202547 - REMOVAL AND DISPOSAL OF EXCESS MATERIALS

Description:

This item will consist of removing (i.e. loading and hauling) and disposing of excess materials, including soil, rock and debris, that is excavated from private utility trenches or on-site to an approved disposal site.

Construction Methods:

Upon Award of the Contract, the Contractor shall immediately notify Delaware State University's Contract Administration office in writing of the intended disposal site(s) and the proposed haul routes. DelDOT reserves the right to reject the site(s) and/or the hauling routes. Material hauling will also be governed by the provisions of Subsection 105.12, Load Restrictions, of the Standard Specifications. Upon receiving written approval of the site(s) and hauling routes from DelDOT, the Contractor shall obtain all permits necessary to haul and dispose of the materials and shall submit a copy of same to the District Engineer.

Method of Measurement:

The quantity of excess material removed and disposed of will be measured in cubic yard (meter).

Basis of Payment:

The quantity of excess material removed and disposed of, in excess of contract scope, will be paid for at the Contract unit price per cubic yard (meter) for removal and disposal of excess material. Price shall be full compensation for removing and disposing of the material and all equipment, tools, labor, work and any other items incidental thereto and necessary to complete the work.

END OF SECTION 202547

302006 – Graded Aggregate Base Course

Description:

This work consists of furnishing, placing, and compacting graded aggregate base course materials on a prepared subgrade or base.

Materials:

The material used to construct graded aggregate base course shall conform to the requirements of Section 813 and Section 821, Type B.

Construction Methods:

Subgrade Placement:

The subgrade shall be properly constructed in accordance with Subsection 202.06. No base course material shall be placed until the subgrade has been approved by the Engineer.

Placement:

1. ***Equipment.*** The aggregate materials shall be spread uniformly by an approved spreading machine or box in such a manner that no segregation occurs. A conventional motor grader will not be approved for placement of graded aggregate on mainline roadway sections. Where it is not possible to use a spreading machine or box in patching or other tight areas, other approved methods can be used only in such manner that no segregation occurs. Water shall be uniformly applied with an approved sprinkling device. Compaction shall be uniformly attained by approved rollers or compactors. No graded aggregate shall be placed until approved equipment is on the Project site and is operational.

2. ***Spreading and Compacting.*** Graded aggregate material conforming to the requirements of Section 821 shall be placed in successive layers. Each layer shall be placed in a level, uniform cross-section not to exceed 8" (200 mm) in depth, loose measurement, unless otherwise approved by the Engineer. The material shall be deposited and spread parallel to the centerline, and the layer shall extend to the full width as shown on the Plans. The material shall be handled so that no segregation of fine or coarse particles occurs. No more than 1,000' (300 m) of material, as measured along the roadway centerline, shall be spread in advance of compaction operations. Each layer shall be properly compacted as specified, before starting the next layer. Water shall be added before the material is compacted. The water shall be applied in a manner that results in a uniform and adequate moisture content. Compaction or rolling shall be performed parallel to the roadway centerline starting at the edges and progressing toward the center. It shall continue until each layer is thoroughly and uniformly compacted to the full width as shown on the Plans. After compacting, all voids in the surface of each layer shall be filled with aggregate meeting the requirements of Section 813, Delaware No. 10. Water shall be applied to the surface and compaction continued. Additional Delaware No. 10 aggregate placement, water application, and compaction shall continue until the layer of base material is well bonded and firm, as determined by the Engineer. In no case shall vehicles be allowed to travel in a single track or to form ruts in the base course. If any sharp irregularities are formed in the subgrade or base course material, the affected area shall be scarified to a depth of 6" (150 mm) and compacted to conform to the requirements of Section 202 or this Section.

3. ***Performance.*** The moisture content of the base course material at the time of compaction shall be within 2% of the optimum moisture content. If the moisture content is not within 2% of optimum, the material shall either be moistened or dried, as needed, and thoroughly mixed before compaction. Compaction of graded aggregate Type A shall continue until each layer is thoroughly and uniformly compacted into a firm and unyielding surface, to the satisfaction of the Engineer. Compaction of graded aggregate Type B shall continue until each layer is thoroughly and uniformly compacted to 98% or more of the laboratory maximum density obtained on a sample of the same material. If the material is too

coarse to use the test methods listed below, compaction shall continue until there is no movement of the material under the compaction equipment.

The determination of compliance with performance requirements as specified in this Subsection shall be in accordance with the following test methods, as modified by the Department:

1. AASHTO T 99 Method C, Moisture-Density Relationship.

2. AASHTO T 191, Density By Sand Cone.

3. AASHTO T 224, Coarse Particle Correction.

4. AASHTO T 238, Density By Nuclear Methods.

5. AASHTO T 239, Moisture Content By Nuclear Methods.

6. AASHTO T 272 Method C, Moisture-Density Family Of Curves.

The finished surface of the graded aggregate base course shall not vary from that required on the Plans by more than 2" (13 mm) when tested with a 10' (3.048 m) straightedge applied to the surface parallel to the centerline of the pavement and when tested with a template cut to the cross-section of the pavement. The actual thickness of the graded aggregate base course shall not be more than 2" (13 mm) less than the thickness shown on the Plans; however, the actual thickness may be greater than that shown on the Plans. Those portions of completed graded aggregate base course not meeting these performance requirements shall be completely removed and replaced with proper material placed in accordance with this Section.

