



# **CONCRETE PAVEMENT IMPROVEMENT PROJECT PHASE V**

**(8th and Warren Intersection; E. Lee between 6th & Rail Road Right of Way; E. Huisache 128 ft. north half of street between 9th and 10th Streets)**

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## INVITATION TO BID

Sealed Bids marked "**Bid No. 15-02 Concrete Pavement Improvement Project Phase V**" will be received at the Purchasing Department, City Hall, Kingsville, Texas until 1:30 P.M. on Wednesday, January 7, 2015. Immediately thereafter the bid proposals will be publicly opened and read aloud in the Robert H. Alcorn Commission Room. **There will be a Pre-Bid Meeting at 1:00 P.M. on Monday, December 29, 2014 in the Robert H. Alcorn Commission Room City Hall, Kingsville, Texas.** Site visitation will follow. The project involves the labor, material, supervision, equipment, tools, and all the incidentals required to complete the entire project as per specifications.

Prospective bidders must read the Instructions to Bidders, Contract Documents, and Detailed Specifications. Detailed plan and specifications are available online at [www.cityofkingsville.com](http://www.cityofkingsville.com).

The successful bidder will be required to enter into a contract for the performance of the work for the price quoted on the Proposal and will provide evidence of current Personal Injury, Property Liability, Worker's Compensation, and Builder's Risk Insurance.

The Contractor will also be required to submit a Reference and Qualifications statement, if the Contractor has not performed a similar project for the City of Kingsville in the last three (3) years.

The bid will be awarded to the lowest responsible bidder whose bid is determined to be the most advantageous to the City, its officers, employees, and agents. Price, in accordance with law, will not be the sole evaluation factor. Misrepresentation, whether substantial or otherwise, at any stage of the bidding and award process, shall be considered in this and all future bids in determining whether or not a bid is "responsible".

THE CITY, IN ACCORDANCE WITH LAW, RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS. The City shall be the sole judge of "responsible" and "advantageous" and this determination shall be final except in cases of a clear definitive showing that such determination is arbitrary, capricious, and unreasonable.

*D. Mason*  
David Mason  
Purchasing & Technology Director

# CONCRETE PAVEMENT IMPROVEMENT PROJECT PHASE V

## INSTRUCTIONS TO BIDDERS

### 1.0 RECEIPT OF PROPOSALS

- 1.1 Proposals will be received at the time, place and under conditions set forth in the published Invitation to Bidders.
- 1.2 Bidding documents are obtainable from the City under conditions set forth in the Invitation to Bidders.

### 2.0 DISCREPANCIES AND INTERPRETATIONS

- 2.1 Notify the Purchasing Department in writing, at least five (5) working days prior to the scheduled bid opening date, if discrepancies, ambiguities or omissions are found in the bidding documents, or if further information or interpretation is desired.
- 2.2 Answers will be given in writing to all bidders in addenda form. All provisions and requirements of such addenda will supersede or modify affected portions of the bidding documents. All addenda will be incorporated in and bound with the Contract Documents. No other explanation or interpretation will be considered binding. The contractor shall acknowledge receipt of addenda(s) by a signed statement included in the bid proposal.

### 3.0 SUBMITTAL PROCEDURE

- 3.1 Submit the Proposal in a large sealed envelope, marked "Bid No. 15-02 Concrete Pavement Improvement Project Phase V".
- 3.2 A smaller envelope shall be affixed to the outside of the larger envelope and contain the following documents.
  - Bid Bond
  - Qualifications Statement
  - Addenda(s) Receipt Acknowledgement
- 3.3 Provide complete bidder identification on the outside of the large envelope.

**CITY OF KINGSVILLE**

**BID FORM**

Bid Form from \_\_\_\_\_ a  
(Corporation/Partnership/Individual) doing business as \_\_\_\_\_.

The undersigned, as bidder, declares that the only person or parties interested in this Proposal as principals are those named herein; that this Proposal is made, without collusion with any other person, form or corporation; that he/she has carefully examined the form of Contract, Instructions to Bidders, Specifications, and the Drawings therein referred to and that he has carefully examined the locations, conditions and the classes of materials of the proposed work; and agrees that he/she will provide all the necessary machinery, tools, apparatus and other means of construction and will do all the work and furnish all the materials called for in the Contract Documents in the manner therein prescribed, for the prices quoted below.

It is understood that the funds for payment of the work contemplated by this proposal are to be derived from an appropriation heretofore made or to be made by the City of Kingsville and that payments on the Contract will be by bank checks.

If a Bidder's Bond is furnished, and not a Certified or Cashier's Check, it is understood that the bond will be executed on the Bid Bond form enclosed herein. Failure to do so will constitute an irregular bid, which will be rejected. Use of Surety Company's Bid Bond form will NOT be acceptable.

Addenda No. \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

Addenda No. \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

Addenda No. \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

Addenda No. \_\_\_\_\_ Received by \_\_\_\_\_ Date \_\_\_\_\_

**Bid Item, "Bid No. 15-02 Concrete Pavement Improvement Project Phase V"** including supervision, equipment, tools, and other incidental related work required to construct and complete the work in accordance with the drawings and specifications, as prepared by the City of Kingsville, plans dated December 15, 2014 for a price of:

\$ \_\_\_\_\_  
Total Project Price - words

\$ \_\_\_\_\_  
Total Project Price - figures

The work to be completed in ninety (90) consecutive calendar days after the notice to proceed has been issued by the City's Representative.

In submitting this bid, it is understood that the right is reserved by the City of Kingsville to reject any and all bids. The City of Kingsville also reserves the right to award the bid on any or all individual bid items. If written notice of the acceptance of this bid is mailed or delivered to the undersigned before this bid is withdrawn, the undersigned agrees to execute and deliver a contract in the prescribed form and furnish the required bond within ten (10) days after the contract is presented to him/her for signature.

**BY SUBMITTING A BID, THE BIDDER AGREES TO ABIDE BY ALL OF THE TERMS AND CONDITIONS OF THE "INVITATION TO BID", GENERAL CONDITIONS, SPECIAL CONDITIONS AND SPECIFICATIONS.**

I certify that the above "**Bid No. 15-02 Concrete Pavement Improvement Project Phase V**" will meet or exceed all of the minimum specifications and conditions set forth by the City of Kingsville, Texas.

DATED THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 2015.

\_\_\_\_\_  
(BIDDING FIRM)

ADDRESS: \_\_\_\_\_

\_\_\_\_\_

TELEPHONE: \_\_\_\_\_

BY: \_\_\_\_\_

# Concrete Pavement Improvement Project

## Phase IV

Bid 15-02


**(8th and Warren Intersection;  
E. Lee between 6th & Rail Road Right of Way;  
E. Huisache 128 ft. north half of street  
between 9th and 10th Streets)**

Street Repair Priorities

## Concrete Pavement Location & Cost

1.  *Lee Between 6th and RR ROW*

2.  *8th and Warren Intersection*

3.  *North Side of E. Huisache  
Between 9<sup>th</sup> and 10th*

Total =



### REFERENCE AND QUALIFICATIONS STATEMENT

All questions must be answered and the data given must be clear and comprehensive, additional information may be provided on separate attached sheets. This form must be complete with the most recent similar type projects within the past three years and other current information.

Project Owner: \_\_\_\_\_

Owner Address: \_\_\_\_\_

Owner Phone: \_\_\_\_\_

Date Completed: \_\_\_\_\_ Total Cost: \_\_\_\_\_

Project Owner: \_\_\_\_\_

Owner Address: \_\_\_\_\_

Owner Phone: \_\_\_\_\_

Date Completed: \_\_\_\_\_ Total Cost: \_\_\_\_\_

Project Owner: \_\_\_\_\_

Owner Address: \_\_\_\_\_

Owner Phone: \_\_\_\_\_

Date Completed: \_\_\_\_\_ Total Cost: \_\_\_\_\_

Contracts in Progress:

Owner	Expected Completion Date	Amount
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_____	_____	_____
_____	_____	_____
_____	_____	_____

Name of Bank Reference: \_\_\_\_\_

Name of Bank Officer: \_\_\_\_\_ Phone: \_\_\_\_\_

**CITY OF KINGSVILLE  
BID BOND**

KNOW ALL MEN BY THESE PRESENTS,

That we, \_\_\_\_\_  
(Name and Address of Bidder)

\_\_\_\_\_

hereinafter called the Principal, and \_\_\_\_\_, (Surety), a corporation or firm duly authorized to transact surety business in the City of Kingsville and listed in the current notice of the Department of Treasury list of companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, hereinafter called the Surety, are held and firmly bound unto the City of Kingsville hereinafter called the Obligee, in the sum of not less than five percent (5%) of the greatest total amount of the bidder's proposal, as a proposal guarantee, the payment of which sum will and truly be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for: Project Number: \_\_\_\_\_  
\_\_\_\_\_  
(Full name and location of project)

NOW, THEREFORE, if the Obligee shall award the Contract to the Principal and the Principal shall enter into the Contract in writing with the Obligee in accordance with terms of such bid, and furnish such bonds and other instruments as may be specified in the Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, then this bond shall be null and void. If in the event of failure of the Principal to execute such contract and furnish such bonds and other instruments required by the Contract Documents to the Principal for execution, this bond shall become the property of the Obligee, without recourse of the Principal and/or Surety, not as a penalty but as liquidated damages.

Signed this \_\_\_\_\_ DAY of \_\_\_\_\_, 2014.

By: \_\_\_\_\_  
(Bidder)

\_\_\_\_\_  
\*By: \_\_\_\_\_  
(Surety)

\_\_\_\_\_  
(Attorney-in Fact)

\*Attach Power of Attorney (Surety) for Attorney-in-Fact.

**Surety Seal**

**DISCLOSURE OF GUARANTY FUND NONPARTICIPATION**

In the event the insurer is unable to fulfill its contractual obligation under this policy or contract or application or certificate or evidence of coverage the policyholder or certificateholder is not protected by an insurance guaranty fund or other solvency protection arrangement.

**PAYMENT BOND**

CITY OF KINGSVILLE  
COUNTY OF **KLEBERG**

KNOW ALL MEN BY THESE PRESENTS:

That we, \_\_\_\_\_, as Principal, and \_\_\_\_\_, as Surety, are hereby held and firmly bound unto the City of Kingsville in the penal sum of:

\_\_\_\_\_ Dollars \$\_\_\_\_\_ for the payment whereof, the said Principal and Surety bind themselves, their heirs, executors, administrators and successors, jointly and severally firmly by these presents.

The conditions of this obligation are such that, whereas the Principal entered into a certain contract, hereto attached and made part hereof, with the City of Kingsville, dated \_\_\_\_\_ for the \_\_\_\_\_.

Now, if the Principal shall promptly make payments to all claimants, as defined in Article 5160, Revised Civil Statutes of Texas, 1925, as amended, supplying labor and materials in the prosecution of the work provided for in said contract documents, then this obligation shall be null and void, otherwise it shall remain in full force and effect.

This bond is made and entered into solely for the protection of all claimants supplying labor and material in the prosecution of the work provided for in said contract documents, and all such claimants shall have a direct right of action under the bond as provided in Article 5160, Revised Civil Statutes, 1925, as amended.

The surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract documents or to the work to be performed thereunder shall in any way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract documents or to the work to be performed thereunder.

IN WITNESS WHEREOF, the above bounded parties have executed this instrument under their several seals this \_\_\_\_\_ day of \_\_\_\_\_, 2014, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative pursuant to authority of its governing body.

\_\_\_\_\_, Principal (PRINCIPAL'S SEAL if a corporation)

By: \_\_\_\_\_ Title: \_\_\_\_\_

\_\_\_\_\_, Surety

By \_\_\_\_\_ (SURETY'S SEAL)  
Attorney-in-Fact

# CONCRETE PAVEMENT IMPROVEMENT PROJECT PHASE V

## GENERAL CONDITIONS

### 1.01 CONTRACT DOCUMENTS

The contract Documents consist of the Instructions to Bidders, General Conditions, Special Conditions, Specifications, Bid Proposal, Plans and all modifications thereof incorporated into any of the documents before the proper execution of the bonds and of the attached and of the Agreement, all of which are attached and are part of the contract following execution of the agreement by an authorized representative of the City and Contractor. The Contract Documents are complementary and what is called for by any one is as binding as if called for by all.

### 1.02 DRAWINGS AND SPECIFICATIONS

There will be no drawings furnished.

### 1.03 EXCEPTIONS TO PLANS AND SPECIFICATIONS

Exceptions and inconsistencies in Plans and Specifications shall be brought to the attention of the Purchasing Director, promptly before the bid date. Unless the Purchasing Director receives notice before the bid opening, it shall be assumed that all contract documents are acceptable as written and that the successful bidder will complete the project satisfactorily in the scheduled time period, for the amount bid having examined the plans, specifications, other contract documents, and the site of proposed work; and being familiar with all the conditions surrounding the construction of the proposed project, including the availability of materials and labor.

### 1.04 VERIFICATION OF MEASUREMENTS

It is the Contractor's responsibility to verify all measurements and quantities before ordering materials. Significant deviations from those on the plans shall be reported to the Purchasing Director on a timely basis.

### 1.05 SCOPE OF WORK/TIMING OF CONSTRUCTION

The Plans and Specifications provide for construction of the **CONCRETE PAVEMENT IMPROVEMENT PROJECT PHASE V** for the City of Kingsville. It is the responsibility of the Contractor to provide all work, materials, labor, equipment, tools and supervision to fully complete the project in the construction period specified, in accordance with the Specifications, Drawings, and other Contract Documents. Completion of the project in a timely manner is very important to the normal operations of the City.

## **SPECIAL CONDITIONS**

### **1.01 PROJECT SITE**

The general location of the site is from (8th and Warren Intersection; E. Lee between 6th & Rail Road Right of Way; E. Huisache 128 ft. north half of street between 9th and 10th Streets)

### **1.02 SCOPE OF WORK**

As per set of construction plans and specifications with the following special items:

1. Sawcut, remove, and dispose existing concrete pavement and/or curb and gutter as shown in attached drawings.
2. All concrete pavement to be cut in full depth and at least 6" (six inches) beyond the bad areas and must be either rectangular or square in shape.
3. All new concrete pavements to be minimum 6" (six inches) in depth with #4 rebar @ 18" O.C.E.W. (on Center Each Way) with 3600 psi compression strength.
4. All new concrete must be doweled at least 1' (one foot) to existing concrete and all joints shall be sealed.
5. Any existing features and/or utility structure needing to be removed during construction must be replaced to match current or better condition. Contractor must notify the property owners, provide safe ingress and egress to property owners and any and all emergency vehicles at and in the vicinity of the construction site.
6. Contractor must not change the current drainage/stormwater flow pattern and before pouring concrete shall check the slope and elevation of surrounding area to meet above requirements.
7. Contractor must inform the City Engineer if water meters or valve and manhole lids need adjustment to match new concrete pavement.
8. Contractor is solely responsible for utility relocation, traffic control, and erosion control at no cost to the City.
9. All of the areas to be repaired are classified as priority numbers 1, 2, and 3 on the basis of the condition of the pavement (Priority 1 = worst, Priority 2 = moderately bad, and Priority 3 = bad). Contractor must provide the separate proposal for each area based on priority. Project may be awarded individually for each priority or together.
10. All Right of Way disturbed areas shall be graded properly and seeded.

