



City of Kettering

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Montgomery County
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CONSTRUCTION AND MATERIAL SPECIFICATIONS

EFFECTIVE JANUARY 1, 2010

CITY OF KETTERING CONSTRUCTION AND MATERIAL SPECIFICATIONS

JANUARY 1, 2010

THESE SPECIFICATIONS ARE BASED ON THE STATE OF OHIO DEPARTMENT OF TRANSPORTATION (ODOT), CONSTRUCTION AND MATERIAL SPECIFICATIONS, MOST CURRENT EDITION.

CITY OF KETTERING SPECIFICATIONS ARE DESIGNATED WITH A "K" PRECEDING THE ITEM NUMBER. SOME OF THESE SPECIFICATIONS REFLECT ADDITIONS AND/OR MODIFICATIONS TO AN ODOT SPECIFICATION.

IF A CONFLICT OCCURS BETWEEN A CITY SPECIFICATION AND AN ODOT SPECIFICATION OR REFERENCED SECTION, THE MORE STRINGENT SPECIFICATION WILL APPLY, UNLESS APPROVED OTHERWISE BY THE CITY.

THE CITY OF KETTERING RESERVES THE RIGHT TO USE ODOT SPECIFICATIONS, BUT USE BID UNITS OF ITS CHOOSING.

FOR ANY QUESTIONS OR CLARIFICATION, CONTACT:

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ITEM K-202 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

Description

This item shall consist of removal of structures and obstructions according to Item 202 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Construction

All backfill shall be made with granular material or low strength mortar backfill. All undamaged castings shall remain the property of the City and shall be stored at locations determined by the Engineer for removal by the City.

The removal of existing pipes, manholes, catch basins, and other drainage structures within the limits of excavation required for the installation of a proposed item, shall be paid for as part of the proposed item unless otherwise noted in the plans.

Payment

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-203A ROADWAY EXCAVATION AND EMBANKMENT

Description

This item shall consist of performing Roadway Excavation and Embankment, including channels, according to Item 203 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT). If explosives are used, all Federal, State and Local regulations covering the use of explosives shall be observed.

Compaction

The compactive effort as specified in Sections 203.06 and 203.07 of the Construction and Material Specifications of ODOT will be modified to conform to the requirements of AASHTO T-99, Method "C" as follows:

Embankment: From the surface of the subgrade to a point two (2) feet below the surface of the subgrade, the embankment shall be compacted to at least one hundred (100) percent of the material's maximum density based on optimum water content of the material. The remainder of the embankment shall be compacted to at least ninety-five (95) percent of the material's maximum density based on optimum water content of the material.

Payment

The basis for payment shall be as set forth in the Construction and Material Specifications of ODOT Section 203.10 and shall include those items specified in the General Notes for payment as part of this item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-203B ROCK EXCAVATION

Description

This item shall consist of performing the excavation and disposal of rock encountered within the limits of the work necessary for the construction of roadways, structures, and the installation of pipes and appurtenances, in accordance with the specifications and in reasonably close conformity with the lines, grades and typical cross sections shown on the plans or established by the Engineer.

Definition

Rock excavation is defined as the removal of material which is either solid or stratified and which cannot be removed by recognized standard excavating methods. This material will require drilling, blasting, or some other mechanical means of shattering. Boulders one (1) cubic yard and over in volume required to be removed are classified as rock excavation. Loam, sand, gravel, clay or other material will not be classified as rock excavation even though portions of it may be stratified or laminated, or may be as hard as portions of sandstone or limestone.

Construction Requirements

- A. Pavements: Rock excavation necessary for the construction of pavements shall be in accordance with Item 203 of the Construction and Material Specifications of the State of Ohio.
- B. Trenches: Rock excavation shall be to the depth required to provide a minimum of four (4) inches of clearance below all parts of the pipe, valves, fittings and other appurtenances and structures. Trench widths shall be a minimum of eight (8) inches wider than the outside diameter of the widest part of the pipe, valves, fittings and other appurtenances and structures.
- C. Rock Blasting: The Contractor shall excavate by blasting in accordance with the requirements of Item 208 of the Construction and Material Specifications of the State of Ohio.

Measurement

The quantity of rock excavation shall be the number of cubic yards of material as measured in place, required to be removed to meet the specified depth and width limitations. Any excavation and backfill beyond the specified limits will be the expense of the Contractor.

Payment

Payment shall include the removal and disposal of the rock; the required material for embankment, bedding and trench backfill not stipulated for payment as part of another item of these specifications. Rock excavation shall be paid as an additional item and not included in the quantities calculated for payment as part of another item of these specifications. Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-204 SUBGRADE COMPACTION

Description

This item shall consist of preparing subgrade according to Item 204 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Materials

Suitable material shall meet the requirements of Section 204.02 of the Construction and Material Specifications of ODOT except that slag may not be used. When specified, geotextile fabric, geogrid, or other approved methods of subgrade stabilization shall be used as shown on the plans or as directed by the Engineer.

Soft Subgrade

Soft subgrade shall be removed and replaced as directed by the Engineer. However, if the soft subgrade results from the contractor's failure to provide adequate drainage and maintenance of the subgrade, the contractor will be responsible for replacing the soft subgrade and disposing of the removed material.

Payment

The basis for payment shall be as set forth in Section 204.09 of the Construction and Material Specifications of ODOT and shall include those items specified in the General Notes for payment as part of this item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-301 ASPHALT CONCRETE BASE

Description

This item shall consist of the construction of an Asphalt Concrete Base according to the requirements of Item 301 of the Construction and Materials Specifications of the Ohio Department of Transportation (ODOT).

Material

Materials shall meet the requirements of Section 301.02 and 401.03 of the Construction and Material Specifications of ODOT, except that slag may not be used and the maximum reclaimed material shall not exceed 30%.

Measurement

The quantity measured shall be the actual number of tons, compacted in place, as determined by plant delivery tickets.

Payment

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-304 AGGREGATE BASE

Description

This item shall consist of the construction of an aggregate base according to the requirements of Item 304 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Aggregate

Aggregate shall meet the requirements of section 304.02 of the Construction and Material Specifications of ODOT except that slag may not be used.

Measurement

Aggregate Base Course shall be measured as specified in the Construction and Material Specifications of ODOT section 304.07 except that the quantity to be paid for will be based on the actual number of tons placed, as determined by plant delivery tickets.

Payment

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

K-312 ASPHALT PAVEMENT IN PLACE COLD RECYCLING

Description

This item shall consist of mixing the existing pavement surface and base of a roadway with an asphalt emulsion, pulverizing and re-compacting to form a rejuvenated surface and base course with or without the addition of additional aggregate, in accordance with these specifications and in conformity with lines, grades, thickness and typical cross sections as established by the Engineer.

Materials

Materials shall meet the following requirements:

- Ohio Department of Transportation SS-1 Emulsified asphalt
- Aggregate K-304

Construction

Processing and mixing equipment: In place mixers of the rotary tiller type with the capability to process and mix the material to the required depth shall be used. The mixer shall be equipped with means for applying the full specified quantity of the emulsified asphalt in one pass of the mixer. Water, if needed, shall be added during processing either by means of a spray bar, equipped water truck or by means of the mixer spray equipment.

Processing: The existing asphalt surface and aggregate base shall be broken up so that the individual particles do not exceed 2" in size using in place mixers, to a total depth of 6" below the finished surface as directed by the Engineer. 304 aggregate shall be added where needed to conform to plan lines. The blended material shall then be brought to a uniform moisture content by further processing using in place mixers, either adding water or aerating as required to produce a uniform damp condition for proper mixing of the emulsified asphalt. The cost of added water shall be included in the price for this item. The moisture content necessary for mixing shall be determined by the contractor and shall be approved by the Engineer.

Mixing: Emulsified asphalt shall be added through the spray bar of the in place mixer at the rate specified by the Engineer in gallons per square yard; the full quantity shall be applied during one pass of the mixer. The rate of mixing shall be controlled by the contractor, as necessary, to produce a mixture visually uniform in composition throughout. Additional passes of the mixer may be required to correct non-uniformity of composition. There shall be no pockets of unmixed material adjacent to the edge of pavement or between adjacent passes of the mixer.

Shaping: After mixing and prior to compaction the mixture shall be shaped as necessary for compliance after compaction with the typical sections and the surface tolerances of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT) section 304.06. The loose mixture shall be set up at the pavement edge as required to finish flush with the pavement edge and to assure full densification at this point.

Compaction: Compaction shall follow mixing as closely as conditions permit. Should the mixture be unstable under the rollers due to excess moisture, the Engineer may require the mixture be aerated using the in place mixer to reduce the moisture content. Compaction requirements shall be as specified in the Construction and Material Specifications of ODOT section 304.04 except that water shall not be applied.

K-312 ASPHALT PAVEMENT IN PLACE COLD RECYCLING (cont)

Excess Material: If during the operation it is necessary to remove excess material from the job site after scarification due to elevations and at the direction of the Engineer, this cost shall be paid as excavation item K-203A.

Maintenance of Traffic: Suitable methods such as barricades, flagmen and necessary signing to provide protection to the residents, workmen or traveling public shall be the responsibility of the contractor. Residents affected by the work shall be notified by the contractor, in writing, the day before the work is to begin. The written notice shall include a telephone number where the contractor may be reached. Suitable ingress and egress shall be maintained for emergency equipment. The cost of traffic control shall be included in this item.

Measurement

The number of square yards of pavement stabilization shall be calculated using plan lines and dimensions. The number of gallons of emulsified asphalt shall be measured in accordance with the Construction and Material Specifications of ODOT Item 109.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction of the pavement in place pavement scarification.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI)

Description

The work covered under this provision consists of furnishing all materials, equipment, labor and preparation necessary for the application of a Stress Absorbing Membrane Interlayer. The applied materials shall completely seal the entire pavement surface and provide a uniform textured surface, suitable for the placement of hot mixed asphalt overlays, micro-surfacing or slurry surfacing overlays, or left intact as a finished pavement surface.

Materials

1. POLYMER MODIFIED BITUMINOUS EMULSION BINDER

<u>EMULSION PROPERTY METHOD</u>	<u>MIN</u>	<u>MAX</u>	<u>TEST</u>
S.F. VISCOSITY, 50 C (sec)	50	400	ASTM D 244
PERCENT SOLIDS (%) *	68	-	ASTM D 244
STORAGE STABILITY, 24 hrs (%)	-	1.0	ASTM D 244
SIEVE TEST, #20 mesh (%)		0.1	ASTM D 244
<u>RESIDUE PROPERTY METHOD</u>	<u>MIN</u>	<u>MAX</u>	<u>TEST</u>
PENETRATION, 100g, 5 sec, 25 C (dmm)	70	100	ASTM D 5
SOFTENING POINT, RING & BALL (C)	48.9	-	ASTM D 36
ELASTIC RECOVERY, 4C, 10cm (%) **	60	-	ASTM D 6084
FORCE DUCTILITY, 4C, 40cm ***	20 lbs./sq.in.		ASTM D 113 ¹

¹Modified

*By distillation or evaporation.

** The specimen is extended 10 cm. The extended area is severed immediately in the middle using a pair of shears. After 1 hour at the test temperature, the severed ends are returned to contact and the ductilometer reading is made again. The sample must recover at least 70 percent of the original 10-cm distance.

*** ASTM D 113 as modified by the addition of a load cell to the standard ductility test apparatus. The load cell is calibrated in pounds per square centimeter. Reading is measured at 40 cm. Reading is multiplied by 6.45 to yield pounds per square inch force required to extend the test specimen.

The asphalt modifier shall be of a SBS type polymer. Styrene-Butadiene-Styrene. The modifier shall be added to the asphalt cement prior to the emulsification process. The asphalt modifier shall be an SBS type polymer, Styrene – Butadiene – Styrene. The modifier shall be added to the asphalt cement and pre-dispersed prior to the emulsification process.

2. AGGREGATE

The surface cover aggregate shall be 100% crushed material from quarried stone, natural gravel or other high quality aggregate and meet the following requirements.

PHYSICAL REQUIREMENTS

<u>TEST</u>	<u>DESCRIPTION SPECIFICATION</u>	
AASHTO T96	L.A. Abrasion Test	40% max.
S1029*	Deleterious Materials	1.0 max.
S1021*	Crushed pieces	100%
AASHTO T104	Sodium sulfate soundness test, 5 cycle	15

GRADING REQUIREMENTS

ASTM C-117

<u>SIEVE SIZE</u>	<u>TYPE I</u>	<u>TYPE II</u>
1 inch (25mm)	100	100
¾ inch (19mm)	100	90-100
½ inch (12.5mm)	95-100	20-50

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI) (cont)

<u>SIEVE SIZE</u>	<u>TYPE I</u>	<u>TYPE II</u>
No. 4 (4.75mm)	5-25	0-10
No. 8 (2.36mm)	0-10	0-5
No. 200 (75um)	2	2

STORAGE OF MATERIALS – Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work.

STOCKPILES – Stockpiling and loading methods shall be such as to permit ready identification of the aggregate materials and to minimize segregation. Sites for stockpiles shall be clean prior to storing materials. Material shall not be removed from stockpiles within one foot of the ground until final clean-up of the worksite. Materials shall be handled in a manner such that moisture content shall be reasonably minimized and uniform for each days run.

Equipment

Equipment shall be safe, environmentally acceptable, and capable of producing a consistent quality product.

PRESSURIZED DISTRIBUTOR APPLICATOR – The pressurized distributor shall have a computerized rate control that automatically adjusts the distributor’s pump to the ground speed. The distributor shall be capable of heating and re-circulating the bituminous binder to the specified temperature. A number of nozzles shall be spaced longitudinally along the variable width spray bar for uniformly applying the bituminous material and shall include a means of controlling the operation of the nozzles. Interchangeable nozzles and sizes shall be used for the material and rate specified and shall be properly positioned and bar height adjusted so as to provide an overlapping pattern and a uniform rate of application across the desired pavement coverage width without ridges or streaking.

The unit shall include:

- A speed control used by the operator to control the travel speed and rate of product application.
- A method for the driver to control the product placement edge from either side of the unit.
- A digital speed/application readout that operates continuously and is located in the operators view.
- The bitumen application system capable of maintaining the specified application rate within +/- 0.02 gal/sq.yd.

AGGREGATE SPREADER – The aggregate material spreader shall be a variable width, self-propelled unit equipped so as to deliver a uniform distribution of aggregate particles across the desired pavement surface without ridges or laps at the specified rate. The aggregate spreader unit shall include:

- A ground speed control device interconnected with the aggregate applicator so as to provide a computerized application rate control of the aggregate that adjusts to the travel speed.
- A variable wide application box which is adjustable to maintain a uniform application rate of aggregate to cover exposed emulsion without ridges or laps.
- Capability to apply aggregate at an application rate range of 5 to 70 lbs/ sq.yd.

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI) (cont)

- Spreading of aggregate in a manner such that the tires of the truck or spreader at no time contact the uncovered and newly applied bituminous material.

COMPACTING EQUIPMENT – Self-propelled pneumatic-tired roller(s), weighing not less than 8 tons shall be used.

MISCELLANEOUS - All equipment including hand tools, thermometers, etc., shall be provided. All equipment used on the roadway shall be equipped with at least one approved flashing, rotating or oscillating amber light visible from all sides. All material storage tanks and material handling units shall be capable of heating and storing materials such as to not cause damage to the emulsion. The Contractor may use conventional chip seal equipment on project segments of less than 24,000 square yards or on spot repairs. Equipment shall conform to 407.03.

Pre-Paving On-Site Meeting

A meeting between the contractor and engineer will be held at the project site prior to beginning work. The agenda for this meeting will include:

- Review of contractors detailed work schedule
- Review of the traffic control plan
- Inspection of equipment
- Calibration and adjustments to equipment

Weather Limitation

The stress absorbing membrane shall be placed when the pavement and atmosphere temperature is 10 C (50 F) or above. Placement is not permitted if it is raining, the chance of rain is imminent or when the pavement surface condition is wet or when impending weather conditions are such that proper curing may not be obtained.

Construction

The contractor shall follow the construction methods as described.

