers of not more than six inches (6") in depth, loose measurement, for the full width of the cross section, and shall be kept level by the use of blade graders, bulldozers, or other approved devices.

Each layer of the embankment, before starting the next, shall be thoroughly compacted by rolling as hereinafter specified. Hauling shall be distributed over the full width of the embankment and, in no case, will deep ruts be allowed to form during the construction.

Embankments shall be rolled with a sheepfoot tamping roller approved by the Engineer of such weight to exert at least 200 pounds pressure per square inch of cross sectional area when in contact with a plane surface. Each layer of the embankment shall be rolled for it's full width a minimum of two trips of the roller for each inch in depth of the loose material placed in the layer. Special care shall be exercised by the Contractor for the proper filling and compaction of side ditches on the street to subgrade.

The rolling shall be done while the moisture content of the soil is as near as possible to optimum. If and when the material is dried out below optimum, it shall be sprinkled with

water before rolling. Embankment material containing excess moisture, as determined by the Engineer, shall be required to dry to the proper consistency before being placed and compacted.

The Contractor shall maintain adequate drainage on the project being graded at all times. In the event water pockets are formed, they shall be drained by the Contractor, and all wet and unstable material shall be removed and disposed of, and the area backfilled and compacted with suitable material. Such work caused by the failure of the Contractor to keep the area adequately drained shall be performed at his expense.

- g) Maintenance - During the construction and until the street is surfaced, the Contractor shall maintain the street being improved. This shall include keeping all drainage lines free from loose earth or other material that may cause them to become clogged. If necessary, the Contractor shall place stone as directed by the Engineer to maintain the traffic. The cost of such stone will be incidental to the project.

3. Method of Measurement

Grading quantities shall be measured in cubic yards as determined by the average end method at 100 foot intervals or as shown on plans or on a linear foot basis.

B. SUBGRADE

1. General

This item shall consist of the construction and preparation of the subgrade on that portion of the road bed on which the base course and curbs and gutters are to be placed. The limits of the subgrade shall be the area between lines one foot (1') outside of the back of curbs or proposed base course.

After the earth work has been substantially completed and all adjacent drains and structures have been completed and backfilled as specified, the subgrade shall be brought to the lines, grades, and typical cross section shown on the plans, and finished in accordance with these specifications.

## 2. Construction Methods

The subgrade shall be properly shaped and thoroughly compacted so that it conforms to the lines and grades as shown, and shall be brought to a firm, unyielding condition before any base course or curbs and gutters are placed thereon. If the subgrade does not contain sufficient moisture for compaction, it shall be wetted as directed by the Engineer.

All soft and unyielding material, boulders, loose stones, or any other unsuitable material in the subgrade which will not compact readily shall be removed and replaced with suitable material which shall be thoroughly compacted. All submerged roots, stumps, or other perishable matter encountered in the preparation of the subgrade shall be removed.

In preparing the subgrade, the material excavated shall not be piled outside and along the forms in such a manner as to interfere with the proper operation of the finishing of curbs and gutters or the proper drainage of the subgrade.

- a) Rolling of Subgrade - The subgrade shall be rolled as required by the Engineer for the entire length of the project with a 10-ton, 3-wheel, power driven roller. During the rolling of the subgrade, the surface shall be maintained smooth by blading or other approved means. Rolling shall be continued until the subgrade has been compacted throughout to its maximum practical density as determined by the Engineer. Any portion of the subgrade inaccessible to rolling operations shall be thoroughly compacted with hand or mechanical tampers.
- b) Protection of Subgrade - Ditches and drains shall be provided and maintained to satisfactorily drain the subgrade. In no case shall any base course or curbs and gutters be placed on frozen or muddy subgrade. Frost crystals or mud caused by freezing and thawing shall be removed and replaced with suitable material or allowed to dry before placing any base course or curb and gutters. If ruts are formed in the prepared subgrade, the subgrade shall be scarified and thoroughly compacted.

3. Method of Measurement

The construction and preparation of the subgrade, including undercut, shall not be measured for direct payment. Where material is available at the job site for backfill, no measurement will be made for excavation. If borrow material is needed for backfill, it will be measured on a cubic-yard basis for payment.

C. BASIS OF PAYMENT

Payment will be made for all grading quantities on the unit or lump sum prices as stated in the proposal and measured as previously stated. The sum of each payment shall be full compensation for all materials, labor, and other costs to the Contractor.