## CONTRACT

THIS AGREEMENT made this \_\_\_\_\_ day of \_\_\_\_\_, 2015 by and between \_\_\_\_\_ hereinafter called the CONTRACTOR, and the City of Kingsville, hereinafter called the OWNER or CITY.

WITNESSETH, that the Contractor and Owner for the consideration hereinafter named agree as follows:

**Article 1 - Scope of Work:** The Contractor shall furnish all the materials and perform all the work called for in the Contract Documents and described in the Specifications entitled:

### **BID NO 15-02 CONCRETE PAVEMENT IMPROVEMENT PROJECT PHASE V**

**Article 2 - Time of Completion:** The Contractor shall begin work at the job site within fourteen (14) days after the date of the Notice to Proceed issued by the Owner's Representative. The work to be performed under this contract shall be completed in ninety (90) consecutive calendar days plus any extended days approved by the Owner's Representative in accordance with the Specifications. For each calendar day that any work is not completed after the expiration of the time, as calculated fourteen (14) days from the date of the Notice to Proceed plus consecutive calendar days stated above plus approved extended days, the sum of Two Hundred Dollars (\$200.00), per calendar day, will be deducted from the money due or to become due the Contractor, not as a penalty, but as liquidated damages and added for administration.

**Article 3 - The Contract Sum:** The Owner shall pay for the performance of the Contract, subject to additions and deductions provided therein, the sum of [ \$\_\_\_\_\_ ].

**Article 4 - Partial Payment:** Owner shall make progress payments as approved by the Owner's Representative in accordance with the General Conditions.

**Article 5 - Acceptance and Final Payment:** Final payment shall be due on acceptance of the work, provided the Contract has been completed as provided in the General Conditions.

Before issuance of the final payment, the contractor shall submit evidence, satisfactory to the City of Kingsville that all payrolls, material bills, subcontractors and other indebtedness connected with the work have been paid in full. **Failure to provide this documentation within ninety (90) calendar days of final acceptance of the project will result in the contractor forfeiting the entire 10% retainage payment of the contract.**

**Article 6 - The Contract Documents:** The Specifications, the Proposal, the Instructions to Bidders and the Drawings, together with this Agreement, form the Contract Documents and they are as fully a part of the Contract Documents as if hereto attached or herein repeated.

CONCRETE PAVEMENT IMPROVEMENT  
PROJECT PHASE V  
SPECIFICATIONS

## SECTION 02050 DEMOLITION

### Part 1 GENERAL

#### 1.01 Existing Condition

- A. Owner assumes no responsibility for actual condition of structures to be demolished. Existing conditions at the time of inspection for bidding purposes will be remain unchanged by the Owner insofar as practicable.
- B. Minimize interference with adjacent facilities or areas of usage. Do not obstruct existing ways of traffic circulation, vehicular or pedestrian.
- C. Provide and maintain temporary fences, coverings barriers and/or safety devices required to protect damage to any persons or property.
- D. Maintain egress, access and exists at all times, unless obstruction is approved forty-eight (48) hours in advance by the Owner.
- E. Protect existing structures and surfaces scheduled to remain. Promptly repair damaged structures and surfaces at no additional cost.
- F. Maintain existing utilities and protect from damage for duration of operations. Interruption of services is to be only with Owner approval forty-eight (48) hours in advance of interruption. When so required by the Owner, provide temporary services for duration of utilities interruption.
- G. Where demolition operations require the removal of an item or structure which will compromise the security of the existing facility, provide temporary closures or barrier until new material acquisition for such work so that such situations are minimized and provide Owner forty-eight (48) hours advance notice prior to commencement.

#### 1.02 Pollution Control

- A. Use water sprinkling, temporary enclosures or other suitable methods to limit dust and dirt to a condition of "lowest possible emissions". Clean adjacent structures and improvements and return adjacent areas to condition existing prior to start of work.
- B. Conform to applicable requirements of the TCEQ, EPA, OSHA, and any other regulatory authority having jurisdiction over this work. Provide monitoring and other evidence of compliance as required to statute or safe-work practice, at no additional cost of the Owner.



## Part 2 PRODUCTS

### 2.01 Material Disposition

- A. Unless indicated otherwise, all demolished material is to be removed from the site and properly disposed of. Items of salvageable value to the Contractor but not indicated for reuse or turning over the Owner, shall be removed as the work progresses in a timely manner. Storage (or sale) of these items on site will not be permitted.
- B. Reused Items: Certain items may be indicated on the Drawings or in the Specifications to be salvaged and/or reused. Where items are so identified, Contractor shall store and protect said items for duration of the project.

## Part 3 EXECUTION

### 3.01 Preparation

- A. Prevent movement or settlement of adjacent structures. Provide all necessary shoring and bracing. Protect existing landscaping materials, areas, surfaces, and structures that are to be demolished. Disconnect, remove and cap utility lines within demolition areas.

### 3.02 Execution

- A. Perform all demolition required to effect the requirement of this project in an orderly and careful manner. Remove all items scheduled to reuse or to be turned over to the Owner in such a manner as to minimize damage.
- B. Construct and maintain dust partitions to confine dirt, dust, fumes and other forms of air pollution to the construction area. Partitions must have perimeters sealed. Protect HVAC system from intake and/or distribution of such contaminants.
- C. Cease operations and notify Engineer immediately if adjacent structures appear to be endangered. Do not resume operations until corrective measures have been taken. Repair damage to adjacent structures caused by demolition operations.
- D. Remove demolished materials not scheduled for reuse or turning over to Owner from the site in a timely fashion. Broom clean demolished areas at end of each day's work.
- E. Store and protect items scheduled for reuse. Prior to reinstallation, clean said items and prepare for reuse and, where applicable, refinishing.

- F. Notify the Owner at such time when items scheduled to be submitted to the Owner are available. Unless otherwise indicated, the Owner will pick up these materials at the project site. The Contractor shall obtain a written receipt from the Owner for same.
- G. Demolished materials shall not be sold on site or the Owner's employees.
- H. Do not burn or bury demolished materials on site.
- I. Backfill open pits and holes caused as a result of demolition.
- J. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- K. Replace or restore to Engineer's satisfaction existing structures, finishes, or items damaged by demolition operations. Replace or restore to Engineer's satisfaction all landscaping materials, including turf, damaged by demolition operations.

## SECTION 02070 GEO-GRID REINFORCEMENT

### Part 1 GENERAL

#### 1.01 Description

- A. This item shall consist of finishing and installing geo-grid reinforcement in accordance with the lines and grades shown on the plans.

#### 1.02 Related Work

- A. Section 02310: Earthwork for Pavements

#### 1.03 Measurement and Payment

- A. This item will be measured by the square yard of surface area as shown on the plans. No measurement will be made for lapping of material.
- B. The work performed and materials furnished, as prescribed by this item, will be paid for at the unit price bid for "Geo-Grid Reinforcement", which shall be full compensation for furnishing all labor, material freight, tools, equipment and incidentals, and for doing all the work involved in placement of the geo-grid, complete in place.

#### 1.04 Submittals

- A. Contractor shall submit manufacturer technical data of all material for Engineer approval.

### Part 2 PRODUCTS

#### 2.01 Material

- A. The geo-grid shall be single layer grid structures formed by a regular network of integrally connected polymeric ensile elements with apertures designed to interlock with the surrounding fill material. The fabric shall be capable of maintaining dimensional stability during placement and under normal construction traffic. The geo-grid shall be resistant to damage during construction, including ultraviolet degradation, and it shall have long-term resistance to chemical and biological degradation caused by the material being reinforced. Tenser BX-1100 or approved equal.

- B. The geo-grid shall also conform to the properties specified below.

Property	Test Method	Requirement
Aperture Size	I.D. Calipered	0.75-1.5 inches
Open Area	COE Method CW-02215	70% min.
Rib Thickness	ASTM D 1777	0.025 inches, nom
Junction Thickness	ASTM D 1777	0.06 inches, nom
Secant Aperture Stability Modulus @ 20 cm-kg	In-Plane-Rotation Test Kinney, Univ. of Alaska	3.2 cm-kg/deg. Min
Flexural Rigidity min	ASTM D 1388 64	250,000 mg-cm.
Both directors		
Tensile Modulus	GRI-GG1-87	14,000 lb/ft. min
Junction Strength	GRI-GGI-87	765 lb/ft. min
Junction Efficiency	GRI-GG2-87	90%, min

C. Alternate geo-grid material will be considered. Such material must be pre-approved in writing by the Engineer prior to bid date. Alternate material packages must be submitted to the Engineer a minimum of fifteen (15) days prior to bid date. Submittal packages must include, as a minimum, the following:

1. Full-scale laboratory testing and in-ground testing of pavement structures reinforced with the specific geo-grid that qualifies the structural contribution of the geo-grid to the pavement structure. The increase in structural layer coefficient of the base course must meet or exceed that of the design geo-grid.
2. Independent certified test results stating that the alternate geo-grid has a secant aperture stability modulus at 20 cm-kg, when tested in accordance with the "Grid Aperture Stability by In-Place-Rotation" test of 3.2 or greater.
3. A list of five (5) comparable projects, in terms of size and applications, in the United States, here the results of the specific alternate geo-grid's use can be verified after a minimum of one (1) year service.
4. A sample of the geo-grid and certified specification sheets.

### Part 3 EXECUTION

- A. Subgrade shall be prepared as specified and as indicated on the plans.
- B. The geo-grid shall be installed in accordance with the lines and grades shown on the plans. The geo-grid shall be oriented such that the roll lengths run parallel to the road direction. Geo-grid sections shall be overlapped a minimum of one foot (1') unless otherwise indicated on the plans.
- C. Care shall be taken to ensure the geo-grid sections do not separate during construction; adjacent rolls may be tied together every thirty feet (30') using suitable plastic ties. Placement of geo-grid around corners may require cutting

and diagonal lapping. The geo-grid may be pinned, or held in place by other means, at the beginning of the backfill section but will be left free elsewhere to relieve wrinkles or folds in material during placement.

- D. Should the geo-grid be ripped or torn during installation, the damaged area shall be uncovered to determine full extent of the damage. New geo-grid section shall overlap all torn or damaged geo-grid a minimum of three feet (3') in all directions.
- E. Fill material shall be placed in lift thickness and compacted as shown on the plans. Tracked construction equipment shall operate on the grid only when a minimum of four-inch (4") cover is provided. Rubber-tired equipment may operate directly on the grid at speeds less than five (5) miles per hour if the underlying material is capable of supporting the loads. Sections of geo-grid that are damaged by construction activity shall be repaired at the Contractor's expense.

## SECTION 02300 EARTHWORK

### Part 1 GENERAL

#### 1.01 Related Work

- A. Section 02070: Geo-Grid Reinforcement
- B. Section 02310: Earthwork for Pavement
- C. Section 02320: Lime Stabilized Soils
- D. Section 02510: PVC Water Pipe System
- E. Section 02550: PVC Sanitary Sewer System
- F. Section 02600: Storm Drain System
- G. Section 03300: Cast-in-Place Concrete
- H. Section 03400: Precast Concrete

#### 1.02 Job Conditions

- A. The contractor shall examine the site prior to bidding and shall be held to have knowledge of existing grades, topography, obstructions, and other visible site related conditions.
- B. Maintain all benchmarks and other necessary reference points throughout construction. Replace if disturbed or destroyed.
- C. Keep all excavations free from water at all times furnishing such pumps, equipment and power as may be required. Maintain surface drainage during construction.
- D. Existing Utilities: Locate by hand excavation and protect from damage. Stake and identify locations and maintain same. Coordinate with Owner and utility companies to maintain services. Do not disrupt service without providing temporary means of service acceptable to the Owner. Repair any damages to utilities as promptly as possible, at no expense to the Owner.
- E. Protection: Protect structures, sidewalks, pavement and other facilities on the site. Stake and identify locations of active utilities to remain and protect same. Barricade open excavations and provide means of warning as required. Provide necessary bracing and shoring at excavations to maintain the integrity of the excavation prior to backfilling. Comply with all governing safety regulations.
- F. Use of explosives will not be permitted. Burning of removed materials will not be permitted.
- G. Perform all work with experienced personnel and appropriate equipment to insure first class workmanship in a timely fashion.

- H. Excavation and backfill required by any trade or subcontractor shall be performed by the affected parties in the manner described hereafter.

### 1.03 Warranty

- A. Contractor shall for a period of two (2) years from acceptance correct any area exhibiting settlement, ponding or otherwise improper conditions at no expense to the Owner.

### 1.04 Geotechnical Testing and Quality Control

- A. A recognized Independent Testing Laboratory will be selected by the owner to perform field and lab testing services. The expense of these tests and re-tests shall be borne by the Contractor. These services will include proctors, in-place densities, Atterberg limits, and any other testing procedures deemed appropriate by the Owner. These services will be identified to the contractor for his use in coordinating with the Testing Laboratory. The scope of testing services may be adjusted at the Owner's discretion prior to or at any point during the project.
- B. All inspections and tests shall be performed in accordance with applicable ASTM Standards. Standard proctors to be in accordance with ASTM D698. Atterberg limits to be in accordance with ASTM D4318.
- C. The Contractor will be responsible for notifying the Testing Laboratory at appropriate points of progress so that the identified scope of testing can be affected. Such notification to be made in a timely fashion. The Contractor shall cooperate with the Testing Laboratory so that the functions of the laboratory may be properly performed.
- D. Should test results indicate that materials or placement do not conform to the requirements of these specifications, non-conforming work in-place shall be removed, replaced or reworked or any combination thereof until such work, after re-testing, conforms to these requirements. All expenses of re-testing to be born by the Contractor. Scope of re-testing to be as determined by Engineer.
- E. Testing of materials described herein in no way relieves the Contractor of his obligation to provide materials and construction in full compliance with the requirements of the Contract Documents.

## Part 2 PRODUCTS

- A. All fill materials for the project site to obtain grades and conditions indicated on the drawings. Natural excavated fill may be reused as common fill if so approved by the Engineer.

- B. All select fill to be new material. Stripped topsoil may be reused for topsoil.
- C. Additional fill materials from Contractor's source shall be supplied by the Contractor as needed at no additional expense to the Owner.
- D. All fill materials shall be clean and free from deleterious matter.
- E. Sand Bedding for envelopes around utility lines shown on the drawings shall meet the following requirements:

Passing 1/2" Sieve	100% by weight
Passing 3/8" Sieve	90% to 100% by weight
Passing No. 4 Sieve	80% to 100% by weight
Passing No. 200	maximum 20% by weight
Plasticity Index	non-plastic 8 maximum
Liquid Limit	30 maximum

- F. Select fill shall be placed under all concrete work on grade, thickness as indicated on the drawings. Select fill shall be natural uniform mixture of light tan sand and clay (maximum P.I. of 12). Common caliche meeting the P.I. requirement may also be utilized under concrete slabs on grade. Material to be free from debris and organic material.
- G. Select fill under sidewalks, curbs and gutters, and other site related structures to be two inch (2") thickness minimum, unless noted otherwise on the drawings.
- H. Common fill shall be placed at all locations requiring fill material, except at areas under concrete work on grade and under concrete or asphalt paving flexible base. Common fill to be natural excavated soil or a mixture of soil and clay. All common fill to be free from debris, organic matter and lumps or clods in excess of two inch (2") in any dimension. Provide common fill to elevations necessary to bring the covering topsoil material to required finish elevations.
- I. Topsoil shall be placed at a minimum four inch (4") layer over all areas to receive turf or planting or where shown on the plans for topsoil. Topsoil to be fertile agriculture topsoil capable of sustaining healthy plant growth.