1. The contractor shall establish stations, at 1000 feet intervals on the entire project, prior to placing the stress absorbing membrane. The stations shall be maintained until project completion.
2. Preparation of the surface shall be in accordance with 407.05. The surface shall be thoroughly cleaned by the contractor and shall be dry when the bituminous binder is applied. Material cleaned from the surface shall be removed and disposed of as directed by the engineer. Removal of mud, clay, and other fine silts shall be accomplished by high pressure spray water, min 6000 psi.
3. Bituminous SAM-CE emulsion shall be heated to a temperature within the specified range and applied using an approved pressurized distributor and at a uniform and consistent rate as approved for the design of the project surface to be treated.
4. The specified aggregate shall be spread uniformly onto the bituminous binder within 120 seconds of the bituminous spray and be in accordance with 422.08, except that three wheel rollers are not required.
5. Project greater than 12,000 m² require a minimum of two rollers to be used. Rollers shall proceed at a maximum speed of 5 mph. The entire surface shall receive a minimum of two roller passes. The first roller pass shall be performed within one minute of aggregate spread.

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI) (cont)

6. Brooming of the completed surface shall be accomplished prior to full opening to unrestricted use by traffic. The entire surface shall be clean of all loose material within 24 hours prior to the resurfacing with an asphalt mixture.
7. Before opening to traffic the contractor shall post loose stone signs and 25 mph speed plaque mounted below the sign. These signs shall be placed at the beginning of the work area and at one-mile intervals through out the project. The loose stone signs shall be maintained until the completed surface is free of loose material.
8. The contractor shall protect all utility casting using tarpaper or other approved material. All covers shall be properly fitted to the casting and removed prior to sweeping.

Application of Bituminous Binder

The bituminous binder shall be heated to the specified temperature and uniformly placed to prevent ridges or streaks in the surface and shall be in accordance with 409.07 and item 3 under Construction above.

1. BITUMINOUS BINDER

The bituminous binder shall be applied at a temperature of 150 F – 190 F., and at the rate specified +/- 0.02 gallons/sq.yd.. The supplier of (SAM-CE) binder is to design the application rate of the cover material and binder in relation to the surface condition to be treated. This rate shall be approved by the engineer prior to use.

2. APPLICATION OF SURFACE COVER AGGREGATE

- Stockpiling and loading methods shall permit ready identification of material and to minimize segregation and contamination.
- The moisture content of the course aggregate shall be below 4% and maintained throughout the project.
- Course aggregate shall be spread uniformly with ridges or gaps at the specified rates.
- Spreading shall be adjusted to produce a minimum of excess loose particles and shall provide complete coverage after rolling.
- Spreading shall be accomplished such that the tires of trucks or spreader at no time come into contact with the newly applied bituminous material.

3. MATERIAL APPLICATION RATES

**BINDER APPLICATION RATE
(Gallon Per Square Yard)**

<u>APPLICATION TYPE</u>	<u>TYPE I</u>	<u>TYPE II</u>	<u>TOLERANCE</u>
Finished Surface	0.40 – 0.45	NA	+/- 0.2
Prior to Micro-Surfacing	0.45 – 0.50	NA	+/- 0.2
Prior to 1 inch min. Overlay	0.50 – 0.55	0.65 – 0.70	+/- 0.2

AGGREGATE APPLICATION RATE- shall be as determined by the supplier of SAMI binder and project design and shall produce a completed surface with no exposed binder. The supplier of SAMI emulsion shall determine the application rate for emulsion and aggregate, based on the pavement condition, aggregate type, and aggregate size. This information shall be reported to the Engineer prior to beginning work and shall include an aggregate gradation on the job specific materials.

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI) (cont)

Quality Control

To measure compliance the contractor shall use the methods described in this section.

- Aggregate Gradation
- Aggregate Moisture Content
- Yield Check on Bituminous Binder
- Temperature Check on Bituminous Binder

If the Contractor's test results exceed any of the identified quality control tolerances, the Engineer shall be immediately notified. The Engineer will review explanation and the corrective action taken by the Contractor. Another test will be taken and if the test results still exceed the quality control tolerance, placement shall STOP. The Contractor shall immediately notify the Engineer, and identify the cause of the excessive deviation and detail corrective action necessary to bring the deficiency into compliance. The Engineer will give approval prior to resumption of work.

1. BITUMINOUS BINDER

The application rate shall not exceed a tolerance of 0.02 gallons per square yard from the specified rate, and within the temperature range as specified in Sub-Section 7.1.

2. SURFACE COVER AGGREGATE

The aggregate shall be clean and uniform, and shall be within the gradation range as specified in Sub-Section 2.3. Moisture content shall not exceed the tolerance as specified in Sub-Section 7.2

Documentation

The Contractor shall provide the Engineer a daily report with the following information:

- Control Section/Project Number/County/Route
- Date/Air Temperature/Pavement Temperature
- Bituminous Binder Temp. (3 per day)
- Station Location Per Test
- Beginning and Ending Stations
- Yield Check on Bituminous Binder (3 per day)
- Aggregate Gradation & Moisture (1per day)
- Length/Width/Total Area

Other required documentation shall include:

- To be provided as requested or at project completion.
- Bill of Lading on aggregate and bituminous binder.

Acceptance

The Contractor shall inspect the completed Stress Absorbing Membrane during the application process for any deficiencies. The deficiencies will be limited to surface flushing, surface patterns, and loss of stone retention. Workmanship shall be inspected for the following:

- Untreated areas (missed)
- No overlap on longitudinal joints
- No overlap on construction joints

ITEM K-422 SPECIAL STRESS ABSORBING MEMBRANE INTERLAYER (SAMI) (cont)

All corrective work shall be accomplished prior to resurfacing with bituminous materials, or within 24 hours. The Contractor shall furnish materials, equipment, and labor to make corrections at no additional cost to the contract. The Engineer shall give final approval on inspection and corrective work.

Measurement and Payment

The completed work as measured will be paid for at the Contract unit price for the following contract items. Payment for Stress Absorbing Membrane includes all materials, equipment, labor, and preparation, final clean up and related incidentals.

<u>Item</u>	<u>Description</u>	<u>Unit</u>
K-422	Stress Absorbing Membrane Interlayer, Type I	Square Yard
K-422	Stress Absorbing Membrane Interlayer, Type II	Square Yard

ITEM K-448 ASPHALT CONCRETE

Description

This item shall consist of the construction of an asphalt concrete surface course or intermediate course according to the requirements of Item 448 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Unless otherwise specified, ODOT Specification 401.20 (Asphalt Binder Price Adjustment) shall be exempted from all non-federally funded City of Kettering projects.

The quantity of material measured for payment shall be the actual number of tons compacted in place as determined by plant delivery tickets. Payment shall be made at the contract unit price bid per ton.

Payment

The price bid for this item shall include all labor, equipment and material necessary to the construction of an asphalt concrete surface course or intermediate course.

Payment shall be made at the contract price bid for the specified items.

ITEM K-452 CONCRETE PAVEMENT

Description

This item shall consist of the construction of a Portland Cement Concrete Pavement, with integral curbs where specified, on a prepared subgrade or subbase course in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer.

Material and Construction

Concrete shall meet the requirements of Item K-499 of these specifications.

Measurement

The quantity to be paid for shall be the actual number of square feet or square yards of concrete pavement, of the thicknesses specified, completed and accepted in place. All measurements will be made horizontally along the centerline of the concrete pavement.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction of the concrete pavement and shall include the construction of integral curbs as specified, sawing of joints, expansion material; dowels, hook bolts, tie rods and load transfer devices as required; curing materials, sealing of joints with approved joint sealer, pre-mold joint material as specified; depressing curbs for driveways, providing curb openings for drain tile where directed, and constructing thickened end sections or construction joints with dowel bars as directed by the Engineer.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-499 CONCRETE, GENERAL

Description

This item consists of the proportioning, material, and construction requirements for Portland Cement concrete.

Proportioning

Prior to use of any Portland Cement Concrete on this project, the contractor shall supply the City with a mix design, prepared in accordance with Item 499 of the Construction and Materials Specifications of the Ohio Department of Transportation (ODOT) for Type C concrete and will also meet the following sections:

- A. Concrete shall develop seven (7) and twenty-eight (28) days, the average compressive strength indicated in the following table:

	<u>Average Strength</u>	<u>Minimum Strength</u>
7-Day Test	2900 psi	2400 psi
28-Day Test	4000 psi	3500 psi

- B. The amount of cement shall not be less than 600 pounds per cubic yard of concrete. (In proportioning materials for concrete, one (1) sack of cement weighing ninety-four (94) pounds will be considered as one (1) cubic foot.)
- C. Fine and coarse aggregate shall be measured separately and fine aggregate shall not be less than thirty (30) percent nor more than forty-five (45) percent of the volume of the aggregate.
- D. The amount of water shall be only sufficient to obtain a workable mix. In no case shall the slump of concrete exceed four (4) inches, when tested according to ASTM C-143. The exception to this is use of a super-plasticizer as approved by the Engineer.
- E. The percentage of entrained air shall be between five (5) and eight (8) percent (for coarse aggregate sizes No.57 or 67), by volume, when tested according to ASTM C-231. Entrained air percentage for other aggregate sizes and classes of concrete shall be in accordance with the Construction and Material Specifications of ODOT Item 499.
- F. The contractor and supplier shall permit access to the work and materials for all required tests and inspections. Yield tests will be made by the Engineer for the purpose of determining the cement content per cubic yard of concrete, if determined necessary. Twenty-four hours advance notice is required for this testing. If at any time such cement content is found to be less than that specified above, the batch weights of fine and coarse aggregate shall be reduced proportionally until the cement per cubic yard of concrete is not less than specified.

Test cylinders or beams will be made from concrete incorporated in the work; test cores will be cut from the completed work when required by the Engineer. Cylinders falling below the "Average" Compressive Strengths shown in the strength table above will be sufficient reason for increasing the cement without additional cost to the City. Cylinders

ITEM K-499 CONCRETE, GENERAL (cont)

falling below the "Minimum" Compressive Strength shown in the strength table above will be sufficient reason for rejection of the work involved.

The measurement of the volume of entrained air in the freshly mixed Portland Cement Concrete will be determined by the Engineer. Failure of the percentage of entrained air to fall within the specified limits will be sufficient reason for rejecting the materials.

Material

- A. Portland Cement shall meet the requirements of ASTM C-150, Type I (ODOT 701.04) for plain cement or C-150, Type IA (ODOT 701.01) for air-entraining cement. Type IA Cement shall be used. (The letter "A" designates air-entraining Portland Cement.) If high early strength concrete is required, Type III (ODOT 701.05) or Type IIIA shall be used.
- B. Fine and Coarse Aggregates shall meet the requirements of Section 703.02 of the current ODOT Construction and Material Specifications, except that the use of slag shall not be permitted. The gradation of coarse aggregate shall meet the requirements of ODOT 703.01 (Table 703-1). Fine aggregates shall meet the requirements of ODOT. 703.02.
- C. Water used in mixing concrete shall be clean and free from deleterious amounts of acid, alkalis or organic materials.
- D. Air-entraining admixtures used with plain cement or with air-entraining cement shall meet the requirements of Section 705.10 of ODOT Construction and Material Specifications and shall be specifically prepared for air-entrainment only.
- E. Other materials may be use only with the approval of the Engineer and confirmed in writing.

Construction

- A. Job mixed concrete shall not be used unless permission is obtained from the Engineer. Ready mixed concrete shall be mixed and delivered in accordance with the requirements set forth in the "Standard Specifications for Ready Mixed Concrete: (ASTM C-94)", except that concrete shall be delivered to the work and discharged from the mixer or agitator within a period of 1.5 hours after all ingredients are in the mixer or agitator. Delivery tickets shall be time-stamped when all ingredients are in the mixer or agitator.
- B. Forms shall conform to the shape, lines and dimensions of the members as called for on the plans and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape. The use of bent or damaged side forms varying more than 1/8" in ten (10) foot of length from the true plane of the top and 1/4" in ten (10) foot on the vertical face, shall not be permitted.
- C. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not fall free more than five (5) feet. The concreting shall be carried on at such a rate that the concrete is at all times

ITEM K-499 CONCRETE, GENERAL (cont)

plastic and flows readily. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used. When concreting is once started, it shall be carried on as a continuous operation until the placing of a section is completed.

The top surface shall conform to the specified cross-section and profile as shown on the plans. No water or cement shall be added to the surface of the pavement at any time during construction.

- D. Joints shall be constructed where shown on the construction drawings or where required by the Engineer and shall conform to the details set forth on the detail drawing.
- E. Following compaction, the concrete shall be finished and floated in a manner approved by the Engineer. After floating has been completed and while the concrete is still plastic, it shall be tested for trueness with ten (10) foot straightedges. After final curing, the concrete pavement will be tested for smoothness with an approved surface testing machine and all such surface variations of more than 3/16" in ten (10) foot length of pavement shall be ground off to within the specified tolerances. Sections containing depressions which cannot be corrected by grinding shall be replaced by the contractor to the satisfaction of the Engineer.

Before the concrete has taken its initial set, the edges of the pavement where designated on the plans or by the Engineer shall be worked with an approved tool and rounded to a radius of one-eighth (1/8) inch. Any tool marks left by the edging shall be eliminated by texturing the surface. The final surface shall be a broom finish. Retooled joints shall not be constructed unless approved by the Engineer.

- F. The following provision shall be made for the proper curing of all concrete. Immediately after the final finishing and after the free water has disappeared, all exposed surfaces of the concrete shall be sealed by spraying thereon, as a fine mist, a uniform application of the curing material in such a manner as to provide a continuous uniform, water-impermeable film without marring the surface of the concrete. A minimum of one (1) gallon of material shall be used for each two hundred (200) square feet of surface treated. Curing material shall be white in color, unless otherwise approved by the Engineer, and in accordance with AASHTO, M148, TYPE 2, latest revision. The material shall be of such a nature or so treated that it will be distinctly visible for at least four (4) hours after application. Concrete to be placed after October 31, which will be opened to traffic during the following winter, shall be cured by use of polyethylene sheeting placed as soon after the finishing operations as possible without marring the surface of the concrete. The entire surface of the top and sides of the newly placed concrete shall be covered and maintained covered for seven (7) days. Any concrete surfaces exposed by the removal of forms within seven (7) days after it has been placed shall be cured as specified above.
- G. Adequate equipment shall be provided for heating the concrete material and protecting the concrete during the freezing or near freezing weather. No concrete shall be placed when the temperature of the surrounding air is below thirty-two (32) degrees F., unless permission is obtained from the Engineer. All concrete materials and all reinforcement forms, fillers and ground with which the concrete is to come in

ITEM K-499 CONCRETE, GENERAL (cont)

contact, shall be completely free from frost. Whenever the temperature of the surrounding air is below forty (40) degrees F., all concrete placed in forms shall have a temperature of between fifty (50) and seventy (70) degrees F. and adequate means shall be provided for maintaining a temperature of not less than fifty (50) degrees F., for a minimum of three (3) days, except when high early strength is used, the temperature shall be maintained at not less than fifty (50) degrees F. for two (2) days or for as much more time as is necessary to insure proper curing of the concrete. The housing, covering or other protection used in connection with curing shall remain in place and intact at least twenty-four (24) hours after the artificial heating is discontinued. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

ITEM K-601 SLOPE AND CHANNEL PROTECTION

Description

This item shall consist of the construction of slope and channel protection, on a prepared subgrade or subbase course in accordance with the Construction and Material Specifications of the Ohio Department of Transportation (ODOT) Item 601 and in conformity with the lines, grades, thickness and typical cross sections shown on the plans or established by the Engineer.

Material

Material shall meet the requirements of ODOT Item 601.02 except that concrete shall meet the requirements of Item K-499 of these specifications with the air content being six (6%) percent to eight (8%) percent.

Construction

Concrete slope and channel protection shall be of the dimensions shown on the plans and as specified by the Engineer.

Measurement

Measurement shall be as specified in ODOT Item 601 except that placed concrete protection will be measured by the square yard of finished surface, of the thickness specified, completed in place, on the side slope and bottom of the channel.

Payment

Payment shall be as specified in ODOT Item 601 and shall include constructing cut-off walls and maintaining existing flow in the channel.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-602 MASONRY

Description

This item consists of the construction of concrete headwalls and other masonry structures in accordance with Item 602 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Material

Material shall meet the requirements of Section 602.02 of the Construction and Material Specifications of ODOT except that concrete shall meet the requirements of the proportioning and material sections of Item K-499 of these specifications.

