CITY OF SAN ANGELO

General Requirements and Geotechnical Investigation For the:

SOUTHLAND BLVD ROADWAY IMPROVEMENTS

OCTOBER 3, 2016

CITY OF SAN ANGELO
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General Requirements

Specifications attached may be missing additional referenced specifications. Please contact the engineer prior to bid with any questions pertaining to specifications or their use.

SECTION 01000

GOVERNING SPECIFICATIONS

PART 1: DESCRIPTION

A. All specifications and special provisions applicable to this project are identified as follows:

1) Standard Specifications – Adopted by the Texas Department of Transportation November 1, 2014. Standard Specifications are incorporated into the contract by reference
2) All other General and Supplemental conditions included elsewhere in the contract documents.

3) All other technical specifications included elsewhere in the contract documents.

B. Where discrepancies occur between the various governing specifications, the special provisions shall govern over the standard specifications.

C. TxDOT Items 2-4 and 6-9 are superseded by the contract general and supplemental conditions, where applicable. Wherever, in the TxDOT Standard Specifications, reference is made to the State of Texas, the Department and its representatives, such reference shall be taken to mean the City of San Angelo and its representatives.

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D. The above-listed specification items are those under which payment is to be made. These, together with such other pertinent items, if any, as may be referred to in the above-listed specification items, and including the special provisions and special specifications listed above and the other technical specifications included in the project manual, constitute the complete specifications for this project.

END OF SECTION 01000

SECTION 01010

SUMMARY OF WORK

PART 1: DESCRIPTION

A. The work consists of HMAC widening and overlay of a local roadway consisting of grading, base, structures, traffic signal relocation, curb and gutter, pedestrian improvements and signing and marking for approximately 645 linear feet of roadway.

PART 2: WORK SEQUENCE

A. The CONTRACTOR shall determine his own method of construction and detailed work sequence while observing all construction constraints and substantial and overall completion times are achieved. The CONTRACTOR shall properly coordinate his sequence of work and submit a detailed construction schedule to the Engineer for approval.

PART 3: CONTRACTOR RESPONSIBILITIES

A. Execute all work as defined in the plans and specifications.

B. Arrange for the securing of any necessary permits not obtained by the OWNER and pay for the same.

C. Arrange for necessary temporary water service and pay for this service and all water used during construction of the project.

D. Provide adequate temporary sanitary facilities.

PART 4: MEASUREMENT AND PAYMENT

A. No separate measurement or payment will be made for this item.

SECTION 01014

ENVIRONMENTAL PROTECTION

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Construction of the Work covered by these Contract Documents is subject to the applicable provisions and rules of the Texas Commission on Environmental Quality (TCEQ) and United States Army Corps of Engineers and all other local applicable Federal, State, and Local laws, rules, regulations, ordinances, and conditions/requirements of permits issued by governmental agencies for the conduct of this project.

1.02 RELATED SECTIONS

A. 01300 – Submittals

B. 02105 – Containment and Disposal of Waste

1.03 SUBMITTALS

A. Record Data - Storage and Fueling Plan: for hydraulic fluid, oil, and fuel: Submit for approval by ENGINEER prior to bringing fuel storage on-site. Describe plan for fueling equipment and fuel storage including spill prevention, containment, and cleanup provisions. Provide a list of all equipment that will contain more than 55 gallons of hydraulic fluid, oil, or fuel. Provide drawings for the secondary containment systems pertaining to above ground fuel storage tanks, equipment-mounted fuel tanks, oil reservoirs, and oil and fuel lines (including hydraulic fluid lines). Provide a description on how secondary containment will be inspected. Provide a description on how fueling operations will be handled over or near a waterway, or on shore, describing environmental protection methods that will be implemented. Provide description for requesting additional fuel storage containers not included in initial request. Provide inspection form to be used on a weekly basis in evaluating these areas.

B. Record Data - Equipment Maintenance Plan: Describe plan for minimizing the potential environmental impacts of preventative and non-scheduled equipment maintenance activities. Describe what environmental protections measures will be implemented prior to and during both preventative and non-scheduled equipment maintenance activities.

C. Record Data – Equipment Inspection Reports: Provide inspection procedure and example inspection form to be used on a weekly basis to report equipment inspections.

D. Record Data – MSDS: Provide MSDS data sheets on all proposed fuels, chemicals, paints greases, hydraulic fluids, coatings, epoxies, cements, admixtures, etc. to be used on and with equipment, to be used temporarily during construction, and to be permanently incorporated into the work.

E. Record Data – Materials used to perform the Work: Provide a list for the following types of materials that will be used in performing the Work.

1) Ozone-depleted chemicals
2) Materials with volatile organic compounds (VOC's)
3) Any material that will become an F-Listed waste (e.g. acetone, xylene, toluene, methyl ethyl ketone).
4) Acutely toxic materials.
5) Constituents subject to reporting under the state and federal Right-to-Know regulations (as shown on the Material Data Sheets).

F. Record Data – Care of Water Plan: Describe plan for dewatering an area and managing water flows and infiltration into the work area. All water flows from, or generated by the work, must meet State and Federal regulations prior to entering a creek, stream or a lake. Regulations include, but not limited, to 30 TAC 307 and 26 TWC 121, Surface Water Quality Standards and Water Quality Control for the State of Texas respectively.

G. Record Data – Storm Water Inspections: Contractor to submit weekly storm water inspections to OWNER based on Storm Water Pollution Prevention Plan provided by OWNER.

1.04 PROTECTION OF LAND RESOURCES

A. The land resources, within the project boundaries and outside the limits of work under the Work of this Contract, shall be preserved in their present condition or be restored to a condition after construction that will appear to be natural and not detract from the appearance of the project. Activities shall be confined to areas defined by the Drawings and Specifications.

1.05 PROTECTION OF WATER RESOURCES

A. No water courses shall be polluted with any construction debris, loose soil, suspended sediment, petroleum products, abrasives, epoxies, paints, solvents, cleaners, fuels, surface preparation materials, oils, lubricants, bitumens, calcium chlorides, insecticides, herbicides, or other toxic materials harmful to life unless specifically permitted. Chemical emulsifiers, dispersant, coagulants, or other cleanup compounds shall not be used without prior written approval. It is the responsibility of the CONTRACTOR to insure compliance with state and local water quality standards and to identify if any additional discharge permits are required to perform Work.

B. The CONTRACTOR may be required to submit a certified Spill Prevention Control and Countermeasures Plan (SPCC) that will fulfill the requirements of the Clean Water Act, CFR Part 112. In the event that the total capacity of all hydraulic fluid, oil, fuel containing tanks, containers, and equipment exceeds 1,320 gallons and if the project continues after 8/1/06 then an SPCC I required. The plan must be prepared prior to installing or mobilizing equipment that would cause the 1,320 gallon limit to be exceeded.

C. The CONTRACTOR will submit for approval all fuel storage containers, prior to mobilizing containers onto site, in accordance with Edwards Aquifer Rules (30 TAC 213). Additional fuel storage containers not approved in initial request must be individually approved by the ENGINEER.

1.06 DEWATERING

A. The CONTRACTOR will control and manage all dewatering of the project, and any non-storm water discharges from the construction site in compliance with all TCEQ water quality discharge requirements, including but not limited to 30 TAC 307, Surface Water Quality Standards for the State of Texas.

B. Contractor shall provide continuous observation of dewatering activities and effectiveness of BMP's.

C. The following non-storm water discharges from construction activities are acceptable.

1) Discharges from fire fighting activities
2) Fire hydrant flushings
3) Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless spilled materials have been removed; and if local, state, or federal regulations are applicable, the materials are removed according to those regulations), and where the purpose is to remove mud, dirt, and dust
4) Water used to control dust
5) Potable water sources including waterline flushings
6) Air conditioning condensate
7) Uncontaminated ground water or spring water, including foundation or footing drains where flows are not contaminated with industrial materials such as solvents or other pollutants

D. Dewatering and non-storm water discharges will, at a minimum, flow through silt fence, or other suitable structural controls, prior to leaving the site, as necessary to meet compliance requirements with all State and Federal water quality discharge requirements, including but not limited to 30 TAC 307 or 26 TWC 121, Surface Water Quality Standards and Water Quality Control for the State of Texas respectively.

E. Dewatering of water contaminated with hydrocarbons or other oils is prohibited from being discharged to a creek, stream, lake, or the soil surface.

1.07 PROTECTION OF AIR QUALITY

A. All Work shall be performed in such a manner as to ensure that air quality is protected. CONTRACTOR will complete and maintain all records to support compliance with the applicable air quality standards including but not limited to 30 TAC 106.183.

1.08 PROTECTION OF FISH AND WILDLIFE

A. All Work shall be performed and all steps taken to prevent interference or disturbance to fish and wildlife. Water courses or habitats outside the project boundaries shall not be altered or disturbed, without OWNER's written prior consent.

1.09 BURNING OF DEBRIS

A. No debris or surplus materials may be disposed of by burning at the job site or at any other location.

1.10 INFORMATION REGARDING WASTES REQUIRED WITH BID

A. Waste control measures shall be implemented during construction activities to prevent unauthorized release and ensure proper management of waste in accordance with Section 02105 – Containment and Disposal of Waste.

1.11 PROHIBITED MATERIALS

A. The CONTRACTOR is strictly prohibited from using any of the following types of materials that could generate waste in performance of the work.

1) Asbestos, asbestos-containing material (ACM)
2) Mercury containing material
3) Surface coatings with lead, cadmium, chromium, or mercury
4) PCB containing material
5) Radioactive containing material

1.12 ENVIRONMENTAL INSPECTIONS

A. The OWNER reserves the right to perform environmental inspections. The CONTRACTOR shall provide remedial action as required by the OWNER.

PART 2: NOT USED

PART 3: EXECUTION

3.01 EROSION CONTROL DURING CONSTRUCTION

A. The CONTRACTOR shall utilize the Best Management Practices (BMP's) with regard to controlling erodible soils within the construction lay-down area, project site, and while working near water, or water courses. This may include installing and maintaining silt fences or other similar structural controls as prescribed within the Storm Water Pollution Prevention Plan or additional controls as needed for any erodible soil, or storage of materials within the lay-down area and work site.

3.02 STORM WATER POLLUTION PREVENTION PLAN SWPPP

A. Implementation of the SWPPP is required. The CONTRACTOR will perform all actions required within the SWPPP in relation to day to day on site activities including: weekly inspections of controls, and maintenance to sediment and erosion controls based on inspection records. Contractor shall provide a copy of the inspection records to Owners Representative on a weekly basis beginning with first required inspection, in addition, CONTRACTOR will maintain records in accordance with Texas Pollution Discharge Elimination System requirements.

3.03 PLACEMENT OF TEMPORARY PLATFORMS AND ACCESS FACILITIES

A. Temporary platforms or other temporary access facilities may be placed for temporary construction access to perform required Work. All placements of temporary platforms shall be conducted in accordance with the terms and general conditions of the U.S. Army Corps

of Engineers Nationwide Permit Program and other environmental compliance requirements specified herein.

3.04 PREVENTIVE MAINTENANCE, FUELING, AND SPILL CONTAINMENT

A. Scheduled preventive maintenance shall be performed on all construction equipment prior to mobilization in the work area. CONTRACTOR shall establish a maintenance area within the staging area for performing all routine and preventative maintenance, when possible. CONTRACTOR shall thoroughly inspect all construction equipment for any leaks prior to use at the job site and on a daily basis.

B. A spill can be defined as an accidental release of a solid, liquid, or gas to land, air, or water that would create a potential or actual hazard to human health or the environment.

1) The CONTRACTOR is solely responsible for any spills or release caused by himself or any of his subcontractors that occur during the performance of, or in connection with the performance of the Work under this Contract. The CONTRACTOR shall be responsible for all notifications required by any federal, state, or local law or regulations. The CONTRACTOR shall immediately notify the OWNER of the nature and location of any spill. The CONTRACTOR shall provide a written report to OWNER that identifies the substance, quantity released, location of the spill, agencies notified/talked to if any, cleanup and remediation activities conducted or planned. The written report should be a narrative that summarizes on the scene activity, remediation efforts, and if long term remediation will be required. This initial report shall be provided to the OWNER within 24 hours after the incident. Follow up reports may be required if requested by the OWNER. These requirements are also required if the spill occurs off the OWNER's property as a result of contractors performance of the Work under this Contract.
2) The CONTRACTOR shall be liable for, and agrees to indemnify and hold the OWNER harmless from any and all liabilities, including, but not limited to, remediation costs, fines, penalties, court costs, and attorney fees resulting from spills, releases, improper handling and/or disposal of wastes connected with a spill by the CONTRACTOR.
3) Spills shall be cleaned up to background levels or to criteria as set forth in the applicable federal, state, or local laws and regulations, or whichever is the most stringent.

C. The CONTRACTOR shall provide a temporary secondary containment berm with plastic liner around all stationary construction equipment subject to potential leakage of fluids or fuel to contain accidental leakage and/or discharges. Detection and cleanup of liquid fuel, oil leaks, or spills, shall be accomplished as follows.
1) Leak Detection: Leaks from any tanks or lines on equipment shall be detected by the CONTRACTOR during a daily check. Any fuel, oil, or chemical leak shall be reported immediately verbally and then in writing, in the appropriate format, to the OWNER's Resident Representative. The CONTRACTOR shall ensure that the source of the leak is repaired and that the spilled fluid is cleaned up immediately and thoroughly.
2) Leak Cleanup: The CONTRACTOR shall be responsible for all spill cleanups and notify OWNER's Resident Representative immediately. Any fuel, oil, or chemical leakage shall be collected in the bermed area surrounding the equipment using absorbent material. Contractor shall keep absorbent materials on site for clean up.

Contaminated absorbent materials shall be disposed of in accordance with Section 02105 – Containment and Disposal of Waste.

3) Oil Filters: Used oil, oil filters, and cartridges shall be collected by the CONTRACTOR and these items will be recycled at an OWNER approved and audited recycling facility.

4) Operation of Equipment in Areas Subject to Direct Discharge to Waterways: Special precautions shall be taken to prevent releases of fuel, oil or chemicals when equipment is working over or adjacent to the water. This shall include provision of secondary containment for equipment-mounted fuel tanks, oil reservoirs, and fuel and oil lines (including hydraulic fluid lines). Exposed hydraulic lines shall be double wrapped and/or shielded by the use of deflectors, as necessary, to prevent a release to the water in the event of a line rupture. No fuel container larger than 250 gallons shall be stored on-site outside of the staging area designated on the construction drawings, unless prior written approval by the owner. Fueling of equipment over or adjacent to water shall be done using a maximum fuel storage/transfer container size of five (5) gallons. A funnel shall be used to minimize fuel spillage, and a drip pan shall be used to capture any spillage of fuel. If the total quantity of containers smaller than five gallons on a barge, platform, walkway, or structure exceeds five (5) gallons, then these multiple items shall be kept in secondary containment while in storage.

D. The CONTRACTOR should attempt to use and work with the least amount of chemicals or fuels needed for a given job.

3.05 NOISE CONTROL

A. The CONTRACTOR shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with appropriate sound muffling devices and operated in a manner to cause the least noise consistent with efficient performance of the Work.