## Part 3 EXECUTION

### 3.01 Delivery, Storage and Handling

- A. Handle and neatly stockpile materials both new and excavated (suitable for reuse) with a minimum of interference with traffic, existing site facilities and other trades as approved by the Engineer.
- B. Stockpile different soil types separately.
- C. Prevent dirt and dust from blowing or otherwise becoming a nuisance to the occupants of adjacent facilities, to the public or to the procedure of this work.

### 3.02 Excavation

- A. Perform all excavations for the completion of the entire project. Remove and dispose of material required to obtain subgrade elevations, including existing paving and visible obstructions; also underground structures and utilities indicated to be removed.
- B. Excavate to elevations and dimensions indicated, plus sufficient space for forms, erections, shoring and removal.
- C. Keep excavations clean and free of loose materials. Keep excavations free of water. Remove water and reshape excavations prior to placing concrete. Provide and maintain all pumps, piping and equipment required to properly de-water excavation.
- D. All excavations to be inspected and approved by the Engineer prior to pouring concrete, backfilling, or otherwise covering.
- E. Contractor to bear cost of extra work and materials caused by excavations beyond dimensions and grades required.

### 3.03 Trenches

- A. Provide excavation for trenches required by piping, conduits and work of all trades including mechanical and electrical work. Trenches to be depths and dimensions required for finished installation.
- B. All trenches shall meet or exceed the latest requirements of OSHA.
- C. Shape trenches as required to prevent sides from caving by back sloping vertical sides. Contractor shall be solely responsible for back-slope used. Provide bracing and/or shoring as required to protect existing structures as well as workers. Remove bracing/shoring in a timely fashion as backfill occurs.

## SECTION 02310 EARTHWORK FOR PAVEMENTS

### Part 1 GENERAL

#### 1.01 Description

- A. This specification shall govern for the excavation and placement of earthwork and subgrades.

#### 1.02 Related Work

- A. Section 02070: Geo-Grid Reinforcement
- B. Section 02300: Earthwork
- C. Section 02320: Lime Stabilized Soils
- D. Section 02500: Caliche Base
- E. Section 02505: Limestone Base

#### 1.03 Submittals

- A. Contractor shall provide technical data and/or samples for each of the following material items:
  - 1. Common Fill, only when source is offsite
  - 2. Five (5) gallon sample of cliché on-site and Geotechnical Lab report
  - 3. Geotechnical Soil and Density Field reports

#### 1.04 Geotechnical Testing and Quality Control

- A. A recognized Independent Testing Laboratory will be selected by the Owner to perform field and lab testing services. The expense of these tests and re-tests shall be borne by the Contractor. These services will include proctors, in-place densities, Atterberg limits, and any other testing procedures deemed appropriate by the Owner. These services will be identified to the Contractor for his use in coordinating with the Testing Laboratory. The scope of testing services may be adjusted at the Owner's discretion prior to or at any point during the project.
- B. All inspections and tests shall be performed in accordance with applicable ASTM Standards. Standard proctors to be in accordance with ASTM-D698. Atterberg limits to be in accordance with ASTM D4318.
- C. The contractor will be responsible for notifying the Testing Laboratory at appropriate points of progress so that the identified scope of testing can be affected. Such notification to be made in a timely fashion. The contractor shall cooperate with the Testing Laboratory so that the functions of the laboratory may be properly performed.

- D. Should test results indicate that materials or placement do not conform to the requirements of these specifications, non-conforming work in place shall be removed, replaced or reworked or any combination thereof until such work, after re-testing to be as determined by Engineer.
- E. Testing of materials described herein in no way relieves the Contractor of his obligation to provide materials and construction in full compliance with the requirements of the Contract Documents.

## Part 2 PRODUCTS

- A. Backfill is a specified material used in refilling a cut, trench, or other excavation, placed at a specified degree of compaction.
- B. Compaction is the process of mechanically stabilizing a material by increasing its density at a controlled moisture condition.
- C. Degree of Compaction is expressed as a percentage of the maximum density obtained by the test procedure described in ASTM D698, 1991 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Hammer and 12-in (304.8-mm) Drop, for general soil types abbreviated in this specification as a percentage of maximum density (ASTM D 698).
- D. Embankment is "fill" having a top that higher than adjoining ground.
- E. Excavation is the removal of soil, rock, or hard material to obtain a specified depth or elevation.
- F. Fill is a specified material placed at a specified degree of compaction to obtain an indicated grade or elevation.
- G. In-Situ Soil is existing in-place soil.
- H. Lift is a layer (or course) of soil placed on top of a previously prepared or placed soil.
- I. Soil is the surface material of the earth's crust resulting from the chemical and mechanical weathering of rock and organic material.
- J. Subgrade is the material in excavation (cuts) and fills (embankments) immediately below any sub base, base, pavement, or other improvement. Also, as a secondary definition, the level below which work above is referenced.
- K. Topsoil is a natural or undisturbed soil formation, the fine-grained, weathered material on the surface or directly below any loose or partially decomposed organic matter. Topsoil may be a dark-colored, fine, silty, or sandy material with

a high content of well decomposed organic matter, often containing traces of the parent rock material.

- L. Unsatisfactory Material is existing, In-Situ soil or other material which can be identified as having insufficient strength characteristics or stability to carry intended loads in fill or embankment without excessive consolidation or loss of stability.

### Part 3 EXECUTION

#### 3.01 Application

- A. Materials and workmanship specified herein with reference to State Department of Highways and Public Transportation, SDHPT, shall be in accordance with the referenced articles, sections and paragraphs of the standard except that contractual and payment provisions do not apply.
- B. Deliver and store materials in a manner to prevent contamination or segregation.

#### 3.02 Weather Limitation

- A. Fill and backfill shall not be constructed when weather conditions detrimentally affect the quality of the finished course.
- B. Place fill and backfill only if the atmospheric temperature is above freezing in the shade and is rising.
- C. Do not construct fill and backfill in the rain or on saturated subgrades.
- D. If weather conditions, in the opinion of the Engineer, are not suitable for construction, the work shall be scheduled for a later time, approved by the Engineer.
- E. The Contractor shall furnish equipment to add moisture to the fill or backfill during and after placement.

### 3.03 Compaction

- A. Compact each layer or lift of material specified so that the in-place density tested is not less than ninety-five percent (95%) of the maximum density of the standard proctor (ASTM D 698).
- B. Subgrade shall be tested at a rate of one (1) proctor and Atterberg limits per type of soil and one (1) field density per 300 square yards of subgrade surface area.

### 3.04 Site Grading

- A. Grade to finished grades indicated within 0.10 foot.
- B. Grade areas to drain water away from structures and to provide suitable surfaces for mowing machines.
- C. Existing grades, which are to remain but are disturbed by the Contractor's operations, shall be restored to the original condition.

### 3.05 Finishing Subgrades

- A. Finish surface of top lift or top of subgrade to the elevation and cross section indicated.
- B. Finished surface shall be smooth and of uniform texture.
- C. Lightly scarify or blade the finished surface to bring the finished surface to within 0.05 foot of the indicated grade and to eliminate imprints made by compaction and shaping equipment.
- D. Surface shall show no deviations in excess of ½-inch when tested with a ten (10) foot straight edge.

### 3.06 Disposition of Surplus Material

- A. Surplus or other soil material that is not required or suitable for filling or backfilling shall be stock piled at a location within the Owner's premises.

### 3.07 Protection of Surfaces

- A. Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes prior to acceptance of work.

## SECTION 02320 LIME STABILIZED SOILS

### Part 1 GENERAL

#### 1.01 Description

- A. This specification shall govern for all material, labor, equipment, workmanship, testing, and other incidentals required to lime stabilize the soils as shown on the drawings and as specified herein.
- B. Lime stabilization shall be used only for soils having a plasticity index greater than twelve (12).

#### 1.02 Related Work

- A. Section 02300: Earthwork
- B. Section 02310: Earthwork for Pavements
- C. Section 02500: Caliche Base
- D. Section 02705: Asphalt Pavement Repair
- E. Section 03305: Concrete Paving, Curbs, and Sidewalks

1:03 References: The publications listed below form a part of this specification to the extent referenced.

#### 1.04 Submittals

- A. When the quantity of lime required for stabilization is being determined by laboratory testing, the laboratory shall submit design data to the Engineer for review and approval.
- B. Ten (10) days prior to the construction, the Contractor shall submit a list of equipment to be used and their relation to method of mixing proportioning, spreading, pulverizing and compacting subgrade, and slurry application.
- C. Geotechnical reports shall be submitted directly to the Engineer's office. Test reports shall include Field Sample of Optimum Moisture-Maximum Density of Lime Stabilized Soil and Field In-Place Moisture and Density of Lime Stabilized Soil.
- D. Contractor shall submit to the Engineer a Certificate of Compliance for the Lime.

## Part 2 PRODUCTS

- A. Hydrated lime shall be Type 1, AASHTO M216 Grade A.
- B. Water utilized for the lime process shall be potable.

## Part 3 EXECUTION

### 3.01 Weather Limitations

- A. Do not construct subgrade when weather conditions detrimentally affect the quality of the materials.
- B. Do not apply lime unless the air temperature is at least forty (40) degrees F in the shade and rising.
- C. Do not apply lime to soils that are frozen or contain frost. If the air temperature falls below 35 degrees F in the shade, protect completed lime-treated areas by approved methods against the detrimental effects of freezing.
- D. Remove and replace any damaged portion of the completed soil-lime treated area with new soil-lime material in accordance with this specification.

### 3.02 Application

- A. Site Preparation shall be performed where shown on the drawings and as required by Section 02300 Earthwork, Clean debris from area to be stabilized. Remove rocks larger than two (2) inches. Inspect original ground for adequacy for the forthcoming compactive effort of lime treatment work.
- B. When stabilized course is to be constructed to meet a fixed grade, provide adequate line and grade stakes for control. Finished and completed stabilized areas shall conform to the lines, grades, cross section, and dimensions indicated.
- C. Locate grade stakes in lanes parallel to centerline of areas under construction, and suitably placed for string lining. The Contractor shall be responsible for maintaining line and grade. After the subgrade has been brought to the line and grade as shown on the typical sections, the subgrade should be scarified to the specified depth and width of stabilization and then partially pulverized. All deleterious materials like stumps, roots, and turf, etc. and aggregate larger than two (2) inches should be removed.
- D. Lime treatment and sequence of construction shall comply with NLA BUL326 and sequence of construction operations, unless specified otherwise hereinafter.
- E. The Engineer shall approve the lime slurry preparation facilities. Provisions shall be made for agitation in the distributor truck to prevent setting of lime solids.

The hydrate slurry may be prepared either in a central mixing tank or tank trucks, with agitation provided for mixing. Prepare quicklime slurry using a portable batch-slacking unit. Accurately weigh or meter lime and water. Standard water or asphalt trucks, properly cleaned, with or without pressure distributors, may be used to apply lime treatment.

- F. After site preparation, scarify subgrade and spread lime.
- G. Hydrated lime shall be uniformly spread at a rate of five (5) percent by weight. A typical lime slurry ration is one (1) ton lime to five hundred (500) gallons of water. Maintain the water content at five (5) percent above optimum during application to lime-subgrade mixture. Distribute lime in successive passes over subgrade material until proper amount of lime has been spread to the proper depth. Continually agitate slurry to keep mixture uniform. Keep pumps, distribution spray bars, slurry injection equipment and other equipment clean of excessive lime slurry. The Contractor's laboratory shall verify the specified amount and rate of application of lime for the various materials encountered.
- H. The lime-subgrade shall be thoroughly rotary mixed throughout the proper depth and width of the subgrade and pulverized to a minus two (-2) inch. Water shall be added to raise the moisture of the subgrade-lime mixture at least five (5) percent above optimum moisture content. The soil-lime shall be rotary mixed. The mixer shall continue making passes until it has produced a homogeneous, uniform mixture of lime, subgrade, and water. Continue mixing or re-mixing operations, until material is free of streaks or pockets of lime and mixture is uniform.
- I. After initial mixing, the lime-treated layer should be shaped and sealed to the approximate section and compacted lightly for curing and to minimize evaporation loss, lime carbonation, or to prevent excessive wetting for possible heavy rain. Moisture cure lime-subgrade mixture up to forty-eight (48) hours until adhesive quality of clay is reduced to almost normal subgrade consistency. Heavy clays may require up to seven (7) days of curing.
- J. During curing, the surface shall be maintained in a moist condition by light sprinkling and rolling. Heavy traffic loads shall be kept off, and the surface shall be maintained in a smooth condition by rolling as required.
- K. Re-scarify, mix, and pulverization of the lime-soil shall continue until all of the clods are broken down to pass a one (1) inch screen and at least sixty (60) percent pass a No-4 Sieve. Additional water may be required to raise the mixture approximately two (2) percent above optimum moisture content prior to compaction.
- L. Compact the lime-soil material to ninety-five (95) percent of the density (Standard Proctor). The density value shall be based on a representative field sample of the lime-subgrade mixture, not the untreated (raw) subgrade.



Compaction should begin immediately after final mixing, but in no case should any delay exceed five (5) days. The surface of the lime-treated soil shall be graded after compaction to achieve the finish grades shown on the drawings.

- M. Finish completed section by rolling with a pneumatic roller or other suitable light roller that will sufficiently compact and prevent hairline cracking. Keep the compacted lime treated surface moist until covered by a subsequent layer. When a bituminous wearing course is schedule for application, the surface shall be broom cleaned and dampened.
- N. Temporary joints shall be made at the end of each working day, prepare a temporary joint in fully compacted material normal to paved surface centerline. Construct a longitudinal temporary joint for partial width sections against which future material is to be placed.
- O. Remove temporary joints during next work period by trimming three (3) inches into treated material for continuity. Trimmed material shall be incorporated in subsequent work. Temporary joints shall not coincide with any longitudinal or transverse temporary joint location of previous or subsequent construction. Re-mixing four (4) inches into the previous day's work may be substituted for joints providing the method and equipment is acceptable to the Engineer.
- P. The Contractor shall provide warning signs and barricades so that traffic will not travel over freshly treated surfaces. Do not permit equipment or traffic on lime-treated material until subgrade stability is assured.
- Q. Maintain the finished surface until work has been completed. The Contractor shall provide drainage during entire period of construction to prevent water from collecting or standing on area to be stabilized.

### 3.03 Equipment and Limitations

- A. The type of equipment to be used for each category of work shall conform to the NLA Bulletin 326 unless specified otherwise. Maintain equipment in satisfactory and safe operating condition.
- B. Spreading hydrated lime by aggregate spreaders, dump trucks, end-dumping or tailgate control methods, or agricultural spreaders is not allowed.
- C. Motor graders will not be allowed to mix lime with clays. Deep-lift rotary mixers may be used and may facilitate changes in specified depths of operation, providing equipment and method of operation sustains uniform distribution of lime with required compacted density throughout the deeper layer, with approval of Engineer.
- D. Unauthorized equipment such as hauling or transportation vehicles will not be allowed for compaction purposes.

