

**NEW BOSTON INDEPENDENT SCHOOL DISTRICT**

**Addendum #1-Technical Specifications**

REQUEST FOR PROPOSAL- # MS2021-RD

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Middle School Campus Pavement and Drainage Improvements

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ADDENDUM RELEASE DATE: July 7, 2021

PROPOSAL DUE DATE: July 12, 2021 at 12:00 p.m. Local Time

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# TECHNICAL SPECIFICATIONS

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## TECHNICAL SPECIFICATIONS

All construction requirements will meet the *Standard Specifications of Highway Construction, Texas Department of Transportation*, latest edition.



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# TECHNICAL SPECIFICATIONS

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**1.0 GENERAL**

The work to be performed under this section shall consist of furnishing all labor, equipment and materials as necessary in association with site clearing and restoration as shown in the plans and specifications herein.

It shall be the responsibility of each bidder to examine the site carefully and make his own calculations as to costs to be incurred by reason of the requirements of this section.

**2.0 SITE CLEARING AND RESTORATION****2.1 Trees, Shrubs and Underbrush**

All trees, shrubs, underbrush and miscellaneous debris above natural ground surface within the appropriate easements shall be removed as necessary and disposed of by the Contractor. Any decorative shrubs shall be replaced with same type and size.

When trees and shrubs are adjacent the work area and are not to be removed or replaced, the Contractor shall protect such plants by substantial wooden boxes and guards. Contractor shall not allow machinery or employees to scrape, tear or damage the plants in any manner, and if in the opinion of the Engineer such plants would be damaged, hand excavation may be required. The Contractor shall be responsible for all damages to such plants.

**2.2 Fencing**

All fencing within the appropriate easements shall be removed and reconstructed as necessary. Fence reconstruction shall be performed immediately after the improvements have been completed within the adjacent area in the same construction and manner as original. Reconstruction shall include restoring existing material and utilizing new materials as necessary. The Contractor is responsible for securing the breached fence at all times during construction to prevent the release of any livestock. In the event livestock may be encountered, the Contractor shall contact the Owner and Engineer 72 hours in advance of such construction activities.

**2.3 Lawns**

All disturbed lawns shall be repaired by installing solid sod. Grass type shall be the same as original or as approved by the Engineer. Topsoil shall be preserved or hauled in to reestablishment proper finished grade of lawn. All areas to receive solid sod shall be prepared with 5 inches of topsoil and raked smooth to remove all clods or debris greater than 1".

**2.4 Gravel Roads and Drives**

All dirt or gravel roads or drives disturbed due to construction activities shall be restored to its original condition or better. Road and drive reconstruction shall be accomplished by reusing existing aggregate or hauled-in material as approved by the Engineer.

## **2.5 Sidewalks, Curbs and Culverts**

The Contractor shall remove and replace all sidewalks, curbs and culverts as necessary for construction activities. Reconstruction of these items shall be in the same manner and type, or as approved by the Engineer. All finished grades shall match existing conditions or as directed by the Engineer.

## **2.6. State Owned Right-of-Way**

Where construction activities will occur within state owned right-of-ways, the site work shall conform to the appropriate Department of Transportation requirements. The Contractor shall be responsible for notification of the Department of Transportation at least 48 hours prior to such construction activities.

## **2.7 Paved Surfaces**

All paved surfaces to be open-cut and repaired as indicated on the construction drawings shall be paid for at the unit price specified in the Bid Proposal. Damage to paved surfaces not shown on the plans to be open-cut shall be repaired at the expense of the Contractor.

## **3.0 ACCESS TO PROPERTY**

Contractor shall maintain sufficient steel plates of adequate length, width and strength to maintain continual access for adjacent property owners. Costs associated with emergency repairs to driveways and streets as requested by the Owner shall be deducted from the contract price.

## **4.0 TRAFFIC CONTROL**

The Contractor's operations are restricted to appropriate right-of-ways and / or easements. The Contractor shall provide for traffic control devices, including but not limited to flagging, signage, etc as necessary for maintaining safe and continual flow of traffic during construction.

The Contractor shall provide barricades and temporary construction fencing on all open ditches and trenches left unattended.

## **5.0 MEASUREMENT AND PAYMENT**

No separate payment shall be made for any of the items listed in this section, but shall be considered subsidiary to the price for street installation.

**END OF SECTION**

**1.0 GENERAL**

The work covered by this section of the specifications includes all demolition as necessary to construct the proposed project. Items to be demolished shall include but not limited to clearing and grubbing trees and underbrush, existing concrete pavement, and existing asphalt pavement.

**2.0 MEASUREMENT AND PAYMENT**

This item is considered incidental to other work items and therefore not measured and paid for as a bid item.

**3.0 PROJECT CONDITIONS****3.1 Explosives**

The use of explosives will not be permitted.

**3.2 Traffic**

Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

**3.3 Protection**

Provide covered passageways to ensure the safe passage of persons around the area of demolition. Conduct operations to prevent damage by falling debris or other causes to adjacent structures, and other facilities as well as persons.

**3.4 Damages**

Promptly repair damages caused to adjacent facilities by demolition operations, as directed by the Engineer and at no cost to the Owner.

**3.5 Utility Services**

Maintain existing utilities, indicated to remain, keep in service, and protect against damage during demolition operations.

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to the governing authorities.

Arrange and pay for disconnecting and capping utilities services. Disconnect and stub off. Notify

the affected utility company in advance and obtain approval before starting this work. Place markers to indicate location of disconnected services.