3.06 EQUIPMENT HYDRAULIC SYSTEMS

A. All hydraulic systems and lines on CONTRACTOR’s equipment should be evaluated to determine if vegetable-based or environmental friendly hydraulic oil can be utilized over waterways. Vegetable-based or environmental friendly hydraulic oil is required if equipment manufacturer allows replacement of standard hydraulic oils. Provide MSDS sheets on the proposed hydraulic fluids. All hydraulic systems shall be double wrapped with absorbent materials or use deflective devises.

PART 4: MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement or payment will not be made for Work required under this Section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

END OF SECTION 01014

SECTION 01015

CONTRACTOR USE OF THE PREMISES

PART 1: GENERAL

1.01 SCOPE OF WORK

A. The CONTRACTOR shall not begin construction until all erosion and sedimentation control devices shown on the plans and related to the portion of the work have been installed, a preconstruction meeting at the site has been held per the plans, and the inspector has approved the erosion and sedimentation controls.

B. Spoil material to be used on the job shall be stored within the limits of construction shown on the Plans. Trash, material unsuitable for fill and spoil material shall be permanently disposed of offsite. The CONTRACTOR shall take care not to cause mud, dirt and dust to be carried off the site. When construction is complete the site shall be fully restored and cleaned up of all trash, debris and contaminated soils due to chemical spills or other similar products. No burning on-site is permitted.

C. All workers employed by the CONTRACTOR shall have such skill and experience as will enable them to properly perform the duties assigned them. Any person employed by the CONTRACTOR or a subcontractor who, in the opinion of the OWNER'S REPRESENTATIVE, does not perform his work in a proper and skillful manner, or who is disrespectful, intemperate, disorderly, or otherwise objectionable, shall at the written request of the OWNER'S REPRESENTATIVE be forthwith discharged and shall not be employed again on any portion of the work without the written consent of the OWNER'S REPRESENTATIVE. The CONTRACTOR shall furnish such suitable machinery, equipment, and construction forces as may be necessary, in the opinion of the OWNER'S REPRESENTATIVE, for the proper prosecution of the work, and failure to do so may cause the OWNER'S REPRESENTATIVE to withhold all estimates which have or may become due or the OWNER may suspend the work until his requests are complied with.

D. All work within temporary or permanent easements shall conform to any and all restrictions, conditions, and/or requirements as may be set forth in the related specific easement documents. Easements secured for this project are shown on the plans and will be presented to the CONTRACTOR.

E. All work within staging and storage areas obtained by CONTRACTOR shall conform to all requirements of these specifications.

1.02 NOTIFICATION OF PROPERTY OWNERS

A. Unless otherwise indicated, the CONTRACTOR will notify property owners abutting the right-of-way or easements, or otherwise that will be affected by construction activities, of impending construction. The CONTRACTOR shall exercise diplomacy and tact with individual property owners. The CONTRACTOR shall specifically designate a single responsible individual that will be responsible for the giving of notifications to the affected property owners or tenants in accordance with this section. The OWNER will have the right to approve the responsible individual and may ask that they be replaced at anytime.

B. CONTRACTOR shall give to property owners or tenants 48 hours notice prior to initiating work in their vicinity (within one city block or otherwise which might be affected by the work. Such notice shall be at a minimum presented by door hangers, the language on which shall be previously approved by the OWNER. The notice shall include a general description of the work to be accomplished, a direct contact name and local phone number for either the CONTRACTOR's superintendent or the employee responsible for the giving of notices, the name and phone number of the OWNER's onsite inspector, a general and accurate schedule identifying the time anticipated for the work and any other information pertinent to the work. Once notices are given, CONTRACTOR shall focus on completing that phase of work within the duration given. Subsequent notices may be required, at the sole discretion and direction of the OWNER, should the CONTRACTOR fail to complete the work within the identified schedule.

C. Additional 48 hours notices shall be provided to property owners, or others that may be affected by the work, at the sole discretion and direction of the OWNER, for subsequent work activities or phases in the same area that occur beyond 10 working days of completing a work phase identified in an initial notice.

1.03 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

A. Contractor shall protect, shore, brace, support and maintain all underground pipes, conduits, drains, and other underground facilities uncovered or otherwise affected by the Contractor's operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, sod, landscaping, irrigation, and other surface structures affected by construction operations shall be restored to their original condition, whether within or outside the easement/right-of-way. All replacements shall be made with new materials of equal appearance.

B. Only trees marked on the plan to be removed may be removed. All other trees shall be protected against injury from construction operations. Tree protection shall be installed at locations as indicated on the plans. Whenever practicable, the Contractor shall utilize hand excavations to tunnel underneath large tree roots.

C. Dust Control during construction shall be performed by the Contractor in a manner to minimize nuisance conditions and to the satisfaction of the Owner's Representative. The Contractor shall provide a dust control system for trenching operations. No direct payment will be made for dust control.

D. On a daily basis the Contractor shall sweep all streets, driveways and parking areas on which trenching, excavating, pipe laying or other dust generating activities occur. A street sweeper containing a dust control system shall be maintained on the project site at all times that trenching, excavating, pipe laying or other dust generating activities are ongoing.

E. Hand excavate to tunnel under other underground obstructions.

1.04 TEMPORARY DRAINAGE PROVISIONS

A. Contractor shall be responsible for providing for the drainage of stormwater and such water as may be applied or discharged on the site in performance of the Work. Contractor shall

construct temporary drainage facilities to handle, carry through, or divert around his Work all drainage flow, including storm flows to prevent silting of waterways or flooding damage to adjacent properties.

1.05 NOISE CONTROL

A. Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound level in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

1.06 FENCES AND MAILBOXES

A. All existing fences affected by the Work shall be maintained by the Contractor until completion of the work. Fences which interfere with construction operations shall be maintained with temporary fencing that shall be in place at nights/weekends and when the Work is not progressing at that site.

B. Contractor shall remove, reset temporarily, and replace permanently all mailboxes that are affected by the work. Access to mailboxes for delivery U.S. Mail shall be provided at all times. Temporary and permanent installations shall conform to the requirements of the United States Postal Service. Payment for removing and resetting of mailboxes will not be paid for directly, but will be considered subsidiary to the various bid items. Any damage to mail boxes or posts shall be the responsibility of the Contractor.

1.07 WORK ON COMMERCIAL PROPERTIES

A. The CONTRACTOR shall maintain driveway access to all commercial properties during construction of mains and services. Work shall be phased to have a minimal impact on parking during construction. The CONTRACTOR shall coordinate with the property representative regarding the timing of parking space closures and timing of deliveries to the properties.

1.08 MAINTENANCE OF TRAFFIC

A. CONTRACTOR shall conduct his Work to have the least impact with vehicular and pedestrian traffic as is practicable. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether private or public, the Contractor shall provide and maintain suitable traffic control devices, detours, or other temporary measures to accommodate travel, and shall provide reasonable notice to owners of private drives prior to interfering with them.

B. Safety and conveyance of traffic shall be regarded with prime importance. Unless otherwise directed, all portions of streets associated with this Project shall be kept open and provided a dust free, smooth and comfortable ride to traffic. In making open cut street/driveway crossings, the CONTRACTOR shall not block more than one-half of the street/driveway at one time without approval of the Owner.

C. Prior to beginning Work, CONTRACTOR shall designate to the Owner a competent person who will be responsible and available to ensure compliance with the traffic control plans.

D. The CONTRACTOR shall perform the necessary cleanup and temporary or final finishing immediately at the end of each day to fully reopen all streets and driveways. Temporary surfacing shall be provided where necessary to provide a smooth and safe ride in public streets and driveways.

E. Where indicated on the traffic control plan, CONTRACTOR shall erect and maintain detours around construction activities.

F. All traffic control devices shall be constructed and placed in accordance with the Texas Manual on Uniform Traffic Control Devices and the traffic control plans for the project. The Contractor shall be solely responsible for their placement and maintenance throughout the project.

G. All open trenches and other excavations shall have suitable barricades, signs, and lights to provide adequate protection to the public. Obstructions, such as material piles and equipment shall be provided with similar warning signs and lights, and shall be illuminated with warning lights from sunset to sunrise.

1.09 EMERGENCY FACILITIES

A. Free access shall be maintained at all times to fire lanes and emergency and utility control facilities such as fire hydrants, fire alarm boxes, police call boxes, and utility valves, manholes, junction boxes, etc. In the event that it is necessary to make on of these facilities temporarily inaccessible, the Contractor shall obtain approval of such action. Contractor shall also provide at least 24 hours prior notice to the Fire Department, Police Department, and/or governing agency of the facility.

B. Should a water line or gas line be broken by the Contractor during Work activities, or should other emergency conditions arise during the project, the following emergency notifications shall be immediately made by the Contractor.

Should a gas line be broken, the Contractor is to immediately notify the gas company owning the gas line and the following entities:

City of San Angelo Police Dept.	325-481-2696
City of San Angelo Fire Dept.	325-657-4283
City of San Angelo Inspector	To be provided
City of San Angelo Engineering Services	325-657-4201

Should a water or wastewater line be broken, the Contractor is to immediately notify the owner of the water or wastewater line and the following entities:

City of San Angelo Water Utility	325-657-4209
City of San Angelo Inspector	To be provided

PART 2: NOT USED

PART 3: NOT USED

PART 4: MEASUREMENT AND PAYMENT

A. No separate payment shall be made for work described in this section.

END OF SECTION 01015

SECTION 01040

COORDINATION AND SITE CONDITIONS

PART 1: GENERAL

1.01 SECTION INCLUDES

A. Requirements for coordinating the work under the Contract with other contracts, and requirements regarding existing site conditions.

B. Requirements for cutting and patching of new and existing work.

1.02 JOBSITE COORDINATION

A. Coordination with Work by Others: CONTRACTOR shall coordinate with the TxDOT Sherwood Way (US 67) Contractor.

B. Coordination with Driveway Owners: CONTRACTOR shall coordinate construction with driveway owners and maintain ingress and egress at all times.

C. Coordination with City of San Angelo Fire Department: CONTRACTOR shall coordinate all TCP changes and driveway modifications with the City of San Angelo Fire Department to maintain emergency services ingress and egress at all times.

1.03 SUBMITTALS

A. CONTRACTOR shall submit the following information as applicable to coordination activities:

1) Subsurface Information and Utilities:

a) Records or logs of boring or test holes made by CONTRACTOR, if any.
b) Results of exploratory excavations made to verify locations and nature, shape, dimensions, etc., of existing utilities and facilities; where possible, indicate this information on clean copy of Contract Drawings.

2) Field Relocation: Clearly show proposed relocation of new or existing facilities, or related work affected by the relocation, on clean copy of the Contract Drawings and submit prior to performing the relocation.

3) Connecting Work: Proposed methods of connecting new work to existing facilities:

4) Cutting and Patching:

a) Written notice requesting consent to perform cutting which may affect structural safety or normal functioning of existing facilities.

b) Notifications indicating changed conditions, proposal of alternative materials or methods, time when uncovered work may be observed, and other information necessary to evaluate substitutions when work conditions

necessitate change of materials or methods. CONTRACTOR shall provide and pay for engineering services as required for alternatives and substitutions.

1.04 SITE CONDITIONS

A. General: Information obtained by the OWNER regarding site conditions, topography, subsurface information, groundwater elevations, existing construction of site facilities as applicable, and similar data will be available for inspection at the office of the ENGINEER upon request. The available information includes the following geotechnical reports: **Geotechnical Investigation for Southland Boulevard Project "Roadway Widening from 3 to 5 Lanes" San Angelo, Texas by Rodriguez Engineering Laboratories dated August 5, 2016.**

B. The geotechnical information listed above is offered as supplementary information only. The OWNER does not assume any responsibility for its accuracy or completeness or for the CONTRACTOR's interpretation of such information.

C. Profile Evaluations: Existing ground contours shown on the Drawings were developed from topographic data and some field survey work.

D. CONTRACTOR's Responsibilities for Existing Utilities:

1) Where CONTRACTOR's operations could cause damage or inconvenience to railway, telegraph, telephone, television, power, oil, gas, water, sewer or irrigation systems, the CONTRACTOR shall make arrangements necessary for the protection of these utilities and services. Replace existing utilities removed or damaged during construction, unless otherwise provided for in these Contract Documents.

2) Notify utility offices that are affected by construction operations at least 48 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for the utilities.

3) Contractor shall be solely and directly responsible to OWNER and operator of such properties for damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of injuries or damage which may result from construction operations under this Contract.

4) Neither OWNER nor its officers or agents shall be responsible to CONTRACTOR for damages as a result of CONTRACTOR's failure to protect utilities encountered in the work.

5) In event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental damage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration as promptly as possible and pay for repair. Prevent interruption of utility service unless granted by the utility owner.

E. Interfering Structures:

1) The CONTRACTOR shall protect from damage, all existing structures aboveground or underground which are to remain. The CONTRACTOR shall be responsible for

all costs associated with any restoration of existing structures. An attempt has been made to show major structures on the Drawings. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed.

2) Protect existing structures from damage. Where existing fences, gates, barns, sheds, buildings, or other structure must be removed to properly carry out work, or are damaged during work, restore them to original condition and to the satisfaction of property owner.

3) CONTRACTOR may remove and replace in equal or better than original condition, small structures such as fences, mailboxes, and signposts that interfere with CONTRACTOR's operations.

F. Field Relocation:

1) During construction, it is expected that minor relocations of proposed facilities will be necessary. Make such relocations only by direction of the OWNER's REPRESENTATIVE. If existing structures are encountered that prevent construction as shown, notify the OWNER's REPRESENTATIVE before continuing with work so OWNER's REPRESENTATIVE may make necessary field revisions.

2) Where shown or directed by and acceptable to the OWNER's REPRESENTATIVE and OWNER, provide relocation of existing facilities to include piping, utilities, equipment, structures, electrical conduit wiring, electrical duct bank, and other miscellaneous items. Use only new materials for relocation of existing facilities. Match materials of existing facilities, unless otherwise shown or specified. Perform relocations to minimize downtime of existing facilities. Install new portions of existing facilities in their relocated position prior to removing existing facilities, unless otherwise accepted by OWNER's REPRESENTATIVE. Comply with cutting and patching requirements in this section.

G. Monuments and Markers:

1) Preserve and protect survey monuments and markers throughout construction. If damage occurs or removal becomes necessary, immediately notify OWNER's REPRESENTATIVE and restore monument or marker to original condition.
2) Preserve private and public monuments that are found. If monument must be removed, replace at original location using registered land surveyor. Notify OWNER's REPRESENTATIVE when monuments are encountered.

H. Salvage of Materials:

1) CONTRACTOR shall salvage materials for OWNER's use as directed by the OWNER or OWNER's REPRESENTATIVE. Store materials where instructed on the jobsite. Promptly remove materials to be salvaged from the work area.