### 3.04 Safety Requirements

- A. The Contractor shall insure the prevention of employee eye or skin contact with quicklime during transport or application. Provide and require employees to use protective clothing, high top boots, gauntlet-type gloves, protective headwear, splash-proof safety goggles and face shields, and protective cream.

### 3.05 Testing

- A. A recognized Independent Testing Laboratory will be approved by the Owner to perform field and lab testing services. These services may include proctors, in-place densities, Atterberg limits, and any other testing procedures deemed appropriate by the Owner. All geotechnical testing and retesting shall be paid for by the Contractor without additional charge to the Owner.
- B. The Contractor shall coordinate the scope and frequency of testing with Geotechnical Testing Laboratory. The scope of testing services may be adjusted at the Owner's discretion prior to or at any point during the project.
- C. Frequency of sampling and testing of materials for conformance and quality control shall be as specified herein and shall be performed at such other times as necessary to document contract compliance. The laboratory shall certify all test reports.
- D. Geotechnical testing shall be performed as follows in accordance with ASTM D698.
- E. Lime Sample Optimum Moisture-Maximum Density: One (1) per type of material.
- F. Lime Field In-Place Density: One (1) per three-hundred (300) square yards.
- G. Thickness of final lime treated subgrade and base course shall be not less than thickness shown on the drawings. Final grade smoothness shall not deviate by more than 3/8 inch, when tested with a ten (10) foot straight edge.

## SECTION 02500 CALICHE BASE

### Part 1 GENERAL

#### 1.01 Description

- A. This specification shall govern for all material, labor, equipment, workmanship, testing, and other incidentals required to provide and install a caliche base course in accordance with the drawings and as specified herein.

#### 1.02 Related Work

- A. Section 02070: Geo-Grid Reinforcement
- B. Section 02310: Earthwork for Pavements
- C. Section 02320: Lime Stabilized Soils
- D. Section 02700: Asphalt Surface Treatment
- E. Section 02705: Asphalt Pavement Repair
- F. Section 02710: Hot Mix Asphaltic Concrete
- G. Section 03305: Concrete Paving, Curb, and Sidewalks

#### 1.03 Submittals: Contractor shall submit technical data and certification as follow:

- A. Laboratory Test reports for the Caliche:
  - 1. Standard Proctor
  - 2. Atterberg Limits
  - 3. Optimum Moisture and Compaction
  - 4. Wet Ball Mill
  - 5. Field Densities

#### 1.04 Field Quality Control

- A. A recognized Independent Testing Laboratory, selected by the Owner, shall perform all testing.
- B. The Contractor shall cooperate and coordinate all tests with the Lab, Engineer, and Owner.
- C. Contractor shall pay for all testing and retesting of failures.
- D. Caliche Base Course Testing
  - 1. Raw Sample Optimum Moisture-Maximum Density of Limited Soil: One (1) per type of material
  - 2. Raw Sample Standard Proctor: One (1) per type of material
  - 3. Raw Sample Wet Ball Mill: One (1) per type of material

- 4. Raw Sample Atterburg Limits and Gradation: One (1) per type of material
  - 5. Field In-Place Densities: One(1) per three-hundred (300) square yards
- E. When lime stabilization is required refer to the "Lime Stabilized Soils" specification for additional testing. Test in accordance with ASTM D 698, Method D.

Part 2 MATERIALS

2.01 Caliche Base Material

- A. The material shall be from a source approved by the Engineer. The Material shall conform to TxDot Item 247, Type D, Grade 6, and shall consist of argillaceous limestone, calcareous or calcareous clay particles, with or without stone, conglomerate, gravel, or sand and shall be free of vegetation.
- B. All materials shall be screened, and the oversize shall be crushed and returned to the screened materials again in such a manner that a uniform product will be produced, and will meet the following requirement of the current TxDOT Standard Specifications for Construction of Highways, Streets and Bridges.

2.01 Caliche Gradation	Sieve Size	Percent Retained
	2-1/2"	0
	1-3/4"	0-10
	No. 4"	45-75
	No. 40	60-85

2.03 Caliche Physical Properties

- A. The untreated caliche material passing the 40 mesh, "Soil Binder" shall have the following properties:

Liquid Limit (LL)	40 maximum
Plasticity Index (PI)	5 to 16
Wet Ball Mill Mix Amount	50 (Tex 116E)

- B. The soil binder shall be tested to determine the gradation, LL, PI, Wet Ball Mill, and standard proctor moisture density relation.

## Part 3 EXECUTIONS

### 3.01 Placement of Caliche Base Course

- A. Caliche base course shall be of compacted thickness and at locations indicated.
- B. Spread base course uniformly and compact to ninety-eight (98) percent of maximum laboratory density as determined in accordance with ASTM D698. Method D.
- C. When compacted, finished surface of base course shall not vary more than 3/8-inch when tested with a ten-foot straight edge.
- D. Finished thickness of base course shall not vary more than one-half inch from the required thickness at any point.
- E. Areas not meeting the specified requirements will be rejected until corrected by the Contractor.

## SECTION 02505 LIMESTONE BASE

### Part 1 GENERAL

#### 1.01 Description

- A. This specification shall govern for all material, labor, equipment, workmanship, testing, and other incidentals required to provide and install a limestone base course in accordance with the drawings and as specified herein.

#### 1.02 Related Work

- A. Section 02070: Geo-Grid Reinforcement
- B. Section 02310: Earthwork for Pavements
- C. Section 02320: Lime Stabilized Soils
- D. Section 02700: Asphalt Surface Treatment
- E. Section 02705: Asphalt Pavement Repair
- F. Section 02710: Hot Mix Asphaltic Concrete
- G. Section 03305: Concrete Paving, Curb, and Sidewalks

1.03 Submittals: Contractor shall submit technical data and certification as follow:

- A. Laboratory Test reports for the limestone:

- 1. Standard Proctor
- 2. Atterberg Limits (ASTM D698)
- 3. Wet Ball Mill

#### 1.04 Field Quality Control

- A. A recognized Independent Testing Laboratory, selected by the Owner, shall perform all testing.
- B. The Contractor shall cooperate and coordinate all tests with the Lab, Engineer, and Owner.
- C. Contractor shall pay for all testing and retesting of failures.
- D. Limestone Base Course Testing
  - 1. Wet Ball Mill
  - 2. Atterburg Limits and Gradation
  - 3. Field In-Place Densities with moisture control, one (1) per 300 square yards.

### Part 2 MATERIALS

2.01 Limestone Base Material

- A. The material shall be from a source approved by the Engineer. The material shall conform to TxDot Item 247 Type A, Grade 6, and shall be free of vegetation.
- B. All materials shall be screened, and oversize shall be crushed and returned to the screened materials again in such a manner that a uniform product will be produced, and will meet the following requirements of the current TxDOT Standard Specifications for Construction of Highways, Streets and Bridges.

2.02 Limestone Gradation	<u>Sieve Size</u>	<u>Percent Retained</u>
	2-1/2"	0
	1-3/4"	0-10
	No. 4"	45-75
	No. 40	60-85

2.03 Limestone Physical Properties

- A. The limestone material passing the 40 mesh, "Soil Binder" shall have the following properties:

Liquid Limit (LL)	40 maximum
Plasticity Index (PI)	5 to 12
Wet Ball Mill	45 Max (TEX 116E)

- B. The Soil binder shall be tested to determine the Liquid Limit and Plasticity Index.

Part 3 EXECUTION

3.01 Placement of Limestone Base Course

- A. Limestone base course shall be of compacted thickness and at location indicated.
- B. Spread base course uniformly and compact to 98 percent of maximum laboratory dry density as determined in accordance with ASTM D 698, Method C and within 1.5 percent of the optimum moisture content.
- C. When compacted, finished surface of base course shall not vary more than 3/8-inch when tested with a ten-foot straight edge.
- D. Finished thickness of base course shall not vary more than one-half inch from the required thickness at any point.
- E. Areas not meeting the specified requirements will be rejected until corrected by the Contractor.

## TX DOT ITEM 247 FLEXIBLE BASE

**247.1 Description.** Construct a foundation course composed of flexible base.

**247.2 Materials.** Furnish uncontaminated materials of uniform quality that meet the requirements of the plans and specifications. Notify the Engineer of the proposed material sources and of changes to material source. The Engineer may sample and test project materials at any time before compaction throughout the duration of the project to assure specification compliance. Use Tex-100-E material definitions.

**A. Aggregate.** Furnish aggregate of the type and grade shown on the plans and conforming to the requirements of Table 1. Each source must meet Table 1 requirements for liquid limit, plasticity index, and wet ball mill for the grade specified. Do not use additives such as, but not limited to, lime, cement, or fly ash to modify aggregates to meet the requirements of Table 1, unless shown on the plans.

**Table 1  
Material Requirements**

Property	Test Method	Grade 1	Grade 2	Grade 3	Grade 4
Master gradation sieve size (% retained)	Tex-110-E				As shown on the plans
2-1/2 in.		—	0	0	
1-3/4 in.		0	0-10	0-10	
7/8 in.		10-35	—	—	
3/8 in.		30-50	—	—	
No.4		45-65	45-75	45-75	
No. 40		70-85	60-85	50-85	
Liquid limit, %max. <sup>1</sup>	Tex-104-E	35	40	40	As shown on the plans
Plasticity index, max. <sup>1</sup>	Tex-106-E	10	12	12	As shown on the plans
Plasticity index, min. <sup>1</sup>		As shown on the plans			
Wet ball mill, % max. <sup>2</sup>	Tex-116-E	40	45	—	As shown on the plans
Wet ball mill, % max. increase passing the No. 40 sieve		20	20	—	
Classification <sup>3</sup>	Tex-117-E	1.0	1.1-2.3	—	As shown on the plans
Min.Compressive strength <sup>3</sup> , psi lateral pressure 0 psi lateral pressure 15psi		45 175	35 175	— —	As shown on the plans

1. Determine plastic index in accordance with Tex-107-E (linear shrinkage) when liquid limit is unattainable as defined in Tex-104-E.

2. When a soundness value is required by plans, test material in accordance with Tex-411-A.

3. Meet both the classification and the minimum compression strength, unless otherwise shown on the plans.



1. **Material Tolerances.** The Engineer may accept material if no more than 1 of the 5 most recent gradation tests has an individual sieve outside the specified limits of the gradation.

When target grading is required by the plans, no single failing test may exceed the master grading by more than 5 percentage points on sieves No. 4 and larger or 3 percentage points on sieves smaller than No. 4.

The Engineer may accept material if no more than 1 of the 5 most recent plasticity index tests is outside the specified limit. No single failing test may exceed the allowable limit by more than 2 points.

2. **Material Types.** Do not use fillers or binders unless approved. Furnish the type specified on the plans in accordance with the following:

- a. **Type A.** Crushed stone produced and graded from oversize quarried aggregate that originates from a single, naturally occurring source. Do not use gravel or multiple sources.
- b. **Type B.** Crushed or uncrushed gravel. Blending of 2 or more sources is allowed.
- c. **Type C.** Crushed gravel with a minimum of 60% of the particles retained on a No. 4 sieve with 2 or more crushed faces as determined by Tex-460-A, Part I. Blending of 2 or more sources is allowed.
- d. **Type D.** Type A material or crushed concrete. Crushed concrete containing gravel will be considered Type D material. Crushed concrete must meet the requirements in Section 247.2.A.3.b "Recycled Materials (Including Crushed Concrete) Requirements", and be managed in a way to provide for uniform quality. The Engineer may require separate dedicated stockpiles in order to verify compliance.
- e. **Type E.** As show on the plans.

3. **Recycled Material.** Recycled Asphalt Pavement (RAP) and other recycled materials may be used when shown on the plans. Request approval to blend 2 or more sources of recycled materials.

- a. **Limits on Percentage.** When RAP is allowed, do not exceed 20% RAP by weight unless otherwise shown on the plans. The percentage limitations for other recycled materials will be as shown on the plans.

**b. Recycled Material (Including Crushed Concrete) Requirements.**

**1) Contractor Furnished Recycled Materials**

Contractor furnishes the recycled materials, including crushed concrete; the final product will be subject to the requirements of Table 1 for the grade specified. Certify compliance with DMS-11000, "Evaluating and Using Nonhazardous Recyclable Materials Guidelines," for Contractor furnished recycled materials. In addition, recycled materials must be free from reinforcing steel and other objectionable material and have most 1.5% deleterious material when tested in accordance with Tex-413-A. Test RAP without removing the asphalt.

**B. Water.** Furnish water free of industrial wastes and other objectionable matter.

**C. Material Sources.** When non-commercial sources are used, expose the vertical faces of all strata of material proposed for use. Secure and process material by successive vertical cuts extending through all exposed strata, when directed.

**247.3 Equipment.** Provide machinery, tools, and equipment necessary for proper execution of the work. Provide rollers in accordance with Item 210, "Rolling". Provide proof rollers in accordance with Item 216, "Proof Rolling", when required.

**247.4 Construction.** Construct each layer uniformly, free of loose or segregated areas, and with the required density and moisture content. Provide a smooth surface that conforms to the typical sections, lines, and grades shown on the plans or as directed.

Stockpile base material temporarily at an approved location before delivery to the roadway. Build stockpiles in layers no greater than 2 ft. thick. Stockpiles must have a total height between 10 and 16 ft. unless otherwise shown on the plans. After construction and acceptance of the stockpile, loading from the stockpile for delivery is allowed. Load by making successive vertical cuts through the entire depth of the stockpile.

Do not add or remove material from temporary stockpiles that require sampling and testing before delivery unless otherwise approved. Charges for additional sampling and testing required as a result of adding or removing material will be deducted from the Contractor's estimates.

Haul approved flexible base in clean trucks. Deliver the required quantity to each 100-ft. station or designated stockpile site as shown on the plans. Prepare stockpile sites as directed. When delivery is to the 100 ft. station, manipulate in accordance with the applicable Items.

**A. Preparation of Subgrade or Existing Base.** Remove or scarify existing asphalt concrete pavement in accordance with Item 105, "Removing Stabilized Base and Asphalt Pavement", when shown on the plans or as directed. Shape the subgrade or existing base to conform to the typical sections shown on the plans or as directed.

When new base is required to be mixed with existing base, deliver, place, and spread the new flexible base in the required amount per station. Manipulate and thoroughly mix the new base with existing material to provide a uniform mixture to the specified depth before shaping.

When shown on the plans or directed, proof roll the roadbed in accordance with Item 216, "Proof Rolling", before pulverizing or scarifying. Correct soft spots as directed.

**B. Placing.** Spread and shape flexible base into a uniform layer with an approved spreader the same day as delivered unless otherwise approved. Construct layers to the thickness shown on the plans. Maintain the shape of the course. Control dust by sprinkling, as directed. Correct or replace segregated areas as directed, at no additional expense to the City of Kingsville.

Place successive base courses and finish courses using the same construction methods required for the first course.

**C. Compaction.** Compact using density control unless otherwise shown on the plans. Multiple lifts are permitted when shown on the plans or approved. Bring each layer to the moisture content directed. When necessary, sprinkle the material in accordance with Item 204, "Sprinkling".