#### **4.0 EXECUTION**

##### **4.1 STRUCTURE DEMOLITION**

Demolish structures completely and remove from the site. Use such methods as required to complete the work within the limitations of governing regulations. Demolish concrete in small sections. Break up and remove concrete slabs-on-grade, unless otherwise shown to remain.

##### **4.2 BELOW GRADE CONSTRUCTION**

Demolish foundations to a depth of not less than 12" below the existing ground surface.

##### **4.3 REMOVAL OF EXISTING CONCRETE PAVING**

Existing concrete pavement shall be removed in the areas shown on the drawings. Pavement shall be removed in such a manner that no damage will occur in adjacent slabs. All concrete pavement to be removed where the limits of removal are not at existing joints, shall be scored to a depth of not less than 3 inches with a concrete saw or other similar equipment. Scoring will be done in a straight line and shall be parallel to the existing joints where possible. Care shall be taken not to damage adjacent slabs. If adjacent slabs are damaged during removal operations as determined by the Engineer, the damage portion shall be removed and replaced at the Contractor's expense and in a manner as directed by the Engineer. If cracks or overbreakage into adjacent concrete slabs occur during removal operations, the area within the scoring line shall be widened sufficiently to remove cracks or overbreakage, but if cracks or overbreakage fall within one foot of the next adjacent joint, the remainder of the slab adjacent to that joint shall be removed. During removal operations and after concrete has been removed, the Contractor shall exercise all precautions necessary to keep water from entering the subgrade. If water should enter the excavation, the Contractor shall remove the water by pumping. Any slab or portion of slabs damaged due to negligence on the part of the Contractor shall be removed and replaced at his own expense.

##### **4.4 FILLING VOIDS**

Completely fill below-grade areas and voids resulting from the demolition of structures. Use satisfactory soil materials consisting of stone, gravel, and sand, free from debris, trash, frozen materials, roots and other organic matter, and stones larger than 2" in any dimension. Prior to placement of fill materials, ensure that areas to be filled are free of standing water, frost, frozen material, trash and debris. Place fill materials in horizontal layers not exceeding 6" in loose depth. Compact each layer at optimum moisture content of the fill materials to a density equal to the original adjacent ground. After fill placement and compaction, grade the surface to meet adjacent contours and to provide flow to surface drainage structures.

## **4.5 DISPOSITION OF MATERIALS**

### **4.5.1 Salvaged Items**

Items and materials indicated on Drawings or requested by the Owner to be salvaged shall be removed in a manner to prevent adjacent work from being damaged. Salvaged items and materials shall remain the property of the Owner. The Contractor shall store and protect the items on the Project Site as directed by the Owner.

### **4.5.2 Unsalvaged Items**

Remove from the Project Site and legally dispose of all debris, rubbish, and excess materials existing at Project Site at time of starting work, and/or resulting from the work of this section.

## **4.6 MUNICIPAL OWNED PROPERTY**

### **4.6.1 Protection**

Provide and maintain approved temporary protection of existing installations until project completion and acceptance. Remove temporary protection when and as directed by the Owner.

### **4.6.2 Related Work**

Perform all work relative to removal, storage and/or protection of existing utilities in the way of project construction.

### **4.6.3 Abandoned Utilities**

Existing utilities, which are no longer required, shall be disconnected as directed. Comply with the requirements of municipal agencies and/or utility companies having jurisdiction over such work.

**END OF SECTION**



## 1.0 GENERAL

### 1.1 SUMMARY

The work covered by this section of the specifications and as described in the Bid Form includes all excavation, trenching, backfilling and compaction for street construction as indicated on the drawings and as necessary to construct the proposed project. Contract drawings show Engineer's estimated quantities for reference information only and may not include all items necessary for construction. It is the Contractor's responsibility to identify and estimate quantities for bidding purposes. **All excavation is unclassified material.**

### 1.2 SITE CONDITIONS

A. Unknown Utilities And Obstacles: If any unknown or uncharted utilities are encountered during excavation, promptly notify the Utility Company and the Engineer and if no emergency exists wait for the Engineer's instructions before proceeding. If it is ascertained by the Utility Company that such utility line has been abandoned, the Contractor shall properly cap the line at a depth of 12 inches or more below finish grade. If such unknown utilities are encountered and work is continued without contacting the Engineer for instructions, and damage is caused to said utilities, the Contractor shall repair, at his own expense, such damage to the satisfaction of the utility company concerned.

B. Unknown Obstacles: Should Contractor encounter any unforeseen major obstacle (or rock) in excavation, it is the intention of the Owner to cause an investigation to be made to determine a course of action that will provide for a fair and equitable solution. Rock is defined as boulders measuring 1/2 cubic yard or more and materials that cannot be removed without systematic drilling and blasting such as rock material in ledges, bedded deposits, unstratified masses and conglomerate deposits, and below ground concrete or masonry structures, exceeding 1/2 cubic yard in volume, except that pavements will not be considered as rock.

C. Warranty: The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur within one year after final completion of the contract under which the work was performed. The Contractor shall make, or cause to be made, all necessary backfill, fills, and embankment replacements, and repairs and/or replacements appurtenant thereto, within 30 days after notice by the Engineer or Owner.

## 2.0 PRODUCTS

### 2.1 BACKFILL MATERIAL

Material obtained from project excavations may be used as backfill provided that all organic material, rubbish, debris, and other objectional material is removed. Rock, broken Portland cement concrete and bituminous pavement shall be subject to following size limitation:

Area within one ft. below subgrade - 1-1/2" max. dim.

Backfill Material hauled in from off-site as necessary shall be submitted to the Engineer for approval prior to bringing material on-site.