II. PAVING AND BASE COURSE

Scope of Work

Work done under this section will consist of the placement of stone base, priming, tacking, and asphalt course, as detailed on the plans and in the specifications. This shall include fine grading placement and compaction of the material.

A. TRAFFIC BOUND MACADAM BASE COURSE

This item shall consist of the construction of a base course consisting of graded crushed gravel or crushed gravel or crushed stone material and shall be constructed in accordance with these specifications and typical cross section shown on the plans, or as directed by the Engineer.

1. Materials

The coarse aggregate used shall consist of crushed stone or crushed gravel. Before any material is used, it shall be approved by the Engineer. The Contractor shall notify the Engineer of the source of the material and shall furnish samples as directed before any of the material is used.

The material passing the No. 4 sieve shall be known as "binder" and shall consist of screening, sand, and clay, or other material of satisfactory binding value. The material passing the No. 40 sieve shall have a plasticity index not greater than 6 and liquid limit not

greater than 25, when tested in accordance with AASHTO Method T-89, T-90, and T-91.

The aggregate, including the binder naturally present or added, shall meet the grading requirements as follows:

SIEVE DESIGNATION	PERCENT BY WEIGHT PASSING
1½ - inch	100
1 - inch	90-100
½ - inch	55-90
No. 4	35-60
No. 40	10-35
No. 200	5-20
Clay (-0.005 mm.)	0.3

1. Construction Methods

- a) Equipment - The Contractor shall provide adequate and suitable equipment of such capacity and character to insure the completion of the work in the time specified and to obtain a finished job meeting these specifications. The shaping and mising of the base shall be done with a power driven motor grader.

Adequate scales shall be provided for accurately weighing the aggregate. The scales shall be of the platform truck scales type, and shall have an accuracy of one-half of one percent for all loads.

Adequate and approved rolling equipment shall be used in compacting the base course.

- b) Placing Base Course Material - In handling and placing the material, extreme care shall be taken to prevent segregation of the fine from the coarse material. Segregation shall be cause for rejection at the discretion of the Engineer. The material shall not be dumped in piles directly on the subgrade. The trucks shall be equipped with approved dumping gates so that material can be dumped in layers. The base course material shall be placed on the prepared subgrade in not less than two (2) layers, each layer being approximately one-half (½) of the total base thickness, in order to secure a finished compacted base course as called for on the typical cross section or as specified by the

**B. PLANT MIX ASPHALTIC CONCRETE SURFACE COURSE**

This item shall consist of a surface course composed of aggregate and bituminous material mixed in an approved plant, and shall be constructed on the prepared subgrade or base course in accordance with these specifications and in conformity with the lines, grades, thickness, and typical cross section shown on the plans or as directed by the Engineer.

When called for on the plans or in the Special Conditions, this item shall be constructed in two courses, a binder course and a surface course.

The aggregate and bituminous material shall be combined in such proportions as to produce a mixture conforming to the composition limits by weight as specified in the Special Conditions or plans.

If the Contractor should be unable to keep the mixture consistently uniform and within the specified limits, he shall discontinue operations until he can provide an operator of greater experience or until the necessary adjustments or repairs can be made to the plant.

Samples of the actual mixtures in use will be taken as many times as deemed necessary at the discretion of the Engineer. No change shall be made in the mix without the approval of the Engineer.

**1. Materials**

- a) Asphalt Cement - The bituminous material shall be asphalt made from petroleum. It shall be homogenous, free from water, and shall not foam when heated to 347°F, and shall meet the requirements given in the table below:

<b>ASPHALT CEMENT "Grade AP-3"</b>		
<b>Test Requirements</b>	<b>AASHO Test Method</b>	
Penetration at 77°F	T-49	85-100
Flash Point (open cup), °F	T-48	347 min.
Loss on Heating, Percent	T-47	1.0 max.
Pen. after Heating, % of Original	T-49	60 min.
Ductility at 77°F	T-51	100 min.
Solubility in Carbon Disulfide, %	T-44	99.5 min.
Solubility in Carbon Tetrachloride, %	T-45	99.0 min.
Spot Test	T-102	neg.