Begin rolling longitudinally at the sides and proceed towards the center, overlapping on successive trips by at least  $\frac{1}{2}$  the width of the roller unit. On super elevated curves, begin rolling at the low side and progress toward the high side. Offset alternate trips of the roller. Operate rollers at a speed between 2 and 6 miles per hour.

Rework, re-compact and refurnish material that fails to meet or that loses required moisture, density, stability, or finish before the next course is placed or the project is accepted. Continue work until specification requirements are met. Perform the work at no additional expense to the City of Kingsville.

- 1. Ordinary Compaction.** Roll with approved compaction equipment as directed. Correct irregularities, depressions, and weak spots immediately scarifying the areas affected, adding or removing approved material as required, reshaping and re-compacting.
- 2. Density Control.** Compact to at least 100% of the maximum density determined by the Tex-113-E unless otherwise shown on the plans. Determine the moisture content of the material at the beginning and during compaction in accordance with Tex-103-E.

The Engineer will determine roadway density of completed sections in accordance with Tex-115-E. The Engineer may accept the section if no more than 1 of the 5 most recent density tests is below the specified density and the failing test is no more than 3 pcf below the specified density.

**D. Finishing.** After completing compaction, clip, skin, or tight-blade the surface with a maintainer or subgrade trimmer to a depth of approximately  $\frac{1}{4}$  in. Remove loosened material and dispose of it at an approved location. Seal the clipped surface immediately by rolling with a pneumatic tire roller until a smooth surface is attained. Add small increments of water as needed during rolling. Shape and maintain the course and surface in conformity with the typical sections, lines and grades as shown on the plans or as directed.

In areas where surfacing is to be placed, correct grade deviations greater than  $\frac{1}{4}$  in. in 16 ft. measured longitudinally or greater than  $\frac{1}{4}$  in. over the entire width of the cross-section. Correct by loosening, adding, or removing material. Reshape and re-compact in accordance with Section 247.4.C "Compaction".

**E. Curing.** Cure the finished section until the moisture content is at least 2 percentage points below optimum or as directed before applying the next successive course or prime coat.

**247.5 Measurement.** Flexible base will be measured as follows:

- **Flexible Base (Complete in Place).** The ton, square yard, or any cubic yard method.
- **Flexible Base (Roadway Delivery).** The ton or cubic yard in vehicle.
- **Flexible Base (Stockpile Delivery).** The ton, cubic yard in vehicle, or cubic yard in stockpile.

Measurement by the cubic yard in final position and square yard is a plans quantity measurement. The quantity to be paid for is the quantity shown in the proposal unless modified by Article 9.2, "Plans Quantity Measurement". Additional measurements or calculations will be made if adjustments of quantities are required.

Measurement is further defined for payment as follows:

- A. Cubic Yard in Vehicle.** By the cubic yard in vehicles of uniform capacity at the point of delivery.
- B. Cubic Yard in Stockpile.** By the cubic yard in the final stockpile position by the method of average end areas.
- C. Cubic Yard in Final Position.** By the cubic yard in the completed and accepted final position. The volume of base course is computed in place by method of average end areas between the original subgrade or existing base

surfaces and the lines, grades, and slopes of the accepted base course as shown on the plans.

**D. Square Yard.** By the square yard of surface area in the completed and accepted final position. The surface area of the base course is based on the width of the flexible base as shown on the plans.

**E. Ton.** By the ton of dry weight in vehicles as delivered. The dry weight is determined by deducting the weight of the moisture in the material at the time of weighing from the gross weight of the material. The Engineer will determine the moisture content in the material in accordance with Tex-103-E from samples taken at the time of weighing.

When material is measured in trucks, the weight of the material will be determined on certified scales, or the Contractor must provide a set of standard platform truck scales at a location approved by the Engineer. Scales must conform to the requirements of Item 520, "Weighing and Measuring Equipment".

**247.6 Payment.** The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for the types of work shown below. No additional payment will be made for thickness or width exceeding that shown on the typical section provided on the plans for cubic yard in the final position or square yard measurement.

Sprinkling and rolling, except proof rolling, will not be paid for directly but will be subsidiary to this Item unless otherwise shown on the plans. When proof rolling is shown on the plans or directed, it will be paid for in accordance with Item 216, "Proof Rolling".

Where subgrade is constructed under this Contract, correction of soft spots in the subgrade will be at the Contractor's expense. Where subgrade is not constructed under this project, construction of soft spots in the subgrade will be paid in accordance with pertinent Items or Article 4.2, "Changes in the Work".

**A. Flexible Base (Complete In Place).** Payment will be made for the type and grade specified. For cubic yard measurement, "In Vehicle", "In Stockpile", or "In Final Position" will be specified. For square yard measurement, a depth will be specified. This price is full compensation for furnishing materials, temporary stockpiling, assistance provided in stockpile sampling and operations to level stock piles for measurement, loading, hauling, delivery of materials, spreading, blading, mixing, shaping, placing, compacting, reworking, finishing, correcting locations where thickness is deficient, curing, furnishing scales and labor for weigh and measuring, and equipment, labor, tools, and incidentals.

**B. Flexible Base (Roadway Delivery).** Payment will be made for the type and grade specified. For cubic yard measurement, "In Vehicle" will

be specified. The unit price bid will not include processing at the roadway. This price is full compensation for furnishing materials, temporary stockpiling, assistance provided in stockpile sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

- C. Flexible Base (Stockpile Delivery).** Payment will be made for the type and grade specified. For cubic yard measurement, "in Vehicle" or "In Stockpile" will be specified. The unit bid price will not include processing at the roadway. This price is full compensation for furnishing and disposing of materials, preparing the stockpile area, temporary or permanent stockpiling, assistance provided in stockpile area, sampling and operations to level stockpiles for measurement, loading, hauling, delivery of materials to the stockpile, furnishing scales and labor for weighing and measuring, and equipment, labor, tools, and incidentals.

## SECTION 02510 PVC WATER PIPE SYSTEM

### Part 1 GENERAL

#### 1.01 Related Work

- A. Section 02300: Earthwork
- B. Section 02525: Valves, Fittings, and Hydrants

#### 1.02 Description

- A. This specification shall govern for furnishing of all equipment, materials, labor, and performance of all operations required to provide and install all pressure pipes, valve and fittings shown on the drawings and as specified herein.
- B. Installation of PVC pressure pipe complying with AWWA C900 for 4-12 inch diameter and C905 for 14-36 inch diameter including all labor, equipment, and material, not specifically provide for by others, necessary to complete the work as stipulated in the specification and other contact documents.
- C. Remove pavement or other improved surfaces, excavated the trenches and pits to the required dimensions, provided for the maintenance of traffic and other utilities, support the adjoining ground or structures where necessary, and handle all drainage or ground water.
- D. Replace all damaged utilities, drains, sewer or other structures, backfill the trench and pits, remove surplus excavated material and clean the site of all debris.
- E. Test the completed pipeline for pressure and leakage requirements and disinfect the completed pipeline.
- F. Restore the pavement and other improved surfaces over the trenches.

#### 1.03 Submittals

- A. Contractor shall submit manufacturer technical data for engineer's approval as follows for:
  - Pipe
  - Fittings and Joint Restraints
  - Valves and Boxes
  - Hydrants

#### 1.04 Warranty

- A. This contractor shall guarantee this work to be free of defects, for a period of one year from the date of acceptance in writing by the Engineer.

## Part 2 PRODUCTS

### 2.01 Pipe

- A. Pipes 4-inches in diameter and larger shall be PVC C900 and shall comply with AWWA C900, pressure class 150, and a dimension ratio 18.
- B. Pipes 2-inches in diameter and smaller shall be PVC, schedule 40, pipe shall be type 1, bell end, PR-120, PVC 1120, ATSM D-2241, SDR-21.
- C. 4-inch pipe fittings and larger shall be mechanical joint type. The fittings shall be lined with enameled cement mortar in accordance with AWWA C104. Fittings shall have a pressure rating of 250 P.S.I.
- D. 4-inch gate valves and larger shall conform to the latest revision of AWWA standards C-509 covering resilient seated gate valves and be approved by UFLM. The valves shall be non-rising stem, opening by turning stem left or right and provided with 2" square operating nut. Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to requirements for both AWWA (twice the specified working pressure) and 400 PSI UFLM requirements.
- E. All fitting shall utilize joint restraints, Uni-flange or Meg-a-Lug, AWWA C111, as shown on the plans.

## Part 3 EXECUTION

### 3.01 Handling and Storage

- A. The pipe, valves, fittings, and accessories shall at all times be handled with care to avoid damage.
- B. The contractor shall be responsible for the safe storage of material furnished by or to him, and accepted by him, and intended for the work until it has been incorporated in the completed project.
- C. The interior all pipes, fittings and other accessories shall be kept free from dirt and foreign matter at all times.

### 3.02 Alignment and Grade

- A. All pipes shall be laid low and maintained at the required lines and grades.
- B. Fittings, valves, air vents and hydrants shall be installed at the required locations with valve and hydrant stems plumb. No deviation shall be made from the



required line or grade without approval in writing from the Engineer or his representative.

C. Deviations Occasioned by Other Structures: Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers and other structures encountered in the progress of the work shall be furnished by the contractor at his own expense. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections to main sewers or main drains, the obstruction shall be permanently support, relocated, removed, or reconstructed by the contractor in cooperation with the owners of such utility structures.

D. All pipes shall be laid to the depth of cover shown on the drawings.

### 3.03 Excavation and Preparation of Trench

A. The trench shall be dug in accordance with section 02300, Earthwork, to the required alignment and depth shown on the drawings.

B. Trench Width: The minimum clear width of the trench measured at the horizontal diameter of the pipe shall be 18 inches or 1 foot greater than the outside diameter of the barrel of the pipe, whichever is greater. The maximum clear width of the trench at the top of the pipe shall not be more than the outside barrel of the pipe plus two feet.

C. Preparation of Trench Bottom: The trench bottom shall be constructed to provide a firm, stable and uniform support for the full length of the pipe. Bell holes at each joint shall be provided to permit the joint to be made properly.

D. Stockpiling of Excavated Material: All excavated material shall be stockpiled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural watercourses shall not be obstructed.

### 3.04 Lowering Pipe and Accessories into Trench

A. All pipe, fittings, valves, hydrants and accessories shall be carefully lowered into the trench using suitable equipment in such a manner as to prevent damage to pipe and fittings. Under no circumstances shall the pipe or accessories be dropped or dumped into the trench.

B. The pipe and accessories shall be inspected for defects prior to lowering into trench. Any defective damaged or unsound material shall be repaired or replaced.

C. All foreign matter or dirt shall be removed from the interior of the pipe before lowering into position in the trench. Pipe shall be kept clean after lying.

- D. The sealing surface of the pipe, the bell to be joined and the elastomeric gaskets shall be cleaned immediately before assembly, and assembly shall be made as recommended by the manufacture. When pipe laying is not in progress, the open ends of installed pipe shall be closed to prevent entrance of trench water into the line.
- E. Whenever water is excluded from the interior of the pipe, enough backfill shall be placed on the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and the bedding restored. No pipe shall be laid when the trench conditions or the weather are unsuitable for proper installation as determined by the engineer.
- F. The pipe shall be cut in a neat and workman like manner without damage to the pipe so as to have a smooth end at right angles to the axis of the pipe.

### 3.05 Joining PVC Pipe to Fitting and Accessories

- A. General: Valves, hydrants or fittings connected to PVC plastic pipes shall be equipped with bells having a profile that permits a seal to be made directly between the pipe end and the bell of the fitting with an elastomeric gasket. The elastomeric gasket shall be supplied by the fitting or accessory manufacturer.
- B. Pipe ends shall be cut square, deburred and beveled in accordance with pipe manufacturer's recommendations.
- C. The push on joint is an elastomeric gasket joint. It is assembled by positioning the elastomeric gasket(s) in the annular groove(s) of the bell or coupler and inserting the spigot end of the pipe into the bell or coupler after approved lubricant has been applied as recommended by the manufacturer. The spigot end of the pipe compresses the gasket radially to form a positive seal. The gasket and annular groove are designed, sized and shaped so that the gasket will resist displacement. Care shall be taken so that only the correct elastomeric gasket, compatible with the angular grooves of the bell or coupler is used. Insertion of the elastomeric gasket in the annular groove must be in accordance with the manufacturer's recommendations.
- D. The mechanical joint is a bolted joint of the stuffing box type. Each joint shall consist of:
  - 1. A bell provided with an exterior gland having bolt holes or slots and socket with an annular recess for the sealing gasket;
  - 2. A sealing gasket;
  - 3. A follower gland with bolt holes matching those in the fitting;
  - 4. Tee bolts and hexagonal nuts. Installation recommendations from the manufacturer should be followed.

- E. Install mechanical joint restraints on all fittings and on pipes according to the scheduled shown on the plans.

### 3.06 Setting of Hydrants, Valves and Fittings

- A. Hydrants, valves and fittings shall be provided and installed as shown on the drawings. They shall be inspected and cleaned prior to installation.
- B. Thrust blocking shall be provided at each hydrant, valve, bend, tee, and at reducers or fittings where changes in pipe diameters or directions occur. Anchorage may also be made to the water main pipe with rods and clamps. The size and shape of the thrust blocking is as shown on the drawings.
- C. Plugs shall be inserted into the bells of all dead-end fittings. Spigot ends of accessories, fittings and plain ends of plastic pipe shall be capped. Thrust blocking shall be provided at all dead ends of pipe that are capped or plugged.

### 3.07 Pressure and Leakage Tests

- A. Sufficient backfill shall be placed prior to filling with water and field testing to prevent lifting of the pipe. Where conditions permit, it is recommended that joints be left uncovered to allow any leaks that occur to be easily located. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed, but before placement of permanent surface. In all cases, sufficient backfill shall be placed to confine the pipe system during testing.
- B. Each section of the pipeline shall be slowly filled with water and all air expelled by means of taps at high points. The specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. The test pressure shall be maintained by additional pumping if necessary for the specified time during which the system and all exposed pipe, fittings, valves and hydrants shall be carefully examined for leakage. All defective elements shall be repaired or removed and replaced and the test repeated until all visible leakage has been stopped and the allowable leakage requirements have been met.
- C. The contractor shall furnish the gauges and measuring device for the leakage test, pump, pipe, connections and all other necessary apparatus, and shall furnish the necessary assistance to conduct the test. The duration of each leakage test shall be two hours. The new pipe system shall be tested at twice the system operating pressure but not less than 100-PSI. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within after the pipe has been filled with water and the air in the pipeline has been expelled. A pressure variation of five PSI from the specified test pressure is allowable during test

duration. However, determination of actual leakage shall be made after line has been returned to specified test pressure at the end of test duration.

- D. No installation will be accepted if the leakage is greater than that determined by the formula:

$$L = N \times D \times P \div 7400$$

L is the allowable leakage, in gallons per hour.

N is the number of joints in the length of pipeline tested.

D is the nominal diameter of the pipe, in inches.

P is the average test pressure during the leakage test, in pounds per square inch.

### 3.08 Backfilling

- A. Pipe bedded in sand to four-inch minimum above the pipe.
- B. After the bedded material has been placed, the balance of the backfill shall be machine placed as required but shall contain no large stones or rocks or frozen debris. Unless otherwise specified, trenches under pavements, sidewalks or roads shall be backfilled and compacted to 90 percent density per ASTM D698.
- C. Additional backfill material shall be supplied if needed to completely backfill the trenches, or to fill depressions caused by subsequent settlement.