Measurement

The method of measurement as specified in Section 602.04 of the Construction and Material Specifications of ODOT shall include a measurement for each structure specified as shown on the plans.

Payment

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-603 PIPE CULVERTS, SEWERS AND DRAINS

Description

This item shall consist of constructing, furnishing and installing pipe of the kind and size called for on the plans, specifications and proposal, in accordance with the requirements of Item 603 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Material

Specific material shall meet the requirements of ODOT Section 603.02 except that concrete for plugs, collars, bedding, encasement, etc., shall meet the proportioning, material and construction requirements of Item K-499 of these specifications. Precast concrete plugs shall be used to plug the ends of existing or proposed pipes whenever possible.

The pipe size and kind shall be as indicated on the plans and in the proposal.

Excavation

Excavation shall be performed as specified in ODOT Section 603.05. Sheeting, bracing and timbering shall conform to Specific Safety Requirements Relating to Construction as specified by the Industrial Commission of Ohio and to all Federal and Local laws.

The removal of existing storm sewers, manholes, catch basins and inlets within the limits of excavation for the proposed storm sewer shall be paid for as part of this item.

Bedding

Unless otherwise specified, six-inches (6") of type 2 bedding, as specified in ODOT Sections 603.06 and 703.11, shall be used. Concrete encasement shall be placed as shown on the plans or as directed by the Engineer.

Laying and Jointing Conduit

Conduit shall be laid in accordance with ODOT Section 603.07. Pipe thirty-six (36) inches in diameter or larger shall be pulled home by use of hoists, pull jacks, winches or other approved means, unless otherwise directed by the Engineer.

Concrete pipe joints shall be sealed with Bituminous Pipe Joint Filler in accordance with the requirements of ODOT Section 603.08, unless otherwise specified.

Backfill

Backfill shall be placed according to the requirements of Section 603.10 for Type A or B Conduit. Only granular material, composed of gravel or crushed stone, meeting the requirements of ODOT Section 703.11 may be used for backfill, except that granular slag or foundry sand shall not be used.

Measurement

The method of measurement specified in ODOT Section 603.14 shall be applicable to this item.

When specified as a separate item, pipe bends, wyes, tees, radius pipe and other pipe specials will be deducted from the linear feet of pipe measured for payment and will be measured and paid for according to the units stipulated on the unit price proposal.

ITEM K-603 PIPE CULVERTS, SEWERS AND DRAINS (cont)

The linear feet of concrete encasement measured for payment shall include furnishing and placing of the concrete and any additional excavation required.

Payment

The basis for payment shall be as specified in ODOT Section 603.15 and shall include, plugging proposed or existing conduits, joining to existing and proposed appurtenances as required, excavating for the bedding and preparing the bedding subbase, backfill material, and constructing concrete collars (DM-1.1) where indicated, in accordance with the details shown on the plans.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-604 MANHOLES, CATCH BASINS, INLETS, MONUMENTS

Description

This item shall consist of constructing, reconstructing, or adjusting to grade, manholes, catch basins, inlets, monument assemblies or monument boxes, according to the requirements of Item 604 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Material

The materials shall be as specified in ODOT Section 604.02, except that Concrete shall meet the requirements of Item K-499 of these specifications. Precast concrete structures shall be approved by the Engineer prior to construction and installation.

When adjusting rings are used to adjust manholes, catch basins, water valves, lampholes and monument boxes to grade, they shall be adjusted using a solid ring with a mechanical anchor to the existing casting, and shall be approved by the City prior to installation. The manufacturer's installation procedures shall apply.

Asphalt transition shall be placed around utilities raised to grade prior to the final pavement being placed, as directed by the Engineer. Additional signage for these hazards shall be used as directed by the Engineer and said cost of these signs and labor to install shall be included in Maintaining Traffic, Item K-614.

Construction

Eccentric cone tops shall be used on manholes unless otherwise specified on the plans or in the proposal.

If the elevation between the casting, grate or lid and the final pavement or finished grade elevation is greater than ¼-inch, they shall be adjusted to grade in accordance with ODOT Section 604.03.

Excavation and Backfill

Excavation and backfill shall be as specified in ODOT Section 604.04 except that only granular material shall be used for backfill.

Measurement

The number of manholes, catch basins, inlets, monument assemblies or monument boxes, constructed, reconstructed or adjusted to grade will be the actual number of each specified, completed and accepted.

Payment

Payment for this item shall include: placing of reinforcing steel; setting castings; placing of concrete aprons and curbs for catch basins and inlets; shaping of manhole, catch basin and inlet inverts as directed; constructing and placing precast structures; and adjusting structures to grade. The removal of existing storm sewers, manholes, catch basins and inlets within the limits of excavation for the proposed manholes, catch basins and inlets, shall be paid for as part of this item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-605A UNDERDRAINS

Description

This item shall consist of constructing, pipe, edge, or fabric underdrains in accordance with Item 605 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT). Other materials and applications are to be used as per plan or as directed by the Engineer.

Material

Pipe material shall meet the requirements of ODOT Section 605.02 and be either Corrugated polyethylene drainage tubing (perforated) ODOT 707.31; Polyvinyl chloride plastic pipe, ODOT 707.41; or Polyvinyl chloride corrugated smooth interior pipe, (perforated per ODOT 707.31) ODOT 707.42.

Perforated pipe underdrain is to be wrapped with filter fabric material as per ODOT 712.09 Type A.

Prefabricated edge drain shall conform to ODOT 712.10.

Aggregate underdrain is to be wrapped with filter fabric material as per ODOT 712.09 Type A.

Payment

The price bid for this item shall include all labor, equipment and material incidental to installing and constructing the underdrains; including: bends, tees, wyes, etc.; excavation and backfill; protecting joints; and connecting the drains to designated outlets as directed by the Engineer.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-605B DRAIN TILE

Description

This item shall consist of laying, extending, adjusting, relaying or relocating existing house drains, which include yard, roof or other similar drains now in use which are disturbed because of construction. The location, type and size of new tile shall be determined by the Engineer and shall be placed as directed. This item shall also include the placing of drain tile through the new curb where and when required and as directed by the Engineer.

Material

Pipe shall meet the requirements of Section 605.02 of the Construction and Material Specifications of ODOT and the following requirements:

- For 3", 4" and 6" Drain Tile use ODOT 707.31, 707.33, 707.42 or 707.45
- For 8" and 10" Pipe use ODOT 707.32, 707.33, 707.42 or 707.45
- Other materials and applications to be used as per plan or as directed by the Engineer.

Payment

The price bid for this item shall include all labor, equipment and material incidental to replacing, extending, adjusting, relaying and relocating drain pipe or tile; placing of tile through curbs; necessary bends, tees, clean-outs, special fittings, etc.; excavation of all materials encountered; backfilling of trenches with compacted excavated or granular material as directed, and the protecting and sealing of joints to prevent infiltration of backfill material. Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-608A WALKS, CURB RAMPS, AND STEPS

Description

This item shall consist of the construction of walks, curb ramps, and steps in accordance with these specifications and in conformance with the lines, grades, dimensions and details shown on the plans or attached drawings.

Material and Construction

The concrete shall meet the proportioning, material and construction requirements of Item K-499 of these specifications, except that the air content shall be six (6) percent to eight (8) percent and the contraction joints need not be sawed. Concrete walks shall have a transverse broom finish. Concrete ramps shall have a rougher final surface texture than the adjacent walk and with striations transverse to the ramp slope using a coarse broom or other method approved by the Engineer.

Unless otherwise approved by the Engineer, concrete curb ramps shall conform to ODOT Item 608.07 and shall have ODOT approved truncated domes installed, except not clay or concrete pavers. Truncated domes shall be brick red in color and shall be installed per manufacturer's written instructions.

Walk thickness through driveways shall be as specified on the plans, but shall not be less than six inches (6"). Concrete walks shall be constructed in conformance with Ohio Department of Transportation Construction and Material Specifications, Item 608.03. If slip formed, the provisions of ODOT 609.04 (C) shall apply.

Concrete steps shall conform to ODOT Item 608.06. The number and height of risers for each set of steps shall be as shown on the plans or determined in the field by the Engineer.

Concrete curb ramps shall conform to ODOT Item 608.07.

Half-inch (1/2") vinyl expansion joint material shall be used at 100-foot intervals, adjacent to driveways, and between the walk and any fixed structure (including curb—if walk is adjacent to curb). Contraction joints shall be located at five-foot intervals and be one inch (1") deep with a 3/8-inch radius. Construction joints are to be located as directed by the Engineer.

The material for asphalt or aggregate walks shall be as specified on the plans.

Excavation

The number of cubic yards of excavation and embankment is included in K-203A of these specifications and shall be performed according to the requirements of said item. Unsuitable subgrade material shall be removed, replaced and paid for as part of Item K-905 of these specifications.

Where existing walks, walk ramps, and steps are to be removed and replaced, removal shall be performed and paid for according to the requirements of Item K-202 of these specifications.

Measurements

The measurement of walk, curb ramps and steps shall be as specified by Section 608.08 of ODOT Construction and Material Specifications.

ITEM K-608A WALKS, CURB RAMPS, AND STEPS (cont)

Payment

The price bid for items under this specification shall include all labor, equipment and material incidental to the construction of the walks, ramps and steps and shall include expansion material, subgrade preparation and finishing of surfaces as specified.

Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-608B DRIVEWAYS

Description

This item shall consist of the construction of driveways and drive approaches of concrete, asphalt concrete and/or aggregate, in accordance with these specifications and to the lines, grades, thickness, and details shown on the plan, or as directed by the Engineer.

Material and Construction

The concrete shall meet the requirements of Item K-499 of these specifications.

The material for asphalt concrete and/or aggregate driveways shall be as specified on the plans.

Concrete drive approaches shall be of the thickness indicated on the plans and/or proposal. If a thickness is not specified, the minimum thickness shall be six inches (6").

Driveways shall be of the thickness indicated on the plans and/or proposal. If a thickness is not specified, the minimum thickness shall be :

- Concrete driveways – four inches (4").
- Asphalt Concrete driveways – two inches (2") of asphalt concrete and six inches (6") of aggregate.
- Aggregate driveways – six inches (6").

Excavation

The number of cubic yards of excavation and embankment for driveways and drive approaches is included in Item K-203A of these specifications and shall be performed and paid for according to the requirements of said Item. Unsuitable subgrade material shall be removed, replaced and paid for according to the requirements of Item K-905 of these specifications.

Where existing concrete driveways and approaches are to be removed and replaced, removal shall be performed and paid for according to the requirements of Item K-202 of these specifications.

Measurement

Concrete driveways and approaches to be paid for shall be the actual square yards or square feet in place complete, of the thickness specified. Asphalt and/or aggregate driveways and approaches shall be paid for based on the actual number of tons placed, as determined by plant delivery tickets.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction of driveways and drive approaches, including subgrade preparation, sealing of edges and joints, constructing joints and constructing drive approaches monolithic with curbs where directed, and necessary expansion material. Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-609 CURBING, CONCRETE MEDIANS, AND TRAFFIC ISLANDS

Description

This item shall consist of constructing curb, combination curb and gutter, medians, and traffic islands according to Item 609 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Material

Concrete shall meet the requirements of Item K-499 of these specifications, except that the entrained air shall be six (6) to eight (8) percent.

Construction

The construction of cast in place concrete curbs, and curbs and gutters shall be in accordance with ODOT Section 609.04 and shall be of the type specified on the plans or proposal. Contraction and expansion joints shall be constructed as specified on the plans. Slip formed concrete curb shall be placed in conformance with ODOT Section 609.04 (C).

Curbs placed integral with a concrete pavement shall not be doweled to the pavement.

Asphalt concrete curb shall be placed as specified by Method A under ODOT Section 609.05.

The construction of concrete medians and traffic islands shall be in accordance with ODOT Section 609.06 and in conformity to the lines, grades, dimensions and cross sections shown on the plans.

Measurement

The measurement of curb, combination curb and gutter, medians, and traffic islands, shall be as specified by Section 609.07 of ODOT Construction and Material Specifications.

Integral concrete curbs will not be measured for separate payment, but will be considered as part of the pertinent pavement item.

No deductions will be made for depressed curbs.

Payment

The price bid for this item shall include labor, equipment and material incidental to the construction of the curbing and shall include: expansion material, subgrade preparation, constructing openings in the curb for drain tile where required including connecting to existing drain pipe along with a minimal amount of drain pipe; constructing joints, depressing curbs for driveways; applying a tack coat for asphalt curbs and sealing joints.

Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-614 MAINTAINING TRAFFIC

Description

This item shall consist of maintaining and protecting vehicular and pedestrian traffic in accordance with the requirements of Item 614 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

In addition to these requirements, the contractor shall obtain the approval of the Engineer before closing a traffic lane, establishing a one-way traffic operation or changing traffic lanes due to stages of construction.

Blocking a lane on a thoroughfare or collector street shall only occur between 9 A.M. to 3 P.M., Monday through Friday. Work outside of these hours may be permitted by approval of the Engineer.

Temporary traffic lanes shall be a minimum of eleven feet in width, unless a plan using reduced width is approved by the Engineer.

All traffic control devices are to be furnished by the contractor unless otherwise specified. If the City provides signs, the cost of signs not returned in good condition will be deducted from any money that may be due or become due the contractor.

Milling & Paving Operations

In addition to the requirements and ODOT Specification 614, the pay item for K-614 Maintenance of Traffic for milling and paving operations shall include the following requirements:

All construction notification signs shall be in place before milling operations begin. Signs may include, but not be limited to, "Road Construction Ahead", "Road Work Ahead", "Left (Right) Lane Closed Ahead", "Bump" (at butt-joint locations), "Rough Road", or "Caution – Raised Manholes." Other signs may be used as deemed necessary by the Contractor or the Engineer. The types of signs and the placement of signs shall meet all the requirements of the Ohio Manual of Uniform Traffic Control Devices, and shall be subject to inspection and modification by the Engineer.

After milling operations in a particular area have been completed, and if the placement of the asphalt scratch course will not commence within one (1) hour of the completion of milling operations, the Contractor shall place temporary pavement markings in the milled area. If milling operations are conducted during inclement weather, temporary pavement markings shall be placed as soon as the weather permits. Pavement markings shall only be painted on the milled surface. No other type of pavement marking shall be used unless approved by the Engineer. The Engineer shall approve the striping layout and dimensions for the temporary pavement markings prior to placement.

After the placement of the asphalt scratch course has been completed in an area, and if the placement of the final asphalt surface course will not commence within one (1) hour of the completion of the scratch course, the Contractor shall place temporary pavement markings in the area. The use of reflective tape or latex paint with reflective beads shall be the only approved means of marking. The Engineer shall approve the striping layout and dimensions for the temporary pavement markings prior to placement. Reflective tape shall be removed as the final asphalt surface course is placed. After the placement of the final asphalt surface

ITEM K-614 MAINTAINING TRAFFIC (cont)

course, the Contractor shall place the final pavement markings or temporary pavement markings on the new asphalt surface immediately after the asphalt has been rolled and compacted. The use of reflective tape shall be the only approved means of temporary marking. The Engineer shall approve the striping layout and dimensions for the final and/or temporary pavement markings prior to placement. Reflective tape shall be removed prior to final pavement markings being placed.

The above requirements apply only to roadways that have existing pavement markings that have been removed as a result of milling operations.

The above requirements shall be paid at the lump sum bid price for Item K-614, Maintenance of Traffic. There will not be a separate pay item for placement of signs or for temporary pavement markings, as directed by the Engineer.

Performance

As specified in ODOT Section 614.14, if, in the opinion of the City, the contractor is not furnishing proper maintenance of traffic facilities and proper provisions for traffic control the City may take the necessary steps to place them in proper condition. The City will deduct the cost of such services from any money that may be due or become due to the contractor.

Payment

The basis for payment shall be as specified in ODOT Section 614.16.

Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-616 DUST CONTROL

Description

This item shall consist of furnishing and applying water or dust palliative, or both, when and as directed by the Engineer, according to Item 616 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

The Contractor shall obtain the necessary permits and meet the requirements of the Montgomery County Water Services if water is to be obtained from the local water system. Under no circumstances shall the Contractor use a fire hydrant without a meter and permit from Montgomery County Water Services.