### **3.0 EXECUTION**

#### **3.1 PREPARATION**

Perform work in accordance with OSHA standards. Employ a Trench Safety System for excavations over 5 feet deep.

#### **3.2 PROTECTION**

- A. Existing Utilities: Before starting any excavation work, Contractor shall locate all existing utilities. Existing utilities to remain shall be protected at all times by approved methods. Damage to existing utilities as the result of Contractor's operations and/or improper protection shall be immediately repaired to the satisfaction of the utility company and/or the Owner without additional expense to the Owner.
- B. Existing Structures: Whenever existing utility structures or branch operations leading to main sewers, drains, conduits, pipe or structures present obstructions to the grade and/or alignment of the pipe, they shall be permanently supported, relocated, or reconstructed by the Contractor working under the supervision and direction of the Owner of the utility or obstruction involved.
- C. Other Trades: Protect, as necessary to avoid damage, the equipment, materials, and the installations of other trades who are executing work currently with work of this Section until all work of this Section has been completed.
- D. Excavation: Excavation and new work shall be maintained and protected from cave-ins, slides, settlement, and other injurious conditions by bracing, shoring, and other methods which will enable the work to be carried on safely and expeditiously.

#### **3.3 LAYOUT**

Excavation shall be made in accordance with the lines and grades as indicated on the Drawings. Construction layout control shall be the responsibility of the Contractor and shall be as approved by the Engineer.

#### **3.4 EXCAVATION**

The Contractor shall perform all excavation of every description and of whatever substances encountered, to the depths indicated on the Drawings or as otherwise specified. During excavation, materials suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed from the site of the work and disposed of at the Contractor's expense. Grading shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping, well point, or by other approved method. Earth excavation shall comprise all materials not otherwise classified and shall include but is not limited to clay, silt, muck, gravel, hardpan, or loose stone in masses.

### **3.5 OBSTRUCTIONS**

A. Rock: Rocks, boulders, large stones, buried trees or stumps shall be removed from the subgrade and refilled to subgrade with granular fill and thoroughly compacted.

B. Miscellaneous Items: Any miscellaneous obstructions, shown on the Drawings or otherwise required to be removed and not specifically described herein shall be removed and disposed of by this Contractor in a manner consistent with provisions herein for other items. Such items shall not be paid for separately.

### **3.6 DEWATERING**

The Contractor shall keep all excavations free from water at his own expense. The Contractor shall build all dams and other devices necessary for this purpose, including lowering the water table below excavation bottom by well points and pumping, and provide and operate pumps of sufficient capacity for dewatering the excavations in such manner as shall not cause injury to the public health, to public or private property, to any portion of the work completed or in progress, or produce any impediment to the use of the highways, roads, lanes, streets by the public.

### **3.7 COMPACTION REQUIREMENTS**

Minimum one compaction test per 150 linear foot of street for each fill layer and at least one test per fill layer at each street intersection.

### **4.0 MEASUREMENT AND PAYMENT**

This work item shall be measured in accordance with the units shown in the Bid Form of the contract documents. Earthwork, being both cut and fill required to bring the existing ground surface to the proper subgrade elevations. Payment shall be made per the unit pricing indicated in the Base Bid of the contract documents as the work is completed; which compensation shall include all material, equipment, tools, supervision, accessories and appurtenances required to successfully complete the work.

**END OF SECTION**

**1.0 GENERAL**

This item shall consist of furnishing and placing thermoplastic pavement markings or heat-fused, preformed thermoplastic pavement markings, including words, arrows, and emblems, of the color and type specified, and the removal of pavement markings, all according to these specifications and in conformity with the dimensions and at the locations shown on the plans or as directed. Refer to Arkansas 2014 Standard Specification for Highway Construction, Section 719 Thermoplastic Pavement Marking.

The markings are to be placed under existing traffic conditions. The work shall meet the requirements of the MUTCD except as modified by these specifications.

**2.0 MATERIALS**

The material used shall be a product especially compounded for traffic markings and be listed on the AHTD Qualified Products List. Each container shall be clearly and adequately marked to indicate the color, weight, batch or lot number, and type of material.

The material shall meet the requirements of AASHTO M 249. The pigments used for the yellow pavement marking compound shall be heat resistant, silica encapsulated lead chromate yellow and moly oranges, which shall produce a compound meeting the requirements of Fed. 59513 Color No. 33538. The yellow marking material shall contain a minimum of 4 percent by weight of the yellow pigment with a minimum lead chromate content of 60 percent.

Heat-fused, pre-formed thermoplastic pavement marking material shall meet the requirements of AASHTO M 249 with the exception of the relevant differences due to the material being pre-formed.

The material shall not break down or deteriorate if held at the plastic temperature for a period of 4 hours nor by reason of 4 reheatings to the plastic temperature. The temperature-viscosity characteristics of the thermoplastic material shall remain consistent and there shall be no obvious change in the color of the material.

The material shall not deteriorate by contact with sodium chloride, calcium chloride, or other chemical formations on the roadway or streets, or because of the oil contact on pavement material, or from oil droppings from traffic.

After application and proper drying time, material shall show no appreciable deformation nor discoloration under local traffic conditions and in air or road temperatures ranging from 0° F (-18° C) to 160° F (71° C). The material shall not smear or spread under normal traffic conditions at temperatures below 160° F (71° C).