2) Remove material to be salvaged with extreme care so as not to damage it for future use. Equipment shall be cleaned and protected from dirt and the elements, and stored as directed. Prior to dismantling equipment or piping. The CONTRACTOR

shall confer with the OWNER's REPRESENTATIVE. The OWNER's REPRESENTATIVE will indicate the locations where equipment is to be disconnected. Damage caused by the CONTRACTOR to the equipment or material specified or indicated on the Drawings to be salvaged shall be replaced or repaired by the CONTRACTOR.

I. Connecting to Existing Facilities: Unless otherwise shown or specified, determine methods of connecting new work to existing facilities, and obtain OWNER's REPRESENTATIVE's review and acceptance of connections. CONTRACTOR shall provide necessary engineering services and include the cost for these services in the CONTRACTOR's bid.

1) Determine location, elevation, nature, materials, dimensions, and configurations of existing facilities where necessary for connecting new work.

2) Inspect existing record drawings and shop drawings, conduct exploratory excavations and field inspections, and conduct similar activities as needed.

3) Water and wastewater connection procedures shall conform Specification 02610 (Miscellaneous Pipes and Appurtenances) and 02620 (Private later Relocation)

J. It will be the CONTRACTOR's responsibility to provide construction staking for all structures, facilities and piping systems.

PART 2: PRODUCTS (Not Used)

PART 3: EXECUTION

3.01 CUTTING AND PATCHING

A. General:

1) Execute cutting (including excavating), fitting, or patching of work, required to:

a) Make the several parts fit properly.

b) Uncover work to provide for installation of specified work.

c) Remove and replace defective work or work not conforming to requirements of Contract Documents.

d) Remove samples of installed materials as specified for testing.

e) Install specified work in existing construction.

2) Perform the following upon written instruction of the OWNER's REPRESENTATIVE or OWNER.

a) Uncover work to provide for OWNER's REPRESENTATIVE's observation of covered work.

b) Remove samples of installed materials for testing.

c) Remove work to provide for alteration of existing work.

3) CONTRACTOR shall not, without written consent of OWNER's REPRESENTATIVE of OWNER.

a) Cut or alter work of another CONTRACTOR.

b) Cut structural or reinforcing steel.

c) Endanger existing or new structures or facilities.

d) Shut down or disrupt existing operations.

4) Materials for replacement of work removed shall comply with applicable sections of these Specifications for corresponding type of work to be done.

5) Provide all tools and equipment required to accomplish cutting and patching.

B. Inspection and Preparation:

1) Inspect existing conditions of work, including elements subject to movement or damage during cutting, patching, excavating, and backfilling.

2) After uncovering work, inspect conditions affecting installation of new products.

3) Prior to cutting, provide safety protection.

C. Procedures:

1) Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances and finishes.

2) Execute excavating and backfilling as specified in Division 2.

3) Restore work which has been cut or removed; install new products to provide completed work in accordance with specified requirements.

4) Restore structures and surfaces damaged that are to remain in the completed work including concrete-embedded piping, conduit, and other utilities.

5) Make restorations with new materials and appropriate methods as specified for new work of similar nature; if not specified, use best recommended practice of manufacturer or appropriate trade association.

6) Restore damaged work so there is a secure and intimate bond or fastening between new and old work. Finish restored surfaces to such planes, shapes, and textures that not transition between new and old work is evident in finished surfaces.

PART 4: MEASUREMENT AND PAYMENT

4.01 GENERAL

A. Separate measurement or payment will not be made for Work required under this Section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

END OF SECTION 01040

SECTION 01050

GRADES, LINES AND LEVELS

PART 1: GENERAL

A. The OWNERS survey crews will not stake for construction and will not be on site, except to perform quality control checks.

B. The bench mark for horizontal/vertical control is noted on the Plans.

C. The OWNER'S REPRESENTATIVE will meet with CONTRACTOR on site to point out controls at a mutually convenient date.

All Work shall be done to the lines, grades and elevations indicated on the drawings. Information concerning basic horizontal and vertical control points will be provided by the Engineer. These points shall be used as datum under this Contract. All work to transfer all controls for grades, lines, levels, layout and measurements shall be performed by the CONTRACTOR and require the approval of the Owner's Representative. The CONTRACTOR shall place grade stakes and establish construction staking layout sheets. The centerline and offset centerline stakes will be set at fifty (50) foot intervals and at points of alignment or grade changes. References to lines and grades as established by the CONTRACTOR's surveyor shall be in reference to these stake lines. The CONTRACTOR shall allow a minimum of ten (10) days after submission to the OWNER for approval of construction staking layout sheets. Construction layout sheets shall be in a format acceptable to the Owner's Representative. No Work shall be performed without OWNER approved construction staking layout sheets.

The CONTRACTOR shall provide a registered surveyor, an experienced instrument man, competent assistants, and such instruments, tools, stakes and other materials as required to complete the survey layout and measurement work to conform to the Texas Society of Professional Surveyors Manual of Practice for Land Surveying in the State of Texas, Category 5, Section 1-9 inclusive, and in a format to be established by the Owner's Representative. Prior to any excavation, the CONTRACTOR shall provide the elevation to top of ground at centerline of the pipe as well as cuts and offset stakes at the distance deemed appropriate by the CONTRACTOR to preclude disturbance of offset stakes during construction. In addition, the CONTRACTOR shall furnish, without charge, competent men from his force and such tools, stakes, and other materials as the Owner's Representative may require in establishing or designating control points, or in checking survey, layout, and measurement work performed by the CONTRACTOR.

The CONTRACTOR shall keep the Owner's Representative informed, a reasonable time in advance of the times and places at which he wishes to do Work, so that any checking deemed necessary by the Owner's Representative may be done with minimum inconvenience to the Engineer and minimum delay to the CONTRACTOR. Surveying will be coordinated between the Engineer and CONTRACTOR in a manner convenient to both.

Any Work done without being properly located may be ordered removed and replaced at the CONTRACTOR's expense.

The Engineer will furnish control data, benchmarks and northing and easting coordinate values at PC's, PI's, PT's, and other control points as indicated on the construction Drawings. The CONTRACTOR shall carefully preserve all monuments, benchmarks, reference points, and stakes. In case of the destruction thereof, the CONTRACTOR shall be charged with the expense of replacement and shall be responsible for any mistake or loss of time that may be caused. Permanent monuments or benchmarks which must be removed or disturbed shall be protected until properly referenced for relocation. The CONTRACTOR shall furnish materials and assistance for the proper replacement of such monuments or benchmarks.

The CONTRACTOR shall satisfy himself before commencing Work as to the meaning and correctness of all control stakes, marks, etc., and no claim will be entertained by the OWNER for or on account of any alleged inaccuracies, unless the CONTRACTOR notifies the OWNER thereof in writing before commencing work thereon.

PART 2: NOT USED

PART 3: NOT USED

PART 4: MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for Work required under this Section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

END OF SECTION 01050

SECTION 01070

ABBREVIATIONS

PART 1: GENERAL

1.01 DESCRIPTION

A. The following abbreviations, in addition to those included in Division 0, whenever used in these Contract Documents, the intent and meaning shall be interpreted as follows:

AA	Aluminum Association
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Conditioning Association
ANSI	American National Standards Institute
APA	American Plywood Association
API	American Petroleum Institute
AREA	American Railway Engineering Association
ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CBMA	Certified Ballast Manufacturers Association
CDA	Copper Development Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fencing Manufacturers Institute
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard, U.S. Department of Commerce
ETL	Electrical Testing Laboratories
Fed. Spec.	Federal Specifications
HI	Hydraulic Institute
HMI	Hoist Manufacturers Institute

ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
MIL-	Military Specification (leading symbol)
MMA	Monorail Manufacturers Association
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAPF	National Association of Plastic Fabricators
NBHA	National Builders Hardware Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NGVD	National Geodetic Verified Datum
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundation
NWMA	National Woodwork Manufacturers Association
OECI	Overhead Electrical Crane Institute
OFCI	OWNER-furnished, CONTRACTOR-installed
OFCR	OWNER-furnished, CONTRACTOR-relocated
OSHA	Occupational Safety and Health Act (both Federal & State)
PCA	Portland Cement Association
PDI	Plumbing and Drainage Institute
PS	Product Standards Sections - U.S. Department of Commerce
RMA	Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SDI	Steel Deck Institute
SJI	Steel Joist Institute
SMACNA	Sheet Metal and Air Conditioning Contractors, National Association
SPR	Simplified Practice Recommendations, U.S. Department of Commerce
SSPC	Steel Structures Painting Council
TCA	Tile Council of America
TEMA	Tubular Exchanger Manufacturers Association
UBC	Uniform Building Code
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WIC	Woodwork Institute of California
WWPA	Western Wood Products Association

PART 2: PRODUCTS - Not applicable to this Section.

PART 3: EXECUTION - Not applicable to this Section.

END OF SECTION 01070

SECTION 01200

PROJECT MEETINGS

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This section describes the various project related meetings which will be held on a routine schedule throughout the duration of the project.

B. The CONTRACTOR shall attend all project related meetings as indicated hereinafter. The CONTRACTOR's representatives, as a minimum, shall include his Project Manager and Construction Site Superintendent. Other CONTRACTOR representatives may attend project related meetings; however, a limit of four (4) representatives at any one meeting is mandatory unless the Owner's Representative approves a larger number.

C. The CONTRACTOR shall provide all pertinent reports, copies of reports, etc., for each meeting as may be required by this or other sections of the Specifications.

D. All project related meetings shall be held in the Owner's Representative office unless otherwise specified.

E. The Owner's Representative will record the minutes of all meetings and will furnish all attendees and others, as necessary and appropriate, with copies within three (3) working days. The CONTRACTOR shall advise the Owner's Representative, in writing, of any inaccuracies, discrepancies, objections and or missing items in the minutes, within seven (7) calendar days or receipt of the minutes or by the next meeting, whichever is sooner.

1.02 PRECONSTRUCTION CONFERENCE

A. Prior to issuance of the Notice to Proceed, a Preconstruction Conference shall be held at a location, date and time designated by the OWNER. In addition to the OWNER's, ENGINEER's and CONTRACTOR's representatives the meeting shall be attended by the representatives of regulatory agencies having jurisdiction of the project, if required, and such other persons the OWNER may designate.

B. Unless otherwise specified or agreed by the OWNER and CONTRACTOR, the CONTRACTOR shall present to the OWNER the written safety program, names of salaried specialists of CONTRACTOR and Subcontractors, and all other preconstruction documents required of him by the Contract at that time.

C. In general, matters to be discussed and the instructions and information to be furnished to or given by the CONTRACTOR shall include:

1) Project meeting schedule.
2) Progress schedule and schedule of values submitted by CONTRACTOR.
3) Communication procedures between the CONTRACTOR, OWNER and ENGINEER.
4) The names and titles of all persons authorized by the CONTRACTOR to represent and execute documents for him, with samples of all authorized signatures.

5) The names, addresses and telephone numbers of all those authorized by the CONTRACTOR to act for him in emergencies.
6) Construction permit requirements, procedures and posting.
7) Public notice of starting work.
8) Procedures concerning the installation of work on public or private property not owned by the OWNER.
9) Access and rights-of-way furnished by the OWNER.
10) Forms and procedures for CONTRACTOR's submittals.
11) Change order forms and procedures.
12) Payment application forms and procedures and the revised progress schedule reports to accompany the applications.
13) CONTRACTOR's safety and training program and designation of the CONTRACTOR's safety officer and his qualifications.
14) First-aid and medical facilities to be furnished by CONTRACTOR.
15) Contractor's provisions for barricades, traffic control, utilities, sanitary facilities, and other temporary facilities and controls.
16) Project sign for OWNER if required by the Specifications.
17) Inspector and his duties.
18) Construction surveyor and initiation of surveying services.
19) Testing laboratory or agency, and testing procedures.
20) Construction equipment and methods proposed by the CONTRACTOR.
21) Procedures for payroll and labor cost reporting by the CONTRACTOR.
22) Procedures to ensure nondiscrimination in employment on and for the work.
23) Issuance of the notice to proceed.
24) Use of site for construction, storage, staging, etc. and its interrelationship with other contracts.
25) Inventory of materials to be stored on site.

1.03 PROGRESS MEETINGS

A. Progress meetings shall be held throughout the duration of the project at the frequency determined by the Owner’s Representative. The meetings shall be held on the same day and at the same time in an office, all to be determined at the preconstruction conference. In addition to the OWNER's, ENGINEER's and CONTRACTOR's representatives, the meeting shall be attended by other persons designated/requested by the OWNER, ENGINEER and/or CONTRACTOR.

B. The format may include, but not necessarily be limited to, the following subjects:

1) Review of previous meetings notes and update of pertinent information and project status.

2) Identification and discussion of new job related construction problems. Such discussion will be toward resolving identified problems.

3) Establishment of proposed construction activities for the upcoming month.

4) Coordination with other contracts, including meeting with other contractors.

1.04 OTHER MEETINGS

A. Other meetings shall be held from time to time as may be requested by the CONTRACTOR, the ENGINEER or the OWNER. The time and place of the meetings shall be as mutually agreed upon. Those required to be in attendance at the meetings shall be as requested by that party requesting the meeting.

B. Other meetings shall also include meetings with regulatory agencies. When requested, the CONTRACTOR shall attend meetings held or required by the governmental regulatory agencies having jurisdiction of the project.

C. Other meetings shall also include post-construction conference. A post-construction conference shall be held prior to final inspection of the work to discuss and resolve all unsettled matters. The bonds and insurance to remain in force, and other documents required to be submitted by the CONTRACTOR, will be reviewed and any deficiencies determined. Schedules and procedures for the final inspection process and for the correction of defects and deficiencies shall be discussed and agreed.

PART 2: PRODUCTS - Not applicable to this Section.

PART 3: EXECUTION - Not applicable to this Section.

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the general methods and requirements of submissions for Shop Drawings, Product Data and Samples, Record Drawings, and Construction Progress Schedules.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Contract Closeout: Section 01700

B. Technical Specifications: Division 2 thru Division 16

1.03 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

1) Shop drawings, as defined in the Supplementary Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation drawings, installation instructions, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the work

2) Within 14 days of the notice to proceed per section 01600 the CONTRACTOR shall submit to the Owner's Representative a "SUBMITTAL REGISTER" for review and approval. This register shall include, but is not limited to:

a) Listings of all submittals and samples;

b) Estimated date submittal will be transmitted;

c) Estimated procurement time for each item;

d) Blanks for dates transmitted, approved, and received for initial and follow-up transmittals.

3) All shop drawings submitted by subcontractors for approval shall be sent directly to the CONTRACTOR for preliminary checking. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

4) The CONTRACTOR shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

5) All details on shop drawings submitted for approval shall show clearly the elevations of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

B. Product Data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data); manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the work.

C. Samples, as specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Owner's Representative for independent inspection and testing, as applicable to the work.

D. Contractor's Responsibilities

1) The CONTRACTOR shall review shop drawings, product data and samples prior to submission to determine and verify the following:

a) Field measurements

b) Field construction criteria

c) Catalog numbers and similar data

d) Conformance with the Specifications

2) Each shop drawing, working drawing, sample and catalog data submitted by the CONTRACTOR shall have affixed to it the following Certification Statement, signed by the CONTRACTOR:

"Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements."