- b) Prime Coat - The material used for the prime coat shall be medium-curing cut-back asphalt, grade MC-O or MC-I, as specified in the Special Conditions. The grade of asphalt used shall conform to the latest AASHO Specifications.
- c) Tack Coat - The material for the tack coat shall consist of the following:
- (1) Cut-back asphalt, grade RC-2, meeting the latest AASHO Specifications for the grade.
  - (2) Asphalt cement, grade AP-3, same as described in (1) above.
  - (3) Asphalt emulsion, grade AE-1, meeting the latest AASHO Specifications for that grade.
- d) Coarse Aggregate - The coarse aggregate shall be that portion retained on a No. 10 sieve, and shall consist of crushed stone or crushed gravel. If crushed gravel is used, it shall have at least 70% of the particles with fractured faces. The coarse aggregate shall consist of clean, tough, durable fragments, free from an excess of flat, elongated, soft, or disintegrated pieces, and shall not contain clay, silt, vegetable, or other objectionable matter, and shall be graded from coarse to fine to meet the gradation requirements specified in the Special Conditions.
- The coarse aggregate shall have a loss not more than 55% when tested in accordance with AASHO Method T-96.
- e) Fine Aggregate - The fine aggregate shall consist of clean, tough, rough-surfaced grains, free from clay, loam, and other foreign matter, and shall be graded from coarse to fine to meet the gradation requirements specified in the Special Conditions. When it is necessary to use a mineral filler to meet the required gradation, the filler shall consist of thoroughly dry limestone dust, slag dust, slate dust, or Portland Cement.
- f) Weights, Proportions, and Character of Materials - For the verification of weights or proportions, and character of materials, and determination of temperatures used in the preparation of the mixture, the Engineer, or his authorized representative, shall have access at any time to all parts of

the paving plant and may, at any time, check the loads of materials for weight, mixture, and temperature.

## 2. Construction Methods

- b) Prime Coat - On surfaces not previously paved with bituminous mixes or concrete, a prime coat consisting of from 0.2 to 0.6 gallons per square yard, depending on surface texture, of medium curing asphalt shall be applied with a pressure distributor at a temperature between 80°F and 125°F. The base course shall be well compacted, clean, and free from loose or foreign materials. The surface of the base course shall be dry at the time of applying the prime coat. However, it may be applied, if the Engineer directs, when the base is slightly damp with no signs of free moisture on it's surface.

After the prime coat has been applied, the Contractor shall keep traffic off the road until, in the opinion of the Engineer, the prime coat has penetrated and dried out enough not to pick up under traffic. The surface shall be rolled until all loose material is thoroughly bonded before the wearing surface is placed.

- c) Tack Coat - When the bituminous mix is to be placed on an old pavement, a tack coat shall be applied to the cleaned surface of the old pavement. The material for the tack coat shall consist of rapid curing asphalt, grade RC-2, and asphalt cement, grade AP-3, or an asphalt emulsion, grade AE-1, as stipulated herein before.

The tack coat shall be uniformly applied at a rate of 1/8 to 1/12 of a gallon per square yard, and the temperature at the time of application shall be between 125°F and 150°F for the cut-back asphalt, 100°F to 125°F for the asphalt emulsion, and for the asphalt cement between 275°F and 350°F.

- d) Transportation and Delivery of Mixtures - The mixture shall be transported from the mixing plant to the point of use in vehicles having tight metal bodies previously cleaned of all foreign materials. When directed by the Engineer, each load shall be covered with canvas or other suitable material of sufficient size and thickness to protect it from the weather. Bodies shall be lightly oiled to prevent mixture from adhering thereto. No loads shall be sent out so late in the day as to prevent completion of the spreading and compaction of the

mixture during daylight. The mixture shall be delivered at a temperature between 225°F and 325°F, and within 25°F of the temperature set at the mixing plant.

- e) Placing of Mixture - The mixture shall be spread by means of a mechanical, self-powered paver, capable of spreading the mixture true to line, grade, and crown set by the Engineer. They shall be capable of spreading the mixtures, without segregation, to the required grade and confine the mixtures to true lines without the use of stationary side forms.

The term "screed" includes any "strike-off" device operated by cutting, crowding, or other practical action which is effective on the mixtures at workable temperature without tearing, shoving, or gouging, and which produces a finished surface of the evenness and texture specified.

Longitudinal and transverse joints shall be made in a careful manner. Well bonded and sealed joints are required. If necessary to obtain this result, joints shall be painted with hot asphalt cement and heated.