Payment

The basis for payment shall be as set forth in ODOT Section 616.04.

Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-653 TOPSOIL FURNISHED AND PLACED

Description

This item shall consist of furnishing and spreading topsoil and preparing the subgrade, according to Item 653 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT).

Material

The topsoil composition shall meet ODOT specification 653.02. In addition, the source of the topsoil and a sample shall be submitted to the Engineer for approval before acceptance for use.

Construction

The topsoil shall be placed 4", after compacted, unless specified at another depth on plans, in preparation for seeding or sod. The topsoil shall be compacted to a firmness in which a 200-pound person stepping on the topsoil will not cause indents in the topsoil. The surface of the topsoil shall be such that the final grade as shown on the plans is met. Before placing the seed, the topsoil shall be opened up to receive the seed.

Payment

Items included for payment as part of this Specification shall be indicated on the plans and/or listed in the Proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-659 SEEDING AND MULCHING

Description

This item shall consist of Seeding and Mulching roadway areas according to the requirements of Item 659 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT). The seed mixture and commercial fertilizer shall conform to the specifications listed below. All seeding shall be evenly spread on a prepared seedbed and shall be tacked in place with hydroseeding procedure applied without seed. Any alternate method requires prior approval of the Engineer.

Material

Seeding shall be performed as specified in Section 659.12 except that the seed shall be labeled in accordance with U. S. Department of Agriculture Rules and Regulations under the Federal Seed Act and State Seed Laws. Seed that appears, in the opinion of the Engineer, to have become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. The fertilizer, kind of seed, and minimum percentage by weight of pure live seed in each lot of seed, shall be as described below. All seed mixtures shall be approved by the Engineer before placement and may include furnishing seed labels.

Kettering Type 1 Mix

For areas such as quality lawns, private property and other areas where normal lawn maintenance will occur, use the following seed mixture.

- 45% Perennial Ryegrass
- 30% Kentucky Bluegrass
- 10% Kentucky Bluegrass
- 15% Creeping Red Fescue

Ryegrass Choices (choose one): SR 4600, SR 4500, SR 4420, SR 4220, SR 4600, Defender, Majesty, Pentium, Brightstar.

Bluegrass Choices 30% and 10% (choose two at ratio of 3:1): Arlene, Cynthia, Cannon, Abbey, Nottingham, Goldrush, Kenblue, Merit, Raven, Rampert, Gaelic, Cashe.

Creeping Red Fescue (choose one): Pennlawn, Wendy Jean, SR 5250, Fenway.

Seeding Rate: 4 pounds per 1000 square foot

Kettering Type 2 Mix

For areas such as ditch banks and other areas not expected to receive normal lawn maintenance use the following varieties listed below.

- 85% Turf Type Tall Fescue
- 15% Annual Ryegrass

Fescue Choices (select one or more): SR 8600, SR 8550, SR 8650, Grande II, Dynamic, Coyote II, Dynasty, Greenkeeper WAF, Wolfpack, Fidelity.

Ryegrass Choices (choose one): Citation, Palmer, Derby, Inspire, Manhattan, Pennfine, or Pennent

Seeding Rate: 8 pounds per 1000 square foot

ITEM K-659 SEEDING AND MULCHING (cont)

Kettering Type 3 Mix

For medians, parks, high traffic areas, such as athletic fields, and routine maintenance levels use the following seed mixture.

30%	Turf Type Tall Fescue
30%	Turf Type Tall Fescue
20%	Turf Type Tall Fescue
10%	Kentucky Bluegrass
10%	Perennial Ryegrass

Fescue Choices (choose three at a ratio of 30/30/20): SR 8600, SR 8550, SR 8650, Grande II, Dynamic, Coyote II, Dynasty, Greenkeeper WAF, Wolfpack, Fidelity.

Bluegrass Choices (choose one): Arlene, Cynthia, Cannon, Abbey, Nottingham, Goldrush, Kenblue, Merit, Raven, Rampert, Gaelic, Cashe.

Ryegrass Choices (choose one): SR 4600, SR 4500, SR 4420, SR 4220, SR 4600, Defender, Majesty, Pentium, Brightstar.

Seeding Rate: 7 pounds per 1000 square feet

Fertilizer

Commercial fertilizer shall be a blend bearing the manufacturer's guarantee statement of analysis and shall meet the following minimum requirements for the Percent Nutrients, 100 Pound Total Basis:

12% of Nitrogen (N); 12% of Phosphoric Acid (P_2O_5); 12% of Potash (K_2O)

All fertilizer shall be delivered to the site in the original unopened containers that shall bear the manufacturer's guaranteed statement of analysis. Container labels shall be supplied at the request of the Engineer.

Construction

The topsoil shall be placed 4", after compacted, in preparation for seeding or sod. The topsoil shall be compacted to a firmness in which a 200-pound person stepping on the topsoil will not cause indents in the topsoil. The surface of the topsoil shall be such that the final grade as shown on the plans is met. Before placing the seed, the topsoil shall be opened up to receive the seed. The Inspector shall review the seedbed before the Contractor places seed and before the Contractor places the hydroseeding mulch.

Mowing

If mowing is called for in plan scope of work the Contractor shall provide manpower and equipment as required to remove litter and mow lawn in a neat workmanlike manner. The initial mowing shall occur at the direction of the Engineer. When new grass is between 3.5" – 4" tall the Contractor, at the Engineer's direction, shall mow the new grass to a height of 3". Frequency of mowing after initial mowing shall be subject to Engineer's approval. Contractor shall not remove more than 1/3 of grass height on subsequent mowing events. Payment shall be based on unit price of per 1000 SF per mowing event.

ITEM K-659 SEEDING AND MULCHING (cont)

Payment

The basis for payment shall be as set forth in Section 659.25. Unless listed separately, the cost of fertilizer shall be included in the cost of seeding and mulching.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-660 SODDING

Description

This item shall consist of sodding areas in accordance with the requirements of Item 660 of the Construction and Material Specifications of the Ohio Department of Transportation (ODOT). Fertilizer shall meet the requirements of Item K-659 and applied at the rate specified or as directed by the Engineer. The sod shall be in a healthy, green, vigorous condition for final acceptance.

Payment

The basis for payment shall be as set forth in Section 660.11 and shall include watering for 30 days as specified in Section 660.09. Unless listed separately, the cost of fertilizer shall be included in the cost of sodding.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-901 WATER MAINS AND SERVICE BRANCHES

Description

This item shall consist of laying new water main and adjusting or relocating existing water mains, including valves, boxes and fittings; laying new service laterals and adjusting or relocating existing service laterals, including: service stops, meters, boxes and corporation stops; installing new fire hydrants and adjusting or relocating existing fire hydrants, including valves, boxes and fittings; adjusting existing service boxes, meter pits and boxes, and valve boxes to grade. All work under this item shall be performed in accordance with the requirements of Montgomery County Water Services.

Material and Construction

All material and methods of construction shall conform to the requirements of the Montgomery County Water Services, except that only granular material shall be used for backfill and bedding. Valve box adjustments to grade shall conform to Item K-604.

Excavation

Excavation shall include the removal and disposal of all materials encountered of every name and nature.

Measurement

The length of pipe to be paid for will be the actual lineal feet of the size and kind specified, in place complete, measured along the centerline of the pipe. Measurements shall be continuous through valves, bends, tees, special fittings, etc., and lateral branches shall be measured from the intersection of the center axis of the branch pipe with the inside surface of the main pipe.

Payment for water main adjustments necessitated by the installation of new sewers will be based on the actual number of adjustments made, for the size of pipe specified. Payment for new water main, or water main adjustments due to changes in the elevation of the roadway, will be based on the actual lineal feet of pipe installed or adjusted, measured as set forth above, for the sizes specified.

Service lateral adjustment shall include the adjustment of all pipes of a nominal two (2) inch diameter or less. Measurement for payment of Service Lateral adjustments necessitated by the installation of new sewers will be based on the actual number of laterals adjusted. Payment for new laterals or laterals adjusted due to changes in the elevation of the roadway will be based on the actual lineal feet of pipe installed or adjusted measured as set forth above.

Payment for new fire hydrants shall include, unless specified for separate payment, the furnishing and installing of a valve, valve box, tapping sleeves and valves or tees; cutting or tapping into the main line, and adjusting the hydrant to grade. Pipe required to connect the hydrant to the main line will be measured and paid for separately. Payment will be based on the actual number of hydrants installed.

Payment for relocated or adjusted fire hydrants shall include the removal and resetting of the existing hydrants, including furnishing and installing hydrant extensions as required. Pipe required to connect the hydrant to the main line will be measured and paid for separately. Payment will be based on the actual number of fire hydrants relocated.

Payment for new mainline valves and valve boxes, tapping valves and sleeves, service boxes and meter pits, corporation or service stops, curb boxes, bends, tees, etc., or other special pipe

ITEM K-901 WATER MAINS AND SERVICE BRANCHES (cont)

fittings shall be based on the actual number of the type, kind and size specified. Unless separately stipulated in the specifications or proposal, any of the above mentioned items or other special pipe fittings, shall be included in the unit price bid for the item of which they are appurtenant.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction, installation, relocation and adjustment of water mains, service laterals, fire hydrants and their appurtenances, and shall include all excavation, backfill, required testing, disinfecting, connection to existing lines and concrete for anchorage of waterlines and appurtenances. Necessary permits, as required by Montgomery County Water Services, shall be included in the unit price bid for that item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-902 SANITARY SEWERS

Description

This item shall consist of constructing, furnishing and installing pipes and manholes for sanitary sewers, of the kind and size called for on the plans, specifications and proposal, and shall also include the raising, lowering, relocation, or encasement of existing sanitary sewers and service laterals, all in accordance with the requirements of the Montgomery County Water Services.

Material and Construction

All materials and methods of construction shall conform to the requirements of the Montgomery County Water Services, except that only granular material shall be used for backfill and bedding.

Excavation

Excavation shall include the removal and disposal of all materials encountered of every name and nature.

Measurement

The length of pipe to be paid for will be the actual lineal feet of the size and kind specified, in place complete, measured along the centerline of the pipe. Measurements shall be continuous through manholes, bends, tees, special fittings, clean outs, etc., and lateral branches shall be measured from the intersection of the center axis of the branch pipe with the inside surface of the main pipe.

Sanitary lateral adjustment shall include the adjustment of all pipes of a nominal six (6) inch diameter or less, and shall be measured as set forth above.

The number of sanitary manholes measured for payment will be the actual number of the kind and type specified, in place complete. Manhole drop connections, when specified, shall be included in the price bid for manholes.

The quantity of concrete pipe encasement to be paid for shall be the actual number of cubic yards placed, as shown on the plans or as directed by the Engineer. The contractor shall be responsible for maintaining the minimum trench. If the trench is oversized or irregular in shape only the proposed trench width will be accepted and calculated for concrete encasement. The number of lampholes measured for payment will be the actual number installed including special fittings and castings.

Payment for sanitary wyes, cleanouts, tees, lampholes and plugs, adjusted or relocated; and other special fittings, shall be based on the actual number and type, kind and size specified; unless separately stipulated in the specifications or proposal, any of the above mentioned items or other special pipe fittings, shall be included in the unit price bid for the item of which they are appurtenant.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction and installation of sanitary sewers, service laterals, manholes, and concrete encasement, and shall include manhole frames, covers, steps, hydrostatic testing, connections to existing sewers and manholes, and reshaping of manhole bottoms; all excavation and backfill; necessary bends, tees, fittings, etc., setting and removal of forms where required, and necessary permits as required by the Montgomery County Water Services.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-903 GAS SERVICE

Description

This item shall consist of laying new Gas Services, including valves, boxes and fittings, raising, lowering or relocating existing services between the service valve and the house; adjusting existing service boxes, meter pits and boxes, and valve boxes to grade. Prior to construction the Contractor shall have the utility company test and repair service lines that are not to minimum standards.

Material and Construction

All materials and methods of construction shall conform to the requirements of the Vectren Corporation.

Excavation

Excavation shall include the removal and disposal of all materials encountered of every name and nature.

Measurement

Payment for new or relocated services will be based on the lineal feet of service installed or adjusted in place complete, measured along the centerline of the pipe. Measurements will be continuous through valves, bends, tees and other fittings.

Payment for relocated or adjusted valves, service boxes, valve boxes and meter pits and boxes, shall be based on the actual number of adjustments made.

Payment

The price bid for this item shall include all labor, equipment and material incidental to installing, relocating and adjusting gas services, valves and boxes, including excavation, gravel backfill and required testing and permits.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-905 BASE STABILIZATION

Description

This item shall consist of removing and replacing unsuitable material encountered in the preparation of subgrades, and foundation for pipes, drainage appurtenances, and structures, as directed by the Engineer. The type of replacement material shall be designated by the Engineer. The contractor shall be responsible for removing and replacing material which becomes unsuitable through his own fault or negligence.

Material

Unsuitable material shall be replaced with the following material, as directed by the Engineer:

- A. Gravel: This material shall be sound, durable gravel containing negligible amounts of vegetable matter with 100% of the material passing a 3" sieve and at least 80% by weight of the grains or by particles being retained on a No. 200 sieve.
- B. No. 2 Aggregate: This material shall be crushed limestone or gravel meeting the requirements of Item 703 of the Material and Construction Specifications of ODOT for No. 2 size aggregate.
- C. No. 304 Aggregate: This material shall be crushed limestone or gravel meeting the requirements of Item K-304.
- D. Geogrid: This material shall be Tensar BX1200 geogrid, or approved equal. Approved equal products shall meet or exceed the following specifications:

<u>Index Properties</u>	<u>Units</u>	<u>Values</u>
Aperture Dimensions	mm (in)	25 (1.0)
Minimum Rib Thickness	mm (in)	1.27 (0.05)
Tensile Strength @ 2% strain	kN/m (lb/ft)	6.0 (410)
Tensile Strength @ 5% strain	kN/m (lb/ft)	11.8 (810)
Ultimate Tensile Strength	kN/m (lb/ft)	19.2 (1,310)
<u>Structural Integrity</u>	<u>Units</u>	<u>Values</u>
Junction Efficiency	%	93
Flexural Stiffness	mg-cm	750,000
Aperture Stability	m-N/deg	0.65

Proof that these materials meet the specifications shall be submitted to the Engineer when required.

Construction

The unsuitable material shall be removed to the depth and limit specified by the Engineer. Replacement material shall be placed and compacted as follows:

GRAVEL shall be placed in maximum 8" lifts and compacted equal to the same requirements specified for the material removed or as directed by the Engineer.

#2 AGGREGATE shall be placed in maximum 6" lifts and rolled until properly keyed as specified by the Engineer.

ITEM K-905 BASE STABILIZATION (cont)

#304 AGGREGATE shall be placed and compacted in accordance with the requirements of Item K-304.

GEOGRID shall be installed per the manufacturer's specifications on a smooth, graded, compacted subgrade surface that meets lines and grades specified by the plans or by the Engineer. Place #304 Aggregate in lifts and compact in accordance with the requirements of Item K-304. #304 Aggregate shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in the geogrid and/or movement of the geogrid. A minimum loose fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

Compaction shall be accomplished by using steel wheel or pneumatic tire rollers, and/or vibratory compactors, of sufficient capacity to properly compact the material. Where small areas are to be compacted, hand vibrators or tampers may be used.

Measurement

GRAVEL, #2 AGGREGATE, #304 AGGREGATE:

The quantity of Base Stabilization to be paid for will be based on the actual number of tons of the specified material placed, as determined by Plant Delivery Tickets. The excavation and disposal of unsuitable material shall be considered as part of this item.

GEOGRID

The quantity of Base Stabilization to be paid for will be based on the actual number of square yards of the geogrid placed, as determined by field measurement. The excavation and disposal of unsuitable material shall be considered as part of this item. The quantity of #304 Aggregate to be measured will be based on the actual number of tons of the specified material placed, as determined by Plant Delivery Tickets, and shall be paid for under Item K-304, Aggregate Base.