Under this specification, the term "drying time" shall be defined as the minimum elapsed time after application when the pavement marking shall have and retain the characteristics required in the preceding paragraphs. In addition, the drying time shall be established by the minimum elapsed time after application when traffic will leave no impression or imprint on the applied marking. The drying time shall not exceed a characteristic straight-line curve, the limits of which are 2 minutes at 50° F (10° C) and 15 minutes at 90° F (32° C), measured at a maximum relative humidity of 70%.

The pavement markings shall maintain its original dimension and placement. The exposed surface

shall be free of tack. Cold ductility of the material shall be such as to permit normal movement with the road surface without chipping or cracking. The material shall not be slippery when wet and it shall not lift from the pavement in freezing weather.

The marking shall have a uniform cross section. The density and character of the material shall be uniform throughout its thickness and shall be completely reflectorized both internally and externally. The glass beads used for the drop-on application shall meet AASHTO M 247 with a Type I gradation and shall be suitably treated to resist moisture and retain free flow properties. Beads shall not be specially treated to enhance flotation.

### **3.0 CONSTRUCTION REQUIREMENTS**

The thermoplastic compound shall be screed or ribbon extruded to the pavement surface. Heat-fused, pre-formed pavement markings shall be fusible to asphalt or portland cement concrete surfaces by means of the normal heat of a propane weed-burner type of torch or other heating device as recommended by the manufacturer.

The equipment used to apply the thermoplastic compound onto the pavement shall be suitably equipped for heating and controlling the flow of the material. The equipment shall be constructed to provide continuous mixing and agitation of the material. The conveying parts of the equipment, between the main material reservoir and applicator, shall be so constructed as to prevent accumulation and clogging. The equipment shall be constructed so that all mixing and conveying parts, up to and including the applicator, maintain the material at the plastic temperature. The thermoplastic material shall be dispensed at a temperature recommended by the manufacturer. The applicator shall include a cutoff device remotely controlled to provide clean, square stripe ends and to provide a method for applying skip lines.

The thermoplastic reservoir shall be insulated and equipped with an automatic thermostatic control to maintain the proper temperature of the material.

The thermoplastic machine shall comply with the requirements of the National Board of Fire Underwriters.

Beads applied to the surface of the completed stripe shall be applied by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are immediately dispensed upon the completed line. The bead dispenser shall be equipped with an automatic cutoff control, synchronized with the cutoff of the pavement marking equipment. The beads shall be automatically applied at a minimum uniform rate of 8 pounds (39 kg) of glass beads to every 100 square feet (100 sq m) of surface.

Heat-fused, pre-formed pavement markings shall be instantly highly reflective without the application of additional glass beads.

Thermoplastic markings shall not be applied to the pavement surface when the pavement surface temperature is less than 50° F (10° C) or when the pavement surface shows evidence of moisture.

On new concrete pavements where no pavement markings exist or on existing concrete or asphalt pavements where the existing pavement markings are paint or thermoplastic and do not conflict with the proposed pavement markings, blasting with water or sand or a combination thereof will be required to remove any curing compound, oxidized paint or thermoplastic, or dirt to ensure a good bond. This blasting is considered surface preparation. On newly constructed asphalt pavements any sand, grit, or other surface contaminants must

be removed using compressed air and/or sweeping. Water blasting may be necessary to remove surface contaminants which cannot be removed by the use of compressed air and/or sweeping. This work is considered surface preparation.

Conflicting pavement markings that exist shall be removed by blasting with water and/or sand or by grinding. This blasting or grinding is considered pavement marking removal.

The thickness of thermoplastic markings above the roadway surface shall be 90 mils (2.3 mm) (a minimum of 1584 pounds per mile [446 kg/km] of 4" [100 mm] line). The thickness will be measured by a device supplied by the Contractor during the course of the project capable of measuring the thickness of the marking as installed on the pavement. The minimum thickness, as required above, will be measured in the center of the line when gauged by the equipment described above. The minimum thickness 1/2" (12 mm) from the edges shall not be less than 75% of the thickness required in the center. Maximum thickness of markings is 3/16" (5 mm).

Heat-fused, pre-formed pavement markings shall be supplied with a minimum average thickness of 90 mils (2.3 mm) before application on the roadway surface.

On concrete pavements, paint pavement markings according to Section 718 shall be applied as a primer for the thermoplastic markings, except where thermoplastic markings are to be applied over existing thermoplastic markings. Paint applied to concrete pavement solely as a primer will not be measured or paid for separately, but full compensation therefor will be considered included in the contract unit prices bid for the various items of Thermoplastic Pavement Markings. A primer other than paint may be used when recommended by the thermoplastic manufacturer.

A primer is not required for asphalt pavements, but paint pavement markings complying with Section 718 may be used by the Contractor as a primer at no cost to the Department.

When temperature limitations prohibit placement of thermoplastic markings within the 3 or 14 day limit specified in Section 604, the Contractor shall place painted markings according to Section 718. Painted markings required due to temperature limitations will be measured and paid for under Section 604. In this case, the Contractor shall maintain the painted markings at no additional cost to the Department until the thermoplastic markings, including primer if required, are installed.

Spotting the pavement for center line location on two-way roadways is required. It will be the responsibility of the Contractor to spot using a string line or chain so that spots are placed at intervals not exceeding 10' (3 m). The Department will establish the no passing zones if required. On one-way roadways spotting is required for the initial edge line or lane line placed. Edge lines and/or lane lines may be installed by referencing to center or lane lines. Edge lines shall not be broken for driveways. The trace of the thermoplastic line shall be uniform.