After the base course mixture has been spread and before roller compaction is started, the surface shall be checked and all fat spots and irregular areas removed and replaced with satisfactory material. Irregularities in grade shall be corrected before compacting.

On areas where it is impossible to use mechanical spreading and finishing equipment, the mixture shall be spread and screened by hand. Straight edging and backpatching shall be done after initial compaction while material is still workable.

Contact surfaces of headers, curbing, gutters, manholes, etc., shall be painted with an approved asphalt cement just before the base mixture is placed against them. All exposed longitudinal edges of the surface course shall be "set up" by tamping with a rake or lute at the proper height and level to receive the maximum compression under rolling.

The Contractor shall provide and have ready for use at all times enough tarpaulins or covers for use in case of rain, chilly wind, or delay for the purpose of covering or protecting any material dumped but not spread.

- f) Compacting Surface Course - After placing, the mixture shall be thoroughly and uniformly compacted with tandem rollers of 8- or 10-ton model weighing not less than 250 pounds per inch width of roller thread. Each roller shall be in the charge of a competent, experienced operator, and must be kept in continuous operation as nearly as practicable. Rolling shall start longitudinal at the outer edges and proceed toward the center of the pavement, overlapping on successive trips by at least 1/2 the width of the roller. The speed of the roller shall, at all times, be slow enough to avoid displacement of the hot mixture as a result of reversing. Any displacement shall be immediately corrected. Rolling shall proceed at a rate not in excess of 500 square yards per hour per roller, and shall continue until no further visible compaction is obtainable and all roller marks have been eliminated. Rolling shall compact the mixture to at least 95% theoretical maximum density.

Rolling shall be started as soon as the mixture will bear the roller without undue displacement of hair cracking. Delays in rolling hand-raked mixture will not be tolerated.

To prevent adhesion of the mixture to the roller, the wheels shall be kept slightly oiled or moistened. Places not accessible to the roller shall be thoroughly compacted with hot tamps.

Bituminous mixture shall not be produced or placed during rainy weather, when the subgrade or base course shows excess moisture, or when the air temperature is less than 40°F in the shade away from artificial heat, unless otherwise permitted by the Engineer. Should rain begin during paving operations, the City assumes no responsibility for asphalt left on the trucks at the time that paving operation is halted.

- g) Plant Tickets - The number of batches and total weight of all loads of mixture shall be recorded in duplicate upon plant ticket forms by an authorized representative of the City. With each load delivered to the work, the truck driver shall present one copy of the plant ticket to the Engineer or his representative. The driver shall retain one copy for the Contractor. The Plant Inspector shall keep the stub copy. The weights to be included in the estimate shall be the total of the tickets delivered by the truck driver to the Engineer or his representative on the work. At any time during the delivery of materials and for the purpose of checking the

weighing equipment at the plant, the Engineer may direct the Contractor to weigh, or cause to be weighed on tested and approved platform scales, at the Contractor's expense, the contents of any truckload that is to be delivered to the work.

- h) Protection of Pavement - When edges are to be protected, planks of the same thickness shall be placed adjacent to longitudinal or transverse joints until the surface course is completed. Sections of newly finished pavement shall be protected from traffic until they have become properly hardened by cooling.

3. Method of Measurement

The quantities to be paid for under this item shall be the number of tons of bituminous mixture weighed on approved scales, in place on the street, completed and accepted. The tonnage shall be the actual weight. Bituminous material used for a tack coat shall not be measured as a separate item for compensation.

The quantities of bituminous material used for prime coat shall be the number of gallons used in place, volume corrected to 60°F in accordance with ASTM Designation D-206.

B. BASIS OF PAYMENT

Payment will be made for all items complete and accepted at the unit, or lump sum prices as stated in the proposal and measured as previously stated. The prices stated in the proposal shall cover all work required to make the street improvements in accordance with the plans and specifications. The sum of such payment shall be full compensation for all materials, labor, and other costs to the Contractor.

### **III. CONCRETE SIDEWALKS, DRIVEWAYS, AND CURB AND GUTTER**

#### **Scope of Work**

Work done under this item shall consist of the construction, reconstruction, or alteration of a one-course Portland cement concrete sidewalk, or a one-course Portland cement concrete driveway in accordance with these specifications, or a one-course Portland cement combination curb and gutter, and in conformity to the lines and grades established by the Engineer. It shall also consist of the removal of existing sidewalks or driveways or curb and gutter and other obstructions for excavating and filling, for fine grading and compaction of the subgrade, and all backfilling necessary to complete the work, including the disposal of surplus material and cleaning up of the work.