Payment

The price bid for this item shall include all labor, equipment and material incidental to removing and replacing the unsuitable material, including excavation and disposal of the material replaced, compacting the gravel and aggregate as specified for base stabilization, the use of water necessary for compaction, and/or the installation of Geogrid as specified. If Geogrid is specified, the #304 Aggregate provided, placed, and compacted for the installation of Geogrid shall be paid for under Item K-304, Aggregate Base. If #304 Aggregate is specified for Base Stabilization without the use of Geogrid, then the #304 Aggregate shall be paid for as a part of K-905, Base Stabilization.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-906 FABRIC STABILIZATION

Description

The engineering fabric shall be used on soil subgrades and granular bases to perform drainage, soil separation and reinforcement functions. These basic functions are performed either separately or simultaneously. The fabric shall be placed under concrete, hot asphalt, gravel and any other material requiring any of the above mentioned basic functions.

Material

The engineering fabric shall be a non-woven fabric consisting of either polyester or polypropylene polymeric fibers. Only one side of the fabric can be of thermal bonded construction. The fabric shall comply to the physical property requirements listed in Table I.

TABLE I

PHYSICAL PROPERTY	TEST METHOD	ACCEPTABLE TEST RESULT
Weight (oz./sq. yd.)	ASTM D-3776	6
Grab Strength (lbs.)	ASTM D-4632-91	160
Grab Elongation (%)	ASTM D-4632-91	50
Mullen Burst Strength (PSI)	ASTM D-3786-88	280
Puncture Resistance (lbs.)	ASTM D-4833-88	85

The Contractor shall send the Engineer a sample and/or literature of the fabric containing name of manufacturer, chemical composition, product description and physical property requirements. The Engineer shall approve any and all fabrics prior to their use.

Construction

1. The subgrade shall be constructed to the required elevation, leveled and compacted.
2. Unroll fabric in the direction vehicles will travel, over areas requiring stabilization as directed by the Engineer. Do not unroll more than the required length of fabric (approximately 50 feet) in front of the ongoing operation. This will minimize any distortion, breakage and pulling of the fabric by the construction equipment. Trucks, pavers or other equipment should not make turns or sudden wheel movements on the fabric.
3. Soils with a California Bearing Ratio (CBR) less or equal to 1.5 shall have two (2) layers of engineering fabric with proper overlap. Minimum overlap in stiff and well compacted material in both longitudinal and transversal directions shall be 12". For more information on CBR and overlap see Table II.

TABLE II

APPROXIMATE CBR	IDENTIFICATION PROCEDURE	SOIL CONSISTENCY	OVERLAP*
Less Than 1	Easily Indented with Fist	Very Soft	36"
2	Easily Penetrated with Thumb	Soft	24"
3	Moderate Effort to penetrate with Thumb	Medium	18"
4-6	Indented by Thumb	Stiff	12"
6-16	Indented by Thumbnail	Very Stiff	12"

* Note - Increase overlap by 4" if fabric is made of polypropylene fibers, and if it is to be placed in direct contact with hot asphalt. Asphalt temperature should not exceed 290°F.

4. When a new roll is to be added in the direction of travel, tuck the beginning of this new fabric under the previous end section of fabric with proper overlap. Allow for excess of at least one foot next to curbs and edge of pavements.

ITEM K-906 FABRIC STABILIZATION (cont)

5. Avoid traffic directly on the fabric when soft or very soft soils are present, unless dry conditions have produced a crusted surface. Whenever poor subgrade is encountered, the material (aggregate, asphalt) shall be back dumped and spread in a uniform lift maintaining minimum recommended thickness (3" - aggregate, 2" - asphalt) at all times. Use graders or light dozers to spread the material.
6. Compact the material (aggregate, asphalt) by using a steel roller, initial roll to be a seal roll, increase rolling and or vibration with added depth. Avoid overstressing the soil with equipment used for dumping, spreading and rolling. Severe rutting at the time of placement is an indication of overstressing the soil. Two methods of reducing pressures on the soil are increasing material depth and reducing loads. Any ruts which develop during spreading and compacting should be filled with additional materials rather than bladed from surrounding areas. Any tears shall be repaired by placing a second layer of fabric with proper overlap.

Measurement

The engineering fabric shall be measured for payment by the square yard in place. Measurement will be to the nearest yard. No allowances will be made for overlaps, seams, repair of tears and to either contamination or damage due to the fault or negligence of the contractor. A second layer of fabric placed over poor subgrade, as directed by the Engineer will be measured for additional payment.

Payment

The price bid for this item shall constitute full compensation for furnishing all labor, material and equipment, and performance of all operations in connection with placing the engineering fabric. Payment will be based on the unit price bid.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-907 ASPHALT OVERLAY FABRIC

Description

This item shall consist of furnishing the necessary labor, materials and equipment to prepare the existing pavement surface, apply the asphaltic sealant and lay the geotextile fabric in accordance with the specifications or as directed by the Engineer.

Materials

Fabric

The paving fabric shall be needle punched, nonwoven polypropylene polymeric fabric having the following properties:

<u>Physical Property</u>	<u>Test Method</u>	Acceptable <u>Test Results</u>
Weight (oz./sq.yd.)	ASTM D-3776	4.1
Grab Strength (lbs.)	ASTM D-4632-91	101
Grab Elongation (%)	ASTM D-4632-91	50
Mullen Burst Strength (psi)	ASTM D-3786-87	200
Puncture Resistance	ASTM D-4833-88	60
Asphalt Retention (Gals/sq.yd.)	ASTM Method D - 1682-640	0.20

Asphalt Sealant

Sealant shall meet the following requirements:

Asphalt	Penetration	AASHTO M-20
	or	
	Viscosity Graded (2)	AASHTO M-226

Grade to be determined by the Engineer.

Construction

Surface Preparation: The surface on which the fabric is to be placed should be free of dirt, water and vegetation. Cracks between 1/8 inch and 1/4 inch must be filled with a suitable filler as directed by the engineer. Larger cracks or holes are to be repaired with slurry, cold or hot mix.

Sealant Application: The asphaltic sealant must be uniformly spray applied at the specified rate. Quantity specified will vary with the surface condition of the existing pavement but will normally be applied at the rate of 0.25 to 0.35 gallons per square yard (gsy) residual asphalt. Within street intersections or other zones where vehicle speed change is commonplace the prescribed application rate will be reduced 20 percent.

Application will be by distributor equipment wherever possible, with hand spraying kept to a minimum. Temperature of the asphalt must be sufficiently high to permit a uniform spray pattern and the minimum recommended temperature should be 290°F.

The target width of the asphalt sealant application should be fabric width plus 2 to 6 inches. Asphalt drools or spills should be cleaned from the road surface to avoid flushing and possible fabric movement at these asphalt-rich areas.

ITEM K-907 ASPHALT OVERLAY FABRIC (cont)

Fabric Placement: The fabric shall be placed into the asphaltic sealant with a minimum of wrinkles prior to the time the asphalt has cooled and lost tackiness. The fabric is unrolled so that the bearded (fuzzy) side is unwound into the sealant, thus providing optimum bond between fabric and pavement during the construction process.

As directed by the engineer, wrinkles severe enough to cause "folds" shall be slit and laid flat. Brooming will maximize fabric contact with the pavement surface. Small wrinkles which flatten under compaction are not detrimental to performance.

Overlap of fabric joints should be minimal, although an overlap of 1 to 3 inches is recommended to insure full closure of the joint. Transverse joints should be "shingled" in the direction of paving to prevent edge pick-up by the paver. As directed by the engineer, additional sealant of about 0.20 gsy should be applied to fabric joints.

Protection of Overlay Fabric

Traffic will not be permitted on the membrane until a protective layer of the surface course is placed. The protective layer application temperature shall be 295°F maximum.

Manufacturer's Representative

The manufacturer's technical representative shall be present during the initial installation.

Measurement

The engineering fabric shall be measured for payment by the square yard in place. Measurement will be to the nearest yard. No allowances will be made for overlaps, seams, repair of tears and to either contamination or damage due to the fault or negligence of the contractor.

Payment

The price bid for this item shall include all labor, material and equipment incidental to installing the fabric and shall include surface preparation and filling of cracks.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-910 GABIONS

Description

This item shall consist of the installation of gabions on a prepared base in accordance with the plans or as directed by the Engineer.

Construction and Material

The gabions shall be rectangular baskets of the size and type shown on the construction plans. They shall be unfolded and assembled on the job site according to the manufacturer's instructions. The gabions shall be manufactured with a hexagonal triple twist steel wire mesh 3" x 4" approximately, running at right angles to the long axis of the gabion. The mesh shall be reinforced at all edges with a thicker salvage rod. Each gabion shall be divided into cells of equal size by diaphragms. All wire to be used in the mesh is heavily galvanized steel wire with a zinc coating exceeding Federal specification requirements (QQ-W 461 F). The wire of the mesh shall have a diameter of not less than 0.114" (U.S. Gage II 1/4), the salvage rod shall have a diameter of not less than 0.150" (U.S. gage 9). The zinc coating shall exceed Federal specifications Finish 5, Class 3. Material to be placed in the gabion baskets shall be clean stone approved for gabion use, unless otherwise noted in the plans.

Measurement

The measurement shall be the actual number of gabions in place of each particular size.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction and installation of the various gabions as indicated on the plans, and shall include the furnishing, placing and preparation of all materials required to complete the gabions.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-911 GRAVITY RETAINING WALL

Description

This item shall include all materials, manpower, equipment, incidentals, and appurtenances necessary to install a "semi-dry" masonry block and stone gravity retaining wall in accordance with the City of Kettering Standard Construction Drawings and any project-specific plan drawings and details. Work included and to be paid for under this item includes layout, excavation, base construction, placement of masonry block, mortar, wall stone, drainage pipe, backfill, topsoil, seeding/mulching, and other such work and materials required to yield a complete gravity retaining wall in a workman-like manner, in conformity with the lines, grades, and dimensions shown on the plans or as directed by the Engineer.

Materials

Stone: Unless specified otherwise, the stone shall be limestone and shall be of approved quality, sound and durable, free from segregations, seams, cracks, and other structural defects or imperfections tending to destroy its resistance to the weather. Unless specified otherwise on the plans it shall be free from rounded, worn or weathered surfaces. Individual stones shall not have a thickness or width less than that specified on the plans. The stones shall be roughly squared on joints, beds, and faces. Selected stone, roughly squared and pitched to line, shall be used at all angles and ends of walls. All shaping or dressing of stone shall be done before the stone is laid in the wall and no dressing or hammering which will loosen the stone will be permitted after it is in place. The Engineer shall specify the color of the stone.

Mortar: Use Type S or stronger.

Other materials shall be as described and indicated on the plans or as approved by the Engineer.

Construction

Foundation: Shall be constructed as specified on the plans or as directed by the Engineer.

Drainage: Unless a reason for exemption is granted, install a 4" perforated, fabric-wrapped flexible drain tile at base of wall. Extend drain tile around the low end of the wall. Cut the exposed end flush with the existing grade. Form a mortar collar around the end of the drain outlet. All costs associated with the drain tile installation shall be included in the bid price for K-911 Gravity Retaining Wall.

Wall: Masonry blocks shall be laid to line and in courses roughly leveled up. Use freshly made mortar in and around the blocks to ensure a sufficient bond between individual blocks. The mortar joints shall be full and the blocks carefully settled in place before the mortar has set. Joints and beds shall have an average thickness of not more than 1 inch.

Face stones are to be selected, trimmed as necessary, and fit together in a workman-like manner to construct a sturdy wall. Mortar shall be used in such a manner to lock stones together to augment wall strength and aesthetic appearance. The use of mortar shall be limited to 60% of the voids between the stones to allow for adequate movement of moisture through the wall. Mortar shall be placed no closer than 3" to the face of the wall, except for the top of the wall where mortar shall be flush.

Each stone shall be cleaned and thoroughly saturated with water before being set and the bed that is to receive it shall be clean and well moistened. All stones shall be well bedded in freshly

ITEM K-911 GRAVITY RETAINING WALL (cont)

made mortar. The mortar joints shall be full and the stones carefully settled in place before the mortar has set. No spalls will be permitted in the beds. Joints and beds shall have an average thickness of not more than 1 inch.

Face stones shall be rectangular with the long axis oriented horizontal. The top and bottom shall be essentially parallel. Minimum height of face stones shall be 1-1/2" to a maximum of 6", except that square face stones shall have a maximum size of 10"x10". The height of a face stone shall not exceed 3/4 of the depth of the stone.

The individual face stones shall be placed so that they break joints with the stone in the course below. Exception is where shorter stones butt a taller stone. Horizontal joints along the face of the wall shall not exceed 3' before butting into a vertical joint.

Top of wall shall have a slight slope (approximately 1/8" per 1') to shed water toward the face.

Whenever possible the face joints shall be properly pointed before the mortar becomes set. Joints that cannot be so pointed shall be prepared for pointing by raking them out to a depth of 2 inches before the mortar has set. The face surfaces of stones shall not be smeared with the mortar forced out of the joints or that used in pointing. Pointing shall not be done in freezing weather or when the stone contains frost.

Joints not pointed at the time the stone is laid shall be thoroughly wet with clean water and filled with mortar. The mortar shall be well driven into the joints and finished with an approved pointing tool. The wall shall be kept wet while pointing is being done and in hot or dry weather the pointed masonry shall be protected from the sun and kept wet for a period of at least three days after completion.

After the pointing is completed and the mortar set, the wall shall be thoroughly cleaned and left in a neat and workmanlike condition.

Stone masonry shall not be constructed in freezing weather or when stone contains frost, except by written permission of the Engineer and subject to such conditions the Engineer may require.

In case any stone is moved or the joint broken, the stone shall be taken up, the mortar thoroughly cleaned from bed and joints, and the stone reset in fresh mortar.

Backfill: Place granular backfill behind the wall, a minimum of 8" thick measured from the backside of the wall. Stop the granular backfill approximately 10"-12" from the top of the wall.

Backfill shall be 1/4" to 1" diameter stone, free of fines and dust. Use of any other aggregate that will provide equivalent drainage may be used subject to approval of the engineer.

Restoration: Contractor shall restore any damaged turf areas with a minimum of 4" of topsoil. Smooth and blend the topsoil into the existing topography to provide positive drainage. Place grass seed and mulch per the requirements of K-659 Seeding and Mulching.

ITEM K-911 GRAVITY RETAINING WALL (cont)

Unless otherwise specified or itemized in the construction plans, all costs associated with restoration shall be included in the unit bid price for item K-911, Gravity Retaining Wall.

Measurement

Unless otherwise specified, the quantity of gravity retaining wall measured for payment shall be the measured square footage of the front face of the wall, as measured from the top of the wall to 6" below the finished grade and along the front face of the wall. The top, ends and rear faces of the wall shall not be included in the square footage measured for payment, but shall be constructed to the same quality standards as the front face of the wall.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the construction and installation of the various structures as indicated on the plan and shall include the furnishing, placing and preparation of all material required to complete the structures. The cost to finish the top, ends and rear faces of the wall shall be included in the price bid for this item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-915 EXCESS COST OF HIGH-EARLY-STRENGTH CEMENT

Description

This item shall consist of furnishing high-early-strength cement instead of the cement required for the specified concrete in the item involved. It shall be used only when specified on the plans or where directed by the Engineer

Material

The Ohio Department of Transportation (ODOT) Construction and Material Specifications Item 499 for Class FS and MS shall apply. The excess cost shall be the difference between the price for the concrete item using K-499 concrete and the price for the same concrete item using cement per ODOT specification 701.05.

Measurement

The quantity of high-early-strength concrete to be paid for shall be based on the actual quantity of the concrete item, completed and accepted, in place.

Payment

Payment for this item will be made at the price bid per square yard and shall cover only the cost of the high-early-strength cement over and above the cost of the cement required for the specified concrete in the item involved.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-916 CONCRETE SURFACE TREATMENT

Description

This item shall consist of furnishing and applying a concrete surface treatment of fifty (50) percent boiled linseed oil and fifty (50) percent mineral spirits to concrete pavement and curbs as designated by the Engineer. The purpose for this work is an anti-spall prevention to be used in fall construction.

Materials

The materials shall consist of a mixture of fifty (50) percent boiled linseed oil as defined by ASTM D 260, Type 1 and fifty (50) percent mineral spirits, as defined by ASTM D 235, Type 1. The mixture shall be proportioned volumetrically.