A straightedge meeting the approval of the Engineer shall be supplied by the Contractor at each placement operation. The straightedge shall be constructed of rigid materials that resist warping and bending.

Method of Measurement:

The quantity of graded aggregate base course will be measured by the cubic yard (cubic meter). The volume of cubic yards (cubic meters) will be measured as the number of square yards (square meters) of surface area of graded aggregate base course, placed and accepted, multiplied by the depth shown on the Plans If the depth of the graded aggregate base course placed and accepted is greater than the depth shown on the Plans, the plan depth will be used to measure the quantity for payment. If the limits of measurement for pay quantities for graded aggregate base course are designated on the Plans, the quantity of graded aggregate base course measured for payment will be the number of square yards (square meters) of surface area multiplied by the depth, placed within the payment lines and grades shown on the Plans. If the limits are not designated on the Plans, or have been changed by the Engineer, in-place dimensions of the accepted graded aggregate base course will be established. The computation of quantity will be made from cross-sections taken after the completion of work under this Section. As an alternate method of measurement, graded aggregate base course will be measured by the ton (metric ton) if so required by the Contract. The weight will be determined according to Subsection 109.01. On jobs paying by the ton (metric ton), the Engineer reserves the right to template areas for payment, through use of a conversion factor supplied by the Department, whenever the Contractor exceeds the limits of base course placement shown on the Plans. Materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer will not be measured for payment.

Basis of Payment:

The quantity of graded aggregate base course will be paid for at the Contract unit price per cubic yard (cubic meter) or by the number of tons (metric tons) installed, as required by the Contract for this material. Price and payment will constitute full compensation for preparing, furnishing, placing, and compacting the materials, and for furnishing all labor, equipment, tools, and incidentals required to complete the work. No payment will be made

for materials placed beyond the designated lines and grades as shown on the Plans or beyond the limits established by the Engineer.

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END OF SECTION 302506

304503 - PORTLAND CEMENT
304504 - CEMENT STABILIZED FULL-DEPTH RECLAMATION

Description:

This work shall consist of stabilization of road pavements by in-place pulverizing and blending of the existing underlying granular material with an appropriate percentage of Portland cement. Use of other stabilizing agents, such as lime, must be approved by the Department. To adjust the grade, Graded Aggregate Base Course shall be added to the stabilized mix. The process shall result in a uniformly mixed, fully compacted and cured mixture of sub-grade and roadway materials to produce a working platform for subsequent paving operations and a structural support for the pavement.

Materials and Construction Methods:

Reclaimed Material. Once this material is pulverized, the following gradations shall be met: 95% passing the 2" (50 mm) sieve and 55% minimum passing the 3/8" (4.75 mm) sieve (AASHTO T27).

Slurry Stabilizing Agent. The slurry-stabilizing agent shall be made of Portland cement and water. Due to particular conditions, the use of lime or limestone dust may be required. If Portland cement is utilized, it shall be Type I or II, meeting the requirements of Section 801 in the Standard Specifications. If lime is utilized, it shall meet the requirements of AASHTO M216.

Water. The water shall be free from minerals or organic substances deleterious to the recycled base and cement and shall meet the requirements of Section 803.

Aggregates. If imported aggregates are required, they shall meet the material requirements of Section 302 of the Standard Specifications.

Curing Materials.

Asphalt. The asphalt used as a curing film for the reclaimed base course shall be RS 1 or RS 2 meeting the requirements of AASHTO M 140 respectively and shall be approved prior to use.

Liquid Membrane Curing Compounds. Shall meet the requirements of Section 812.02(i)(1) of the Standard Specifications.

Preconstruction:

Sampling and Pre-Testing Reclaimed Materials: The Contractor will obtain samples of the granular base and subgrade soils from test pits or cores to the depth to be recycled for laboratory evaluation. The Contractor will provide to the Engineer the following information:

(1) Test Pit and cores location, one sample for every 1500' (500 m) with a minimum of six samples on each mix design, with additional locations selected upon pavement conditions and variability.
(2) Depth of the existing road structure to be recycled unless shown otherwise on plans.
(3) Laboratory test results:

DESCRIPTION OF TEST METHOD	AASHTO TEST
Determintation of water moisture content	T265
Liquid Limit, Plastic Limit, and Plasticity Index of Soil	T89, T90
Sand Equivalent Value of soils and Fine Aggregate	T176
Sieve Analysis of Fine and Coarse Aggregates	T27
Materials Finer than 0.075 mm Sieve in Minteral Aggregates by Washing	T11
Claissifciation of Soils	M145
Moisture-Density Relationship of Soil-Cement Mixtures	T134
Unconfined Compressive Strength (Test implemented on treater material and completed with freeze-thaw cycle)	T208

Mix Design: Design shall be performed by the contractor in accordance with these specifications and submitted to the Engineer for approval 10 working days prior to the planned start of the work. The mixture design shall determine: optimum moisture content, the gradation correction by addition of aggregates (if required), and the percent by weight (theoretical design percentage) of Portland cement or approved stabilizing agent content to achieve 500 psi (1.72 Mpa) compressive strength in 7 days.