3) Submittals shall be organized by Specification Section when possible. Each submittal shall include a cover/transmittal sheet displaying the specification section (s) covered by the submittal.

4) The CONTRACTOR shall submit a minimum of 5 copies of each submittal/shop drawing to the OWNER or CONTRACTOR may submit electronically.

5) When submittals/shop drawings are returned for correction by the CONTRACTOR, the CONTRACTOR shall resubmit the complete submittal/shop drawing.

1.04 RECORD DRAWINGS

A. Record Drawings shall be maintained continually throughout the project by the CONTRACTOR. Record Drawings shall be reviewed with the Owner's Representative prior to submittal of monthly pay requests.

B. Before final payment will be made, the CONTRACTOR must furnish the OWNER with one (1) set of Record Drawings.

C. The Record Drawings shall be marked neatly in red showing all changes, additions or deletions to the Design Drawings to reflect the actual construction conditions.

1.05 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 10 calendar days after the effective date of the agreement and no later than the pre-construction conference.

B. Submit revised schedules with each application for payment, identifying changes since previous version.

C. Indicate estimated percentage of completion for each item of work at each submission.

PART 2: NOT USED

PART 3: NOT USED

PART 4: MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for Work required under this section.

END OF SECTION 01300

SECTION 01307

PROTECTION AND PRESERVATION OF PRIMITIVE RIGHTS AND ANTIQUITIES

PART 1: GENERAL

The Contractor shall take responsible precaution to avoid disturbing primitive records and antiquities of archaeological, paleontological or historical significance. No objects of this nature shall be disturbed without written permission of the Engineer. When such objects are uncovered unexpectedly, the Contractor shall stop all work in close proximity and notify the Engineer of their presence and shall not disturb them until written permission to do so is granted. All materials uncovered shall become the property of the owner of the land on which they are uncovered and shall be handled in accordance with all rules, regulations and laws governing the disposition of such materials.

If it is determined by the Owner, in consultation with the Texas Antiquities Committee, that exploration or excavation of primitive records or antiquities on the project site is necessary to avoid loss, the Contractor shall cooperate in the salvage work attendant to preservation. If the Engineer determines that the salvage work will increase the project cost or will delay the Contractors work, an appropriate change order shall be executed.

END OF SECTION 01307

SECTION 01410

TESTING LABORATORY SERVICES

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Pre-construction testing to verify conformance of materials with the requirements of the specifications shall be performed and paid for by the CONTRACTOR. Testing results shall be submitted to the ENGINEER in accordance with Section 01300.

B. The OWNER will employ and pay for services of an independent testing laboratory to perform QA/QC services specified in this Section. All other required tests shall be paid for by the CONTRACTOR, including tests required for gradation, concrete mix designs, asphalt mix designs, etc. See related Sections for specific requirements of the CONTRACTOR.

C. Employment of a testing laboratory by the OWNER or the CONTRACTOR in no way relieves the CONTRACTOR of his obligation to perform the work according to the Contract.

1.02 WORK INCLUDED

Testing is required for the following items of work:

A. Soils compaction control.

B. Cast-in-place concrete.

C. HMAC Compaction Control

PART 2: TESTING LABORATORY

2.01 DUTIES

A. Cooperate with the ENGINEER and CONTRACTOR; provide qualified personnel promptly on notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1) Comply with specified standards; ASTM, other recognized authorities and as specified.

2) Ascertain compliance with requirements of the Contract documents.

C. Promptly notify the ENGINEER and CONTRACTOR of irregularities or deficiencies of work which are observed during performance of services.

D. Promptly prepare and distribute reports of inspections and tests as follows:

1) ENGINEER: 2 copies
2) CONTRACTOR: 2 copies
3) OWNER: 2 copies

2.02 LIMITS OF AUTHORITY

The laboratory is not authorized to:

A. Release, revoke, alter or enlarge on requirements of the Contract documents.

B. Approve or accept any portion of the work.

C. Perform any duties of the CONTRACTOR.

PART 3: CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel; provide access to the work or to manufacturer's operations.

B. Provide to laboratory preliminary representative samples of materials to be tested in required quantities.

C. Furnish copies of mill test reports.

D. Furnish casual labor and facilities:

1) To provide access to the work to be tested.

2) To obtain and handle samples at the site.

3) To facilitate inspections and tests.

4) For laboratory's exclusive use for storage and curing of test samples.

E. Coordinate/schedule all laboratory tests with the Owner’s Representative. Notify the Owner’s Representative sufficiently in advance of operations to allow for his coordination with the testing laboratory.

F. Arrange with the laboratory and pay for additional samples and tests required for the CONTRACTOR's convenience.

G. CONTRACTOR to pay for any quality control test that fails and requires retesting of the material.

PART 4: MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for Work required under this Section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

END OF SECTION 01410

SECTION 01500

TEMPORARY FACILITIES

PART 1: GENERAL

The facilities and controls specified in this section are considered minimum for the project. After obtaining approval, the Contractor can provide additional facilities and controls which he deems necessary for proper execution of the work and to meet his responsibilities for protection of persons and property. Contractor shall obtain all required permits for temporary facilities at his own expense.

1.01 BUILDINGS

A. STORAGE. Provide watertight storage facilities of suitable size with floor above ground level for all materials susceptible to weather damage. Storage of other materials on blocks off the ground is acceptable. Place materials to permit easy access for inspection and identification.

B. OTHER BUILDINGS. The location or building of structures or the erection of tents or other forms of protection are allowed as approved.

1.02 UTILITIES

A. JOB TELEPHONE. A cellular telephone will be acceptable provided the Contractor's superintendent (as specified in the General Conditions) shall be accessible by telephone at all times that work is in progress.

B. TEMPORARY CONNECTIONS. Arrange and secure all temporary connections for water, electricity, gas and other services needed to do the work. The cost of connection and use is paid by the Contractor.

1.03 SANITATION

Provide and maintain sanitary conveniences to satisfy requirements of local or state health authorities, ordinances, and laws. Obtain approval for location, secluded from public view.

1.04 ACCESS ROAD AND PARKING

Access to the work from existing roads shall be provided by the Contractor at his expense. The Owner assumes no responsibility for the conditions or maintenance of any existing road or structure thereon that may be used by the Contractor for performing the work under these specifications for traveling to and from the site of the work. No direct payment will be made to Contractor for constructing temporary road and structures for construction operations, or for improving, repairing, or maintaining any existing road or structure thereon that may be used by the Contractor for performance of the work under these specifications. Contractor shall restore all temporary roads to their condition immediately prior to use by the Contractor. The cost of all work described in this paragraph shall be included in the prices bid in the other items of work. Access to the work site must be through a public right-of-way, or through a public easement. Crossing of lots except in the easements will not be allowed, unless contractor has obtained specific permission from the property owner.

1.05 BARRICADES AND WARNINGS

A. The safety of the public shall be regarded as of primary importance during construction. In all respects, provisions for public safety shall be the Contractor's responsibility.

B. Should conditions be such that the public safety is involved, the Contractor shall provide warning lights which shall be kept burning between the hours of sunset and sunrise and the Contractor shall maintain a watchman on the site during these hours and during all other hours in which work is not in progress and the watchman's primary responsibility shall be to maintain the lights and warnings. Barricades and warnings shall be as approved by the Engineer.

1.06 REMOVAL OF TEMPORARY FACILITIES AND CONTROLS

Prior to the final inspection remove all temporary buildings, storage facilities, sanitary conveniences, and signs. Disconnect all temporary utility connections. Clear the area of unnecessary safety items and temporary controls. Remove or restore, as required, all temporary roads and parking areas. Clean up the entire area as specified in the Section 01700.

END OF SECTION 01500

SECTION 01550

PUBLIC SAFETY AND CONVENIENCE

PART 1: GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. General Conditions: Section 00700

B. Supplemental General Conditions: Section 00800

C. General Requirements

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION

3.01 GENERAL

A. CONTRACTOR shall maintain reasonable local vehicular and pedestrian dust free traffic, including use of driveways, to proceed safely with minimum inconvenience, except during actual construction operations. CONTRACTOR provided flaggers shall assist traffic when a street is operating under a single lane. Two-way traffic shall be maintained at all other times.

B. CONTRACTOR shall maintain traffic by placing steel plates with Asphaltic concrete berms, temporary fill or bridging and temporary surfacing with cold-mix Asphaltic concrete paving.

C. Sidewalks shall not be obstructed, except by special permission of the local government as applicable. Access to private dwelling and to commercial establishments shall be provided at all times.

D. CONTRACTOR shall plan and execute his operations in a manner that will cause a minimum interference with traffic. The CONTRACTOR shall place and maintain in good condition, standard barricades at each end of the Project and at other locations where traffic is rerouted or blocked from using regular traffic lanes. Barricades and warning signs shall be in accordance with Texas Department of Transportation (TxDOT).

E. Signs, barricades and warning devices informing public of construction features shall be placed and maintained by the CONTRACTOR who shall be solely responsible for their maintenance

F. Neither explosives nor blasting shall be permitted on this Work.

G. The CONTRACTOR shall adhere to work hours and noise ordinances of the local government. Dust control shall be maintained at all times.

H. Any private property damaged during the course of construction shall be immediately repaired or replaced to its original condition.

3.02 TRAFFIC CONTROL

A. It shall be sole responsibility of the CONTRACTOR to furnish, install, and maintain barricades, detour signs, warning signs, lights and all regulatory traffic control devices of the size and type specified, at locations indicated, or as directed or approved by the Owner's Representative.

B. Throughout the life of the Contract, all existing roads and Traffic Control devices included in the Work shall be maintained by the CONTRACTOR to a condition, in the opinion of the OWNER, which is equal to or better than that which existed when Work commenced. Maintenance of existing roads and devices shall take priority over all other Work items and shall be subject to a seven-day-a-week, 24-hours-per-day time frame. The CONTRACTOR shall provide a smooth and safe riding surface for all vehicles traveling the posted speed limit along the route of this Project. This could include, but not be limited to, small cars, motorcycles, mopeds and bicycles. If the condition of the street surface deteriorates, for any reason, CONTRACTOR shall take necessary steps to insure immediate restoration.

C. Maintenance work will not be paid for directly but will be considered subsidiary to various Bid items of this Contract.

D. In the event that CONTRACTOR fails, in opinion of OWNER, to maintain a smooth surface for public comfort, fails to provide ingress and egress to private property, and/or does not provide and maintain proper traffic control devices, OWNER may provide these services and deduct any cost thereof, including overtime and administrative expenses, from all estimates thereafter due the CONTRACTOR. Such action by the OWNER shall not relieve the CONTRACTOR of his liability to protect the public at construction site.

E. CONTRACTOR shall notify the City of San Angelo, Police Department, Fire Department, EMS, TxDOT, Tom Green County, SAISD, and surrounding businesses, as applicable, at least four Working Days in advance of beginning proposed Work with intention to close or partially block any street or any part thereof, or of any construction affecting free flow of traffic. The CONTRACTOR shall plan and adequately provide barricades and warning devices. The same parties shall be notified when normal traffic flow is restored.

F. Should the CONTRACTOR, in his operations, reduce an existing two-way roadway to less than two-way traffic, CONTRACTOR shall provide flagging operations and route traffic through the construction area one lane at a time.

G. The CONTRACTOR's Flaggers shall be required any time it is necessary for the CONTRACTOR's equipment to move into or across an open traffic lane, or at other such times as directed by the Owner's Representative. A flagger shall be utilized to aid exit of hauling equipment from open traffic lanes to the Work area, and entry of hauling equipment from Work area to open traffic lanes. Flaggers shall be dressed and conduct operations in accordance with Texas Manual on Uniform Traffic Control Devices. CONTRACTOR shall provide English speaking flaggers. Flagging operations shall be the sole responsibility of the CONTRACTOR.

H. The CONTRACTOR and Subcontractors shall confine their activities to the immediate area of the construction site and provide the following:

1) Appropriate temporary fences, barricades, and/or Metal Beam Guard Fence if required, for site work involving excavation, utility extensions, remote construction work or other circumstances involving safety of public or protection of the work in progress.

2) Warning lights at open trenches, excavations, etc., during hours from dusk to dawn each day. Protection of structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations, from damages caused by settlement, lateral movement, undermining, washout and other hazards.

3.03 SPOILS DISPOSAL

CONTRACTOR shall submit a haul route plan including a map of the proposed route(s) for the ENGINEER's approval.

3.04 RESTORATION

A. In order to minimize environmental and potential flood impacts, the sum of the amount of trench opened in advance of the completed line and the amount of trench left unfilled at any time shall be restricted to one (1) full block or 300 linear feet, whichever is less.

B. Restoration shall be an on-going process during construction operations and shall immediately precede completion of construction of each successive section of the line, which shall not exceed 1,200 linear feet without approval of the ENGINEER.

3.05 STREET MARKERS AND TRAFFIC CONTROL SIGNS

It shall be responsibility of the CONTRACTOR to remove, preserve and reset, as required, Street Marker and Traffic Control Signs that are within construction limits to the line and heights as described in Texas Manual on Uniform Traffic Control Devices before any sidewalks or street excavation is begun. Signs shall not be laid on the ground. No payment will be made for this work but shall be considered subsidiary to the various Bid items. Any damage to signs or posts shall be paid for by the CONTRACTOR.

3.06 BURNING PERMIT

No burning shall be allowed on site.

3.07 DRIVEWAYS

The approach grade of existing driveways shall not be modified unless specifically indicated on the drawings or directed by the Owner's Representative. Within the right-of-way, and outside the right-of-way, all driveways shall be replaced per existing conditions. Excavation, Flexible Base, Portland Cement Concrete and Asphaltic Concrete, used for driveways as prescribed above shall not be measured for payment but shall be considered subsidiary to various Bid items in the Contract unless payment is included as a separate Contract pay item.

PART 4: MEASUREMENT AND PAYMENT

4.01 TRAFFIC CONTROL

A. Traffic Control will be paid for monthly. Traffic Control will consist of supplying, installing, and maintaining all traffic control devices, flaggers, and other items required for traffic control.

END OF SECTION 01550

SECTION 01600

MATERIALS AND EQUIPMENT

PART 1: GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

B. Related Sections: The following Sections contain requirements that relate to this Section:

Section 01070 specifies abbreviations of industry standards to products specified.

Section 01300 specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.

1.03 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1) "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

2) "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature that is current as of the date of the Contract Documents.

3) "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

4) "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.04 SUBMITTALS

A. Product List: Prepare a list showing products specified in tabular form acceptable to the OWNER. Include generic names of products required. Include the manufacturer's name and proprietary product names for each item listed.

1) Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.

2) Form: Prepare product list with information on each item tabulated under the following column headings:

a) Related Specification Section number.
b) Generic name used in Contract Documents.
c) Proprietary name, model number, and similar designations.
d) Manufacturer's name and address.
e) Supplier's name and address.

B. Initial Submittal: Within 14 days after date of Notice to Proceed, submit copies of an initial product list in accordance with Section 01300. Provide a written explanation for omissions of data and for known variations from Contract requirements.