Construction

Prior to applying the concrete surface treatment, the surface shall be clean and dry and, if necessary, shall be cleaned by brooming or by the use of compressed air. The spray coat shall be applied after the curing of concrete is complete and after the concrete has dried for at least three (3) days of normal dry summer weather, or its equivalent as determined by the Engineer. During this drying period, no other chemicals, such as de-icing agents, shall be applied to the concrete which will receive the surface treatment. During the application of the spray and until the surfaces are completely dry, pedestrian and vehicular traffic, material and equipment shall not be permitted on the treated surfaces. During spraying, care shall be exercised to keep the area clear of sparks or flames because of the extremely low flashpoint of the mixture. The work shall be scheduled so that spray application and drying will occur when the temperature of the concrete and the surrounding air is 50° F or higher.

The mixture shall be applied by spraying as a fine mist at a uniform rate in such a manner as to provide a continuous film on the surface. Two separate coats shall be applied. During application the material shall be agitated to secure a uniform mixture. The first coat shall be applied at a rate of 0.025 gallons per square yard. After the first coat has completely dried, a second coat shall be applied at a rate of 0.015 gallons per square yard.

Measurement

The quantity to be paid for shall be the actual square feet or square yards of concrete surface treatment completed and accepted in place.

Payment

The price bid for this item shall include all labor, equipment and material incidental to the surface treatment of the concrete pavement. Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-917 UNDERSEALING CONCRETE PAVEMENTS

Description

The Contractor shall furnish all labor, materials, equipment, and incidentals to perform the drilling of pavement and undersealing of voids, cavities and backfill deficiencies underlying the existing concrete pavement.

In addition intersecting streets not covered by these improvements will be undersealed to a point determined by the City - usually to the end of the intersecting street radius returns.

The work shall reestablish a uniform subgrade support for said concrete pavement and stabilize the existing pavement slabs. All work shall be in accordance with Specifications or as directed by the City.

Materials

Grout Mix Design (Materials): The mix shall consist of six to seven part approved fly-ash, finely ground powdered limestone or hydrated lime and one part Portland Cement with water added to provide the desired consistency for flowability. Wetting agents, additives that increase flowability and reduce shrinkage and bleeding, shall be used in the mix. A definite method of proportioning must be adopted to ensure uniform consistency. The grout shall have a minimum strength of 300 psi at seven (7) days as determined by a compression test on 6" x 12" test cylinder. Tests shall be at the Contractor's expense.

The mix design shall be submitted to and approved by the City prior to beginning any work.

Alternate mix designs such as those making use of Portland Cement and Topsoil may be submitted, but must be accompanied by a list of locations and clients previously using the mix. Alternate mix designs must be submitted with the bid to be considered. The City shall be the sole judge as to whether or not the alternate mix is permitted and the bidder agrees to accept the decisions without dispute.

Water: The Contractor shall be required to supply necessary (or arrange for) water service; to obtain necessary permits for its use; and to pay for all water consumed during drilling and grouting operation from the Montgomery County Water Services.

Construction

Grout Holes: Generally, holes should be spaced not less than 12" or more than 18" from a transverse joint. The holes should not be spaced more than six (6) feet center-to-center or as directed by the City. Holes shall be patched at the direction of the City.

Filling Voids: The operations to fill voids shall require the pumping in one (1) hole until the grout begins to flow from the adjacent hole, to assure complete filling of all voids. When the nozzle is removed from the hole, the grout should be cleaned from the hole.

Control of Leakage: Leakage shall be controlled by varying the consistency of the grout, or by bulkhead grouting the pavement at specific points established, as indicated on plans or as directed by the City. Blowouts in the berm shall be tamped full with dry grout to maintain pressure.

ITEM K-917 UNDERSEALING CONCRETE PAVEMENTS (cont)

Maintaining Traffic: The work must be planned and organized so as not to interfere with the use of the street by local traffic and emergency vehicles. Proper warning signs and barricades, or in some cases a flagman, all satisfactory to the City shall be used to protect the work area and the public.

Haul routes along and across any public traveled way shall be kept free and clean of all rubbish and debris including spillage, resulting from the grouting operation. When necessary for the alleviation of a dust nuisance, water or dust palliatives, or both, shall be applied to the area by the Contractor.

Care and Custody of the Work: The Contractor shall have full care and custody of the work until completion and acceptance, and will be responsible for all damages to and repair to existing improvements, repairs, property and/or utility structures while the work is in his charge.

Records: The Contractor will keep records of all grouting operations. Legible copies of daily reports shall be furnished to the City for permanent retention. The report shall cover all work placement subsequent to the previous reports and shall be verified and signed by the Contractor's representative. The report shall contain verification of all supplies and materials incorporated into the project.

Payment

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-919 CONCRETE JOINT REPAIR

Description

This item shall consist of the repair of joints prior to an asphalt overlay. The use of this repair shall be on all longitudinal and transverse joints plus other areas as required by the Engineer.

Materials

Material shall be PavePrep™ as manufactured by the PavePrep Corporation or approved equal. Material manufacturer must guarantee product performance for a period of not less than eighteen (18) months.

To be considered "or equal" to PavePrep, the material submitted must have been successfully used as a heavy-duty reflective crack retardant for a period of not less than five (5) years. A documented record from a minimum of six references substantiating product field performance over a wide geographic area and a variety of substrate conditions must be presented at the time of material submission for consideration.

The material shall be a high density asphalt mastic sandwiched between two layers of polymeric fabric meeting the following properties:

DENSITY	80 LBS./FT. ³	ASTM E 12-70
WEIGHT	0.9 LB./FT. ²	
CALIPER (RETAINS 95% CALIPER AFTER LOADING)	0.135 INCHES	ASTM D1777
ABSORPTION	1% MAXIMUM	ASTM D517-68
BRITTLENESS	PASS	ASTM D517-68
SPECIFIC GRAVITY (MASTIC COMPOUND)	1.67 MINIMUM	ASTM D70-52
WEIGHT/GALLON (MASTIC COMPOUND)	14.0 MINIMUM	ASTM D70-52
SOFTENING POINT (MASTIC)	200° F MIN.	ASTM D2398-68
COLD FLEX (2" X 5" SPECIMEN) 180° BEND ON 2" MANDREL	0° F MIN.	NO CRACKING
HEAT STABILITY (2" X 5" SPECIMEN) HUNG VERTICALLY IN A MECHANICAL OR CONVECTION OVEN - 2 HR. - 190 DEGR. F	190° F	NO CRACKING OR DELAMINATION
POLYESTER REINFORCEMENT: CYCLES TO BREAK (SINGLE FIBER)	2,100,000 PLUS	
FLAMMABILITY (SELF-EXTINGUISHING, NO BURN RATE WHEN TESTED IN ACCORDANCE WITH FEDERAL DEPT. OF TRANSPORTATION SPECIFICATION 302)		
PERCENT ELONGATION	100%	INSTRON
TENSILE STRENGTH	1000 LBS. IN. ²	INSTRON
WIDTH	AS SPECIFIED	
LENGTH	102 FEET	

Asphaltic Tack: The asphaltic tack to be applied to the pavement surface shall meet the following requirements:

<u>Material</u>	<u>Specification</u>
Rubberized Crackfiller	ASTM 3405

A rubberized crackfiller such as PCF-100™ will be used as a tack. The crackfiller must meet specification ASTM 3405 and employ no solvents. Minimum recommended temperature for PCF-100 tack is 350 degrees F. Rate of application should be equivalent to AC-20 rate. The crackfiller shall be squeegeed into the prepared joint and/or crack to a width of the joint material plus two (2) inches.

ITEM K-919 CONCRETE JOINT REPAIR (cont)

Sand: Although not required, small amounts of washed sand may be used to blot excess asphalt if necessary to facilitate movement of traffic or construction equipment over the material prior to the overlay. There should be no need, however, if the correct amount of tack is used. Hot mix can be sanded out on material ahead of paver if material is sticking to tires, trucks, or paver and will eliminate such problems should they occur.

Construction Method

Surface Preparation: The surface and joints upon which the material is to be placed should be free of dirt, water, and vegetation. Larger cracks or holes are to be filled with a suitable material (cold or hot mix) prior to covering with joint material at the direction of the Engineer.

Material Placement: The material shall be placed into the tack prior to the time the asphalt has cooled and lost its tackiness. Woven polyester side of material should be placed up (exposed to traffic). Material shall be cut (when necessary) with a razor knife from the woven polyester side.

Where transverse and longitudinal joints meet, the mat may be butted or overlapped. Overlap is mandatory, however, on bridge decks or where intentional waterproofing is desired. Additional tack is required to bond the two mat areas together where overlapping is used.

Cornering can be accomplished without sectioning material by walking gathered material to one spot and slicing bubble out with razor knife and tacking the overlap. Removal and replacement of material that is damaged after placement is the responsibility of the contractor.

Material Overlay: Hot mix overlay can immediately follow placement of the material or be delayed and opened to traffic as required. Maximum exposure to traffic prior to overlay of pavement should not exceed three (3) days.

Prior to hot mix overlay, the material shall be tacked over along with the existing surface with an accepted paving tack, i.e. SS-1, SS-1H at a rate prescribed by the engineer. Any tack other than an emulsion must be approved by the PavePrep Corporation prior to its application.

Installation Temperature: Air and pavement temperatures during material installation should be sufficient to allow adequate tacking. Material installed in cold weather should be overlaid as reasonably soon as possible. The combination of cold brittle tack and traffic could cause some breaking loose of the mat. During warm weather conditions, this should be no problem.

Measurement

The lineal footage of concrete joint repair will be the actual footage completed and accepted. Overlays of joints shall be deducted and calculated only in one direction.

Payment

Payment shall be made at the contract unit price per linear foot of the material in place. This price shall be full compensation for furnishing all materials including bituminous tack, asphalt concrete filler either hot or cold mix, and for all preparation, cleaning of existing joints and application of these materials, and for all labor, equipment, tools and incidentals necessary to complete the item. Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-921 ASPHALT PAVEMENT REJUVENATING

Description

This work shall consist of furnishing all labor, material, and equipment necessary to perform all operations for the application of an asphalt rejuvenating agent to asphaltic concrete surface courses. The rejuvenation of surface courses shall be by spray application of a cationic rejuvenating agent composed of petroleum oils and resins emulsified with water. All work shall be in accordance with the specifications, the applicable drawings, and subject to the terms and conditions of this contract.

Materials

The asphalt rejuvenating agent shall be an emulsion composed of a petroleum resin oil base uniformly emulsified with water. Each bidder must submit with his bid a certified statement from the asphalt rejuvenator manufacturer showing that the asphalt rejuvenating emulsion conforms to the required physical and chemical requirements shown below.

<u>Tests</u>	<u>ASTM</u>	<u>AASHTO</u>	<u>Requirements</u>	
			<u>Minimum</u>	<u>Maximum</u>
Tests on Emulsion:				
Viscosity @ 25°C, SFS	D-244	T-59	15	40
Residue, % W ¹	D-244 (Mod.)	T-59 (Mod.)	60	65
Miscibility Test ²	D-244 (Mod.)	T-59 (Mod.)	No Coagulation	-
Sieve Test, %W ³	D-244 (Mod.)	T-59 (Mod.)	-	0.1
Particle Charge Test	D-244	T-59	Positive	-
Percent Light Transmittance ⁴	GB	GB	-	30
Tests on Residue from Distillation:				
Flash Point, COC, °C	D-92	T-48	196	-
Viscosity @ 60°C, cSt	D-445		100	200
Asphaltenes, %w	D-2006-70	-	-	1.00
Maltene Dist. Ratio	D-2006-70	-	0.3	0.6
<u>PC + A₁</u> ⁵				
S + A ₂				
PC/S Ratio ⁵	D-2006-70		0.5	-
Saturated Hydrocarbons, S ⁵	D-2006-70		21	28

¹ ASTM D-244 Modified Evaporation Test for percent of residue is made by heating 50 gram sample to 149 C (300° F) until foaming ceases, then cool immediately and calculate results.

² Test procedure identical with ASTM D-244-60 except that .02 Normal Calcium Chloride solution shall be used in place of distilled water.

³ Test procedure identical with ASTM D-244 except that distilled water shall be used in place of two percent sodium oleate solution.

⁴ Test procedure is attached.

⁵ Chemical composition by ASTM Method D-2006-70:

PC = Polar Compounds, A₁ = First Acidaffins, A₂ = Second Acidaffins, S = Saturated Hydrocarbons

Performance

The rejuvenating agent shall have a record of at least five years of satisfactory service as an asphalt rejuvenating agent and in-depth sealer. Satisfactory service shall be based on the capability of the material to decrease the viscosity and increase the penetration value of the

ITEM K-921 ASPHALT PAVEMENT REJUVENATING (cont)

asphalt binder as follows. The viscosity shall be reduced by a minimum of 45 percent and the penetration value shall be increased by a minimum of 25 percent. Testing shall be performed on extracted asphalt cement from a pavement to a depth of three eighths inch (3/8"). In addition, the pavement shall be in-depth sealed to the intrusion of air and water.

The bidder must submit with his bid the manufacturer's certification that the material proposed for use is in compliance with the specified requirements. The bidder must submit with his bid previous use documentation and test data conclusively demonstrating that; the rejuvenating agent has been used successfully for a period of five years by government agencies such as cities, counties, etc.; and that the asphalt rejuvenating agent has been proven to perform, as heretofore required, through field testing by government agencies as to the required change in the asphalt binder viscosity and penetration number. Testing data shall be submitted indicating such product performance on a sufficient number of projects, each being tested for a minimum period of three years to insure reasonable longevity of the treatment, as well as produce consistency. RECLAMITE®, manufactured by Golden Bear Oil Corporation, is a product of known quality and accepted performance.

Product Standards and Alternates

The product "Reclamite"® for the asphalt rejuvenating agent as manufactured by Witco Corporation is the standard for these specifications and the prices quoted on the bid sheet base bid shall be for this standard. Should a bidder wish to submit a bid for alternates to the standard, said prices shall be entered on the bid sheet as the "alternate bid" for each item. In the event that the bidder submits no bid for the standard, only the "alternate bids" should be completed.

Bidders may offer an alternate for the standard specified in the specifications provided the bidder adheres to the following and submits same with the bid.

- a. List the proposed alternate on the bid sheet form giving the product name and price.
- b. Furnish complete specifications and descriptive literature for the alternate as well as a one-gallon sample of the material proposed for use. Such descriptive and detailed information shall be complete and at least equal in detail to the City's requirements for the standard item for which the alternate is offered.
- c. Submit a current Material Safety Data Sheet for the alternate materials.

The alternate will be given consideration by the City. The contractor may furnish only those alternate items included in his proposal and approved by the City prior to award of a contract.

If no alternate is indicated on the bid sheet, the contractor shall furnish the standard (brand) specified in the attached specifications.

Should the alternate offered be found unacceptable by the City based on the data submitted with the bid and no bid is entered on the bid sheet for the standard, then said bid will be considered non-responsive.

ITEM K-921 ASPHALT PAVEMENT REJUVENATING (cont)

Temperature/Weather Limitations

The temperature of the asphalt rejuvenating emulsion, at the time of application shall be as recommended by the manufacturer. The asphalt rejuvenating agent shall be applied only when the existing surface to be treated is thoroughly dry and when it is not threatening rain. The asphalt rejuvenating agent shall not be applied when the ambient temperature is below 40° F.

Applicator Experience

The asphalt rejuvenating agent shall be applied by an experienced applicator of such material. The bidder shall have a minimum of three years experience in applying the product proposed for use. He must submit with his bid a list of five projects on which he applied said rejuvenator. He shall indicate the project dates, number of square yards treated in each and the name and phone number of the government official in charge of each project.

A project superintendent knowledgeable and experienced in application of the asphalt rejuvenating agent must be in control of each day's work. The bidder shall submit a written experience outline of the project superintendent.

Handling of Asphalt Rejuvenating Agent

Contents in tank cars or storage tanks shall be circulated at least forty-five minutes before withdrawing any material for application. When loading the distributor, the asphalt rejuvenating agent concentrate shall be loaded first and then the required amount of water shall be added. The water shall be added into the distributor with enough force to cause agitation and thorough mixing of the two materials. To prevent foaming, the discharge end of the water hose or pipe shall be kept below the surface of the material in the distributor which shall be used as a spreader. The distributor truck will be cleaned of all of its asphalt materials, and washed out to the extent that no discoloration of the emulsion may be perceptible. Cleanliness of the spreading equipment shall be subject to the approval and satisfaction of the Engineer.