Compressive Strength Testing: The Contractor shall test for compressive strength by the following method:

Specimen shall be moist cured for 7 days. Specimen shall then be soaked in room temperature water for 4 hours and frozen overnight. Specimen shall then be soaked again in room temperature water for 4 hours. Upon completion of soaking, specimen shall be surface dried and immediately tested. Unconfined compressive strength shall be greater than 500 psi (1.72 Mpa).

Pavement Design: The hot-mix overlay thickness shall be provided by DelDOT.

Construction:

Equipment. The equipment shall be capable of reclaiming in-place bituminous overlays and road base materials to a depth of 1.3' (0.4 m), and pulverizing them down to the gradation as defined above under **Materials**. Equipment shall be capable of automatically metering additives with a variation of not more than plus or minus two percent by weight of liquids. The cement shall be applied by use of a mobile cement mixer trailer capable of mixing a predetermined ratio of cement and water, or by means of a cyclone screw-type, pressure-manifold type distribution or method as approved by the Engineer. It will also be acceptable to complete the dosing and mixing operations simultaneously in-place.

Maintain all equipment in a satisfactory operating condition.

Mixing. The specific aggregate fractions to be added as required, shall be spread onto the carriageway before the recycler. Break down, pulverize, and mix the pavement and aggregate to a depth that will result in a compacted thickness of 6" (0.15 meters) (unless shown otherwise on the Plans). Pulverized material shall be shaped to rough grade, desired cross-slope, and profile. Apply the designed quantity of Portland cement and water to assure proper compaction.

Cutting depth shall be measured for each 7500' (2500 m) or less. Any section deficient 1" (25 mm) or more from the specified depth shall be corrected at no expense to the Department.

Grading & Compaction. After the surface is finished in conformity to the lines and grades shown on the plans, compaction is completed using pad-foot and steel wheeled vibratory rollers. The vibratory pad-foot roller shall perform the initial breakdown rolling. After initial breakdown rolling and steel drum compaction, the base course shall be fine graded and rolled using the steel drum roller in static mode. The pad foot roller will not be used again on any section that has been fine graded.

The material shall be placed and compacted with the moisture content in the range from optimum moisture content to minus two percent of optimum. Given the reclamation depth, use of vibratory pad-foot roller is required for initial breakdown rolling.

The rolling operations shall be based on the control strip method of density control. The control strip shall be constructed of mixture produced with the reclamation equipment and within the pavement section. The Contractor shall construct at least two (2) control strips by varying the roller sequence to achieve maximum density. Compact the remaining recycled mixture to a target density of at least 96% of the highest average control strip density. Whenever there is a change in the reclaimed materials or compaction method or equipment, or when unacceptable results occur, at least two (2) new test control strips shall be constructed by varying the roller sequence to achieve maximum density. The in-place density of each compacted course shall be determined in accordance with AASHTO T191 or AASHTO T238.

Finishing: Proceed with mixing, grading, and compacting in continuous operations. Complete finishing during daylight hours, unless otherwise permitted.

Surface Tolerances: When directed by the Engineer, completed layer shall be tested for smoothness and accuracy of grade. Difference of level between any point of the surface, controlled by the 10' (3 m) straightedge, shall not exceed 1" (25 mm).

Protection: Protect any finished portion of the base course to prevent marring, distortion or damage of any kind from construction equipment. Immediately correct any such damage to the department's satisfaction.

Curing: Stabilized layers shall be allowed to cure for 7 days after final compaction has been completed. Surfaces shall be protected from drying by an asphalt emulsion (0.68 to 1.36 liters/square meter) and blotting sand or by curing compound. During curing, surface shall be open to traffic.

Weather Conditions: The stabilization work shall NOT be conducted when raining and shall be conducted when the air and ground temperature is at least 45°F (7°C) and rising.

Method of Measurement:

The quantity stabilized pavement will be measured as the actual number of square yards (meters) of pavement stabilized and accepted.

The quantity of graded aggregate base course will be measured by the (metric) ton in accordance with Subsection 302.05 of the Standard Specifications.

The quantity of cement will be measured in accordance with a Subsection 109.01 of the Standard Specifications as the number of pounds (kilograms) of cement used in the completed and accepted stabilized pavement not to exceed, in the proportion of the mix for payment purposes, more than 10% of the theoretical design percentage.

There will be no measurement for water or any stabilizing agents other than cement.

Basis of Payment:

The quantity of stabilized pavement will be paid for at the Contract unit price per square yard (meter). Price and payment will constitute full compensation for sampling, designing the mix, furnishing water and stabilizing agents (other than cement), pulverizing the subgrade, mixing, compacting, furnishing and applying curing materials, and for all labor, equipment, tools and incidentals required to complete the work.

The quantity of graded aggregate base course will be paid for at the Contract unit price per (metric) ton. Price and payment will constitute full compensation for furnishing and spreading the material.

The quantity of cement will be paid for at the Contract unit price per pound (kilogram). Price and payment will constitute full compensation for furnishing, mixing the cement with water, applying the cement water mix, and for all labor, equipment, tools and incidentals required to complete the work.