### 3.09 Restoration of Surfaces and-or Structures

- A. The contractor shall restore and/or replace paving, curbing, sidewalks, gutter, shrubbery, fences, sod or other disturbed surface or structure to a condition equal to that before the work began and to the satisfaction of the Engineer and shall furnish all labor and material incidental thereto.

### 3.10 Cleaning Up

- A. The contractor shall remove and dispose surplus material, pipe, and temporary structures. All dirt, rubbish and excess earth from excavations shall be disposed of by the contractor in compliance with applicable laws and ordinances. The construction site shall be left clean, to the satisfaction of the engineer.

### 3.11 Disinfection

- A. Before being placed in service, the new pipeline and all exposed sections of existing pipeline shall be disinfected in accordance with AWWA Standard C651, "Disinfection of Water Mains".

SECTION 02600  
REINFORCED CONCRETE PIPE STORM DRAIN SYSTEM

1.0 GENERAL

1.1 Related Work

- A. Section 02050: Demolition
- B. Section 02200: Earthwork
- C. Section 03300: Cast-in-Place Concrete

1.2 Description

- A. This specification shall govern all equipment, plant, materials, labor and performance of all operation required to provide and performance of all operation required to provide and install all Storm Drain System as shown on the drawings and as specified herein.
- B. This specification is for the proper installation of a reinforced concrete pipe (RCP) system for storm drain applications.

1.3 Submittal

- A. Pipe
- B. Joint material
- C. Sand Bedding material (5-gallon bucket)

2.0 MATERIALS

- A. Concrete structures shall be constructed as shown on the plans and as specified in Section 03300.
- B. Reinforced concrete pipe shall comply with the requirements of ASTM C76, Class III, tongue and groove pipe.
- C. Joint material shall be asphalt mastic or "ram-neck" or approved equal.

3.0 EXECUTION

3.1 Deliver, Storage, and Handling

- A. Upon arrival at the jobsite the pipe shall be inspected for quantity and shipping damage.
- B. The pipe shall not be dropped. Tie down straps shall not be removed until the pipe is secured from rolling or from being dropped.

- C. Store pipe as close as possible in an organized manner. Pipe shall be stored on level ground. Blocking should be provided to prevent rolling.
- D. Protective covers on joint material shall remain on the pipe until it is ready for installation.
- E. Any damaged pipe should be removed and replaced with new pipe.

### 3.2 Installation

- A. Install pipe to the proper line and grade shown on the plans and per manufacturer recommendations.
- B. Trench shall be excavated on line the pipe bedding shall be placed to the proper thickness. The top of the bedding must be adjusted to allow for the difference between the invert (flowline) and pipe profile wall thickness.
- C. Trench shall be excavated to the width shown on the plans and as specified. When excavation depths or soil conditions require shoring or use of a trench box, the bottom of the shoring or trench box should be placed not lower than the top of the pipe.
- D. Joints shall be installed according to the manufacturer recommendations. The ends of the pipe should be clean and free of debris just prior to placing the joint sealant material. The joint is designed to prevent infiltration of soil and exfiltration of storm water.

## High Density Polyethylene (HDPE)

### Part 1 GENERAL

#### 1.01 Section Includes

- A. High Density Polyethylene (HDPE) pipe for gravity sewers and drains, including fittings.
- B. HDPE pipe for sanitary sewer force mains, including fittings.
- C. HDPE pipe for water service lines, including fittings.

#### 1.02 Unit Prices

A. No separate payment will be made for HDPE pipe under this Section. Include cost in unit prices for gravity sanitary sewers and storm sewers.

#### 1.03 Submittals

- A. Conform to requirements of Section 01300 - Submittals.
- B. Submit shop drawings showing design of pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.

#### 1.04 Quality Control

- A. Provide the manufacturer's certificate of conformance to the Specifications.

### Part 2 PRODUCTS

#### 2.01 Approved and Pre-Approved Products

- A. Provide HDPE pipe as follows:

WALL CONSTRUCTION	MANUFACTURER	PRODUCT OPTIONS	ASTM DESIGNATION	PIPE STIFFNESS (MIN)	DIAMETER RANGE (INCHES)
Solid Wall	Provide Submittals	Approved	F714	115 psi	8 to 10
				72 psi or as shown in bid sheet or on plans	12 to 48

- B. Solid wall pipe shall be produced with plain end construction for heat joining (butt fusion) conforming to ASTM D2657. Utilize controlled temperatures and pressures for joining to produce a fused leak-free joint.
- C. Water service line to be copper tubing size (CTS) and conform to ASTM D2737 and AWWA C901 Standards. It can be joined with heat fusion or mechanical fittings designed for CTS tubing.

## 2.02 MATERIALS

A. Pipe and Fittings: High density, high molecular weight polyethylene pipe material meeting the requirements of Type III, Class C, Category 5, Grade P34, as defined in ASTM D1248. Materials meeting the requirements of cell classification in accordance with ASTM D3350 are also suitable for making pipe products under these specifications.

### B. Gaskets

1. Use gaskets meeting requirement of ASTM F477. Use gasket molded into a circular form or extruded to the proper section and then spliced into circular form. When no contaminant is identified, use gaskets of properly cured, high-grade elastomeric compound. The basic polymer shall be natural rubber, synthetic elastomer, or a blend of both.
2. Pipes to be installed in potentially contaminated areas, especially where free product is found near the elevation of the proposed sewer, shall have the following gasket materials for the noted contaminants:

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by the pipe

C. Lubricant. Use a lubricant for assembly of gasket joints which has no detrimental effect on the gasket or on the pipe, in accordance with manufacturer's recommendations.



## 2.03 WORKMANSHIP

- A. Furnish pipe and fittings that are homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. Provide pipe as uniform as commercially practical in color, opacity, density, and other physical properties.

## 2.04 INSPECTIONS

- A. The Engineer or City Engineer reserves the right to inspect pipes or witness pipe manufacturing. Such inspection shall in no way relieve the manufacturer of the responsibilities to provide products that comply with the applicable standards and these Specifications.
- B. Manufacturer's Notification to Customer. Should the Engineer or City Engineer wish to witness the manufacture of specific pipes, the manufacturer shall provide the Engineer or City Engineer with adequate advance notice of when and where the production of those specific pipes will take place.
- C. Failure to Inspect. Approval of the products or tests is not implied by the Engineer's or City Engineer's decision not to inspect the manufacturing, testing, or finished pipes.

## 2.05 TEST METHODS

- A. Conditioning. Conditioning of samples prior to and during tests is subject to approval by the Engineer and City Engineer. When referee tests are required, condition the specimens in accordance with Procedure A in ASTM D618 at 73.4 degrees F plus or minus 3.6 degrees F (23 degrees C plus or minus 2 degrees C) and 50 percent relative humidity plus or minus 5 percent relative humidity for not less than 40 hours prior to test. Conduct tests under the same conditions of temperature and humidity unless otherwise specified.
- B. Flattening. Flatten three specimens of pipe, prepared in accordance with Paragraph 2.05A, in a suitable press until the internal diameter has been reduced to 40 percent of the original inside diameter of the pipe. The rate of loading shall be uniform and at 2-inches per minute. The test specimens, when examined under normal light and with the unaided eye, shall show no evidence of splitting, cracking, breaking, or separation of the pipe walls or bracing profiles.
- C. Joint Tightness. Test for joint tightness in accordance with ASTM D3212, except replace the shear load transfer bars and supports with 6-inch-wide support blocks that can be either flat or contoured to conform to the pipe's outer contour.

D. Purpose of Tests. The flattening and the joint tightness tests are not intended to be routine quality control tests, but rather to qualify pipe to a specified level of performance.

## 2.06 MARKING

1. Mark each standard and random length of pipe in compliance with these Specifications with the following information:
  1. Pipe size
  2. Pipe class
  3. Production code
  4. Material designation

## Part 3 EXECUTION

### 3.01 INSTALLATION

- A. Conform to requirements of the following Sections:
  1. Section 02720 - Storm Sewers
  2. Section 02730 - Gravity Sanitary Sewers
- B. Install pipe in accordance with the manufacturer's recommended installation procedures.

## SECTION 02705 ASPHALT PAVING REPAIR

### Part 1 GENERAL

#### 1.01 Related Work

- A. Section 02310: Earthwork for Pavements
- B. Section 02500: Caliche Base
- C. Section 02700: Asphalt Surface Treatment
- D. Section 02710: Hot Mix Asphalt Pavement
- E. Section 03305: Concrete Paving, Curbs & Sidewalks

#### 1.02 Quality Assurance

- A. Work in this area shall be done by a paving contractor approved by the Engineer and by personnel experienced in asphalt paving.
- B. This work shall be coordinated with other related work and conform to the applicable regulatory standards.

#### 1.03 Guarantee

- A. This contractor shall guarantee this work to be free of defects, for a period of one year from the date of acceptance in writing by the Engineer.

### Part 2 PRODUCTS

#### 2.01 Materials

- A. Subgrade shall be compacted existing subgrade, compacted to 95% standard AASHTO.
- B. Flexible base shall consist of an 8" minimum thickness caliche base conforming to Texas Department of Transportation Item 247, Type "D" Grade 3. It shall be compacted to 95% Proctor (standard).
- C. Asphalt Paving shall consist of a 2-inch layer of conforming to Texas Department of Transportation, Item 340, Hot Mix Asphaltic Concrete Pavement, Type D. It shall be compacted to 98% of optimum density
- D. Prime Coat shall be Medium Curing Cutback asphalt, MC-30, per ASTM D-2027.
- E. Tack coat shall be Asphalt Emulsion, SS-1, per ASTM D-977.
- F. Herbicide shall be commercial chemical for weed control, acceptable to and approved by EPA and authorities having jurisdiction.

- G. Pavement marking paint shall be Alkyd-Resin, ready-mixed AASHTO M248, Type 1, yellow.

### 3.01 Performance

- A. After the completion of all general sites grading in areas to receive asphalt pavement repair, backfill and compact subgrade to within 10-inches of finished grade. Compact as specified.
- B. Apply herbicide in strict accordance with manufacturer's requirements and recommendations for performance and safety.
- C. After successful testing of the subgrade, apply the specified flexible base (maximum lift of 8" per lift). Fine grade and compact as specified.
- D. After successful testing of flexible base, apply tack coat and 2-inch layer of hot mix asphalt in accordance with specified standards.
- E. The joint between existing paving and new asphalt work shall be in a straight uniform line, all in a smooth grade. Prime all surfaces as required.
- F. When applicable, apply striping, directional markings and other graphics indicated using specified coating system and as specified.

SECTION 02710  
HOT MIX ASPHALTIC CONCRETE (HMAC) PAVEMENT

Part 1 GENERAL

1.01 Summary

- A. This specification shall govern for all material, labor, equipment, workmanship, testing, and other incidentals required to provide and install the bituminous asphaltic concrete pavement in accordance with the drawings and as specified herein.

1.02 Related Work

- A. Section 02500: Caliche Base
- B. Section 02720: Prime Coat
- C. Section 02725: Tack Coat
- D. Section 02740: Pavement Marks and Stripes
- E. Section 03300: Cast-in-Place Concrete
- F. Section 03400: Precast Concrete

1.04 Quality Control and Warranty

- A. Contractor shall submit a certificate from the manufacturer that the material supplied meets or exceeds the requirement of the specification.
- B. Finished surface shall not vary more than 1/8-inch when tested with a 10-foot straight edge.
- C. Areas not meeting the above requirements will be rejected until corrected by the Contractor.
- D. This contractor shall guarantee this work to be free of defects, for a period of one year from the date of acceptance in writing by the Engineer.

Part 2 MATERIALS

2.01 Hot Mix Asphaltic Concrete

- A. The hot mix asphaltic concrete (HMAC) shall be produced, transported, and applied in accordance with the latest edition of the Texas Department of Transportation (TxDOT), Standard Specifications for Construction of Highways, Streets and Bridges.
- B. The Contractor shall submit a one year recent plant mix design certifying the hot mix asphaltic concrete design complies with the TxDOT specifications for Engineer approval at least one week prior to installation.

- C. The contractor shall attain a laboratory specimen of the design mix prepared in accordance with MIL-STD-620, Method 100, at the contractor's expense.
- D. The hot mix asphaltic concrete shall be TxDOT Item 340, Type "D". Hot mix-cold laid asphaltic concrete pavement, TxDOT Item 334, may be used for asphalt repair and level-up courses upon Engineer approval.
- E. The HMAC shall be placed to the compacted thickness indicated on the drawings.

### Part 3 EXECUTION

#### 3.01 Placement

- A. The surface to receive the HMAC shall be prepared and approved before placing the HMAC.
- B. Apply tack coat to surface, when requested by the Engineer, as specified in Section 02744.
- C. Spread wearing course with a bituminous spreader at a temperature of not less than 250 degrees F no more than 300 degrees F.
- D. When compacted, the finished surface shall be smooth, uniform in texture and density, and conform to the cross sections and surface tests.
- E. Placement of the asphaltic mixture shall be done without tearing, shoving, gouging, or segregating the mixture and without producing streaks.
- F. The asphaltic concrete shall be rolled while hot. The first roller shall be a steel-wheel roller weighing not less than 10 tons.
- G. In areas where the use of machine-spreading is impractical, spread the mixture by hand. Spread mixture with hot rakes in a uniformly loose layer of a thickness that when compacted will conform to the required grade and thickness. During hand spreading carefully place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation.
- H. Do not dump the loads any faster than can be properly handled by the shovel and/or rake workers.
- I. Geotechnical testing on core samples shall be performed at intervals of 500-square yards at locations requested by the Engineers. Compaction of each layer shall be 98% of maximum laboratory density.

## SECTION 02715 HOT MIX (HMAC) OVERLAY

### Part 1 GENERAL

#### 1.01 SUMMARY

- A. This specification shall govern for all material, labor, equipment, workmanship, testing, and other incidentals required to provide and install the asphalt hot-mix (HMAC) overlay in accordance with the drawings and as specified herein.

#### 1.02 Related Work

- A. Section 02310: Earthwork for Pavement
- B. Section 02500: Caliche Base
- C. Section 02710: Hot Mix Asphaltic Pavement
- D. Section 02725: Tack Coat
- E. Section 02740: Pavement Marks and Stripes
- F. Section 03300: Cast-in-Place Concrete

#### 1.03 Quality Control and Warranty

- A. Contractor shall submit a certificate from the manufacturer that the material supplied meets or exceeds the requirements of this specification.
- B. The contractor shall submit a one-year recent plant mix design certifying the hot mix asphaltic concrete design certifying the hot mix asphaltic concrete design complies with the TxDOT specifications for Engineer approval at least one-week prior to installation.
- C. The HMAC shall be placed to the compacted thickness indicated on the drawings and not less than 1.5 inches in thickness.
- D. Finished surface shall not vary more than 1/8-inch when tested with a 10-foot straight edge.
- E. Areas not meeting the above requirements will be rejected until corrected by the Contractor.
- F. This contractor shall guarantee this work to be free of defects, for a period of one year from the date of acceptance in writing by the Engineer.