The finished lines shall have well defined edges, shall be uniform in thickness, and shall be straight and true. No stripe shall be less than the specified width. Any corrections of variations in width or alignment of the stripes shall not be made abruptly. Lines that cannot be corrected to meet these requirements shall be removed in accordance with Section 604 at the Contractor's expense.

Line removal as specified on the plans shall be performed in such a manner that no conflicting pavement marking will be left in place. Removal of the pavement marking by a means that will gouge the surface will not be permitted.

#### **4.0 METHOD OF MEASUREMENT**

Refer to Bid Form Section for payment of Thermoplastic Striping for striping and markings.

**1.0 GENERAL**

The work to be performed under these items consists of furnishing and installing asphalt concrete hot mix (ACHM) binder and surface courses. The work shall be accomplished in close conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

**2.0 MEASUREMENT AND PAYMENT**

The contract bid price for this item is on a unit price basis. Actual quantity of ACHM used shall be measured by square yards complete in place. Payment will be based on the contract bid unit price; which price shall include compensation for ACHM including aggregate, asphalt and additives, hauling, mixing, heating, placing, rolling and finishing and for all labor, tools, equipment, materials and supervision necessary to complete the work.

**3.0 MATERIALS****3.1 ASPHALTIC CONCRETE HOT-MIX (ACHM) SURFACE COURSE**

ACHM Surface Course shall comply with Design Type 2 of Table 407, below.

TABLE 407-1

## REQUIREMENTS FOR ASPHALT CONCRETE SURFACE COURSE

Sieve	A. Design Requirements				Maximum Mix Tolerance
	Type 1	Type 2	Type 3	Type 4	
	Percent Passing				
3/4"	100	100	--	--	
1/2"	85-100	85-100	100	100	
#4	55-80	55-80	60-80	95-100	+7
#10	35-60	35-60	40-60	75-95	+4
#20	22-45	22-45	22-47	45-62	+4
#40	15-35	15-35	15-40	30-55	+4
#80	8-22	8-22	8-24	15-30	+4
#200	2-8	2-8	2-8	5-12	+2
Asphalt Content	4.5-7.5	4.5-7.5	4.5-7.5	6.0-10.0	+0.4
	Type 1	Type 2	Type 3	Type 4	
No. of Blows:	75	50	50	50	
Minimum Marshall Stability, lbs.:	1750	1000	1000	750	
Marshall Flow, 1/100":	7-16	7-16	7-16	--	
% Air Voids: (AASHTO T 166 and T 209)	3.0-5.0	2.5-5.0	2.0-5.0	--	
Minimum % VMA:	14	14	15	--	
Minimum Water Sensitivity Ratio %:	75	70	70		
(as determined by AHTD Test Method No. 455)					
% Mineral Filler:	2-4				
% Anit-strip:	As required for all types				

**3.2 ACHM BINDER COURSE**

ACHM Binder Course shall comply with Design PG70-22

#### **4.0 EXECUTION**

No work shall be started on this Bid Item until the job mix formula has been determined by laboratory design. The Contractor shall utilize an approved laboratory to develop the job mix formula. The laboratory test data, results, and recommendation shall be submitted to the Engineer for approval, prior to any work on these Bid Items.

Construction materials and equipment for this item shall comply with TXDOT standard Specifications.

Construction requirements for this item shall comply with TXDOT Standard Specifications.



**1.0 GENERAL**

The work performed under this Section consists of furnishing and installing cement for stabilization of 8" of in place subgrade at an application rate of 30 lb/sy. The application rate is for bidding purposes only and subject change upon geotechnical laboratory recommendation. See Paragraph 4.1 of this Section.

**2.0 MEASUREMENT AND PAYMENT**

This work item shall be measured by the square yard in place and paid at the contract unit price; which price shall be full compensation for cement, hauling, placing and mixing, labor, tools, equipment, materials and supervision necessary to complete the work.

**3.0 MATERIAL**

Cement utilized for subgrade stabilization shall be hydraulic cement in dry powder form. The cement shall conform to ASTM C-150-42. Water used in the stabilization process shall be clean and free from injurious amounts of oil, salt or other deleterious substances. The water shall not contain vegetable matter or other foreign materials.

**4.0 EXECUTION****4.1 LABORATORY TESTING**

Prior to execution of this work, the Engineer shall obtain the service of a geotechnical laboratory to determine the cement application rate. In the event the geotechnical laboratory's recommendation for cement application rate differs from that specified herein, a change order will be executed to revise the contract unit price for this work item.

**4.2 INSTALLATION**

Mechanical mixing equipment shall be utilized that is capable of mixing (8") in a single pass.

Prior to beginning the cement treatment, the soil shall be shaped to the required grade and section and compacted to sufficient density to prevent rutting under normal operation of construction equipment. Soft areas shall be corrected to provide uniform stability prior to cement application at the direction of the engineer.

Hydraulic Cement may be applied to the partially pulverized material in the dry condition. Spreading shall be accomplished by uniformly distributing the cement to the surface of the subgrade. Spreading equipment shall be of a type and design capable of uniformly distributing the cement without excessive loss.

No equipment, except water trucks and that equipment used for spreading and mixing, shall be permitted to pass over the spread cement until it is mixed with the soil.

Any procedure that results in excessive loss or displacement of the cement shall be immediately discontinued.

Water shall be applied to the spread cement immediately after placing to moisten the cement and form a dust palliative. Water shall be added during mixing operations to moisten the mixture but the total water added to the mixture including that added to form a slurry shall not exceed the optimum by more than 5%.