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END OF SECTION 304503

321723 - PAVEMENT MARKINGS

PART 1 - GENERAL

SUMMARY

A. Section includes painted markings applied to [asphalt] [and] [concrete] pavement.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aexcel Inc.
2. Benjamin Moore & Co.
3. Color Wheel Paints & Coatings.
4. Columbia Paint & Coatings.
5. Conco Paints.
6. Coronado Paint; Benjamin Moore Company.
7. Diamond Vogel Paints.
8. Dunn-Edwards Corporation.
9. Ennis Traffic Safety Solutions, Inc.
10. Frazee Paint; Comex Group.
11. General Paint.
12. Kwal Paint.
13. M.A.B. Paints.
14. McCormick Paints.
15. Miller Paint Co.
16. Parker Paint; Comex Group.
17. PPG Industries.
18. Pratt & Lambert.
19. Rodda Paint Co.
20. Rohm and Haas Company.
21. Scott Paint.
22. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.

1. Color: White, Blue.

B. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

1. Color: White, Blue.

C. Glass Beads: AASHTO M 247, Type 1[made of 100 percent recycled glass].

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

END OF SECTION 321723

401801 – WMA Superpave, Type C, 115 Gyrations, PG 64-22
Superpave- Warm Mix Asphalt (WMA)

Description:

Warm mix asphalt (WMA) is the generic term used to describe the reduction in production, paving, and compaction temperatures achieved through the application of one of several WMA technologies.

The WMA technologies follow all Superpave specifications for the appropriate mixture except as modified herein.

Materials:

WMA may be produced by one or a combination of several technologies involving plant foaming processes and equipment, mineral additives, or chemicals that allow the reduction of mix production temperatures to within 185^{o}F to 275^{o}F.

Mix Design:

Develop and submit a job mix formula for each mixture according to AASHTO R35. Each mix design shall be capable of being produced, placed, and compacted as specified. Apply all mix design requirements for Superpave HMA to the development of the WMA mix design.

The contractor shall submit a written mix design formula for review and approval at least 30 calendar days before production. The following information shall be submitted:

1. WMA technology and/or additive information.
2. WMA technology manufacturer's recommendation for usage.
3. WMA technology manufacturer's established target rate for water and additives, the acceptable variation for production, and documentation showing the impact of excessive production variation.
4. WMA technology manufacturer's material safety data sheets (MSDS).
5. Documentation of past WMA technology field application including points of contact.
6. Temperature range for mixing and compacting.
7. Asphalt binder performance grade test data over the range of WMA additive percentages proposed for use.
8. Laboratory test data, samples and sources of all mix components, and asphalt binder viscosity-temperature relationships.

The contractor shall follow the manufacturer's recommendation for incorporating additives and WMA technologies into the mix. The contractor shall also comply with the manufacturer's recommendation regarding receiving, storage, and delivery of additives.

Construction:

Production Plants. The contractor shall modify their production plant as required by the manufacturer to introduce the WMA technology. Plant modifications may include additional plant instrumentation, the installation of asphalt binder foaming systems and/or WMA technology delivery systems, tuning the plant burner and adjusting the flights in order to operate at lower production temperatures and/or reduced tonnage.

Weather Limitations. Place WMA only on dry, unfrozen surfaces and only when weather conditions allow for proper production, placement, handling, and compacting. Even with WMA technologies, the ambient paving temperature shall be above freezing.

Hauling Equipment, Pavers, Rollers, Joints, Compaction Requirements, Joints, Surface Tests, Method of Measurement, and Basis of Payment shall be as stated in the appropriate Superpave item with the same pavement type, gyration, asphalt binder grade, and stone type.

END OF SECTION 401801

SECTION 404000 BITUMINOUS SURFACE TREATMENT

Description:
This work consists of constructing one or more courses of bituminous material and aggregate upon the completed and accepted foundation or existing surfacing.

MATERIALS:

Asphalt:
The asphalt for bituminous surface treatment shall be RC-70 or CRS-1 for the prime coat and RC-250 or CRS-2 for seal coats. All material shall conform to the requirements of Section 811 or 817 whichever is applicable. The material used shall be applied within the following temperature limits:

Material	Limits
RC-70	80 to 150 °F (27 to 66 C)
RC-250	100 to 175 °F (38 to 79 C)
CRS-1	70 to 140 °F (21 to 60 C)
CRS-2	125 to 185 °F (52 to 85 C)

Coarse Aggregate:
Coarse aggregate shall conform to the following requirements:

(a) Coarse aggregate for the initial treatment may consist of crushed slag composed of clean, tough, durable pieces of air-cooled blast-furnace slag, reasonably uniform in density and quality, and free of glassy particles, coke, dirt, or other objectionable matter.

(b) Crushed slag in dry condition shall weigh not less than 70 lb/ft³ (1120 kg/m³) when tested according to AASHTO T 19/T 19M, Rodded Method.

(c) Coarse aggregate for initial treatment may also be crushed stone or crushed gravel weighing not less than 95 lb/ft³ (1520 kg/m³) when tested according to AASHTO T 19/T 19M and conforming to the requirements of Section 805.