## Part 2 MATERIALS

### 2.01 Hot Mix Asphaltic Concrete

- A. The hot mix asphaltic concrete (HMAC) shall be produced, transported, and applied in accordance with the latest edition of the Texas Department of Transportation (TxDOT) Standard Specifications for Construction of Highways, Streets, and Bridges.
- B. The hot mix asphaltic concrete shall be TxDOT Item 340, Type D.
- C. The Tack Coat material shall be as specified elsewhere.

## Part 3 EXECUTION

- A. The asphalt material and tack coat shall be placed only when weather conditions, in the opinion of the Engineer, are suitable.
- B. The existing pavement surface shall be cleaned and swept of all grass, weed, dirt, and other deleterious material. Weed and grass herbicide shall be applied according to manufacturer instructions.
- C. All existing potholes, ruts, and any other weak section of the existing pavement shall be cut out and repaired with hot-mix level-up.
- D. Tack coat shall be as specified but not in excess of 0.05 gallons per square yard.
- E. The hot-mix overlay shall be spread on a prepared and approved surface so that it will receive initial rolling during daylight. The hot-mix material shall be spread with an approved paving-finishing machine in such a manner that when properly compacted, the finished pavement will be smooth and of uniform density.
- F. Compaction shall be 98-percent of maximum laboratory density.
- G. Geotechnical testing on core samples shall be performed at intervals of 500-square yards at locations requested by the Engineer.



## SECTION 02720 PRIME COAT

### Part 1 GENERAL

#### 1.01 Summary

- A. This specification shall govern for furnishing all plant, labor, equipment, supplies, materials, and in performing all operations required to apply a prime coat of asphaltic material on an approved base course completed in accordance with the applicable section of this specifications.

#### 1.02 Related Work

- A. Section 02500: Caliche Base
- B. Section 02710: Hot Mix Asphaltic Concrete
- C. Section 02725: Tack Coat

#### 1.03 Submittal

- A. Contractor shall submit a letter of certification from the asphaltic material supplier for Engineer approval.

### Part 2 PRODUCTS

- A. The asphaltic materials used for prime coat shall be MC-30, ASTM D2027, Medium-Curing Cutback Asphalt, or RC-30 or RC-70, ASTM D2028, Rapid Curing Cutback asphalt.
- B. Attention is directed to the fact that the flash point for cutback asphalt is approximately 80-F.
- C. Care shall be taken to prevent open flames from coming in contact with cutback asphalt or gases of the cutback asphalt.
- D. The Contractor shall be responsible for any fires or accidents, which may result from heating the cutback asphalt.

### Part 3 EXECUTION

- A. Before the application of the prime coat the surface shall be cleaned by sweeping or other approved methods and all loose materials compacted.
- B. If found necessary by the Engineer, the surface shall be lightly sprinkled just prior to application of the asphaltic materials.

- C. The asphaltic materials shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the material in the quantity specified, evenly and smoothly under a pressure necessary for proper distribution.
- D. The contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all the heating equipment and in the distributor and for determining the rate at which it is applied.
- E. The prime coat shall be applied at 60-F.
- F. The asphaltic material shall be applied at the rate not more than 0.4 and not less than 0.3 gallons per square yard, the exact rate to be determined by the Engineer.
- G. Prime coat shall not be applied when the air temperature is below 60-F and falling, but it may be applied when the air temperature is above 50-F and is rising.
- H. Asphaltic materials shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.
- I. No traffic or hauling will be permitted over the freshly applied prime coat until authorized by the Engineer.

## SECTION 02725 TACK COAT

### Part 1 GENERAL

#### 1.01 Summary

- A. This specification shall govern for furnishing all plant, labor, equipment, supplies, materials, and in performing all operations required to apply a tack coat of asphaltic material on an approved surface.

#### 1.02 Related Work

- A. Section 02500: Caliche Base
- B. Section 02710: Hot Mix Asphaltic Concrete
- C. Section 02715: Hot Mix Overlay
- D. Section 02720: Prime Coat

#### 1.03 Submittals

- A. The Contractor shall submit a manufacturer statement certifying the material meets or exceeds the requirements of this specification.

### Part 2 MATERIALS

- A. The asphaltic materials used for tack coat shall be either Cutback Asphalt or Asphalt Emulsion. Cutback Asphalt shall be RC-70 or RC-250, ASTM D2028, Rapid Curing Cutback asphalt.
- B. Asphalt emulsion shall be SS-1, ASTM D 977. Asphalt Emulsion may be diluted with not more than 50 percent water.
- C. Care shall be taken to prevent open flames from coming in contact with cutback asphalt or gases of the cutback asphalt.
- D. The Contractor shall be responsible for any fires or accidents, which may result from heating the cutback asphalt.

### Part 3 EXECUTION

- A. Before the application of the tack coat, the surface shall be cleaned by sweeping or other approved methods and all loose materials compacted.
- B. The asphaltic materials shall be distributed the material in the quantity specified, evenly and smoothly under a pressure necessary for proper distribution.

- C. The contractor shall provide all necessary facilities for determining the temperature of the asphaltic material in all the heating equipment and in the distributor and for determining the rate at which it is applied.
- D. The temperature of the tack coat material shall be 60-F during application.
- E. The asphaltic material shall be applied at the rate not more than 0.12 and not less than 0.08 gallons per square yard, the exact rate to be determined by the Engineer.
- F. Tack coat shall not be applied when the air temperature is below 60-F and falling, but it may be applied when the air temperature is above 50-F and is rising.
- G. Asphaltic material shall not be placed when general weather conditions, in the opinion of the Engineer, are not suitable.
- H. No traffic or hauling will be permitted over the freshly applied tack coat.

## SECTION 03100 CONCRETE FORMWORK

### Part 1 GENERAL

#### 1.01 Related Work

- A. All concrete formwork, including forms, shores, re-shores, and required braces to be the responsibility of the Contractor, who shall be responsible for the design, engineering and constructing of the formwork as required to meet construction loading requirements and applicable code requirements. Forms to be provided so that resultant concrete conforms to required lines, shapes and dimensions. Design formwork to be readily removed without impact, shock or damage to the in-place concrete surfaces and adjacent finishes.
- B. Formwork to be in compliance with ACI Recommended Practice for Concrete Formwork and with applicable sections of ACI 301.

#### 1.03 Design

- A. Contractor shall be responsible for designing, erecting, shoring, bracing and maintaining formwork required to place concrete and to safely transmit all vertical and lateral loads that might be applied to the structure and formwork until the reinforced concrete has attained sufficient strength to safely accommodate such loads. Form design shall include considerations of live load, dead load, weight of equipment, weight of materials, impact loads, vibrator frequencies, ambient temperatures, foundation pressures, stress and any other factor affecting the safety of the structure during construction.
- B. Provide supports, re-shores and bracing in such a manner as to provide a means of field adjustment of forms due to shift and/or settlement during placement procedures.
- C. Design formwork to minimize joints. Design formwork assemblies to facilitate form removal and to allow forms to be stripped without removal of shoring and bracing that may be required to remain in place. Forms to be readily removable with a minimum of impact to concrete structure.

## Part 2 PRODUCTS

### 2.01 Form Materials, Accessories, and Ties

- A. Plywood: Douglas fir conforming to PS-1 for Construction and Industrial grade plywood.
- B. Lumber: Douglas fir, structural grade with grade stamp clearly visible.
- C. Form Release Agent: Commercial formulation that will not bond with, stain or adversely affect concrete surfaces. Agent shall not impair subsequent treatment of concrete surfaces requiring bond or adhesion.
- D. Form Ties: Factory fabricated, adjustable length, removable or snap-off metal ties designed to prevent form deflection and to prevent spilling of concrete surfaces upon removal. Provide ties so that portion remaining within concrete is at least 1-1/2" from outer surfaces. Provide face disk not larger than 1" in diameter with water seal feature.
- E. Chambers: Wood or PVC strips, 3/4" x 3/4"; unless indicated otherwise on the plans; maximum lengths as practical.
- F. Anchorage: Provide nails, lag bolts and other anchorage items as required of sufficient size, strength and character to maintain formwork in place while placing concrete.
- G. Waterstops: Refer Section 03300.

## Part 3 EXECUTION

### 3.01 Inspection and Installation

- A. Verify lines, levels, elevations and measurements before proceeding with the formwork. Inspect formwork construction before any concrete is placed to insure adequate bracing and shoring to meet loading requirements.
- B. Construct forms in accordance with ACI 301 to exact sizes, shapes, elevations and dimensions required. Provide for openings, offsets, keyways and recesses as required. Provide all shoring and bracing required to ensure stability of formwork during and after placement. Support form-facing materials by structural members spaced sufficiently to prevent deflection. Provide extra studs and/or girts at intersecting planes to maintain true square intersections. Seal all openings and joints to prevent leakage and "fins".
- C. Provide openings in forms to accommodate the work of other trades, including mechanical and electrical work.

- D. Set and build into formwork anchorage such devices, accessories and other embedded items required for other work that is attached or supported by cast in place concrete. Use setting drawings and instructions provided by manufacturer of such items. Ensure that items are installed level and plumb and that they are not disturbed during concrete placement operations.
- E. Provide temporary openings where interior areas of formwork are inaccessible for cleanout. Inspection and/or concrete placement. Brace openings and set lightly to forms. Provide openings at bottom of forms to allow water to drain. Close all temporary openings with tight fitting panels flush with inside face of forms.
- F. Forms for Exposed Concrete: Drill forms to suit ties utilized and to prevent concrete leakage. Provide chamfer strips at all sight-exposed external corners. Provide all other form-mounting shapes, recesses and projections with smooth finish materials and install in forms with sealed joints to prevent displacement.
- G. Edge Forms and Screed Strips for Slabs: Set edge forms and intermediate screed strips for slabs to obtain required elevations in the finish slab surface. Provide and secure units required to support screeds.
- H. Construction Joints: Locate construction joints not shown on the Drawings so as not to impair the strength and appearance of the structure, as approved by the Engineer. Provide keyways for slabs and all other construction joints in walls and beams. Place construction joints perpendicular to the main reinforcement with the reinforcement continued across the joint, unless otherwise indicated.

### 3.02 Form Releases, Form Removal, and Form Reuse

- A. Coat form surfaces with form release agent. Apply in strict accordance with manufacturer's printed instructions. Apply prior to placement of reinforcing steel, inserts, anchor devices and other embedded items.
- B. Forms shall be left in place until concrete has attained sufficient strength to support its own weight and construction and design load, which may be imposed upon it. Re-shore structural members as required by construction conditions to permit successive construction; such restoring being the sole responsibility of the contractor.
- C. Remove forms progressively so that no unbalanced loads are imposed on the structure. Do not damage concrete surfaces during removal of the forms.
- D. Clean and repair forms to be reused. Patching of voids will not be permitted at exposed faces of concrete.
- E. Store forms to prevent damage until reuse.
- F. Reapplication of form release agent is required prior to each reuse of forms.

## SECTION 03200 CONCRETE REINFORCEMENT

### Part 1 GENERAL

#### 1.01 Related Work

- A. Section 03100: Concrete Formwork
- B. Section 03300: Cast In Place Concrete

#### 1.02 Quality Assurance

- A. Comply with CRSE "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and Documents 63 and 65.
- B. Conform to ACI 301 Specifications for Structural Concrete for Building and 315 manual of Standard Practice for Detailing Reinforced Concrete Structures.

#### 1.03 Submittals

- A. Shop Drawings: If requested by Engineer, submit shop drawings indicating fabrication, bending and placement of reinforcing steel. Show locations and quantities of steel sizes, spacing, bending and cutting requirements, splicing, stirrup spacing, support and spacing devices.
- B. Certificates: If requested by the Engineer, submit 4 copies of steel mill test certificates for supplied concrete reinforcing. Indicate physical and chemical analysis.
- C. Foreign Manufactured Reinforcing Steel: Test supplied steel for compliance to ASTM requirements by an independent testing laboratory located in the United States, approved by the Owner. All costs for testing to be borne by the Contractor.

### Part 2 PRODUCTS

#### 2.01 Materials

- A. Reinforcing steel: ASTM A615, 60 ksi yield billet-steel deformed bars: No. 3 bars and less, and No. 4 bars used as stirrups or ties- Grade 40; all others- Grade 60; uncoated finish.
- B. Welded Wire Fabric: ASTM A185. Sizes and gauge as indicated on the Drawings. Provide in flat sheets (rolled sheets are unacceptable).
- C. Tie Wire: 16 gauges annealed.



- D. Chairs, Bolsters, and Supports: Plastic-coated, type of proper size, type, and spacing required to support reinforcing steel and to maintain required clearances prior to and during placing procedures. Provide flat "tins" welded to feet of bolsters to be placed over insulation, void forms or other otherwise unstable surfaces.

## 2.02 Materials

- A. Fabricate reinforcing steel to required shapes and sizes with fabrication tolerances in accordance with ACI 315.
- B. Do not re-bend or straighten reinforcing in a manner, which will damage or weaken the material.
- C. Splices: Locate splices for scheduled reinforcing. Splices for unscheduled reinforcing to be minimized. Where splices area required, stagger splices in adjacent bars.

## Part 3 EXECUTION

### 3.01 Delivery, Storage, Handling, and Preparation

- A. Deliver reinforcing steel to the project site bundled with weather resistant tags and marks. Store at site in such a manner as to prevent damage and accumulation of dirt, mud and excessive rust.
- B. Contractor shall, prior to placement of any reinforcing steel, secure Engineer's approval for placement, tying and supporting procedures. Required interpretations shall be obtained prior to initiation of placement.

### 3.02 Installation

- A. Comply with specified standards for details and methods of reinforcement placement and support.
- B. Clean reinforcement to remove loose rust and scale and any other materials which will reduce bond between reinforcing and concrete.
- C. Place reinforcement to obtain required coverage. Provide chairs, bolsters and bar supports in sufficient types, quantities and locations to carry reinforcement. Arrange space and securely tie bars and bar supports together with tie wire to hold reinforcement accurately in position. Set wire ties so the ends are directed away from exposed concrete surfaces.
- D. Position support and secure reinforcement against displacement by formwork, construction or concrete placement operations.

- E. Where required, install wire fabric in as long lengths as practical. Lap adjoining pieces at least one full mesh and lace together with wire. Do not make end laps between supporting beams or directly over beams of continuous structures. Offset end laps with adjacent widths to prevent continuous laps.
- F. Splices: Unless otherwise shown all laps and splices shall be equal to 30 bar diameters, but in no case less than 12". This also applies to temperature reinforcing.

### 3.03 Inspections

- A. Notify Engineer 24 hours in advance of concrete placement operations to permit inspection of reinforcing steel and preparatory work and allow necessary corrections to be made before such operations are commenced.

## SECTION 03300 CAST IN PLACE CONCRETE

### Part 1 GENERAL

#### 1.01 Related Work

- A. Section 03100: Concrete Formwork
- B. Section 03200: Concrete Reinforcement
- C. Section 03400: Precast Concrete

#### 1.02 Quality Assurance

- A. Perform work in accordance with ACI 301- Specifications for Structural Concrete for Buildings and ACI 304- Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- B. Obtain materials from same source throughout the work.
- C. All concrete work included in other sections of these Specifications that NOT specifically described therein shall comply with the requirements of this Section.