Applicating Equipment

The distributor for spreading the emulsion shall be self-propelled, and shall have pneumatic tires. The distributor shall be designed and equipped to distribute the asphalt rejuvenating agent uniformly on variable widths of surface at readily determined and controlled rates from 0.05 to 0.5 gallons per square yard of surface, and with an allowable variation from any specified rate not to exceed five (5) percent of the specified rate.

Distributor equipment shall include full circulation spray bars, pump tachometer, volume measuring device and a hand hose attachment suitable for application of the emulsion manually to cover areas inaccessible to the distributor. The distributor shall be equipped to circulate and agitate the emulsion within the tank.

A check of distributor equipment as well as application rate accuracy and uniformity of distribution shall be made when directed by the engineer.

The truck used for sanding shall be equipped with a spreader that allows the sand to be uniformly distributed onto the pavement. The spreader shall be able to apply 1/2 pound to 3 pounds of sand per square yard in a single pass. The spreader shall be adjustable so as not to broadcast sand onto driveways or tree lawns. The sand to be used shall be free flowing, without any leaves, dirt, stones, etc. Any wet sand shall be rejected from the job site.

ITEM K-921 ASPHALT PAVEMENT REJUVENATING (cont)

Any equipment which is not maintained in full working order, or is proven inadequate to obtain the results prescribed, shall be repaired or replaced at the direction of the Engineer.

Application of Rejuvenating Agent

The asphalt rejuvenating agent shall be applied by a distributor truck at the temperature recommended by the manufacturer and at the pressure required for the proper distribution. The emulsion shall be so applied that uniform distribution is obtained at all points of the areas to be treated. Distribution shall be commenced with a running start to insure full rate of spread over the entire area to be treated. Areas inadvertently missed shall receive additional treatment as may be required by hand sprayer application.

Application of asphalt rejuvenating agent shall be on one-half width of the pavement at a time. When the second half of the surface is treated, the distributor nozzle nearest the center of the road shall overlap the previous application by at least one-half the width of the nozzle spray. In any event the centerline construction joint of the pavement shall be treated in both application passes of the distributor truck.

Before spreading, the asphalt rejuvenating agent shall be blended with water at the rate of two (2) parts rejuvenating agent to one (1) part water, by volume or as specified by the manufacturer. The combined mixture of asphalt rejuvenating agent and water shall be spread at the rate of 0.05 to 0.10 gallons per square yard, or as approved by the Engineer following field testing.

Where more than one application is to be made, succeeding applications shall be made as soon as penetration of the preceding application has been completed and approval is granted for additional applications by the Engineer.

Grades or super elevations of surfaces that may cause excessive runoff, in the opinion of the Engineer, shall have the required amounts applied in two or more applications as directed. After the street has been treated, the area within one foot of the curb line on both

sides of the road shall receive an additional treatment of the asphalt rejuvenating emulsion. Said treatment shall be uniformly applied by a method acceptable to the Engineer.

After the rejuvenating emulsion has penetrated, a coating of dry sand shall be applied to the surface in sufficient amount to protect the traveling public as required by the Engineer.

The contractor shall furnish a quality inspection report showing the source, manufacturer, and the date shipped, for each load of asphalt rejuvenating agent. When directed by the Engineer, the contractor shall take representative samples of material for testing.

Street Sweeping

The contractor shall be responsible for sweeping and cleaning of the streets prior to, and after treatment.

Prior to treatment, the street will be cleaned of all standing water, dirt, leaves, foreign materials, etc. This work shall be accomplished by hand brooming, power blowing or other approved methods. If in the opinion of the Engineer the hand cleaning is not sufficient then a self-propelled street sweeper shall be used.

ITEM K-921 ASPHALT PAVEMENT REJUVENATING (cont)

All sand used during the treatment must be removed not later than forty-eight (48) hours after treatment of the street. This shall be accomplished by a combination of hand and mechanical sweeping. All turnouts, cul-de-sacs, etc. must be cleaned of any material to the satisfaction of the Engineer. Street sweeping will be included in the price bid per square yard for asphalt rejuvenating agent.

If, after sand is swept and in the opinion of the Engineer a hazardous condition exists on the roadway, the contractor must apply additional sand and sweep same no later than twenty-four (24) hours following reapplication.

No additional compensation will be allowed for reapplications and removal of sand.

Resident Notification

The contractor shall distribute by hand, a typed notice to all residences and businesses on the street to be treated. The notice will be delivered no more than twenty-four (24) hours prior to the treatment of the road. The notice will have a local phone number that residents may call to ask questions. The notice shall be of the door hanger type which secures to the door handle of each dwelling. Unsecured notices will not be allowed. The contractor shall also place the notice on the windshield of any parked cars on the street. Hand distribution of this notice will be considered incidental to the contract.

Traffic Control

The contractor shall schedule his operations and carry out the work in a manner to cause the least disturbance and/or interference with the normal flow of traffic over the areas to be treated. Treated portions of the pavement surfaces shall be kept closed and free from traffic until penetration, in the opinion of the Engineer, has become complete and the area is suitable for traffic.

When, in the opinion of the Engineer, traffic must be maintained at all times on a particular street, then the contractor shall apply an asphalt rejuvenating agent to one lane at a time. Traffic shall be maintained in the untreated lane until the traffic may be switched to the completed lane.

The contractor shall be responsible for all traffic control and signing required to permit safe travel. The contractor shall notify the Police and Fire departments as to the streets that are to be treated each day through the Engineering Department.

If, in the opinion of the Engineer, proper signing is not being used, the contractor shall stop all operations until safe signing and barricading is achieved.

Method of Measurement

Asphalt rejuvenating agent will be measured by the square yard as provided for in the contract documents.

Basis for Payment

The accepted quantities, measured as provided for above, will be paid for at the contract unit price for asphalt rejuvenating agent. Asphalt rejuvenating agent shall be paid for per square yard which shall be full compensation for furnishing all materials, equipment, labor and incidentals to complete the work as specified and required.

ITEM K-922 SLURRY SEAL SURFACE TREATMENT

Description

The item shall consist of furnishing all plant, labor, equipment, and materials in performing all operations necessary in connection with the application of an emulsified asphalt slurry seal surface upon the designated surface, in complete and strict accordance as specified herein or as directed by the Engineer.

The slurry seal surface shall consist of a mixture of emulsified asphalt, mineral aggregate, water and/or mineral fillers and other additives when required, properly proportioned, mixed, and spread evenly on the surface or as specified herein and as directed by the Engineer. The cured slurry shall have a homogeneous appearance, fill all cracks, adhere firmly to the surface and have a skid resistant texture.

Applicable Specifications

Current editions of the following agency specifications and methods form a part of this specification:

- **AASHTO** - American Association of State Highway & Transportation Officials
- **ODOT** - Ohio Department of Transportation - Special Provisions Most Current Edition
- **ASTM** - American Society for Testing and Materials - D3910-81A
- **ISSA** - International Slurry Seal Association - A-105-2003

Materials

A. Asphalt Emulsion

The emulsified asphalt shall conform to AASHTO specifications for dense mixing grade SS-1h except that they shall be of the QUICK TRAFFIC SLURRY SEAL EMULSION TYPE, and in conformance with ISSA Technical Bulletin #140.

B. Aggregate

The mineral aggregate shall consist of 100% crushed gravel or slag. The aggregate shall be clean and free from vegetable matter and other deleterious substances. When tested by AASHTO T176, the aggregate blend shall have a sand equivalent of not less than 45. When tested according to AASHTO T104, the aggregate shall show a Los Angeles Rattler loss of not more than 35%.

Mineral filler or liquid retarding and accelerating agents shall be considered as part of the blended aggregate and shall be used in minimum required amounts. Mineral fillers shall be used if needed to improve the workability of the mix or gradation of the aggregate and shall be graded sufficiently fine to effect complete dispersion through the mixture.

The aggregate proposed for use in the work shall have a proven durability record for the conditions and traffic expected. The Engineer shall approve the aggregate source before work proceeds.

ITEM K-922 SLURRY SEAL SURFACE TREATMENT (cont)

The combined mineral aggregate shall conform to the following dry gradation (undecanted):

Sieve Size	Type I	Type II	Type III
	(Slurry Seal)	(Slurry Seal)	(Chip Mix)
	Percent	Percent	Percent
	Passing	Passing	Passing
	(Dry)	(Dry)	(Dry)
3/8	100	100	100
No. 4	100	90-100	70-90
No. 8	90-100	65-90	45-70
No. 16	65-90	45-70	28-50
No. 30	40-60	30-50	19-34
No. 50	25-42	18-30	12-25
No. 100	15-30	10-21	7-18
No. 200	10-20	5-15	5-15

Theoretical Asphalt Content, % Extracted from dry sample:

	10-16	7.5-13.5	6.5-12
	Type I	Type II	Type III
Application Rate, (Lbs./SY, Dry)	8 ± 2	15 ± 2	20 ± 2

- C. Water. All water used with the slurry mixture shall be potable and free from harmful soluble salts.
- D. Stockpiling of Aggregate. When the aggregate supply is likely to become contaminated with oversize materials or other contamination, stockpiling at areas other than the quarry site will not be permitted. Segregation of the aggregate will not be permitted.
- E. Storage of Asphalt Emulsion. The Contractor shall provide suitable storage facilities for the asphalt emulsion. The container shall be equipped to prevent water from entering the emulsion. Suitable heat shall be provided if necessary to prevent freezing.
- F. Mineral Filler. Portland Cement, hydrated lime or other approved filler meeting the requirements of ASTM D242 shall be used if required by the mix design. They shall be considered as part of the dry aggregate.

Design

The bidder shall submit to the Engineer a complete laboratory design made in a qualified laboratory before the work commences. A complete analysis of the materials and Job Mix Formula proposed for use in the performance of the work shall be made in accordance with procedures outlined in the current issue of International Slurry Seal Association Technical Bulletin No. 111 as indicated by the Engineer. The Engineer shall select from the data presented by the bidder the optimum design for the materials selected by the contractor.

ITEM K-922 SLURRY SEAL SURFACE TREATMENT (cont)

Submittals

The bidder shall submit along with the required written materials analysis and proposed Job Mix Formula the following physical specimens:

1. 5 kg. of the proposed aggregate selected.
2. 4 liters of the proposed emulsion selected.
3. 1/2 kg. of the filler selected, if applicable.
4. 3 series of consistency tests at 100, 85 and 70% BR and at 2-3, 4-5 and 6-7 cm. consistencies.
5. 2 each of abraded Wet Track Abrasion Test specimens of 100, 85 and 70% Br.
6. 2 each of sand adhered Loaded Wheel Test specimens at 100, 85 and 70% BR.

Each specimen shall be indelibly identified with the date and source.

Samples of materials and of the finished slurry surface shall be furnished by the Contractor as directed by the Engineer during progress of the work. Test reports may be requested from the Contractor as additional materials arrive.

Equipment

All equipment, tools and machines used in the performance of this work shall be maintained in satisfactory working order at all times. Descriptive information on the slurry mixing and application equipment to be used shall be submitted for approval not less than 10 days before the work starts.

Slurry Mixing Equipment

General: The slurry mixing equipment may be either a batch type, truck mounted unit containing reloadable material compartments or a self-contained, continuously self-loading unit. The material delivery systems shall continuously deliver precise, predetermined quantities of each material specified in the job mix design in the proper sequence to the mixing chamber.

Mixer (Mixing Chamber): The mixer shall intimately and uniformly disperse all materials and discharge the completed mixture without restrictions, dams or gates to the material spreader. The mix shall be longitudinal, double-shafted type containing multiple, alternately opposed, variably pitched paddle-type blades adequately powered and at sufficient speed to exert a total rotary tip exposure to the mix in excess of 50,000 feet per minute at a minimum production rate of 2 tons per minute.

Material Proportioning Control Units: Each material delivery function [(a) fines feed (b) aggregate feed, (c) emulsion feed, (d) water feed, (e) liquid additive feed, and other required materials feeder] shall be independently operated, controlled and monitored with a digital rate of flow meter and a totalizing indicator. Externally mounted, calibrated liquid level gauges for each liquid [(f), (g), (h)] shall be required. A digital read-out, calibrated distance measuring instrument capable of measuring the length of each run shall be required.

All instruments, gauges and meters shall be accurate to within +5% of the operating range required. All instruments and controls shall be centrally mounted in a protected console and

ITEM K-922 SLURRY SEAL SURFACE TREATMENT (cont)

shall be readily accessible during operation to both the operator and the operator and the Engineer or his designated representative.

Certification: The bidder must submit, as part of his proposal, a written certification on the forms provided in the proposal documents stating that the bidder's equipment proposed for use in the performance of this work meets the requirements of this specification.

Slurry Spreading Equipment

Attached to the mixing machine shall be a mechanical spreader box equipped with flexible material in contact with the surface to prevent loss of slurry on varying grades and crown by adjustments to assure uniform spread. Provision for mix agitation is required when traffic systems are used.

There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width. The box shall be kept clean, and true. Build-up of asphalt and aggregate on the box shall not be permitted. The use of burlap drags or other drags shall be approved by the Engineer.

Cleaning Equipment

Power brooms, power brushes, power blowers, air compressors, water flushing equipment, and hand brooms shall be suitable for cleaning the surface and cracks of the old surface. High pressure water (10 gal/m at 7000 psi) shall be the only approved method for removal of mud and adhesive clays.

Auxiliary Equipment

Hand squeegees, shovels, and other equipment shall be provided as necessary to perform the work.

Preparation of Surface

Immediately prior to applying the slurry, the surface shall be cleaned of all loose material, silt spots, vegetation, and other objectionable material. Any standard cleaning method used to clean pavements will be acceptable, except water flushing will not be permitted in areas where considerable cracks are present in the pavement surface.

When the slurry is being placed over a polished, slick or highly absorbent surfaces a 1 part emulsion, 3 parts water, tack coat of the same asphalt emulsion type and grade as specified for slurry may be required. This mixture may be applied with the slurry machine spreader box or may be spray applied. The normal application rate of 0.05 to 0.10 gallons of the diluted emulsion per square yard of surface. The Engineer shall give final approval.

All structures which may become marred by the slurry such as open grates, catch basins, manholes and valve boxes, shall be masked prior to the work with .006" plastic or equal and attached so as not to be displaced by the operations. Care shall be taken at intersections to achieve a clean straight line as directed by the Engineer by use of 15 pound roofing felt or equal. All masking materials shall be removed at the completion of the work.

The Engineer shall give final approval of the prepared surface.

ITEM K-922 SLURRY SEAL SURFACE TREATMENT (cont)

Traffic Control

Suitable methods such as barricades, flagmen, pilot cars, etc., shall be used to protect the uncured slurry surface from all types of traffic. Any damage to the uncured slurry will be the responsibility of the Contractor. The Engineer shall give final approval to the method used.

Residents affected by the work shall be notified by the Contractor, in writing, the day before the work is to be done. The written notice shall include a local telephone number where the contractor may be reached. Prior approval of the written notice by the Engineer is required before starting the project.

Weather Limitations

The slurry seal surface shall not be applied if either the pavement or air temperature is 50 F or below and falling, but may be applied when both the air and pavement temperature are 45 F or above and rising. The mixture should not be applied if high relative humidity prolongs the curing beyond a reasonable time. When special low temperature coalescence and adhesion properties have been demonstrated, the materials may be applied at temperatures no lower than 38 F during fair weather.

Control of Composition and Rate of Application of the Slurry Mix

The optimum Job Mix Formula as set forth in the materials section of this specification shall be translated into job control quantities by the Contractor in accordance with ISSA TB #107. The rate of spread shall be determined by the contractor in accordance with ISSA Technical Bulletin #112.

At the completion of each load, a record shall be made of all material quantities used, distance and width covered and operating conditions. The load record shall include:

Quantities Used:

1. Fines or portland cement
2. Aggregate @ % moisture
3. Asphalt Emulsion
4. Water
5. Liquid Additive
6. Other Materials

Other Data:

7. Distance and width traversed
8. Mixer speed
9. Location of spread
10. Weather conditions

The load record shall be made available at all times to the Engineer or his authorized representative. Final payment will not be made until all load tickets and inventories are verified to assure that Job Mix Formula quantities have been applied. In case of disputes, the Engineer's judgment shall be final.