Mixing may be accomplished by means of rotary tillers, pulvimixers, or other mechanical equipment. The first stage of the mixing process shall continue until the cement and moisture are thoroughly and uniformly dispersed throughout the mixture. After this has been completed, the surface shall be rolled with pneumatic rollers until sealed sufficiently to shed rain.

After the first mixing stage, the mixture shall be allowed to set for a minimum of 3 days or until the mixture becomes friable. During this period, the surface shall be sprinkled as necessary to keep it moist.

After the materials have been satisfactorily mixed and pulverized, the mixture shall be compacted to a density, as determined by AASHTO T 191 or T 238, of not less than 95% of the maximum density obtained by AASHTO T 99. Sprinkling may be necessary during the compaction to maintain the desired moisture content. Compaction shall be accompanied by sufficient blading to eliminate irregularities and maintain the required section.

In the event of rain adding excessive moisture to the uncompacted material, the entire section shall be reworked.

During the final stages of the compaction, the surface shall be shaped to the lines, grades, and cross sections shown on the plans. When required, the surface may be lightly scarified and bladed. Final rolling of the completed surface shall be accomplished with a pneumatic roller.

The completed surface shall be moist cured for a minimum of two (2) days, or as directed by the Engineer. The completed surface shall be maintained in a moist condition until the aggregate base course is installed over the cement treated soil, a maximum of ten days.

The Contractor shall, at no cost to the Owner, maintain the treated soil until the aggregate base course is applied. The maintenance shall be considered as part of the processing of the cement treatment.

**END OF SECTION**

## **1.0 GENERAL**

This is a general specification applicable to all items that are to be constructed wholly or partially of concrete in conjunction with utility construction. The work covered by this section consists of furnishing all material and equipment, and performing all labor for the manufacture, transporting, placing, finishing, and curing of concrete in the structures included in these specifications.

### **1.1 Performance Requirements**

Comply with applicable provisions of the following codes, specifications, and standards except as otherwise shown or specified.

ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."

ACI 318 "Building Code Requirements for Reinforced Concrete."

### **1.2 Submittals**

Laboratory Test Reports shall be submitted for approval 48 hours prior to start of work for concrete materials and mix design tests. Submit reports of Inspection and Testing as specified under "Field Quality Control".

## **2.0 MATERIALS**

### **2.1 Cement**

Cement shall be Type I or Type III Portland Cement at the Contractor's option, conforming to ASTM Specification Designation C-150-42.

Cement shall be stored in weatherproof and dry buildings and shall be free of cakes or lumps at the time it is used in the concrete.

### **2.2 Course Aggregate**

Coarse aggregate shall consist of crushed stone, gravel, crushed gravel, or a combination of these.

Gravel and crushed gravel shall consist of clean, hard, durable particles free from adherent coatings, thin or elongated pieces, soft or disintegrated particles, dirt, organic, or injurious matter.

Coarse aggregate shall have a percent of wear of not more than 30, when subjected to the Los Angeles Abrasion Test.

The maximum amount of deleterious substances in coarse aggregates shall not exceed the following percentages by weight:

Material removed by decantation	1.0%
Shale slate, or other similar materials	1.0%
Clay lumps	0.5%

Soft fragments	0.3%
Other deleterious substances, including fragile, thin, elongated or laminated pieces	3.0%
The sum of all deleterious substances, exclusive of materials removed by decantation, shall not exceed by weight	5.0%

Aggregate shall be free from a harmful excess of salt, alkali, vegetable or other objectionable matter occurring either free or as adherent coatings.

### **2.3 Fine Aggregate**

Fine aggregate shall consist of a sand, or a mixture of sands and not more than 50 percent of stone screenings, with or without a mineral filler. The sand, or mixture of sands, in fine aggregate shall consist of clean, hard, durable, uncoated grains, free from lumps. Stone screenings shall consist of clean, hard, durable, uncoated fragments resulting from the crushing of stone.

Natural sand free from deleterious substances, meeting requirements of ASTM C-33.

### **2.4 Water**

Potable water: Not to exceed a .45% water to cement ratio.

### **2.5 Admixtures**

Set Control Retarder. Non-air-entraining conforming to ASTM C-494, Type B.

Set-Control Accelerator. A water reducing, chlorine-free set accelerating agent conforming to ASTM C-494, Type C or E.

Air Entrainment. ASTM C-260, neutralized vinsol resin.

Calcium Chloride. Not permitted separately or as an admixture ingredient.

### **2.6 Curing**

Sheets shall be waterproof paper ASTM C-171 or white polyethylene sheeting: AASHTO M-171. Liquid types shall be ASTM C-309, Type I or II, Class A. Oily, waxy, or loose residue that could interfere with future coatings, or sealant bond: discoloration of surfaces designated to remain uncovered.

### **2.7 Non-Shrink Grout**

A factory mixed, non-metallic, with min. compressive strength at 28 days to be 5000 psi, conforming to Corps Specification CRD C-621.

## **3.0 MIX DESIGN**

Submit written reports of proposed mix designs for each type of concrete for review prior to beginning concrete production. At Contractor's option, method used to determine proportioning can be either laboratory trial batch or field experience.

Concrete mixes will be designed and made in sufficient number to represent the required water-cement ratios; these mixes shall comply with the requirements herein prescribed for class, strength, and consistency. The water-cement ratio is defined as the total U.S. gallons of water (weight 8.33 pounds) including the moisture content of all aggregates per sack of

cement (weight 94 pounds net). The minimum cement factors and maximum water factors for the various classes of concrete shall not exceed a .45% water to cement ratio.

All concrete shall have a 28 day strength of 3,000psi. unless otherwise noted.