(d) The slag, crushed stone, or crushed gravel shall conform to the grading requirements of Section 813, Delaware No. 57 or 67.

(e) Coarse aggregate for the two treatments following the initial application shall consist of crushed chips composed of crushed stone, crushed gravel, or crushed slag, conforming to the requirements of Section 813, Delaware No. 8.

Fine Aggregate:
Sand for tack coat shall conform to the requirements of Section 804.

EQUIPMENT:

Distributors:
The distributors used shall be capable of uniformly applying the bituminous material in liquid form. Devices to control the pressure, volume, and temperature shall be provided. Each distributor shall have an approved calibration chart, be equipped with an approved sampling device, and conform to the following:

(a) Pressure. The pressure shall be supplied by a positive displacement pump or air compressor. The pressure shall be uniform throughout the entire width of spray. If pressure is supplied by an air compressor, automatic controls must be provided to maintain sufficient and even pressure throughout the application of an entire load.

(b) Temperature. The distributor shall be equipped with a heating system that applies heat uniformly across the width of the tank. Provisions shall be made for circulating or agitating the material whenever necessary while heating. The distributor shall be equipped with a thermometer marked in degrees Fahrenheit (Celsius) of sufficient range to determine the actual temperature of the material.

(c) Tachometer. All distributors shall be provided with an approved tachometer recording feet (meters) per minute with a tabulation of feet (meters) per load with adjustments. Each load tabulation shall start at zero. There shall also be a totaling tabulation of this instrument.
(d) Volume. A tachometer shall give correct readings of the speed, and the volumetric efficiency of the distributor shall ensure the correct volume at various speeds. Tests shall be required to prove the volumetric efficiency of the distributor at various speeds as directed by the Engineer.

(f) Circulating System. All pump distributors shall be equipped with a circulating system designed to maintain a homogenous liquid while circulating in the distributor tank. This circulating system shall also be arranged to circulate the material in the tank truck before application. Air distributors shall be equipped with a device for agitating the bituminous material in the tank trucks when necessary.

(g) Tests. Necessary tests shall be made to determine the accuracy of all pressure gauges, tachometers, and pump efficiencies. The tests shall be made by the Contractor when and as required.

(h) Spray Bars. Each distributor shall be equipped with spray bars capable of applying material uniformly throughout the entire length of the spray bars when they are extended. Spray bar extensions shall be provided for applying up to a 24′ (7.3 m) width in one operation. Spray bars shall be equipped with a cleaning device and a shut-off valve to prevent dribbling, dripping, or streaking.

(i) Tank Capacity Gauge. A float or other approved type tank capacity gauge shall be furnished to indicate the volume in the tank in not less than 25 gal (100 L) units. The gauge shall have adjustments for correction. Tanks shall have a minimum capacity of 750 gal (2800 L). If the Engineer deems that the equipment applying the material is inadequate or fails to comply with all regulations, the Engineer will order the equipment to be removed from the job and require that another unit be placed on the work.

Mechanical Spreader:
The Contractor shall furnish and operate at least one approved mechanical spreader capable of receiving the material to be spread and being accurately adjusted to distribute the aggregate uniformly at a regulated truck speed.

Broom Drag:
A broom drag shall be furnished and used on the initial application of coarse aggregate. The broom drag shall be a non-revolving type, at least 15′ (4.5 m) in length, and shall have at least four rows of brooms. One row must be at each end of the drag.

Rollers:
The Contractor shall furnish and operate at least two power rollers. One power roller shall be three-wheeled, rated by the manufacturer to be between 5 and 8 tons (4500 and 7300 kg). The other power roller shall be a self-propelled, pneumatic-tired roller of approved design and weight, unless otherwise directed. The tires of the rubber tire roller shall be uniformly inflated. The difference between the pressure in any two tires shall never be greater than 5 psi (35 kPa). The Contractor shall provide means for checking the tire pressure on the job at all times.

CONSTRUCTION METHODS:

Seasonal and Weather Limitations:

Surface treatment shall not be applied during the following conditions:
(a) on any wet or frozen surface,
(b) when the ambient temperature is below 50 °F (10 °C)
(c) between October 1 and April 15, without written permission from the Engineer, and
(d) when the weather conditions prevent the proper completion of the work, as determined by the Engineer.

Application:
The bituminous surface treatment shall be completed according to the following procedure. The first application of bituminous material shall not be applied until the moisture content of the foundation is within 2% of the optimum moisture content and the roadway has been properly shaped and approved. An initial application of priming asphalt

shall be applied at the rate of approximately 0.5 gal/yd² (2.3 L/m²). Then, approximately 50 lb/yd² (27 kg/m²) of stone or 40 lb/yd² (22 kg/m²) of slag shall be spread from a mechanical spreader. After the initial treatment, two treatments shall be applied using approximately 0.30 gal/yd² (1.4 L/m²) of sealing asphalt and from 17 to 20 lb/yd² (9 to 11 kg/m²) of crushed chips for each application. If slag is used, approximately 0.35 gal/yd² (1.6 L/m²) of sealing asphalt shall be used for each treatment.