#### **A. MATERIALS**

##### **3. Concrete**

Concrete shall contain cement, coarse aggregate, and fine aggregate with a minimum of 3,000 pounds compressive strength per square inch at 28 days.

##### **4. Water**

Water shall be clean and free from salt, oil, or organic substances. Water from local rivers, creeks, or ditches shall not be used.

#### **B. CONSTRUCTION METHODS - SIDEWALK AND DRIVEWAY**

##### **3. Subgrade Preparation**

The subgrade for sidewalks and driveways shall be formed by excavating to the required depth, and shaped to the proper cross section, and shall be thoroughly compacted by rolling or tamping before placing any concrete to 95% compaction.

Where tree roots are encountered, they shall be removed to a depth of one foot for the full width of the walk.

All soft and spongy places shall be removed and all depressions filled with suitable material which shall be thoroughly compacted in layers not exceeding six (6) inches in thickness.

Where existing sidewalks or driveways are to be removed, they shall be removed for their entire depth and disposed of in a

satisfactory manner. Entire sections of a sidewalk slab between joints shall be removed when directed by the Engineer.

4. Protection of Subgrade

Ditches and drains shall be provided and maintained to satisfactorily drain the subgrade. In no case shall sidewalk and driveway be placed on frozen or muddy subgrade. Frost crystals or mud caused by freezing and thawing shall be removed and replaced with suitable material at the Contractor's expense, or allowed to dry before placing sidewalk and driveway. If ruts are formed in the prepared subgrade, the subgrade shall be scarified and thoroughly compacted. If borrow material is required because of improper handling or drainage, the cost of such will be borne by the Contractor.

5. Grading Specifications

See Grading Specifications for Classification of Excavation General Requirements, Disposal of Excess Material, Stripping, Rock, Slopes, and Embankments.

6. Dimensions

Sidewalk slabs shall have an area of not more than thirty-six (36) square feet, and the length of the slab shall be equal to the width providing, however, that where sidewalks are to be repaired, the size of the slab replaced shall be of the same dimensions as those remaining in the old walk.

The minimum thickness of a sidewalk shall be four (4) inches, except where it is crossed by a driveway, and then it shall be a minimum of six (6) inches. Where, in the opinion of the Engineer, driveways and sidewalks are to be subjected to very heavy traffic loads, he may designate the minimum thickness to be eight (8) inches, or may require wire mesh reinforcement or both.

7. Alignment and Grades

Sidewalks shall be constructed in conformance to the lines and grades on the Plans. Sidewalks shall have a uniform slope toward the curb of not less than one-quarter (1/4) inch per foot, nor greater than one-half (1/2) inch per foot.

The elevation of the front edge of the sidewalk shall be determined by allowing a slope upward from the top of the curb of one-half (1/2)

inch per foot for the distance from the curb line to the front edge of the sidewalk.

8. Drainage

A four-inch (4") cast iron or steel pipe shall be provided where necessary to carry the drainage from down spouts under the sidewalk and parkway and through the curb. Drains may be connected to storm sewers if they exist. Vitrified clay sewer pipe may be used for drains under sidewalks and parkways in residential zones, provided the top of the bell of such pipes is placed at least three inches (3") below the surface of the concrete where such piping crosses the sidewalk.

9. Forms

Forms used in constructing sidewalks shall be of wood or metal for full depth of the concrete, straight, free from warp, and of sufficient strength. They shall be staked securely enough to resist the pressure of the concrete without springing. If of wood, they shall be of two-inch (2") surfaced planks. All forms shall be subject to the approval of the Engineer. All work forms shall be thoroughly cleaned before being reused.

10. Placing Concrete

No concrete shall be placed until the forms and subgrade have been approved by the Engineer. The subgrade shall be thoroughly wetted and the concrete shall be placed thereon in one course to the required depth. The concrete shall be thoroughly spaded and rammed and struck off with a template to the required grade and cross section. Successive batches of concrete shall be deposited in a continuous operation until individual sections are completed.