### Part 2 PRODUCTS

#### 2.01 Concrete Materials

- A. Cement: ASTM C-150; normal- Type 1 Portland cement; gray color. Concrete for the various members of the structure to minimum compression strength in pounds per square inch within 28 days as indicated on the drawings.
- B. Fine and course aggregates: ASTM C-33; maximum aggregate size to be 1-1/2, unless noted otherwise.
- C. Water; clean, potable and free from oil, acid alkaline, salts and other deleterious materials.

#### 2.02 Admixtures and Accessories

- A. Except for air-entrainment averaging 3% but not exceeding 5% no other admixtures to be used with Engineer's approval. Air-entrainment admixture to conform to ASTM C-260.
- B. Bonding Agent: Polymer resin emulsion or latex emulsion.
- C. Curing Compound: ASTM C-309, Type 1, curing compound shall not affect finishes to be installed nor adhesives used to install them. Sonnerborn Kure-Seal or equal.

D. Waterstop: Volcay "Waterstop-Rx" or equal.

E. Expansion Joint Filler: Performed, non-extruded resilient, ASTM D-994.

#### Part 4 EXECUTION

##### 3.01 Inspections and Job Conditions

- A. Verify inserts, pipes, sleeves, conduits, anchors, plates, reinforcement and other items to be cast into concrete are accurately placed, securely position and will not obstruct placement of concrete.
- B. Conform to ACI recommendations for hot-weather (ACI 305) and for cold-weather (ACI 306) concrete mixing and placement.
- C. Perform no concrete operations when temperature is below 40 degrees F. or is expected to fall below 40 degrees F. within the ensuing 24 hours. Temperature of mixed concrete shall not exceed 90 degrees F. nor be less than 60 degrees F.

##### 3.02 Concrete Design and Mixing

- A. Mix concrete in accordance with ACI 613. Volumetric proportioning not allowed. Measurement of materials to be by weight only by methods that will permit proportions to be accurately controlled.
- B. Concrete may be proportioned and mixed on the job, dry batched for mixing on the job or procured from a "transit mixed" concrete. If transit-mixed, mixing and transporting operation to conform to ASTM C-94. Mixing water shall not be added after a truck has left the plant except by permission of Engineer or his representative. No concrete shall be used in work, which has been held longer than 1-1/2 hours in a mixer truck. If dry batched to job site, the batching plant operations to conform with ASTM C-94. Transportation of dry materials shall be performed in such a manner as to prevent loss, segregation or contamination of ingredients. If job proportioned and mixed, aggregates must be stock piled separately and handled in such a manner as to prevent inclusion of any foreign materials. Except for emergency hand-mixing under approved condition, all concrete to be machine mixed in an approved type mixer for a minimum period of 1-1/2 minutes in a drum rotating at a peripheral speed of about 200 feet per minute. All equipment to be clean.
- C. Aggregates to be proportioned by weight. Use of fractional sacks of cement will not be permitted unless the cement is proportioned by weight. Water to be measured by an accurate measuring device, which can be adjusted to compensate for variations in free moisture content or aggregates. Re-tempering of partially hardened concrete or mortar will not be permitted. Concrete to be proportioned so as to include the minimum amount of water to obtain a workable mix in accordance with the limits prescribed.

- D. The determination of the proportions of cement, aggregate and water to attain the required strengths shall be established by tests which shall be made in advance of the beginning of operations using the consistencies suitable for the work and in accordance with the "Standard Method of Making compression Tests of Concrete" ASTM C-39.
- E. Unless noted otherwise on the Drawings, all concrete shall be 3000-psi minimum compression strength at 28 days.

### 3.03 Placement

- A. No concrete to be placed at any time without the Engineer's direct presence, unless approved by the Engineer.
- B. Notify the Engineer 24 hours prior to commencement of placement operations. Placement of concrete will not be allowed until inspection and approval of reinforcement, formwork and other conditions of placement has been done by the Engineer.
- C. Maintain concrete coverage around reinforcing as shown on the Drawings. In no case shall coverage be less than 1-1/2", unless noted otherwise.
- D. All concrete placements to be in strict accordance with ACI 301. For standard concrete, elapsed time between proportioning of materials and placing of concrete shall not exceed 1-1/2 hours. Delivery of concrete to be scheduled so that continuity of a pouring operation is not interrupted for more than 15 minutes between trucks.
- E. Before depositing concrete, remove debris and water from spaces to receive concrete. Wet forms and abutting concrete surfaces as directed.
- F. When depositing new concrete against old, wire brush clean and thoroughly wet old surfaces and cover with bonding agent in accordance with manufacturer's recommendations.
- G. Convey concrete from mixer to forms immediately by means of approved equipment that will avoid segregation upon placement. Deposit continuously and in layers of such thickness so that no concrete will be deposited on concrete that has hardened. Consolidate concrete to insure avoidance of excessive voids and honeycombs using mechanical vibrators, supplemented by hand-rodging and tamping where required. Do not vibrate to the point that segregation occurs. Vibration to conform to ASTM C-309.

- H. After placement, screed concrete to required lines and levels working with horizontal and vertical strokes. Use bull-float or darbies to smooth surface and to rise fills to surface. Check for humps, depressions or other surface irregularities and correct. Float surface to  $\frac{1}{4}$ " in 10"-0 tolerances. Finish in accordance with Paragraph 3,4, finishing.
- I. Construction loads on in-place construction shall at no time exceed the live load for which the in-place structure was designed. Contractor to obtain same from Engineer and engineer prior to loading structure.
- J. If, for any reason, it shall become necessary to stop placing of concrete at places other than those indicated on the Drawings, such places and the manner of making the joint, shall require the approval of the Engineer. Adequate provisions shall be made against shear by means of keys or added reinforcement or as otherwise directed. Before depositing new concrete against old, forms to be retightened and hardened surfaces cleaned and covered and covered with a coating of mortar and neat cement grout.
- K. Where shown on the Drawings and wherever else concrete cannot be placed continuously, provide construction joints made and located in accordance with methods which will least impair the strength of the structure. Where water stops are indicated, installing strict accordance with manufacture's recommendations. Place concrete continuously between construction joints. Unless indicated otherwise, continue reinforcing across joint and provide 1-1/2" keyways. Prior to pouring, clean previously-poured concrete and apply bonding agent throughout joint area. Do not break or otherwise interrupt successive pours such that cold joints occur.

### 3.02 Finishing

- A. Concrete surfaces to be left exposed to be smooth rubbed finish. Wet surfaces while concrete is green and rub with a carborundum brick until uniform color and texture are produced. Remove burrs, fins and other surface irregularities.
- B. Concrete slabs to be steel-troweled finished unless indicated otherwise. Machine troweling is acceptable, subject to Engineer's approval. Concrete floor areas NOT scheduled to receive floor finish shall be hand troweled after machine troweling and light broomed.
- C. Curing: Apply one coat of Super Rez Seal, by Euclid Chemical Co. to entire slab surface in strict accordance with manufacturer's recommendations. Apply second coat a minimum of twenty-one (21) days later to all areas to have exposed, sealed, concrete floor.
- D. Slope slabs to drain as indicated on the Drawings.

- E. Patch all surface defects immediately upon removal of forms. Defects include, but are not limited to, cracks in excess of .01", honeycombs, rock pockets, spalls and any surface voids or cracks extending back to reinforcing. Patch all tie holes full and solid. Patching material to be 1 part cement to 2-1/2 parts sand. Color to match concrete surrounding defective area by use of appropriate volumes of white cement. Mix with water to stiffest consistency allowing handling and placing. Dampen area to be patched and an area 6" around. Coat with bonding agent. Patch, thoroughly consolidating mortar into patched area. Keep patched area damp cured for 7 days.
- F. Remove and replace all concrete not conforming to lines, levels, details and elevations required by the Drawings. Slabs to be level to 1/4" in 10-0 tolerance. Grind all slabs, where required.

### 3.03 Testing

- A. Contractor shall coordinate with testing laboratory and shall notify same to insure laboratory representation at all required pour.
- B. A recognized Independent Testing Laboratory will be selected by the Owner to perform the following field and laboratory testing services at the expense of the Owner:
  - 1. Inspect and test all concrete materials, except those items such as domestic cement and domestic reinforcing steel covered by mill certificates, which need not be tested by the Laboratory.
  - 2. Make and test concrete cylinders at the frequency of one set of four specimens per 50 cubic yards of concrete for each class placed or fraction thereof per day's pour.
- C. The scope of testing services may be adjusted at the Owner's discretion prior to or at any time during the project.
- D. All inspections and tests to be performed in accordance with applicable ASTM Standards. Slump tests to be in accordance with ASTM C-43. Compression tests to be in accordance with ASTM C-31. In the event the Laboratory determines deviations from the Specifications, the Engineer and Contractor shall be notified immediately. Written reports covering all inspection and testing operation to be furnished promptly to the Engineer and Contractor.
- E. In addition to the foregoing function, the Testing Laboratory shall be considered available to consult with the Contractor will be responsible for notifying the Testing Laboratory at appropriate points of progress so that the identified scope of testing can be reflected. Such notification to be made in a timely fashion. The Contractor shall cooperate with the Testing Laboratory so that the functions of the laboratory may be properly performed.

- F. Should cylinder breaks indicate that below-specified strength tests shall be made on those areas so affected. The method of loading shall conform to the ACI 318. Such tests to be made by the Independent Testing Laboratory and at the expense of the Contractor. Any area or member found to be inadequate by the above test shall be removed and replaced to the satisfaction of the Engineer.
- G. The testing of materials described herein in no way relieves the Contractor of his obligation to provide materials and construction in full compliance with the requirements of the Contract Documents.

#### 3.04 Protection and Cleanup

- A. Immediately after placement, protect concrete from premature drying and excessively hot or cold temperatures.
- B. Maintain concrete with minimum moisture loss at uniform temperature for sufficient time to insure hydration of cement. Perform curing of all concrete by applying curing compound to horizontal concrete surfaces in two coats, with second coat at right angles to first. Apply curing compound in strict accordance with manufacturer's recommendations. Moist-curing or moisture-retaining coverage methods are acceptable, but will require approval prior to concrete placement.
- C. Immediately after completion of concrete operations, remove all debris from site. Immediately prior to final inspection, wash, clean and mop all exposed concrete floors.



SECTION 03305  
CONCRETE PAVING, CURB, AND SIDEWALKS

Part 1 GENERAL

1.01 Related Work

- A. Section 02310: Earthwork for Pavement
- B. Section 03200: Concrete Reinforcing
- C. Section 03300: Cast in Place Concrete
- D. Section 03310: Joint Sealant

1.02 Quality Assurance, Job Conditions and Warranty

- A. All work done in this area to be paid by personnel experienced in concrete finishing work.
- B. Perform no concrete operations when temperature is below 40 degrees F or is expected to fall below 40 degrees F within the ensuing 24 hours.
- C. Temperature of mixed concrete shall not exceed 90 degrees F nor be less than 60 degrees F.
- D. This contractor shall guarantee this work to be free of defects, for a period of one year from the date of acceptance in writing by the Engineer.

Part 2 PRODUCTS

- A. Concrete shall be of material composition as specified Section 03300; 3000 P.S.I. at 28 days. Maximum aggregate size to be 1-1/2".
- B. Expansion Joint Material (Wood): 3/4" B or better redwood.
- C. Expansion Joint Material (Sealant) shall be as specified in Section 02760.
- D. Curing compound to be resin base ASTM C309, Type 1.
- E. Reinforcing Steel shall be as shown on the drawings and as specified Section 03200.
- F. Dowels, except as otherwise detailed, shall be No. 4 reinforcing bars 18" long at 24" on center with one side wrapped with plastic tubing to form a slip joint.
- G. Subgrade and Base materials to be placed as shown on the drawings and as specified elsewhere.

## Part 3 EXECUTIONS

### 3.01 Performance

- A. Excavate earthwork as required to obtain required finish grades, allowing for required thickness of fill material and concrete. Compact earthwork true to line and grade. Earthwork shall be free from soft spots and loose materials. Fill areas to receive concrete with select fill. Level and compact as specified elsewhere.
- B. Forms to be straight, durable and have a depth equal to the required depth. The forms to be securely staked to line and grade in such a manner that there shall be no movement when the concrete is placed. Wet down subgrade before placing concrete.
- C. Reinforcing steel and expansion joints with dowels to be located and accomplished in accordance with the drawings. Expansion joints with dowels to be located and accomplished in accordance with the drawings. Expansion joints and transverse markings to be square with the form-work. Transverse markings to be 1/5 depth of concrete thickness and to be located between expansion joints at a distance not to exceed 10 feet intervals.
- D. Concrete shall be placed in such a manner so that segregation does not occur. Concrete shall be thoroughly tamped with a "jitterbug" or other approved tool. All pours shall begin and end at expansion joints; no cold joints allowed.
- E. Immediately after the finishing has been completed, curing compound shall be evenly applied in strict accordance with manufacture's recommendations. Forms shall be carefully removed so that the concrete work is not damaged. All "honeycombs" shall be plastered before backfilling is accomplished. Protect work for duration of project. Replace portions of work that become damaged prior to acceptance of building by owner.

### 3.02 Finishes

- A. All joints and edges shall be tooled and surface of sidewalks and paving shall receive a medium broom finish unless otherwise indicated. Broom marks shall be uniform and even. The marks shall break the surface to prevent surface from becoming slick when wet. Run broom marks across the width of the forms. Concrete curbs shall have a rubbed and grout coat finish.
- B. Non-slip finish, if required, shall be installed as per manufacturer's recommendations.
- C. Where washed aggregate surface is called for on the plans, aggregate size shall not exceed  $\frac{3}{4}$ ".

## SECTION 03310 JOINT SEALANT

### Part 1 GENERAL

- A. This section shall govern for sealing control, expansion, and/or construction joints in concrete to create a continuous diaphragm to prevent fluid migration and accumulation of debris.

#### 1.01 Related Work

- A. Section 03300: Cast In Place Concrete
- B. Section 03305: Concrete Paving, Curb and Sidewalk
- C. Section 03400: Precast Concrete

#### 1.02 References

- A. American Society for Testing Materials (ASTM)

#### 1.03 Submittal

- A. Contractor shall submit manufacturer technical data for Engineer approval.

### Part 2 PRODUCTS

#### 2.01 Materials

- A. Dow Corning 888 Silicone Joint Sealant over wood expansion material or approved equal.

### Part 3 EXECUTION

#### 3.01 Installation for Silicone Sealant

- A. Clean and blowout joint of contaminants and impurities to a minimum ½-inch depth. Joint must be properly recessed immediately after installation.
- B. Apply sealant in a continuous operation to properly fill the joint. The sealant shall only be applied when temperature is above 40 degrees F.
- C. Excess sealant shall be cleaned off with an appropriate solvent.

Sealed Bids marked “**Bid No. 15-02 Concrete Paving Improvement Project Phase V**” will be received at the Purchasing/IT Department, City Hall, Kingsville, Texas until 1:30 P.M. on Wednesday, January 7, 2015. Immediately thereafter the bid proposals will be publicly opened and read aloud in the Robert H. Alcorn Commission Room. There will be a Pre-Bid Meeting at 1:00 P.M. on Monday, December 29, 2014 in the Robert H. Alcorn Commission Room City Hall, Kingsville, Texas. Site visitation will follow.

Additional specifications or information may be obtained online at [www.cityofkingsville.com](http://www.cityofkingsville.com) Bidders may be present for the bid opening.