Heating and Application of Bituminous Material:

Bituminous materials used for each treatment shall be heated in a manner that ensures even heating of the entire mass and maintained within the specified temperature and pressure range during application. Any material which has been damaged shall be rejected, and any section treated with damaged material shall be removed and replaced. The bituminous material shall be applied in one application at the rates specified using the pressure distributor for the full width of the treatment, unless otherwise directed. The nozzles of the spray bar shall be kept clean at all times. If one or more nozzles becomes blocked during the application of bituminous materials, the distributor shall be stopped immediately, and the nozzles shall be cleaned. The streaked areas shall be made uniform using a hand hose or other approved methods. Joints shall be made by an approved method that ensures proper seal with the preceding application. All excess bituminous material at the transverse junction between distributor loads shall be removed and corrected in a satisfactory manner. If the Contractor is unable to keep the application uniform, the operation shall be discontinued until a more experienced operator or a better distributor, or both, can be provided; or, the Contractor shall take such other precautions as may be necessary to keep the application within specified limits. When applying bituminous materials adjacent to structures or curbs, the Contractor shall furnish and use effective means of protecting the structures or curbs from discoloration.

Spreading of Coarse Aggregate:

As soon as the bituminous material has been applied, it shall be uniformly covered with the specified amount of coarse aggregate. The aggregates shall be applied immediately after the application of the bituminous material for prime and seal coats. Spreading shall be done directly from trucks using approved mechanical spreaders. Trucks or spreaders shall not drive on the uncovered bituminous material. During the spreading of coarse aggregate, a crew equipped with hand brooms shall broom all areas where the aggregate has been unevenly applied. Additional aggregate shall be placed by hand on all areas not properly covered. If directed, the surface shall then be dragged with a light broom drag until a smooth and even surface is obtained.

Rolling of Coarse Aggregate:

Immediately after brooming and dragging, the coarse aggregate shall be rolled in a longitudinal direction with an approved pneumatic-tired roller or rollers. The rolling shall begin at the outer edges of the treatment and progress toward the center, each pass overlapping the previous pass by one-half the width of the roller. This rolling shall be continuous. Enough rollers will be required to complete the rolling operation within one hour after the application of the asphalt. The rolling shall be repeated as often as required to ensure thorough keying of the coarse aggregate into the bituminous material.

Application of Sand:

Sand shall be applied to asphaltic tack coats at the rate of approximately 10 lb/yd² (5.4 kg/m²) by means of approved mechanical spreaders or as directed.

Opening to Traffic:

The roadway shall not be opened to traffic after the application of the treatments until bituminous materials have set and the coarse aggregate has embedded sufficiently to prevent picking up or whipping off by traffic. Signs, barricades, lights, and necessary incidentals for detouring traffic shall be furnished and maintained by the Contractor.

Method of Measurement:

The quantity of bituminous asphalt material will be measured as the number of gallons (liters) applied through calibrated distributors. To determine the number of gallons (liters) applied to the road at the application temperature, the volume of bituminous material in the distributor tank shall be measured while the distributer tank is on a level surface immediately prior to application and immediately following distribution using a rod graduated in 25 gal (100 L) increments. The actual number of gallons (liters) distributed, corrected to the corresponding volume at 60 °F (16 °C), shall be determined using conversion tables and shall be noted on the tickets. The quantity of coarse aggregate will be measured as the number of tons (metric tons) placed and accepted. The weight of each load will be determined according to Subsection 109.01.

Basis of Payment:

The quantity of bituminous asphalt material will be paid for at the Contract unit price per gallon (liter). The quantity of coarse aggregate will be paid for at the Contract unit price per ton (metric ton). Price and payment will constitute full compensation for furnishing and storing all materials; for applying bituminous surface treatment materials and spreading, broom dragging, and rolling coarse aggregate; for removal and replacement due to damaged bituminous asphalt and aggregate material; for controlling traffic; and for all labor, equipment, tools, and incidentals required to complete the work. Any demurrage or loss of time caused by inadequate or non-compliant equipment will be at the Contractor's expense. Sand will be paid for under Section 756.

END OF SECTION 404000

612501 - PVC PIPE, 4"
612502 - PVC PIPE, 6"
612503 - PVC PIPE, 8"
612504 - PVC PIPE, 10"
612505 - PVC PIPE, 12"
612506 - PVC PIPE, 15"
612507 - PVC PIPE, 18"
612518 - PVC PIPE, 21"

Description:

This work consists of furnishing and installing PVC pipe, including all fittings, in accordance with the locations, details, notes on the Plans and as directed by the Engineer. The PVC pipe shall be used for subsurface drainage or for serving as conduit as specified on the Contract Plans.

Materials and Construction Methods:

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D3034 Type PSM, and pipe shall be of SDR-35 or SDR-41 or SDR-42 for subsurface drainage pipe of the nominal size required by the Plans.

The PVC pipe and fittings shall be free from defects and shall conform to the applicable requirements of ASTM D2466 PVC Pipe Fitting, Schedule 40 for conduit of the size required by the Plans.

The excavation and backfill for the pipe shall be performed in accordance with the applicable requirements of Section 612 of the Standard Specifications, unless otherwise modified on the Plans. The pipe shall be installed at the locations and to the lines, grades, and dimensions shown on the Plans or as directed by the Engineer.