Application of the Slurry Surface

- A. **General**. The surface shall be fogged with water directly preceding the spreader. The slurry mixture shall be of the desired consistency when deposited on the surface. Total time of mixing shall not exceed two minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that complete coverage is obtained. No lumping, balling or unmixed aggregate shall be permitted. No excessive breaking of the emulsion will be allowed in the spreader box. No streaks such as caused by oversized aggregate will be left in the finished pavement.

ITEM K-922 SLURRY SEAL SURFACE TREATMENT (cont)

- B. Joints. No excessive build-up or unsightly appearance shall be permitted on longitudinal or transverse joints.
- C. Hand Work. Approved squeegees shall be used to spread slurry in nonaccessible areas. Care shall be exercised in leaving no unsightly appearance from hand work.
- D. Curing. Treated areas will be allowed to cure until such time as the Engineer permits their opening to traffic.
- E. Clean-up. Provisions shall be made for the orderly storage and disposal of waste materials. All masking materials shall be removed at the completion of the work.

Qualification of Bidders

Bidders who have not previously completed satisfactory work for the City of Kettering should provide evidence of adequate experience with the materials and design proposed for this work and shall submit the following:

- A. All public work of this class undertaken by him in the past two years.
- B. A list of equipment available for completion of this work.

Payment

Price bid for this item shall include all labor, equipment and material necessary for the testing, design, and installation of the Slurry Seal Surface including cleaning street surfaces, furnishing control of traffic.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.

ITEM K-925 LANDSCAPE PLANTING

Description

This item shall consist of furnishing and properly installing all landscape plant materials (except sod) in accordance with the Ohio Department of Transportation (ODOT) Construction and Material Specifications Item 661. This work shall include providing plant material, the digging of pocket holes, the placing of topsoil, soil-mix, peat, mulch, bracing and commercial fertilizer. Work under this item shall also include watering in accordance with ODOT Item 662, and any other incidentals necessary to complete this item in accordance with these Specifications, the plan drawings, and as directed by the Engineer.

General

Schedule - All planting is to be completed in accordance with the following schedule:

- | | |
|-----------------------------------|---|
| ▪ Deciduous Trees & Shrubs | March 15 - June 1
September 15 - December 15 |
| ▪ Evergreen Shrubs & Groundcovers | May 1 - June 1
September 15 - October 15 |

Plants will not be installed when soil is frozen, or excessively wet (muddy), as determined by the Engineer.

Disposal of Surplus and Waste Materials - All rocks, debris, rubbish and other unsuitable materials shall be separated from the existing topsoil if such topsoil is to be stored for reuse. All unsuitable and surplus materials shall be removed from the site and disposed of by the Contractor. This shall be considered incidental to the planting work.

Maintenance - The Contractor shall properly care for all plants, doing such watering, fertilizing, cultivating, adjusting of bracings or other maintenance work which is necessary to keep the plants in a healthy condition and in a plumb position. All plants shall be watered as seasonal conditions require and as directed by the Engineer until final acceptance. At any time during the life of the Contract the Engineer may require the Contractor to remove any dead, unhealthy or unsightly plants.

Guarantee and Acceptance - The Contractor shall guarantee that all trees and shrubs shall be in a healthy and vigorous condition one full growing season after plant installation. At this time the Engineer shall inspect the tree, shrub and ground cover planting work and individual plants will be either accepted or rejected. Plants that are dead, or in the opinion of the Engineer have become diseased, or have been injured, or have lost their natural shape due to dead branches or stems, excessive pruning, or other causes will be rejected. If plants are rejected, the Owner shall deduct from the final payment due to the Contractor, a sum sufficient to cover the cost of replacement, including material and labor, until such time that the Contractor performs replacement work in accordance with the plans and these technical Specifications. Rejected plants shall be replaced once by the Contractor in accordance with the plans and technical Specifications not later than one year after final inspection.

Materials

Topsoil - All topsoil used in this work shall be fertile, friable, natural topsoil typical for this locality. It shall not contain a mixture of subsoil or slag and shall be free of lumps, stones, plants or their roots, stalks and other extraneous matter and shall not be used while in a frozen or muddy condition.

ITEM K-925 LANDSCAPE PLANTING (cont)

Topsoil shall have a pH from 5.5 to 7.5 and shall contain not less than 12% or more than 20% organic matter as determined by loss on ignition of moisture free samples dried at 100 degrees centigrade.

Analysis for organic matter and pH shall be made in accordance with current methods of the Association of Officials of the Agricultural Chemists and shall be paid for by this Contractor and furnished to the Engineer in triplicate for approval.

Soil Mix - Soil mix shall be a thoroughly uniform mixture of topsoil and sphagnum peat moss. The ratio by volume is 3 parts top soil to 1 part sphagnum peat moss.

Plant Materials - Plant materials shall conform to the types shown on the plans and as specified herein, and all plant materials shall conform to the American Association of Nurseryman (AAN) Standards.

- i. Name - All plant materials furnished under this item shall be true to name and shall follow standard names of vines, shrubs, and trees in accordance with Horticulture Standards as accepted by the AAN.
- ii. Condition - Plants shall be sound, healthy, vigorous, free from plant diseases, mechanical defects, abrasions, insect pests, or their eggs, and shall have healthy, normal root systems. Plants shall be freshly dug and shall not be heeled-in stock or from cold storage. No plant shall be so bound with rope or wire at any time as to damage the bark, break branches, or destroy its natural shape.
- iii. Origin - All plants shall be nursery-grown under climatic conditions similar to those which exist in the locality of the project site, or shall have been acclimated to these conditions for at least one year. The Engineer will approve exceptions to this clause provided that the Contractor can cite successful, completed local experience using the same types of plants from his proposed point of origin. Exception to this is when plans may identify specific plants to be collected or salvaged subject to proper transplanting.
- iv. Pruning - Plants shall not be pruned prior to delivery except as authorized by the Engineer.
- v. Symmetry - Plant material shall be symmetrical, typical for the variety and species, and shall conform to the minimum measurements shown on the plans. Plants for groups or where symmetry is required, shall be matched as nearly as possible, and shall meet the approval of the Engineer.
- vi. Height and Spread - The height and spread of plants shall be measured with the branches in their normal position. The caliper of all deciduous trees shall be measured one foot above the surface of the ground.
- vii. Inspection - The Contractor shall be responsible for all inspection of plant material that may be required by the State and Federal authorities, and he shall secure and have executed any permits and certificates that may be necessary.

The Engineer, in the presence of the Contractor, shall seal all shade trees and intermediate trees in the nursery. At the Contractor's option, the Engineer in the presence of the Contractor, may approve, all or a representative quantity of deciduous shrubs and

ITEM K-925 LANDSCAPE PLANTING (cont)

evergreen shrubs at the nursery. Plants shall be inspected for size and quality only; variety, color and all other requirements shall be the responsibility of the Contractor. Any plant material delivered to the site which does not satisfy all of the requirements of these Specifications shall be removed from the site by this Contractor and shall be replaced by materials meeting these requirements. No inspection or sealing of plant materials as herein specified shall be taken to change or modify these requirements in any way.

viii. Digging and Moving - All plant material shall be selected and prepared to conform to at least minimum specifications established by the American Association of Nurserymen Standards.

ix. Balled and Burlapped Plants - Plants marked "BB" on the itemized schedule of prices shall be adequately balled and burlapped. No plant shall be accepted when the ball of earth surrounding its roots has been cracked or broken preparatory to or during the process of planting, or when the burlap, staves, ropes, or platforms required in connection with its use have been removed.

All balled and burlapped plants that cannot be planted immediately on delivery, shall be set on the ground and the balls well covered with soil, straw, or other acceptable material, and such material shall be moistened periodically to prevent drying.

Identification - All plants shall be properly marked for identification and for checking with legible, weatherproof labels securely attached before delivery to the site.

Peat Moss - This item shall be a granulated sphagnum peat moss furnished in air-dry condition. It shall be finely shredded material, suitable for horticultural purposes. Shredded particles shall not exceed one-quarter (1/4) inch in size. The pH value shall not be less than 3.5 and not more than 5.5.

Mulch Material - The mulch material shall be shredded wood bark having a uniform soft stringy texture, a dark brown color, and freedom from cakes and lumps. Any substitution shall be subject to approval of the Engineer.

Commercial Fertilizer - Commercial fertilizer shall be a blend bearing the manufacturer's guarantee statement of analysis and shall meet the following minimum requirements:

Percent Nutrients, 100 Pound Total Basis: 12% of Nitrogen (N); 12% of Phosphoric Acid (P₂O₅); 12% of Potash (K₂O).

Commercial fertilizer for shade trees, in tree wells, shall be Planting Tablets. Planting tablets shall be tightly compressed, long-lasting, slow release fertilizer tablet weighing between 5 and 25

grams with a potential acidity of not more than 5% by weight and having an analysis of 20-10-5 OR 12-12-12. Any other analysis shall be subject to approval by the engineer. Use of fertilizer tablets for shade trees, intermediate trees and shrubs is at the contractor's option. Tablets shall be installed according to the manufacturer's recommendations.

All fertilizer shall be delivered to the site in the original unopened containers, which shall bear the manufacturer's guaranteed statement of analysis.

ITEM K-925 LANDSCAPE PLANTING (cont)

Stone - Stone placed in and around base of irrigation heads shall consist of nominal 3/4" to 1 1/2" diameter washed gravel.

Tree Wound Dressing - The Engineer shall approve tree wound dressing.

Bracing Stakes - Bracing stakes for plants shall be 2 x 2 inches of hardwood lumber, free of unsound or loose knots and rot, and from cross grain and sapwood or other defects that may impair strength.

Tree Wrapping Material - Wrapping material for trees shall be waterproof crepe tree wrapping paper 30-30-30 in 4" or 6" strips, or burlap in 6" strips. The tying material in wrapping trees shall be jute twine not less than 2-ply for trees 3" or less in diameter.

Wire - Wire used in bracing trees shall be regular, galvanized soft wire of common quality. All wire shall be new and free from bends and kinks. Wire shall not be placed in direct contact with a tree. Wire against a tree shall be placed within a length of garden hose.

Construction

Planting -

Staking and Excavation - Plant pits shall not be excavated or prepared until they have been staked on the ground with location approved by the Engineer. All plant pits shall be excavated to the depth and size as shown on the plans and/or as called for in these Specifications.

Plant Grade - Set plants in the planting holes at a level such that the top of the root structure is 1 inch (25 mm) above the surrounding soil. Set each plant in the center of the planting hole, plumb, and straight. If the Engineer determines that existing soils are compacted or poorly drained, set the trees and shrubs with half of the root structure above the existing soil level. Add backfill mix around the root structure so that the edges of the root structure are covered by a minimum of 12 inches (300 mm).

Pits - Trees (not in tree wells) shall be planted in individual pits two feet greater in diameter than the plant ball.

Pits - Shrubs shall be planted in individual pits or in trenches. The width of trenches shall be no less than twelve inches greater than the diameter of the ball, and shall have vertical sides. Pits for shrubs shall be no less than twelve inches greater in diameter than the diameter of the ball, and they shall have vertical sides. The depth of such pits and trenches shall not be less than twelve inches more than the depth of the ball when the shrub has been set at the proper plant grade.

Balled and Burlapped Plants - After the trees have been properly set in tree pits, and partially backfilled, the cord and burlap shall be loosened from the top of the ball, but the burlap shall not be pulled out from under the ball. Remove the top one-third of the wire from root balls having wire baskets. ROT-PROOF BURLAP SHALL NOT BE USED.

Backfill Mix - For all plantings, use backfill mix consisting of the following:

- a. 1 part excavated soil.
- b. 1 part sand
- c. 1 part spagnum peat moss or approved compost.
- d. A slow release fertilizer (0-20-20 or equal) added at a rate of 5 pounds per cubic yard to backfill mix. Or apply a surface fertilizer as prescribed in Fertilizer paragraph.

ITEM K-925 LANDSCAPE PLANTING (cont)

Mix backfill at project site.

After setting the tree in the center of the pit, the pit shall be filled to the required grade with the topsoil mixture that shall be thoroughly settled by frequent tamping and watering. There shall be no air space between soil mixture and root ball.

Staking and Guying - The Contractor shall be wholly responsible for assuring that all trees are planted in a vertical and plumb position, and remain so throughout the life of this Contract and maintenance bond. Trees may be staked and guyed depending upon the individual preference of the Contractor, however, prior to their installation the Engineer must approve any bracing procedures.

Trees that sway excessively, move out of plumb, blow down, or are otherwise injured due to settling or failure of bracing techniques, during the life of this Contract and maintenance bond period, will be rejected by the Engineer and shall be replaced or corrected by the Contractor at the contractor's own expense and at the discretion of the Engineer.

Pruning - Plants shall not be pruned prior to delivery, except as authorized by the Engineer. All pruning on the planting site shall be as follows:

- A. The ends of all broken and damaged branches and roots of one-quarter inch (1/4") or larger diameter, shall be pruned with a clean cut, removing only the injured portion. All broken branches and stubs shall be removed.
- B. All wounded or pruned surfaces of one inch or more in diameter shall be painted with approved tree wound dressing.

Wrapping - Wrapping shall be in accord with section 661.15. The Contractor shall be responsible for the condition of this wrapping throughout the life of this Contract. Any damage resulting from the improper installation or maintenance of this wrapping shall be the responsibility of the Contractor and immediately prior to final inspection the Contractor shall replace such damaged trees, unless otherwise directed by the Engineer.

Mulching - All trees not planted in sodded areas shall receive a three inch deep layer of mulch. Mulch shall be pulled away from making direct contact with the tree bark. Bark shall have direct exposure to air.

Edging and Surface Treatment - Where individual plants are arranged in a group, the area between the pits or trenches shall be filled to the finished grade with clean soil from the excavation of plant areas, or with other acceptable soil. After filling has been completed and prior to any required mulching, the entire area between and around the shrubs shall be spaded and pulverized to a depth of three inches and then neatly edged in a line and in a manner acceptable to the Engineer. Arrangement of pits and shrubs must meet with the approval of the Engineer. For individual trees place mulch in a circular bed centered on the tree trunk. Unless otherwise specified the bed diameter shall be three feet. The outer perimeter of the bed shall be neatly shovel cut.

Fertilizer - For trees place fertilizer tablets according to manufacturer's instructions or a surface applied commercial fertilizer (12-12-12) shall be evenly applied over the backfilled area at the rate of 1/2 pound per inch of caliper. For shrubs place fertilizer tablets according to manufacturer's instructions or a surface applied commercial fertilizer (12-12-12) shall be

ITEM K-925 LANDSCAPE PLANTING (cont)

evenly applied to the backfilled area at the rate of 1/4 pound per shrub or over the top of the planting bed at the rate of 5 pounds per 100 square feet. Care shall be taken so that the fertilizer does not contact the stem, trunk, branches or leaves of the plant. For mixing fertilizer into backfill mix see Backfill Mix.

Groundcover and Vine Planting -

Staking and Excavation - Planting areas shall not be excavated or prepared until they have been staked, or otherwise indicated, on the ground with the location and outline approved by Engineer. All plant areas shall be excavated to depth and size as shown on the plans and/or as specified herein.

Pits - Groundcovers or vines shall be planted in individual pits or trenches. Pits shall have a diameter or width not less than 8 inches for 2 1/4" pot size plants or 12 inches for 4 inch pot size plants, and have a depth less than 12 inches. For plant spacing less than one foot apart as per plan drawings the entire bed area shall be tilled to 12" depth.

Plant Grade - Groundcovers and vines shall be set to the finished grade so that they have the same relationship to the surrounding grade as they had before transplanting or before being taken out of a pot.

Peat Moss - Peat moss shall be roto-tilled into groundcover bed at the rate of 3 inch depth of peat moss to 12 inch depth of tillage.

Planting - Planting shall be in accord with paragraph 661.12 of ODOT Construction & Material Specifications.

Mulching and Fertilizing – Mulching and fertilizing shall be in accord with paragraph 661.13 of ODOT Construction & Material Specifications.

Payment

The price bid for this item shall include all labor, equipment and material incidental to installing the landscape planting materials. The laying of sod is covered under a separate item.

Items included for payment as part of this specification shall be indicated on the plans and/or listed in the proposal. Payment shall be made at the contract price bid for the specified items.