### **3.1 Report Data**

Report shall include the following: Aggregate identification, aggregate tests, aggregate scale weight, cement brand, (type, composition), admixture brand, (type, amount), water amount, proportions per cu. yd., gross wt. and yield per cu. yd., slump, air content, strength at 7 and 28 days based on min. of 3 test cylinders.

### **3.2 Maximum Slump**

Vibrated.	3".
Non-vibrated	4".

### **3.3 Admixtures**

Admixture quantities and application procedures shall be as recommended by manufacturer of admixture for climatic conditions prevailing at time of placing concrete. Refer to articles on "Placing Concrete in Cold and Hot Weather" hereinafter this Section for applicable procedures.

Air Entrainment  
Entrained air shall be 5% ± 1%.

### **3.4 Mix Design Adjustments**

Adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Submit adjustments for review prior to making any change. No additional payment will be allowed for adjustments made to achieve specified performance or for the Contractor's benefit.

## **4.0 EXECUTION**

All concrete not placed in the work within thirty (30) minutes after mixing will be rejected and shall be disposed of by the Contractor at his own cost and expense. Except upon specific written authorization by the Engineer, concrete shall not be placed when the temperature is below 40 degrees F. and falling; but it may be placed when the temperature is above 35 degrees F. and rising, the temperature being taken in the shade and away from artificial heat. Neither salt nor chemical admixtures shall be added to the concrete to prevent freezing.

Should the Engineer find that any concrete placed or to be incorporated in this project fails to meet the requirements as specified herein, it will be rejected and shall be removed and disposed of by the contractor at his own cost and expense. The method of disposing of any concrete shall be subject to the approval of the Owner and Engineer. The Contractor shall replace all rejected concrete work with an acceptable concrete as approved by the Engineer.

All concrete used in this project shall be handled in accordance with Method of Sampling Fresh Concrete (ASTM C172, CSA A23.2.21). The slump test for consistency of concrete should be made in accordance with the Method of Test for Slump of concrete (ASTM C143, CSA A23.2.20). Specimens for strength tests shall be made and cured in accordance with Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Field (ASTM C31, CSA A23.2.14).

#### **4.1 Concrete Mixing**

Concrete shall be composed of fine and coarse aggregates, so graded and proportioned, and thoroughly mixed with the required cement and water as will produce a homogeneous mixture of such quality that the concrete will conform to the design and test requirements of this specification.

Comply with the requirements of ASTM C-94 for Ready-Mix Concrete. No water shall be added to mix after truck has left plant, unless authorized by Engineer.

#### **4.2 Inspection**

Immediately in advance of placing concrete, excavation, forms, reinforcement, inserts, etc., will be inspected by the Engineer and if any part of the work is determined to be unsatisfactory, concrete work shall not proceed at that part until all defects have been remedied and approval has been obtained. Such approval shall not in any way relieve Contractor of his obligation to produce the finished concrete required by provisions of the Drawings and Specifications.

During the progress of the work, the Engineer may cast test cylinders and/or beams of the number and type he may desire for testing to maintain a check on the compressive and flexural strength of the concrete test specimens. The cost of all materials used in test specimens and the cost of providing and maintaining curing facilities shall be included in the contract price bid for the work and will not be paid for as a separate contract pay item.

#### **4.3 Preparation**

Before depositing concrete debris and water shall be removed from spaces to be occupied by concrete. Reinforcement shall be thoroughly secured in position. Concrete shall be wheeled over formwork only on runways supported from forms and not on reinforcing steel.

#### **4.4 Bonding and Grouting**

Before depositing new concrete on or against concrete which has set, thoroughly roughen and clean existing surfaces. Re-tighten forms, slush existing concrete surfaces with coat of neat cement. Place new concrete before grout has attained its initial set. Make grout for horizontal construction joints of cement, fine aggregate in same proportion as concrete to be placed, and from 1/2" to 1" in thickness.

#### **4.5 Cold Weather Placement**

Unless authorized in writing, by the Engineer mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40°F, and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35°F. When concrete is authorized at lower air temperatures, aggregates may be heated by either steam or dry heat prior to being placed in the mixer. The apparatus used shall heat the mass uniformly and shall be so arranged as to prevent occurrence of overheated areas. If the air temperature is less than 35°F at the time of placing concrete, the Engineer may require water or aggregates to be heated to not less than 70°F nor more than 150°F. No concrete shall be placed on a frozen subgrade nor shall frozen aggregates be used in concrete.

#### **4.6 Hot Weather Placement**

Hot weather limitations will only apply to concrete for bridge decks. Hot weather concreting practices will be required when the job site temperature in the shade and away from artificial heat is 80°F and rising. When internal temperature of plastic concrete reaches 85°F, the contractor shall prevent the temperature of succeeding batches from going beyond 90°F by approved methods. If necessary, forms shall be pre-cooled by approved methods immediately prior to concrete placement.

#### **4.7 Handling**

In preparation for placing concrete, all sawdust, chips and other construction debris and extraneous matter shall be removed from the interior of forms.

When placing operations involve dropping concrete more than 5 feet, it shall be deposited through sheet metal or other approved method except where deemed impractical by the Engineer. After initial set of the concrete, forms shall not be jarred and no strain shall be placed on the ends of reinforcement bars which project from freshly poured concrete.