Method of Measurement:

The quantity of PVC pipe will be measured as the actual number of linear feet (linear meters) of each size of pipe placed and accepted, measured from end to end of pipe, including structure wall thickness, but excluding structure interior.

Basis of Payment:

The quantity of PVC pipe will be paid for at the Contract unit price per linear foot (linear meter) for each size of pipe. Price and payment will constitute full compensation for furnishing, hauling, and installing pipe, for all cribbing or foundation treatment necessary to prevent settlement, for all shoring and sheeting, for the replacement of any pipe which is not true in alignment or which shows any settlement after laying, and for all material, labor, equipment, tools, and incidentals required to complete the work.

For pipe under 24" (600 mm) nominal inside diameter, the excavation, bedding, backfill and backfilling will be included in the price for this work. For pipe of nominal inside diameter 24" (600 mm and over), payment for excavation, bedding, backfill and backfilling will be in accordance with Section 208.

10/31/01

END OF SECTION 612501

701000 - CURB AND INTEGRAL CURB AND GUTTER

Description:

This work consists of constructing curbs and integral curbs and gutters on a prepared foundation using either fixed forms or slip forms.

MATERIALS:

Portland Cement Concrete:

Portland cement concrete shall conform to the requirements of Section 812, Class B for either fixed-form work or slip-form work.

Preformed Expansion Joint Material:

Preformed expansion joint material shall be ½″ (13 mm) nominal thickness and conform to the requirements of Subsection 808.06.

Bituminous Joint Sealant:

Bituminous joint sealant shall conform to the requirements of Subsection 808.04 (c).

CONSTRUCTION METHODS:

Preparation of Foundation:

The foundation shall be prepared at the required grade to accommodate the elevations, dimensions, and details shown on the Plans. Existing undisturbed soil, where used as foundation, shall be firm and unyielding. All unsuitable material shall be removed and replaced with approved material. When the foundation is to be any material other than existing undisturbed soil, the compaction and density requirements for the Section covering the material shall govern. Where rock is encountered, the grade shall be excavated to 6″ (150 mm) below the bottom of the curb and integral curb and gutter and backfilled with approved material.

Fixed Forms:

Fixed forms shall be of wood or metal and shall extend the full depth of the concrete. Composite material forms may be used for radii work. Forms shall be straight, free from warp, and of sufficient strength to resist the pressure of the concrete, and shall not displace more than 3/8″ in 10′ (10 mm in 3 m) from the vertical or horizontal plane. Forms shall remain in both horizontal and vertical alignment until their removal. Forms shall be clean and coated with an approved form release agent before concrete is placed. Divider plates shall be metal.

Slip-Forming:

When slip-forming is permitted, contraction joints shall be constructed at 20′ (6 m) intervals. All surfaces front, top, and back shall be tooled or sawed to a minimum depth of 1″ (25 mm) and a minimum width of 1/8″ (3 mm). Where slip-forming is used, expansion joints shall be constructed at radius points, structures, obstructions, and 200′ (60 m) intervals.

Placing Concrete:

The concrete shall be placed on a moist foundation between the forms, consolidated, and worked sufficiently to bring mortar to the surface. The surface shall be struck off to the required contour and finished smooth and even with an approved float. Limitations on placing concrete during hot or cold weather shall be as specified in Subsection 501.04.

Construction of Sections:

All transverse joints shall be sealed with approved joint sealant. The sealing shall be performed immediately after the concrete has cured for 72 hours. Longitudinal joints shall be tooled adjacent to rigid pavements and structures and sealed with approved joint filler. This work shall be constructed in sections having a uniform length of approximately 10′ (3 m). Sections shall be separated by open joints at least 1/8″ (3 mm) wide by use of steel templates. Templates shall be not less than 2″ (50 mm) longer than the depth of the curb. Templates shall be secured during the placing of concrete and shall remain in place until concrete has set sufficiently. No sections shall be less than 5′ (1.5 m) in length.

Expansion Joints for Fixed Forms:

Expansion joints shall be formed in curb and in integral curb and gutter at 40′ (12 m) intervals. When constructed adjacent to concrete pavement, expansion joints shall coincide with the expansion joints in the pavement.

Finishing:

A wood or magnesium float shall be used to rub the surface smooth while the concrete is still green. A steel trowel finish shall next be applied, and finally a soft dampened brush shall be used longitudinally along the surface. Finishing shall be performed to a depth of 2″ (50 mm) below the proposed pavement surface elevation. Before the concrete is given the final finish, the flow line of the gutter shall be checked and any irregularities of more than 1/8″ in 10′ (3 mm in 3 m) shall be corrected. Irregularities in grade or alignment of the exposed surfaces shall not exceed 3/8″ in 10′ (10 mm in 3 m). Vertical alignment shall be sufficiently uniform and regular to ensure complete drainage.

Removal of Forms:

Front forms may be removed as soon as concrete has hardened sufficiently. Rear and side forms shall not be removed for at least 12 hours. Surfaces exposed after 12 hours but prior to 72 hours shall be cured using materials specified in Section 812 or immediately backfilled. Minor defects shall be filled with mortar conforming to the requirements of Section 611.