11. Joints

Contraction joints shall be provided uniformly to separate the slab, and shall be cut in a straight line to a depth equal to at least one-third ( $1/3$ ) of the total slab thickness. The joint shall be not less than one-eighth inch ( $1/8"$ ), nor more than one-fourth inch ( $1/4"$ ) in width.

A one-half inch ( $1/2"$ ) expansion joint filled with joint filler shall be placed between all sidewalks and adjoining backs of curbs and between the intersection of two (2) sidewalks and between all sidewalks and driveways. Sidewalks constructed adjacent to

buildings shall be separated from the building with a similar joint. The maximum distance between transverse expansion joints shall be fifty (50) feet. The joint filler shall extend the full depth of the concrete and shall be one-fourth (1/4) of an inch below the finished surface of the sidewalk.

12. Finishing

After the freshly-poured concrete has been brought to the establishing grade, it shall be floated with a wooden float to produce a surface free from irregularities. The final surface shall be obtained by troweling with a steel trowel or hand float and brushing lightly with a light weight brush in a transverse direction so as to produce a uniform gritty surface of the proper texture. All edges and joints shall be rounded to one-fourth inch (1/4").

No more concrete shall be laid than can be properly finished and covered during daylight, unless adequate artificial light satisfactory to the Engineer is provided.

13. Cold Weather Pouring

Concreting operations shall not be undertaken or continued when the surrounding air temperature is below 40°F or the local weather reports indicate the possibility of temperatures of 32°F or lower within the ensuing twenty-four (24) hours, unless provisions are made to insulate or heat the concrete in a manner satisfactory to the Engineer. In any event, the Contractor shall plan and protect his work in a manner which will assure satisfactory results. Any concrete damaged by freezing shall be removed and replaced by the Contractor at his own expense.

Concrete, when deposited in the forms, shall have a temperature of not less than 50°F nor more than 90°F. The concrete shall be maintained at a temperature of not less than 50°F for a period of at least seventy-two (72) hours in the case of normal concrete, or twenty-four (24) hours when high early cement is used. Concrete shall not be deposited on a frozen subgrade.

**14. Curing and Protection**

Immediately after finishing operations have been completed, the entire surface of the concrete shall be covered and cured under burlap or other material approved by the Engineer. The burlap shall be free from holes, dirt, clay, or other foreign matter. Reclaim burlap bags shall not be permitted. The burlap shall weigh not less than twelve (12) ounces per ten (10) square feet when dry. Additional layers may be used to obtain the equivalent weight.

Curing operations shall be carried on at all times when the air surrounding the concrete is 50°F or greater. After finishing the concrete, and the surface is hardened sufficiently or prevent marring, the entire surface shall be covered with one layer of thoroughly saturated burlap overlapping at least six inches (6") at joints to prevent gaps. Additional layers of burlap to result in a total of not less than twenty-four (24) ounces of burlap per ten (10) square feet of surface shall be spread, thoroughly saturated, upon the first layer within thirty (30) minutes after the application of the first layer. The covering shall be maintained fully wetted for seventy-two (72) hours after the concrete has been placed. Water shall be applied by a spray fine enough to avoid damage to the fresh concrete.

Liquid membrane forming curing compound may be used in lieu of keeping the concrete wet. When used, it shall be applied at a rate of one (1) gallon per one hundred fifty (150) square feet of area immediately after the concrete has been finished and the surface water sheen has disappeared. After the curing compound has been applied, the concrete shall be kept covered with a tarpaulin or heavy building paper for at least three (3) days to protect the surface from traffic and rain. Sufficient barricades, signs, and warning devices shall be provided by the Contractor to protect the finished concrete.

**15. Removal of Forms and Backfilling**

After the concrete has set sufficiently, the forms shall be removed and the spaces on both sides shall be backfilled with suitable earth, uniformly spread and compacted. The areas between the curb and sidewalk, and immediately back of the sidewalk, shall be left in a smooth, neat, and workmanlike condition.

16. Protection of Concrete

Immediately after the forms have been removed, traffic shall be excluded from crossing the concrete for a period of approximately fourteen (14) days by erection and maintenance of suitable barricades. The Contractor shall be responsible for any damage resulting from traffic within the fourteen (14) day period and he shall remove and replace any concrete damage as directed by the Engineer.

17. Removal of Defective Work

The Engineer shall have the authority to and shall require the removal of any sidewalk or driveway or portion thereof laid under these specifications which does not conform to the requirements as set forth herein. Upon notification in writing by the Engineer, the Contractor shall take immediate action to correct the faulty work at his own expense.