Concrete, during and immediately after depositing, shall be thoroughly consolidated. Consolidation shall be done by mechanical vibration subject to the following provisions:

- (1) Vibration shall be internal unless authorization for other methods is obtained or as provided herein.
- (2) Vibrators shall be of an approved type and design, capable of transmitting vibration to concrete at frequencies of not less than 4,500 impulses per minute.
- (3) Intensity of vibration shall be such as to visibly affect concrete over a radius of at least 18 inches.
- (4) The Contractor shall provide a sufficient number of vibrators to properly consolidate each concrete batch immediately after it is placed.
- (5) Vibrators shall be manipulated so as to thoroughly work concrete around reinforcement and imbedded fixtures and into corners and singles of forms. Vibration shall be applied at the point of deposit and in the area of freshly deposited concrete. Vibrators shall be inserted and withdrawn from the concrete slowly. Vibration shall be of sufficient duration and intensity to thoroughly compact concrete but shall not be continued so as to cause segregation. Vibration shall not be continued at any one point to the extent that localized areas of grout are formed. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which vibration is visibly effective.
- (6) Vibration shall not be applied directly to or through reinforcement to sections or layers of concrete which have hardened to the degree that concrete ceases to be plastic under the vibration. It shall not be used to make concrete flow over distances so great as to cause segregation. Vibrators shall not be used to transport concrete in forms.

- (7) Vibration shall be supplemented by such spading as necessary to insure smooth surfaces and dense concrete along form surfaces and in corners and locations inaccessible to vibrators.
- (8) These provisions for vibration shall also apply to precast piling, concrete cribbing and other precast members except that, if approved, the manufacturer's methods of vibration may be used.

#### **4.8 Pumping**

Pumping equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Pipes carrying concrete to placing area shall be laid out with a minimum of bends and no unauthorized change in size. Where concrete is conveyed and placed by mechanically applied pressure, suitable equipment of adequate capacity shall be used. Aluminum piping will not be permitted. A grout mortar, or concrete with coarse aggregate omitted, shall be pumped through the equipment ahead of the regular concrete to provide lubrication to start pumping operations. This material shall not be used in placement. The lubrication process need not be repeated as long as pumping operations are continuous. Operation of the pump shall be such as to provide a continuous stream of concrete without air pockets. When pumping is completed, concrete remaining in the pipeline, if it is to be used, shall be ejected in such manner that there will be no contamination of concrete or separation of ingredients.

### **5.0 FINISHING**

#### **5.1 Troweling**

All concrete finish so noted shall be troweled smooth, worked to a good hard even surface, free from tool marks and other defects, and finished according to best practice.

#### **5.2 Tolerances**

Slabs, fill and / or mortar set materials to ACI 301, Class B tolerance (with a maximum variation of 1/4 inch in 10 feet). Tolerances shall not be cumulative.

All slab surfaces shall be placed by the use of continuous screeds which are straight and which have been supported by chairs or other approved methods to give surfaces which are within the specified tolerances.

#### **5.3 Patching**

Immediately after removal of forms, pack holes remaining from bolts or tie rods full with cement mortar. Remove and patch all defects or correct as otherwise directed. Fill honeycomb spots with mortar mixed one part cement to 2-1/2 parts sand with minimum amount of water. Finish to match adjoining surfaces.

### **6.0 FIELD QUALITY CONTROL**

#### **6.1 Inspection and Testing**

Contractor shall make arrangements and pay an approved Testing Laboratory for concrete testing. Sample and test all concrete placed at the job site. Each sample shall consist of three cylinders, one for 7 day testing, two for 28 day testing. Secure samples in accordance with ASTM C-172, curing and packing shall be ASTM C-31. Take at least one sample of concrete



from each pouring operation each day. Take at least one sample from each 50 cu. yds. placed in continuous pours. Samples shall be prepared at the job site and cured in laboratory in accordance with ASTM C-39. Contractor may request curing be done in the field when he considers that there is a possibility of ambient temperature falling below 40 deg. F. Obtain cement mill test reports for each test cylinder and indicate the mill test on compression test reports. Perform slump tests at same frequency as sampling, and more often as necessary to control consistency of concrete. Verify that concrete is discharged from mixers within limit of 1 hour.

## **6.2 Failed Strength Test**

If the compressive strength test fails to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength and subject to additional testing as required by the Engineer or Testing Laboratory. All cost incurred for additional testing shall be born by the contractor.

If additional test shows concrete to still be deficient, the concrete represented by the test shall be removed and replaced at the contractor's expense.

## **7.0 SCHEDULE OF CONCRETE FINISHES**

### **7.1 Exposed Concrete**

Vertical and horizontal surfaces shall be hand rubbed free from of any exposed aggregate and or voids.

### **7.2 Non-Exposed**

Concrete surfaces not exposed shall have all forms removed any wall ties broken off and holes filled with non-shrink grout. All areas with exposed aggregate shall be filled and rubbed prior to back fill.

### **7.3 Curing and Protection**

Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 72 hours. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period. Perform final curing of concrete by use of a moisture retaining cover placed on surfaces for the duration of the curing period.

### **7.4 Temperature**

When the atmospheric temperature is 40 deg. F. and below, maintain the concrete temperature between 50 and 70 deg. F. continuously throughout the curing period. When necessary, make arrangements before concrete placing for continuous heating, covering, insulation, or housing as required for the concrete curing period. Provide cold weather predictions complying with the requirements of ACI 306.

## **8.0 MEASUREMENT AND PAYMENT**

Unless otherwise specified, no separate payment will be made for concrete, but the cost of concrete including all labor and materials will be included in the price bid for a completed pipe installation as set forth in the Plans and Specifications.

No separate payment will be made for the work performed and expenses incurred in the concrete sampling, slump test, and strength tests as required by the Engineer.

**END OF SECTION**