Curing:

Immediately, upon the completion of finishing, all exposed surfaces shall be cured for 72 hours using curing materials specified in Section 812. During the curing period, pedestrian and vehicular traffic shall not disturb newly completed curb or integral curb and gutter.

Backfilling:

As soon as possible after the removal of forms or completion of the slip-form operation, the spaces adjacent to the curb and integral curb and gutter shall be backfilled to the required elevation with suitable material until firm and solid.

Method of Measurement:

The quantity of portland cement concrete curb and integral curb and gutter will be measured as the number of linear feet (linear meters) along the front face of the finished curb.

Basis of Payment:

The quantity of portland cement concrete curb and integral curb and gutter will be paid for at the Contract price per linear foot (linear meter). Price and payment will constitute full compensation for excavating [limited to 1′ (300 mm)

in depth], furnishing, and placing all materials; for forming, placing, finishing, and curing concrete; for backfilling, compacting, and disposing of surplus materials; for sealing joints; and for all labor equipment, tools, and incidentals required to complete the work. If other than existing soil is approved for use as foundation material, it will be measured and paid for under the appropriate Section. If rock is encountered, measurement and payment for removal of the rock will be made under Section 206.

END OF SECTION 701000

SECTION 705000 PORTLAND CEMENT CONCRETE SIDEWALK

Description:
This work consists of constructing Portland cement concrete sidewalk on a prepared foundation.

MATERIALS:

Portland Cement Concrete:

Portland cement concrete shall conform to the requirements of Section 812, Class B.

Preformed Expansion Joint Material:

Expansion joint material shall conform to the requirements of Subsection 808.06.

Curing Material:

Curing materials shall conform to the requirements of Subsection 812.02 (i).

CONSTRUCTION METHODS:

Preparation of Foundation:

The foundation shall be formed at the required grade to accommodate the elevations, dimensions, and details shown on the Plans for the bottom of the sidewalk. Where the sidewalk foundation is to be existing undisturbed soil, the foundation shall be firm and unyielding. All soft and yielding or other unsuitable material shall be removed and replaced with approved granular material. When the sidewalk foundation is to be any material other than existing undisturbed soil, the compaction and density requirements for the Section covering that material shall govern. Where rock is encountered, the grade shall be excavated to 6″ (150 mm) below the bottom of the sidewalk, backfilled with approved granular material, and thoroughly compacted.

Forms:

Forms shall be of wood or metal and shall extend the full depth of the concrete. Composite material forms may be used for radii work. Forms shall be straight, free from warp, and of sufficient strength to resist the pressure of the concrete, and shall not displace more than 3/8″ in 10′ (10 mm in 3 m) from the vertical or horizontal plane. Forms shall remain in both horizontal and vertical alignment until their removal. Forms shall be clean and coated with an approved form release agent before concrete is placed.

Placing and Finishing Concrete:

The concrete shall be distributed to the required depth and for the entire width of the slab by shoveling, or an approved method which preserves the integrity of the mixture. Concrete shall be thoroughly spaded along all joints and on the inside of the forms for its entire depth. The concrete shall be leveled and immediately struck-off by means of an approved screed. The screed shall be shaped to the required crown and of sufficient strength to retain its shape under all working conditions. While the concrete is still moist, it shall be floated with an approved float of either wood or metal to ensure that all irregularities or depressions are filled. The final finish shall be obtained by either a wood float or hair broom. Concrete shall be finished in accordance with Subsection 501.11. If concrete is permitted to be placed during cold weather, it shall be placed in accordance with Section 501. The sidewalk shall be marked into rectangular slabs 5′ (1.5 m) long by scoring, ½″ (13 mm) minimum, with approved edging tools. The surface edges of each slab shall be rounded to a ¼″ (6 mm) radius.

Expansion Joints:

Expansion joints shall extend from the surface to the foundation and must be at right angles to the sidewalk surface. A ½″ (13 mm) expansion joint, shall be placed across the walk every 20′ (6 m). This distance may be adjusted slightly to match existing joints in previously placed concrete work. Expansion material shall also be

placed longitudinally along one side when sidewalk is placed between curbs, pavements, or any fixed structures. Joints shall be formed around all appurtenances, such as manholes, utility boxes, and poles that extend into and through the sidewalk.

Curing:

Concrete shall be cured according to Section 501 for a period of five days. The sidewalk shall not be opened to pedestrian and vehicular traffic until the end of the curing period.

Backfill:

Immediately at the end of the curing period, the sidewalk shall be backfilled with approved material.

Method of Measurement:

The quantity of portland cement concrete sidewalk will be measured as the number of square feet (square meters) measured at the surface of the sidewalk, placed and accepted.

Basis of Payment:

The quantity of portland cement concrete sidewalk will be paid for at the Contract unit price per square foot (square meter). Price and payment will constitute full compensation for furnishing, hauling, and placing all materials; for preparing the foundation; for shaping the shoulders; for replacing rejected sidewalk; and for all labor, equipment, tools, and incidentals required to complete the work. If other than existing soil is approved for use as foundation material, it will be measured and paid for under the appropriate Section. If rock is encountered, measurement and payment for removal of the rock will be made under Section 206.

END OF SECTION 705000