1) At the Contractor's option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

C. Completed List: Within 21 days after date of Notice to Proceed, submit copies of the completed product list in accordance with Section 01300. Provide a written explanation for omissions of data and for known variations from Contract requirements.

D. ENGINEER's Action: The ENGINEER will respond in writing to Contractor within 2 weeks of receipt of the completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. The ENGINEER's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.05 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1) Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.

2) Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that

is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

a) Name of product and manufacturer
b) Model and serial number
c) Capacity
d) Speed
e) Ratings

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1) Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

2) Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3) Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4) Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

5) Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

PART 2: PRODUCTS

2.01 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1) Provide products complete with accessories, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

2) Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Procedures governing product selection include the following:

1) Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document

provisions concerning "substitutions" to obtain approval for use of an unnamed product.

2) Nonproprietary Specifications: When Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.

3) Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

4) Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by the manufacturer for the application indicated. Manufacturer's recommendations may be contained in published product literature or by the manufacturer's certification of performance.

5) Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified.

PART 3: EXECUTION

3.01 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

B. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

PART 4: MEASUREMENT AND PAYMENT

A. No separate payment shall be made for this item.

END OF SECTION 01600

SECTION 01700

CONTRACT CLOSEOUT

PART 1: GENERAL

1.01 SCOPE OF WORK

A. This Section outlines the procedure to be followed in closing out the contract.

1.02 SUBSTANTIAL COMPLETION

A. The Substantial and Final completion dates for the contract shall be established as stated in paragraph 4.02 of the Agreement Between Owner and Contractor For Construction Contract.

1.03 FINAL CLEANING

A. At the completion of work and immediately prior to final inspection, cleaning of the entire project shall be accomplished according to the following provisions:

1) The CONTRACTOR shall thoroughly clean, sweep, wash and polish all work and equipment provided under this Contract, including finishes. The cleaning shall leave the structures and site in a complete and finished condition to the satisfaction of the Owner's Representative and OWNER.

2) The CONTRACTOR shall remove all temporary structures and all debris, including all dirt, sand, gravel, rubbish and waste material.

3) Should the CONTRACTOR not remove rubbish or debris or not clean the buildings and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.

B. Repair, patch and touch-up any marred surfaces equivalent to the specified finish and to match adjacent surfaces, including repair or replacement of pavement, curb and gutter, and other surfaces marred by construction equipment.

C. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.

1.04 FINAL INSPECTION

A. After final cleaning and restoration and upon written notice from the CONTRACTOR that the work is completed, the Owner's Representative will make an inspection with the CONTRACTOR. Upon completion of this inspection, the Owner's Representative will notify the CONTRACTOR, in writing, of any particulars in which this inspection reveals that the work is defective or incomplete with a copy to the OWNER.

B. Upon receiving written notice from the Owner's Representative, the CONTRACTOR shall immediately undertake the work required to remedy deficiencies and complete the work to the satisfaction of the Owner's Representative.

C. When the CONTRACTOR has corrected or completed the items as listed in the Owner's Representative's written notice, he shall inform the Owner's Representative, in writing, that the required work has been completed. Upon receipt of this notice, the Owner's Representative, in the presence of the OWNER and CONTRACTOR, will make another inspection of the project.

D. Should the Owner's Representative find all work satisfactory at the time of this inspection, the CONTRACTOR will be allowed to make application for final payment in accordance with the provisions of the GENERAL CONDITIONS. Should the Owner's Representative still find deficiencies in the work, the Owner's Representative will inform the CONTRACTOR of the deficiencies in writing and will deny the CONTRACTOR's request for final payment until such time as the CONTRACTOR has satisfactorily completed the required work.

1.05 FINAL SUBMITTALS

A. No application for final payment will be accepted until all of the following have been submitted as required in Section 01300, SUBMITTALS including, but not limited to, the following:

1) Final shop drawings
2) Record drawings
3) All Operation and Maintenance Manuals
4) All Equipment Manufacturers' Certificates of Proper Installation

1.06 ACCESSORY ITEMS

A. The CONTRACTOR shall provide to the OWNER, upon acceptance of the equipment, all special accessories required to place each item of equipment in full operation. These special accessory items include, but are not limited to, the specified spare parts, one year's supply of oil and grease, light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators for valve handles more than 6 feet above floor and other expendable items as required for initial startup and operation of all equipment furnished by the CONTRACTOR.

1.07 GUARANTEES, BONDS AND AFFIDAVITS

A. No application for final payment will be accepted until all guarantees, bonds, certificates, licenses and affidavits required for work or equipment as specified are satisfactorily filed with the Owner's Representative.

1.08 RELEASE OF LIENS OR CLAIMS

A. No application for final payment will be accepted until satisfactory evidence of release of liens has been submitted to the OWNER as required by the contract.

1.09 FINAL PAYMENT

A. Final payment will be made to the CONTRACTOR in accordance with the contract and construction specifications.

END OF SECTION 01700

SECTION 01785

PROJECT RECORD DOCUMENTS

PART 1: GENERAL

1.01 SECTION INCLUDES

A. Maintenance and submittal of record documents and Samples.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain one record copy of documents at the site.

B. Store record documents and Samples in field office, if a field office is required by the Contract, or in a secure location. Provide files, racks, and secure storage for records documents and Samples.

C. Label each document “PROJECT RECORD” in neat, large, printed letters.

D. Maintain record documents in a clean, dry, and legible condition. Do not use record documents for construction purposes. Do not use permit drawings to record Modifications to the Work.

E. Keep record documents and Samples available for inspection by ENGINEER.

F. Bring record documents to progress review meetings for viewing by ENGINEER.

1.03 RECORDING

A. Record information legibly with red ink pen on a set of clean opaque drawings, concurrently with construction progress. Maintain an instrument on site at all times for measuring elevations accurately. Do not conceal work until required information is recorded.

B. Contract Drawings and Shop Drawings: Mark each item to record completed Modifications, or when minor deviations exist, the actual construction including:

1. Measured horizontal locations and elevations of Underground Facilities and appurtenances, referenced to permanent surface improvements.

2. Elevations of Underground Facilities referenced to benchmark utilized for the Work.

3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Dimensions and details of field changes.

5. Changes made by Modification.

6. Details not on original Drawings.

7. References to related Shop Drawings and Modifications.

C. Survey all joints of water mains at the time of construction. Record on Drawings, water main invert elevation, elevation top of manway, and centerline horizontal location relative to baseline.

D. For large diameter water mains, mark specifications and addenda to record:

1. Manufacturer, trade name, catalog number and Supplier of each Product actually installed.

2. Changes made by Modification or field order.

3. Other matters not originally specified.

E. Annotate Shop Drawings to record changes made after review.

1.04 SUBMITTALS

A. At closeout of the Contract, deliver Project record documents to ENGINEER.

PART 2: PRODUCTS (Not applicable for this Section)

PART 3: EXECUTION (Not applicable for this Section)

PART 4: MEASUREMENT AND PAYMENT

A. Separate measurement or payment will not be made for Work required under this Section. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

END OF SECTION

Appendix 1 – Geotechnical Investigation

Rodriguez Engineering Laboratories

Construction Materials Engineering Testing

Geotechnical Investigation for Southland Boulevard Project

Roadway Widening from 3 to 5 Lanes
San Angelo, Texas

Submitted to:

Jason Bybel, P.E.
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August 5, 2016

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Rodriguez Engineering Laboratories, LLC

Geotechnical Investigation for Southland Boulevard Project

Roadway Widening from 3 to 5 Lanes

San Angelo, Texas

Submitted to:

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5316 Highway 290 West, Suite 150
Austin, Texas 78735

Submitted by:

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Austin, Texas 78728

August 5, 2016

Jose Melendez, P.E.

Nathan D. Rodriguez, E.I.T.

Geotechnical Investigation for Southland Boulevard Project
Roadway Widening from 3 to 5 Lanes
San Angelo, Texas

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Geotechnical Investigation for Southland Boulevard Project
San Angelo, Texas

INTRODUCTION

Rodriguez Engineering Laboratories was retained by LJA Engineering, Inc. to perform a geotechnical investigation for the proposed Southland Boulevard Project.

It is our understanding from information provided by LJA Engineering, Inc. that the Southland Boulevard Project will widen and reconstruct existing Southland Blvd road from US67 (Sherwood Way) to Sam's/Wal-Mart Intersection. The project will widen the existing roadway from 3 lanes to 5 lanes. The proposed road is expected to be constructed as a flexible pavement structure with concrete curb and gutter. This project is located in San Angelo, Texas

PURPOSE OF STUDY

The purpose of this investigation is to determine the engineering properties of the in-situ subsurface material for the proposed improvements. The scope of work for the field geotechnical investigation includes drilling boreholes and collecting representative soil samples to perform the appropriate laboratory tests. The objective is to submit a summary of the laboratory/field test results and provide recommendations for flexible pavement section. The results of this geotechnical investigation are summarized in this report.

SUBSURFACE INVESTIGATION

The subsurface investigation was performed under the supervision of Jose Melendez, P.E. The field inspection, drilling and logging was performed by Nathan Rodriguez, EIT and Tim Sutherland. The drilling operations included advancing two borings to 10 feet below existing pavement elevations in locations approved by LJA Engineers, Inc. Upon completion, the borings were appropriately backfilled. Appendix C contains a map of the borehole locations. Appendix A contains information of each borehole along with the laboratory test results for Moisture Content, Atterberg Limits, Sieve Analysis and Unified Soil Classification. The borings were drilled with a truck mounted drill rig with a six (6) inch diameter flight-auger at the selected locations.

LABORATORY TESTING

The soil samples obtained during the exploration were sealed at the site and transported to the laboratory. A testing program was conducted on the sealed samples to aid in classification and evaluation of the engineering properties required for analysis. The laboratory tests were performed by experienced laboratory technicians and monitored by the geotechnical engineer. The parameters were determined by the following laboratory tests:

- Potential volumetric shrinkage characteristics of the cohesive soils were determined by the Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D 4318).

- Material gradation for soil classification was determined by the Standard Practice for Classification of Soils for Engineering Purposes (ASTM D 2487).

- Material moisture content was determined by the Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D 2216).

- Field description of the material was determined by the Practice for Description and Identification of Soils (Visual-Manual Procedure) (ASTM D 2488).

The data can be found in Appendix A.

- The Moisture-Density relationship of the natural subgrade soils was determined by the standard test method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3(600 kN-m/m^3)) (ASTM D 698).

- An index of strength and deflection characteristics of the natural subgrade soils was determined by performing the Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils (ASTM D 1883).

The data can be found in Appendix B.

- The Moisture-Density relationship of the subgrade soils was determined by the standard test method for Laboratory Compaction Characteristics and Moisture-Density Relationship of Subgrade and Embankment Soils (TEX-114-E).

- The stress-strain relationship of the cohesive soils was determined by the standard test method for Triaxial Compression for Disturbed Soils Materials (TEX-117-E).

The data can be found in Appendix D.

- The Stabilization of Subgrade was determined by the Standard Specification for Determining Stabilization Ability of Lime by Soil pH (Tex-121-E, Part III).

The data can be found in Appendix E.

- Undisturbed soil sampling was obtained by the standard practice for Thin- Walled Tube Geotechnical Sampling of Soils (ASTM D 1587).

- The approximate value of the unit weight of cohesive soils was determined by performing the standard test method for Laboratory Determination of Density of Soil Specimens using Direct Measurements (ASTM D 7263).

The data can be found in Appendix F.

- The pH of the subgrade material was determined by Standard Test Method for Determining Soil-pH (Tex-128-E).

- The Soluble Sulfate Content was determined for the purpose of insuring that these would not be any potential adverse sulfate-lime reaction in the event lime stabilization is recommended by Standard Test Method for Sulfate Content in Soils Colorimetric Method (Tex-145-E).

The data can be found on CBR/Triaxial table of this report.

SITE AND SUBSURFACE CONDITIONS

Site Conditions

The Proposed Southland Boulevard Project is located approximately 5 miles west of downtown in San Angelo, Texas. The topography in the area is generally flat.

The Geologic Atlas of Texas (San Angelo Sheet) published by the Bureau of Economic Geology at the University of Texas at Austin indicates that the general geology of the area is Permian with San Angelo Formation (Psa). San Angelo Formation (Psa) includes sandstone, shale, and conglomerate. Sandstone, fine-grained quartz, thin bedded to massive, crossbedded, friable, red, gray, yellow, & brown. Shale, sandy in part, indistinctly bedded, red, bluish green. Conglomerate of dolomite and siliceous pebbles associated with sandstone. The thickness of this formation is approximately 125-200 feet

Appendix C includes a geological map of the area as well as a site map of the boring locations.

Subsurface Conditions

Borings to depth were generally advanced with ease. The material sampled varied from low-to-medium plasticity clays. The particular subsurface stratigraphy, as determined by the exploration, is shown in detail in the boring logs.

No groundwater was encountered during drilling operations. However, the short-term field observations generally do not permit an accurate evaluation of the subsurface water levels. Any ground water elevation information provided is representative of conditions existing on the day and for the specific location where the information was taken. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activities.

SUMMARY OF TEST RESULTS

The following is a summary of test results obtained from the field borings information, and laboratory tests of the representative soil samples.

Laboratory Texas Triaxial Value

The following laboratory triaxial value is based on a compaction of approximately 95% of maximum dry density (Tex-114-E, Part I) and moisture of approximately 3.4% above the optimum moisture content.

Triaxial Sample No.	Location	Maximum Dry Density (PCF)	Optimum Moisture (%)	Average Compacted Dry Density (PCF)	Average Compacted Moisture (%)	Texas Triaxial Classification Value
1	Borings at Southland Blvd	114.4	13.4	109.0	16.8	5.2

The Triaxial and proctor data is shown in Appendix D.

Laboratory CBR Value

The following laboratory CBR value is based on a 95% maximum dry density (ASTM D-698) compaction level and a soaking period of 96 hours.

CBR No.	Sample Location	Laboratory Compacted – Soaked CBR	Maximum Dry Density (PCF)	Optimum Moisture (%)	Average Percent Swell Measured
1	Borings at Southland Blvd	2.6	112.3	14.2	1.2

The CBR and proctor data is shown in Appendix B.

The soil classification for the subgrade material used on Triaxial and CBR tests is:

CBR No.	Soil Classification	Atterberg Limits		Moisture Content (%)	Material Passing (%)			Soil pH Value	Soluble Sulfate Content	
		LL	PI		#4	#40	#200		mg/Kg	%
1	Brown, Sandy Lean Clay (CL)	35	18	19.3	86.0	80.7	52.3	8.5	1,760	0.176

Recommended E_{SG} Value

A Resilient Modulus of the Subgrade (E_{SG} Value) of 3,900 psi was obtained using the CBR Value of 2.6, and the following correlation shown in the FAA AC-150/5320-6E.

$K = [(1500 * CBR) / 26]^{0.7788}$
$E_{SG} = 26 * K^{(1.284)}$

The Resilient Modulus of the Subgrade using the Texas Triaxial test result of 5.2 and AASHTO correlation was approximately 4,200 psi.