18. Cleaning Site

Prior to the acceptance of the work, all surplus and rejected material and unsightly objects such as stones, stumps, limbs, roots, concrete, etc., shall be removed from the site and not be considered complete until all cleaning up has been done and the site is of a neat appearance.

C. CONSTRUCTION METHODS - CURB AND GUTTER

3. Subgrade

The subgrade shall be excavated to the required depth below the finished surface in accordance with the plans to the lines and grades established by the Engineer. All soft and yielding material or other unsuitable material shall be removed and replaced with suitable material, and the subgrade shall be compacted thoroughly and finished to a firm, smooth surface. No curb and gutter shall be poured until the subgrade is approved by the Engineer. If borrow material is required because of improper handling or drainage, the cost of such will be borne by the Contractor.

4. Protection of Subgrade

Ditches and drains shall be provided and maintained to satisfactorily drain and subgrade. In no case shall curb and gutter be placed on frozen or muddy subgrade. Frost crystals or mud caused by freezing and thawing shall be removed and replaced with suitable material at the Contractor's expense, or allowed to dry before placing any curb and gutters. If ruts are formed in the prepared subgrade, the subgrade shall be scarified and thoroughly compacted.

5. Grading Specifications

See Grading Specifications for Classification of Excavation, General Requirements, Disposal of Excess Material, Stripping, Rock, Slopes, and Embankments.

6. Forms

The forms shall be of metal of the necessary dimensions to construct the combined curb and gutters specified in the plans. Wood forms may be used where conditions make the use of metal forms impractical. The forms shall be set true to the line and grade established by the Engineer, and held rigidly in position so as to prevent leakage of mortar and springing out of line when the concrete is placed in them. The forms shall be true in line, free from warping or bending.

7. Placing of Concrete

The subgrade shall be moistened and the concrete shall be placed in the forms and tamped sufficiently to bring the mortar to the surface, after which it shall be finished smooth and even by means of a wooden float.

The curb and gutter shall be constructed in place in uniform sections ten (10) feet in length. The joints between sections shall be formed by steel templates one-eighth inch (1/8") in thickness, of the width and depth of the curb and gutter. The templates shall be left in place until the concrete has set sufficiently to hold it's shape, but shall be removed while the forms are still in place.

Expansion joints of suitable material shall be provided at the points designated on the plans or as directed by the Engineer.

8. Finishing

The edge of the curb and gutter shall be finished with an approved edging tool of one-half inch (1/2") radius. Joints shall be similarly finished immediately after the templates have been removed.

The forms shall be left in place until the concrete has set sufficiently so that they can be removed without injury to the curbing. Upon the removal of the forms, the concrete shall be rubbed down to a smooth and uniform finish, but no plastering will be allowed.

No more concrete shall be laid than can be properly finished and covered during daylight, unless adequate artificial light satisfactory to the Engineer is approved.

9. Removing Forms

Forms shall not be removed from freshly placed concrete until it has set for at least twelve (12) hours. They shall be carefully removed and in such a manner as to prevent damaging to the edges of the concrete. Any honeycombed areas along the sides shall be filled promptly with mortar composed of one (1) part cement and two (2) parts of fine aggregate.

10. Other Specifications

See Sidewalk Specifications for Cold Weather Pouring, Curing, Protection of Concrete, Removal of Defective Work, and Cleaning Site.

D. METHOD OF MEASUREMENT

The area of concrete sidewalk and driveway completed and accepted shall be measured and computed in square yards. No measurement shall be made of fine grading of subgrade and backfill. Any common excavation necessary shall be included in the unit price for sidewalk and driveway. Borrow material will be measured in cubic yards and determined by the average end method at one hundred (100) foot intervals.

The length of combination curb and gutter including drop driveway complete and accepted shall be measured in linear feet. The measurements of the curb and gutter shall be measured along the bottom of the gutter near the face of the curb. No measurement shall be made of

fine grading of subgrade and backfill. Any common excavation necessary shall be included in the unit price for curb and gutter.

**E. BASIS OF PAYMENT**

Payment will be made for all items complete and accepted on the unit or lump sum prices as stated in the proposal and measured and previously stated. The sum of each payment shall be full compensation for all materials, labor, and other costs to the Contractor.