We recommend using an E_{SG} Value of 4,000 psi for design purposes.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based upon the data obtained from the borings and laboratory testing of the soil samples, the project information provided to us by LJA Engineering, Inc. and experience with similar soils and site conditions.

Pavement Section Recommendations

Based on information provided by LJA Engineering, Inc., we understand that flexible pavement section recommendations are desired for the proposed pavement. The following pavement recommendations are based on the AASHTO Guide for Design of Pavement Structures.

The following parameters were used for our recommendation for the flexible pavement structure: 5,990 initial ADT, 10,819 ADT (20 years), 1,460,000 (20-year) 18-Kip ESAL, analysis period of 20 years, M_R=4,000 psi, design confidence level of 90%, Serviceability Level (P_o=4.2 and P_t=2.5), and 5 % truck traffic in ADT. Based on the above parameters, the following pavement section may be utilized:

HMAC Pavement
2" TxDOT Item 341, Type "C or D" with PG76-22

HMAC Pavement
3" TxDOT Item 341, Type "B or C" with PG64-22

Flexible Base (Placed in 2 lifts)
12" TxDOT Item 247, Type A, Grade 1

xxxxxxxx Tensar Geogrid xxxxxxx
Lime Treated Subgrade
8" TxDOT Item 260

For the above flexible pavement section, we recommend using the following stipulations for the TxDOT Item 341 mix:

- No recycled shingle material will be allowed in these mixes.
- The final surface course shall contain a maximum of 10 percent RAP.

The recommended pavement section do not take the Potential Vertical Rise (PVR) into consideration; if PVR is desired as part of the design parameters, the geotechnical investigation will need to be expanded. Deeper borings and additional testing will be required to determine the PVR value.

In the event that any changes on the design parameters used above are made, the pavement section recommended in this report shall be reviewed and analyzed by us and a revised report should be issued. The pavement section presented above was based on the laboratory and engineering analysis of the soil samples taken. If any subsurface conditions other than those described here are encountered, Rodriguez Engineering Laboratories should be immediately notified so that further investigations and supplemental recommendations can be provided.

General Pavement Recommendations

Existing subgrade containing organic material shall be removed to avoid differential settlements due to decomposition of these materials. The exposed subgrade should be scarified to a depth of six (6) inches and moisture conditioned and compacted in accordance with TxDOT Specification Item 132. The subgrade shall be tested by proof rolling prior to placement of the first lift of embankment. If the material fails to meet the density specified or any unstable or spongy areas are identified, it shall be reworked as necessary to obtain the required density.

If embankment is utilized, it should comply with the requirements of TxDOT Specification Item 132. The embankment should be placed in successive horizontal layers with a thickness of 8 inches or less in loose measure, for the entire width of the cross section. Compaction of side slopes should be parallel to the long direction of the side slopes. Rocks larger than 4 inches will not be allowed on the upper 6 inch course. Care should be taken to not over-compact high-plasticity clays. Embankment should extend 5 feet from the pavement edge.

Subgrade sample containing clay was analyzed for Sulfate Content, which was found to be less than 0.18 percent by weight of dry soil. This is below the 0.2 percent indicated by Dallas N. Little* as the level at or above which expansion problems may occur with lime, so this should not be a concern. Although the sulfate content during our investigation was relatively low, the soil should be periodically analyzed for sulfate content during construction. If it is determined that the sulfate content of the soil is higher than what was determined during the geotechnical investigation, REL should be notified in order to re-evaluate the changed conditions.

Subgrade material having a plasticity index (PI) exceeding 20 should be stabilized with lime-slurry to a depth of eight (8) inch minimum-compacted thickness. Subgrade material having a PI of 20 or less shall be stabilized using cement to a depth of eight (8) inch minimum-compacted thickness.

If lime stabilization is used, it should comply with the requirements of TxDOT Specification Item 260 (Lime treatment for materials used as subgrade, road mixed). The percentage (based on the dry weight of the soil) of lime required to stabilize the subgrade samples obtained during our investigation was 5%; however, if during construction, after cut/fill operations, other types of subgrade materials are encountered, additional testing should be performed to determine the lime required to stabilize the final subgrade material. Mixture should be brought and maintained to moisture of at least 3 percentage points above its optimum moisture content during mixing and curing periods. The lime treated subgrade during placing operations shall be moisture conditioned to not be below, nor more than 3% above, the optimum moisture content and compacted to a minimum of 95% of the maximum dry density as determined by Test Method Tex-121-E. Lime treated subgrade should extend at least 15 feet from the pavement edge.

If cement stabilization is used, it should comply with the requirements of TxDOT Specification Item 275 "Cement Treatment (Road Mixed)". Testing should be performed during construction to determine the percent cement required to stabilize the final subgrade material. The subgrade material during placing operations shall be moisture conditioned to not below, nor more than 2% above, the optimum moisture content and compacted to a minimum of 95% of the maximum dry density as determined by Test Method Tex-120-E.

Tensar Geogrid TriAx-TX5 may be used. Geogrid shall be placed in-between the compacted treated subgrade and flexible base material. The treated subgrade shall be proof-rolled after compaction and prior to placement of geogrid and base material. Geo-synthetics will also provide long-term materials separation, thus helping to avoid the base material being contaminated with the subgrade. Place the geogrid in accordance to manufacturer recommendations.

Flexible Base should comply with the requirement of TxDOT Specification Item 247, Type A, Grade 1. The base material during placing operations shall be moisture conditioned to not be below, nor more than 2% above, the optimum moisture content and compacted to a minimum of 100% of the maximum dry density as determined by Test Method Tex-113-E. Base material shall be extended at least 3-feet behind the back of curb or pavement edge. Topsoil should be placed over the base extension to protect base from excess water penetration and erosion from runoff.

Asphaltic concrete shall comply with the requirements of TxDOT Specification Item 341. It should be known that if moisture is present in the subgrade, the extensive use of a vibratory roller might wick the moisture through the subgrade and into the base causing the base to pump during placement of the Hot-Mix Asphalt Concrete. If this problem arises, use of the vibratory roller may need to be limited.

Care should be taken to slope the site such that water will not pond around or on the pavement structure during construction. Once completed, the ground surface should slope away from the pavement and have enough topsoil to grow vegetative cover for water runoff protection.

It was also determined that the topsoil encountered during our investigation can be excavated using conventional earth moving equipment (ripper, trencher, backhoe). However, for the bedrock, rock hammers or possibly blasting may be required.

* *Handbook for Stabilization of Pavement Subgrades and Base Courses with Lime, by Dallas N. Little, Kendall / Hunt Publishing Co., 1995. Pp. 51 & 52*

LIMITATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the exclusive use of LJA Engineering, Inc. in the preparation of the pavement design, drawings, and specifications for the proposed construction. Verification of subsurface conditions for purposes of determining difficulty of excavation, dewatering, trafficability, etc., is the responsibility of others specializing in those areas. Our geotechnical scope of work for this site did not include an environmental assessment or chemical testing and analysis of the property's air, water, and subsurface soils. In the event that any changes in the nature, design or locations of these structures are made from those assumed herein, the conditions contained in this report shall not be considered valid until the changes are reviewed and verified in writing.

Appendix A:

Bore Log Data

Rodriguez Engineering Laboratories

Bore Log Data

Boring No. 1

Project: Southland Boulevard Project
Location: 31°25'34.3"N,100°30'43.4"W
Date Drilled: 7/1/2016

Boring Depth: 10 ft.
Water Level: N / A
Drilling Method: A = Auger

Depth (ft)	Soil Symbol	Sample No.	Laboratory Classification: Material Description	Group Symbol	Drilling Method	Moisture Content (%)	Atterberg Limits: LL	PI	Sieve Analysis, Percent Passing: 3"	7/8"	3/4"	3/8"	No.4	No.10	No.40	No.200	Depth (ft)
		N/S	3" HMAC Pavement		A												
1.0		1-1	9.5" BASE. Brown, Silty SAND with Gravel.	SM	A	6.0	Non-Plastic		100.0	100.0	99.6	88.8	70.4	55.6	40.1	30.5	1.0
2.0		1-2	Reddish Brown, Sandy Lean CLAY.	CL	A	17.5	40	21	100.0	100.0	100.0	99.4	98.3	96.0	91.6	64.7	2.0
3.0		1-3	Reddish Brown, Sandy Lean CLAY.	CL	A	17.5	42	22	100.0	100.0	100.0	99.9	98.9	97.1	93.8	66.6	3.0
4.0																	4.0
5.0																	5.0
6.0		1-4	Reddish Brown, Sandy Lean CLAY.	CL	A	16.2	39	21	100.0	100.0	100.0	100.0	99.0	96.6	90.1	62.3	6.0
7.0																	7.0
8.0		1-5	Reddish Brown, Sandy Lean CLAY.	CL	A	14.3	31	12	100.0	100.0	100.0	99.9	97.6	93.1	84.6	60.3	8.0
9.0																	9.0
10.0																	10.0

Boring terminated at 10 ft. No groundwater was encountered.

Rodriguez Engineering Laboratories

Bore Log Data

Boring No. 2

Project: Southland Boulevard Project
Location: 31°25'35.9"N,100°30'44.5"W
Date Drilled: 7/1/2016

Boring Depth: 10 ft.
Water Level: 2.5 ft
Drilling Method: A = Auger
PT = Push Tube

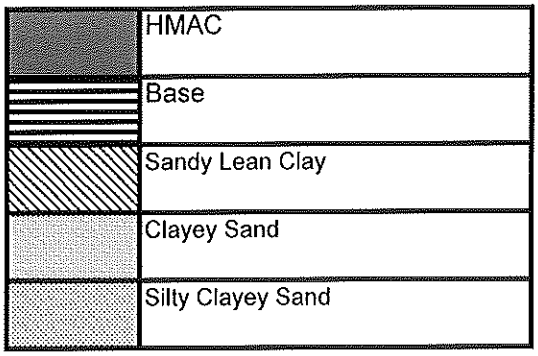
Depth (ft)	Soil Symbol	Sample No.	Laboratory Classification: Material Description	Group Symbol	Drilling Method	Moisture Content (%)	Atterberg Limits: LL	PI	Sieve Analysis, Percent Passing: 3"	7/8"	3/4"	3/8"	No.4	No.10	No.40	No.200	Depth (ft)
		N/S	3.5" HMAC Pavement.		A												
		2-1	7.5" BASE. Grayish Brown, Silty, Clayey SAND with Gravel.	SC-SM	A	5.3	16	4	100.0	100.0	100.0	90.8	74.3	58.1	41.1	31.1	
1.0		2-2	Reddish Brown, Clayey SAND.	SC	PT	22.3	39	21	100.0	100.0	100.0	100.0	99.8	99.1	95.5	48.7	1.0
2.0																	2.0
		2-3	Reddish Brown, Silty-Clayey SAND. Groundwater at 2.5 ft.	SC-SM	PT	19.8	21	4	100.0	100.0	100.0	99.0	98.1	97.2	95.0	30.0	
3.0																	3.0
4.0		2-4	Reddish Brown, Clayey SAND.	SC	PT	20.5	35	17	100	96.9	96.9	95.6	93.3	91.3	87.4	42.9	4.0
5.0																	5.0
		2-5	Reddish Brown, Clayey SAND.	SC	PT	23.3	32	16	100	100	100	98.9	97	95.7	92.6	47.9	
6.0																	6.0
7.0		2-6	Reddish Brown, Sandy Lean CLAY.	CL	A	24.5	46	27	100	100	100	99.6	98.8	97.3	93.6	53.9	7.0
8.0																	8.0
9.0																	9.0
10.0																	10.0

Boring terminated at 10 ft. Groundwater encountered at approximately 2.5' during drilling operations.

LEGEND OF TERMINOLOGY

GRAVELS More than half of Coarse fraction is LARGER than No. 4 Sieve	**Clean Gravels** Little or no Fines	**GW**	Well-Graded, gravel-sand mixtures, mixtures, little or no fines
		GP	Poorly-Graded gravels, gravel-sand mixtures, little or no fines
	Gravels with Fines Appreciable Amount of fines	**GM**	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay Mixtures
SANDS More than half of Coarse fraction is SMALLER than No. 4 Sieve	**Clean Sands** Little or no Fines	**SW**	Well-Graded sands, gravely sands, little or no fines
		SP	Poorly-Graded sands, gravely sands little or no fines
	Sands with Fines Appreciable Amount of fines	**SM**	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
SILTS and CLAYS Liquid Limit LESS than 50		**ML**	Inorganic silts & very fine sands, rock flour, silty or clayey fine sands or clayey silts w/slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays
		OL	Organic silts & organic silty clays of low plasticity
SILTS and CLAYS Liquid Limit GREATER than 50		**MH**	Inorganic silts, micoceous or diatomaceous fine sand or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
Highly ORGANIC Soils		**PI**	Peat & other highly organic soils

Legend of Symbols



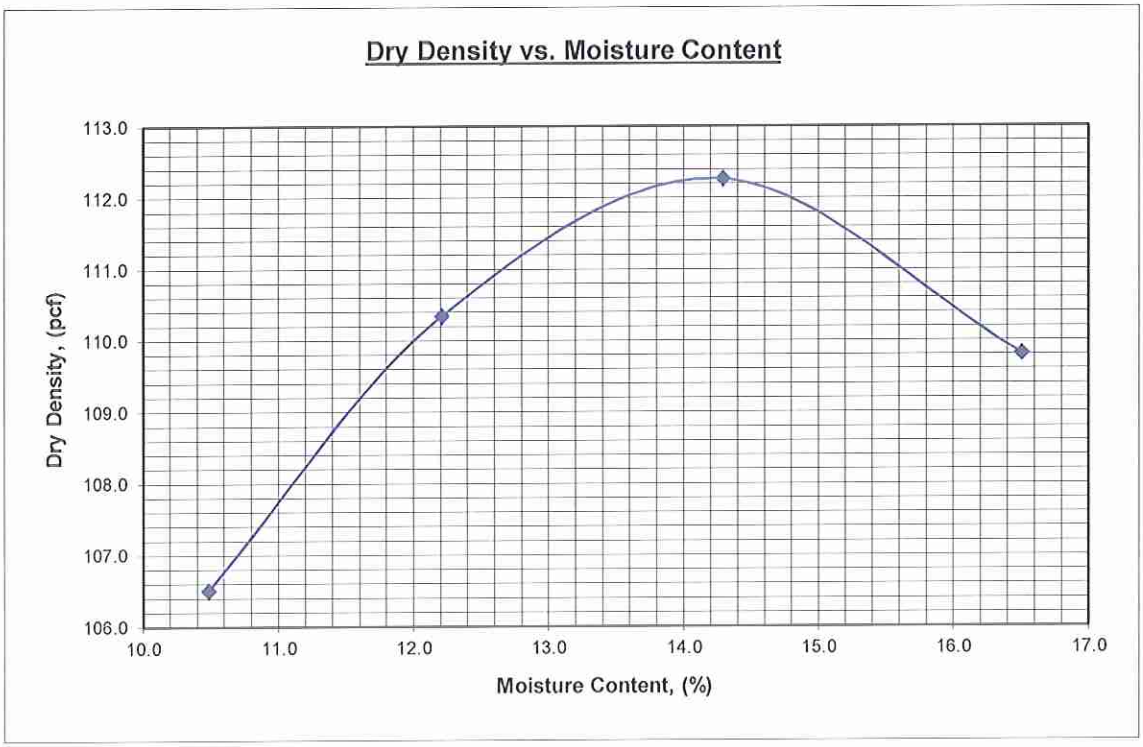
Appendix B:

Subgrade, Proctor and CBR Data

Southland Boulevard
San Angelo, Texas
Proctor Chart for CBR Sample

Laboratory No:	RE16-2076	**Compactive Effort:**	ASTM D698-C
Material Type:	Subgrade	**Maximum Density (pcf):**	**112.3**
Sample Location:	Borings On-Site	**Optimum Moisture (%):**	**14.2**

Specimen No.	1	2	3	4	5
% Water Added	4.0	6.0	8.0	10.0	--
Net Wt. Of Specimen & Mold (g)	6640.1	6849.1	7001.8	6989.4	--
Tare Wt. Of Mold (g)	2637.0	2637.0	2637.0	2637.0	--
Wet Wt. Of Specimen (lb)	8.825	9.286	9.623	9.595	--
Volume of Specimen (ft^3)	0.0750	0.0750	0.0750	0.0750	--
Wet Density of Specimen (pcf)	117.7	123.8	128.3	127.9	--
Guesstimated Dry Density (pcf)	113.1	116.8	118.8	116.3	--
Wet Wt. Of Specimen & Pan (g)	5195.1	5492.4	5663.8	5570.5	--
Dry Wt. Of Specimen & Pan (g)	4820.4	5036.0	5115.7	4955.4	--
Tare Wt. Of Pan (g)	1246.3	1298.0	1280.5	1228.8	--
Wt. Of Water (g)	374.7	456.4	548.1	615.1	--
Dry Wt. Of Material (g)	3574.1	3738.0	3835.2	3726.6	--
Total % Moisture of Specimen	**10.5**	**12.2**	**14.3**	**16.5**	--
Dry Density of Specimen (pcf)	**106.5**	**110.3**	**112.3**	**109.8**	--



Southland Boulevard
San Angelo, Texas
Proctor Chart for CBR Sample

Laboratory No: RE16- 2076
Material Type: Subgrade
Sample Location: Borings On-Site

Compactive Effort: ASTM D698-C
Maximum Density (pcf): **112.3**
Optimum Moisture (%): **14.2**

Specimen No.	1	2	3
No. of Blows	**10 Blows**	**25 Blows**	**56 Blows**
Net Wt. Of Spec.& Mold (g)	7891.5	8239.6	8552.6
Tare Wt. Of Mold (g)	4179.1	4226.0	4204.8
Wet Wt. Of Specimen (lb)	8.184	8.848	9.585
Volume of Specimen (ft^3)	0.0750	0.0750	0.0750
Wet Density of Spec.(pcf)	109.1	118.0	127.8
Wet Wt. of Spec.& Pan (g)	976.9	976.9	976.9
Dry Wt. Of Spec. & Pan (g)	917.6	917.6	917.6
Tare Wt. Of Pan (g)	495.5	495.5	495.5
Wt. Of Water (g)	59.3	59.3	59.3
Dry Wt. Of Material (g)	422.1	422.1	422.1
Total % Moisture of Spec.	**14.0**	**14.0**	**14.0**
Target % Moisture of Spec.	**14.2**	**14.2**	**14.2**
Dry Density of Spec. (pcf)	**95.7**	**103.4**	**112.1**
Initial Measurement (Div.)	24	48	15
Final Measurement (Div.)	101	94	60
Percentage of Swelling	**1.7**	**1.0**	**1.0**

10 blows/lift

Penetration (in)	Load (lb)	Stress (psi)
0.025	1.7	0.6
0.050	3.1	1.0
0.075	8.7	2.9
0.100	9.3	3.1
0.125	11.0	3.7
0.150	14.1	4.7
0.175	21.2	7.1
0.200	21.9	7.3
0.300	31.0	10.3
0.400	35.2	11.7
0.500	44.6	14.9

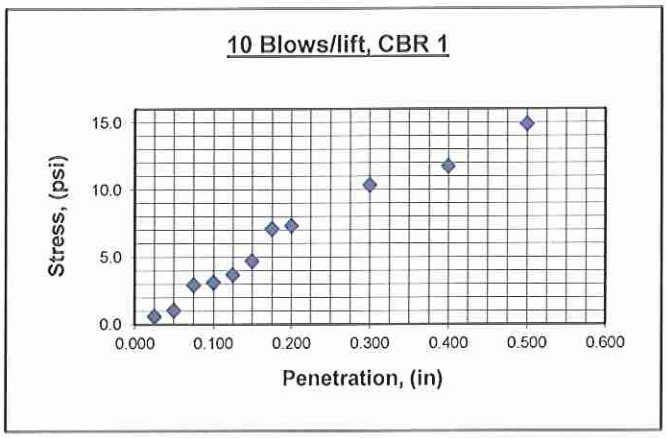
25 blows/lift

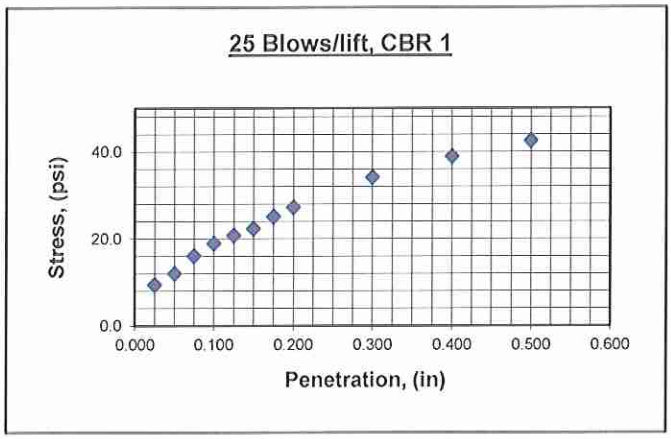
Penetration (in)	Load (lb)	Stress (psi)
0.025	28.3	9.4
0.050	36.1	12.0
0.075	48.2	16.1
0.100	56.8	18.9
0.125	62.3	20.8
0.150	67.0	22.3
0.175	75.5	25.2
0.200	81.9	27.3
0.300	102.6	34.2
0.400	116.9	39.0
0.500	127.8	42.6

56 blows/lift

Penetration (in)	Load (lb)	Stress (psi)
0.025	20.2	6.7
0.050	45.7	15.2
0.075	75.9	25.3
0.100	102.1	34.0
0.125	124.0	41.3
0.150	141.3	47.1
0.175	154.8	51.6
0.200	166.1	55.4
0.300	204.8	68.3
0.400	241.4	80.5
0.500	274.3	91.4

Southland Boulevard
San Angelo, Texas
Proctor Chart for CBR Sample





Dry Density @ 10 Blows/lift (pcf) = 95.7

$CBR_{0.100}$ = (3.1 /1000) x 100 = 0.31

$CBR_{0.200}$ = (7.3 /1500) x 100 = 0.49

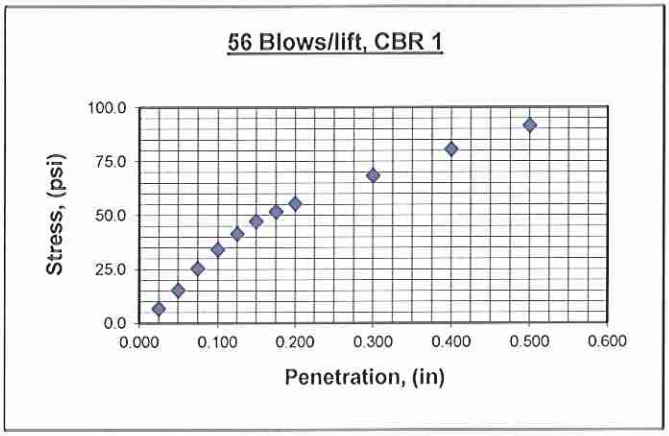
Use CBR = 0.49

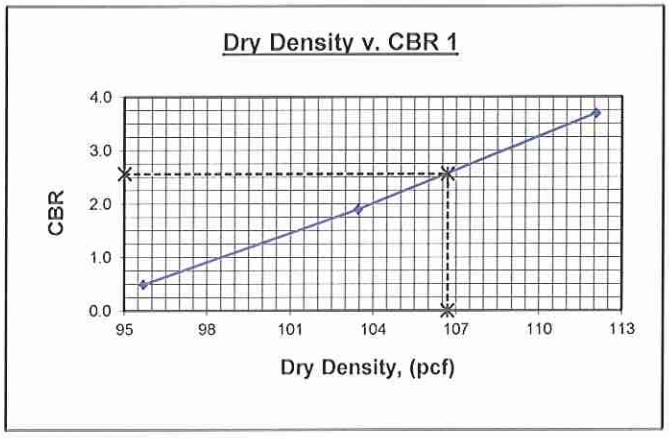
Dry Density @ 25 Blows/lift (pcf) = 103.4

$CBR_{0.100}$ = (18.9 /1000) x 100 = 1.89

$CBR_{0.200}$ = (27.3 /1500) x 100 = 1.82

Use CBR = 1.89





Dry Density @ 56 Blows/lift (pcf) = 112.1

$CBR_{0.100}$ = (34.0 /1000) x 100 = 3.40

$CBR_{0.200}$ = (55.4 /1500) x 100 = 3.69

Use CBR = 3.69

Design CBR @ 95 % Max. Dry Density = 2.6

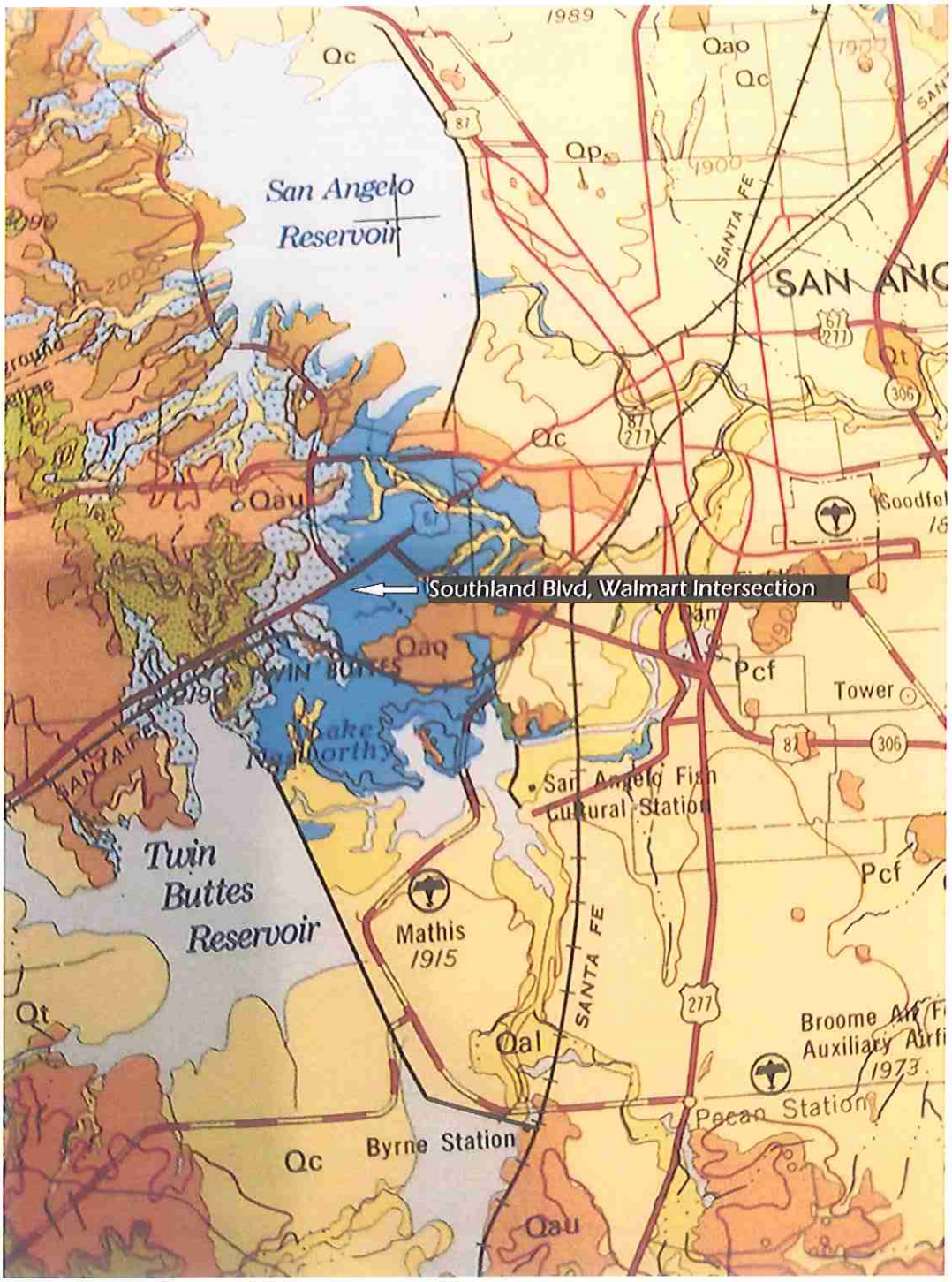
Design CBR @ 100 % Max. Dry Density = 3.7

Appendix C:

University of Texas, Bureau of Economic Geology Map
and
Map of Borehole Locations

Southland Boulevard Project

San Angelo, Texas



The University of Texas at Austin, Bureau of Economic Geology, Geological Atlas of Texas, San Angelo Sheet, 1976

Map of Borehole Locations
Southland Boulevard Project
San Angelo, Texas

NOTE: Boring locations are approximate.

Boring No.	Latitude	Longitude
1	30°25'34.30" N	100°30'43.30" W
2	30°25'35.90" N	100°30'44.50" W

Appendix D:

Subgrade, Proctor and Texas Triaxial Data

TEXAS DEPARTMENT OF TRANSPORTATION

TRIAXIAL COMPRESSION TESTS
Tex-117-E

Refresh Workbook

File Version: 06/23/15 14:07:29

SAMPLE ID:	RE16-2076	SAMPLED DATE:	07/01/2016
TEST NUMBER:	Southland Boulevard	LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	130527
COUNTY:		SPEC YEAR:	
SAMPLED BY:	Tim Southerland	SPEC ITEM:	
SAMPLE LOCATION:	Borings On-Site	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:			
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	

COURSE\LIFT:		STATION:		DIST. FROM CL:	

Moisture-Density Data

Maximum Dry Density (pcf):	114.4
Optimum Moisture Content (%):	13.4
Hygroscopic Moisture Content (%):	

Mass of Mold (universal), (lb):	5.467
Volume of Mold per Linear Inch (universal) (in^3/in):	0.0072
Check here if multiple molds are used:	☐
Mass of Material per Specimen (lb):	6.589
Mass of Water per Specimen (lb):	0.883

Performed By Tex-117-E:	Automated : Part I (Classification)

Triaxial Test Data Sheet

Specimen Data

Specimen Number:	1	2	3	4	5	6	7	8	9
Cell No.:									
Wet Mass Spec. & Mold, (lb):	10.948	10.980	10.970	10.958	10.962	10.955	10.944	10.980	11.021
Mass of Mold (universal), (lb):	5.467	5.467	5.467	5.467	5.467	5.467	5.467	5.467	5.467
Vol. of Mold (universal) (in^3/in):	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072	0.0072
Wet Mass Specimen, (lb):	5.481	5.513	5.503	5.491	5.495	5.488	5.477	5.513	5.554
Initial Height of Specimen, in.:	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
New Height of Specimen, in.:	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
Average Diameter, in.:	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Circumference, in. (manual):									
Circumference, in. (auto):	12.566	12.566	12.566	12.566	12.566	12.566	12.566	12.566	12.566
Area, in.^2:	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57	12.57
Avg. Cross Sectional Area, in^2:	13.59	13.59	13.59	13.59	13.59	13.59	13.59	13.59	13.59

Dry-Back Data

Wet Mass of Pan & Specimen, (lb)	6.781	7.366	7.381	7.398	7.356	7.342	7.360	7.511	6.820
Dry Mass of Pan & Specimen, (lb):	6.000	6.559	6.583	6.602	6.579	6.542	6.583	6.712	6.040
Mass of Pan, (lb):	1.320	1.818	1.891	1.881	1.862	1.841	1.898	2.021	1.312
Dry Mass of Material, (lb):	4.680	4.741	4.692	4.721	4.717	4.701	4.685	4.691	4.728
Mass of Water, (lb):	0.781	0.807	0.798	0.796	0.777	0.800	0.777	0.799	0.780
Moisture Content, (%):	16.7	17.0	17.0	16.9	16.5	17.0	16.6	17.0	16.5
Wet Density, (pcf).:	126.9	127.6	127.4	127.1	127.2	127.0	126.8	127.6	128.6
Dry Density, (pcf):	108.7	109.1	108.9	108.8	109.2	108.6	108.7	109.0	110.4

Strength Data									
Lateral Pressure, psi.:	0	0	3	3	5	7	10	15	20
Evaluated Lateral Pressure, psi.:	0	0	3	3	5	7	10-Void	15	20-Void
Calibration Factor:	-4616524.71	-4616524.71	-4616524.71	-4616524.71	-4616524.71	-4616524.71	-4616524.71	-4616524.71	-4616524.71
Excitation:	9.962493896	9.962493896	9.962493896	9.962493896	9.962493896	9.962493896	9.962493896	9.962493896	9.962493896
Zero:	-7.2745E-05	-7.7739E-05	-7.3107E-05	-7.7799E-05	-7.3666E-05	-8.3385E-05	-7.5394E-05	-7.8248E-05	-7.3185E-05
Dead Load, lbs.:	1.900	1.900	1.900	1.900	1.900	1.900	1.900	1.900	1.900
Piston Correction, lbs.:	0.5818	0.6386	2.4123	2.2074	4.0292	5.5423	7.9326	11.7999	15.6037
Max. Load Reading, div.:	-0.0003	-0.0003	-0.0005	-0.0005	-0.0006	-0.0007	-0.0009	-0.0010	-0.0012
Max Load, lbs.:	101.4	94.4	185.2	193.4	259.6	277.0	381.4	438.4	555.8
Deformation at Max Load, in.:	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Uncorrected Stress, psi.:	8.2	7.7	14.9	15.5	20.8	22.2	30.5	35.0	44.4
% Strain , in./in.:	7.51	7.52	7.51	7.52	7.53	7.51	7.54	7.51	7.53
I-Strain, in./in.:	0.9249	0.9248	0.9249	0.9248	0.9247	0.9249	0.9246	0.9249	0.9247
Corrected Stress, psi.:	7.6	7.1	13.8	14.4	19.2	20.5	28.2	32.4	41.0

Classification:	**5.2**
Internal Angle of Friction:	**20.1**
Cohesion, psi:	**2.6**
Correlation Factor:	**0.9867**

15 psi

Test results may be omitted by typing 'VOID' in the 'Laterial Pressure, psi' cell.

SCA Data (Imported)									
Total Energy (lb-ft) Lift 1:									
Total Energy (lb-ft) Lift 2:									
Total Energy (lb-ft) Lift 3:									
Total Energy (lb-ft) Lift 4:									
Energy/Lift (lb-ft) Lift 1:									
Energy/Lift (lb-ft) Lift 2:									
Energy/Lift (lb-ft) Lift 3:									
Energy/Lift (lb-ft) Lift 4:									
Avg. Drop Ht. (lb-ft) Lift 1:									
Avg. Drop Ht. (lb-ft) Lift 2:									
Avg. Drop Ht. (lb-ft) Lift 3:									
Avg. Drop Ht. (lb-ft) Lift 4:									
No. of Blows (lb-ft) Lift 1:									
No. of Blows (lb-ft) Lift 2:									
No. of Blows (lb-ft) Lift 3:									
No. of Blows (lb-ft) Lift 4:									

Remarks:

Above specimens were compacted at approximately 109.0 PCF dry density and 16.8% moisture.

Test Method:	Tested By:	Tech Cert No.:	Tested Date:
TX117	Jacob Alcala	93	07/12/16

Test Stamp Code:	Omit Test:	Completed Da	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

TxDOT Manuals > Tex-113-E Tex-114-E

TEXAS DEPARTMENT OF TRANSPORTATION

Moisture-Density Relations of Base Material & Sand or Subgrade & Embankment Soils
Tex-113-E *or* Tex-114-E

Refresh Workbook File Version: 08/25/12 15:50:54

SAMPLE ID:	RE16-2076	SAMPLED DATE:	07/01/2016
TEST NUMBER:	Southland Boulevard	LETTING DATE:	
SAMPLE STATUS:		CONTROLLING CSJ:	130527
COUNTY:		SPEC YEAR:	
SAMPLED BY:	Tim Southerland	SPEC ITEM:	
SAMPLE LOCATION:	Borings On-Site	SPECIAL PROVISION:	
MATERIAL CODE:		GRADE:	
MATERIAL NAME:	Subgrade		
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE\LIFT:		STATION:	DIST. FROM CL:

Moisture-Density Work Sheet

Oven Dry Weight, (g):	
Weight of Pycnometer & Water, (g):	
Weight of Aggr., Pycn.& Water, (g):	
Specific Gravity (Apparent)(Override):	2.6
Specific Gravity (Apparent)(Calc):	2.60
Hygroscopic Moisture, (%):	

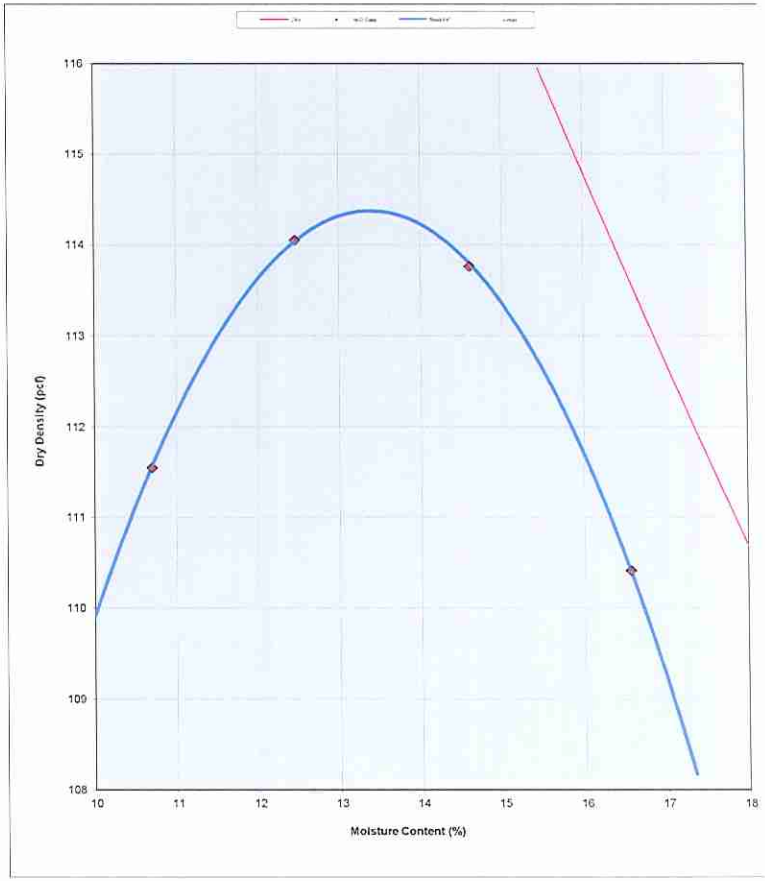
Sample Number :	1	2	3	4
Percent Water Content, (%):	6	8	10	12
Mass Material, (lb):				
Mass Water Added, (lb):				
Wet Mass Specimen & Mold, (lb):	10.851	11.059	11.151	11.078
Mass of Mold, (lb):	5.467	5.467	5.467	5.467
	5.467	5.467	5.467	5.467
Wet Mass Specimen, (lb):	5.384	5.592	5.684	5.611
Height of Specimen, (in.):	6	6	6	6
Volume per Linear mm., (in.):	0.007266667	0.007266667	0.007266667	0.007266667
	0.007266667	0.007266667	0.007266667	0.007266667
Volume of Specimen, (ft^3):	0.0436	0.0436	0.0436	0.0436
Wet Density of Specimen, (lb):	123.49	128.26	130.37	128.69
Wet Mass of Pan & Specimen, (lb):	2.551	2.583	2.091	2.35
Dry Mass Pan & Specimen, (lb):	2.409	2.418	1.963	2.17
Tare Mass Pan, (lb):	1.082	1.094	1.086	1.083
Dry Mass Material , (lb):	1.327	1.324	0.877	1.087
Mass Water, (lb):	0.142	0.165	0.128	0.18
Percent Water on Total , (%):	10.70	12.46	14.60	16.56
Dry Density, (pcf):	111.55	114.05	113.76	110.41
Estimated Dry Density, (pcf):	116.50	118.76	118.52	114.90

Import Data	Import SCA Data 1		Import SCA Data 2		Import SCA Data 3		Import SCA Data 4	
SCA Energy Data	Total Energy (lb-ft)	Avg Energy/ Blow (lb-ft)	Total Energy (lb-ft)	Avg Energy/ Blow (lb-ft)	Total Energy (lb-ft)	Avg Energy/ Blow (lb-ft)	Total Energy (lb-ft)	Avg Energy/ Blow (lb-ft)
Lift 1:								
Lift 2:								
Lift 3:								
Lift 4:								

SCA Drop Data	Avg. Drop Ht. (in)	Blows	Avg. Drop Ht.(in)	Blows	Avg. Drop Ht.(in)	Blows	Avg. Drop Ht.(in)	Blows
Lift 1:								
Lift 2:								
Lift 3:								
Lift 4:								

Unconfined Strength Data (psi):				
Percent Strain (%):				

Max Dry Density, (pcf):	114.4
Optimum Moisture Content, (%):	13.4
M-D Graph R^2 Value:	1.00



Remarks:

Test Method	Tested By	Tech Cert No:	Tested Date:
TX113	Jacob Alcala	198	07/07/16
TX114			

Test Stamp Code:	Omit Test:	Completed Date:	Reviewed By:

Locked By:	TxDOT:	District:	Area:

Authorized By:	Authorized Date:

Appendix E:

Lime Stabilization by pH Method Results

Determining Stabilization Ability of Lime by the Soil pH Method

Southland Boulevard Project

San Angelo, TX

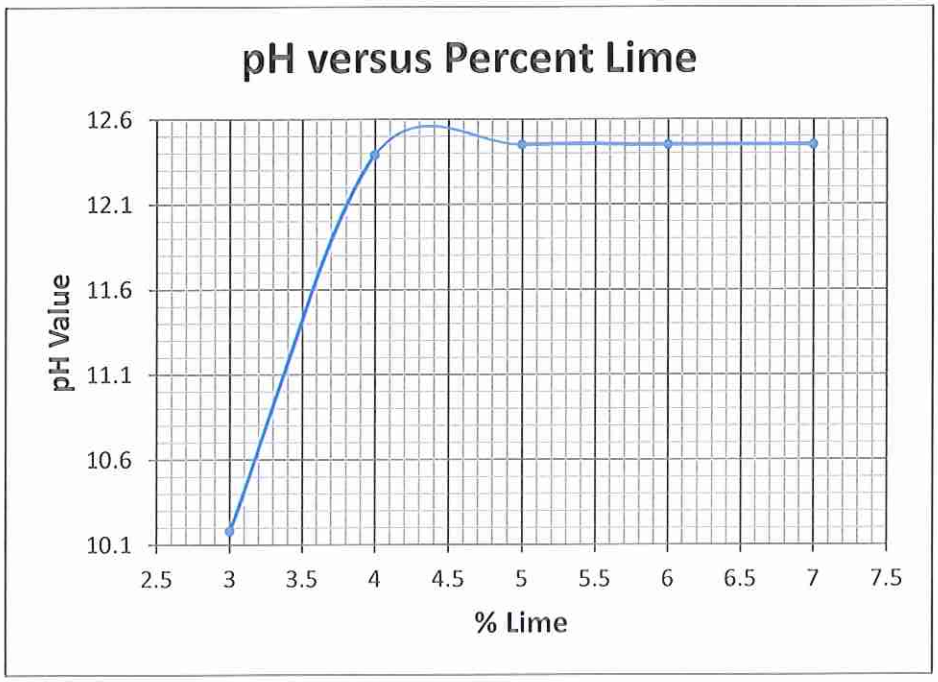
Borings On-Site

Water Content of Air-Dried Sample

Mass of Wet Sample + Tare (g):	0.0
Mass of Dry Sample + Tare (g):	0.0
Tare Mass (g):	0.0
Hygroscopic Moisture Content (%):	0.0

pH Value of Soil-Lime-Water Mixtures

Lime (%)	3	4	5	6	7
Soil (g)	30.0	30.0	30.0	30.0	30.0
Lime (g)	0.9	1.2	1.5	1.8	2.1
Water (ml)	150	150	150	150	150
pH Value	10.18	12.39	12.45	12.45	12.45



Appendix F:

Unit Weight of Cohesive Soils Results

Southland Boulevard Project
San Angelo, Texas
Unit Weight of Cohesive Soils

Boring No.	Sample Depth (ft)	Material Type	Plasticity Index	Diameter (in)	Length (in)	Volume (cf)	Wet Weight (Lb)	Moisture (%)	Dry Unit Weight (pcf)
2	3.5 - 5	Reddish Brown, Clayey SAND	17	2.780	5.170	0.018	2.374	20.5	108.5
	5 - 6.5	Reddish Brown, Clayey SAND	18	2.790	3.010	0.011	1.261	23.3	96.0