TECHNICAL SPECIFICATIONS

APRIL 2024

Beaumont ISD
Preparing Our Next Generation

Beaumont ISD
Pavement Repairs
Mae Clark
Elementary School

Fittz&Shipman INC.

Consulting Engineers and Land Surveyors
1405 CORNERSTONE COURT
BEAUMONT, TEXAS 77706
(409) 832-7238
T.B.P.E. FIRM #1160 T.X.L.S. FIRM #100186

FS 24049

MAE CLARK ELEMENTARY
PAVEMENT REPAIRS
for
Beaumont Independent School District

TECHNICAL SPECIFICATIONS

ITEM 1000
INTRODUCTION

A general description of the work for **MAE CLARK PAVEMENT REPAIRS** for Beaumont Independent School District has been prepared in an effort to give a better understanding and overview of the scope of work to be accomplished under this contract.

The major items of work included in this project are: Removal of existing vegetation, concrete and asphalt pavement, installation of select fill, installation of concrete pavement, striping, signing, seeding and sodding, and clean up.

The owner must allow for normal operation of school facilities on this campus during construction and there is no other construction on-site. All work under this project will be coordinated with the Owner and Owners representatives accomplishing work on site and individuals identified at the pre-construction meeting (Beaumont Independent School District staff, security staff, maintenance staff, etc.).

The contractor will also submit his proposed sequence of operations for all of the work related to this project to the owner and the Engineer before authorization to proceed is issued.

SCHEDULE OF DRAWINGS

COVER SHEET
C1.1 PAVEMENT PLAN
C2.1 DIMENSIONAL PLAN
C3.1 GRADING PLAN
C4.1 EROSION CONTROL PLAN
C4.2 EROSION CONTROL DETAILS
C5.1 SITE DETAILS & NOTES
C5.2 SITE DETAILS & NOTES
C5.3 SITE DETAILS & NOTES

END OF ITEM 1000

ITEM 1020
ALLOWANCES

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. These allowances shall cover the net cost of the materials and equipment delivered and unloaded at the site, and all applicable taxes. The Contractor's handling costs on site, labor, installation, overhead, profit and other expenses contemplated for the original allowances shall be included in the Contractor's sum, and not in the allowance. The Contractor shall cause the work covered by these allowances to be performed for such amounts and by such persons as the Engineer may direct but he will not be required to employ persons against whom he makes reasonable objection. If the cost, when determined, is more than or less than the allowance, the Contract sum shall be adjusted accordingly by Change Order, which will include additional handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor from any increase over the original allowance.

Unexpected balance for allowance sums shall revert to the owner in the final settlement of the contract.

The following CASH ALLOWANCES shall be included in the Base Bid. These sums shall be reconciled per the General Conditions.

Lump-sum allowances.

NONE

Contingency allowances.

Allow a Total of $20,000.00 Owner Directed Contingency Allowance

Allow a Total of $4,000.00 :Laboratory Testing Allowance

At Project closeout credit unused amounts remaining in the contingency allowances to the Owner by Change Order.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

EXAMINATION

Examine products covered by an allowance promptly upon delivery for damage or defects.

PREPARATION

Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

SCHEDULE OF ALLOWANCES

Contingency: Contractor shall include in the Base Bid the following sums as a contingency to cover the cost of hidden, concealed or otherwise unforeseen conditions which develop during completion of the work. Contractor shall proceed with the work in questions only after receiving written directions executed by the Owner and the Engineer. Owner will not be obligated to pay the cost of any work performed without prior written authorization. The Contractor's overhead and profit relative to this contingency sum and work performed in accordance herewith, shall be included in the total Base bid price, but not included in the contingency sum. Unexpended balance of contingency sums shall revert to the Owner in the final settlement of the contract.

Allow a Total of $20,000.00 Owner Directed Contingency Allowance

Field and Laboratory Construction Quality Assurance Testing

Allow a Total of $4,000.00 :Laboratory Testing Allowance

END OF ITEM 1020

ITEM 1566
GENERAL EROSION AND SEDIMENTATION PRACTICES

PART 1 - GENERAL

1.01 DESCRIPTION

This item describes the installation of erosion and sedimentation control practices which must be utilized during construction activities.

1.02 RELATED WORK

Related work as called for in PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATION.

PART 2 - PRODUCTS

Provide materials as specified in PART 3.

PART 3 - EXECUTION

3.01 GENERAL

A. No clearing and grubbing or rough cutting, other than as specifically directed by the Owner to allow soil testing and surveying, shall be permitted until erosion and sedimentation control systems are in place.

B. Equipment and vehicles shall be prohibited by Contractor from maneuvering on areas outside of designated construction zone. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.

C. Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site.

D. Conduct all construction operations under this Contract in conformance with the erosion control practices described in that Item.

3.2 TOPSOILING FOR EROSION AND SEDIMENTATION CONTROL SYSTEMS

A. When removal, stockpiling, and replacing of topsoil and vegetation (topsoiling) is called for as a component of another Item, conduct erosion control practices described in this Item during topsoiling operation.

    1. When topsoiling, maintain erosion and sedimentation control systems, such as swales, grade stabilization structures, berms, dikes, waterways, and sediment basins.

    2. Maintain grades which have been previously established on areas to be topsoiled.

    3. After the areas to be topsoiled have been brought to grade, and immediately prior to dumping and spreading the topsoil ,the subgrade shall be loosened by discing or by scarifying to a depth of at least 2 inches to permit bonding of the topsoil to the subsoil.

Compact by passing a bulldozer up and down the slope to create horizontal erosion control slots.

4. No sod or seed shall be placed on soil which has been treated with soil sterilants until sufficient time has elapsed to permit dissipation of toxic materials.

3.3 PROTECTION OF TREES IN CONSTRUCTION AREAS

A. Heavy equipment, vehicular traffic, and stockpiles of construction materials, including topsoil, are not permitted within the dripline of any tree to be retained. Contractor shall avoid all contact with trees to be retained unless otherwise directed by Owner or required by the work of this Contract.

B. Specimen trees shown on the PLANS shall be boxed or fenced. When called for in the PLANS, tunnel under the root system for the installation of utility lines.

C. Tree trunks, exposed roots, and limbs of the trees designated to be retained which are damaged during construction operations will be cared for as prescribed by a forester or licensed tree expert at the expense of the Contractor.

3.4 DUST CONTROL

A. Control dust blowing and movement on construction sites and roads to prevent exposure of soil surfaces, to reduce on and off-site damage, to prevent health hazards and to improve traffic safety.

B. Control dust blowing by utilizing one or more of the following methods:

1. Mulches, bound with chemical binders such as Curasol, Terratack, or equal.

2. Temporary vegetative cover.

3. Spray-on adhesives on mineral soils when not used by traffic.

4. Tillage to roughen surface and bring clods to the surface.

5. Irrigation by water sprinkling.

6. Barriers using solid board fences, snow fences, burlap fences, crate walls, bales of hay, or similar materials.

C. Dust control methods shall be implemented immediately whenever dust can be observed blowing on the project site.

3.5 EQUIPMENT MAINTENANCE AND REPAIR

A. Maintenance and repair of construction machinery and equipment must be confined to areas specifically designated for that purpose. Such designated areas must be located and designed so that oils, gasoline, grease, solvents, and other potential pollutants cannot be washed directly into receiving streams or storm water conveyance systems. These areas must be provided with adequate waste disposal receptacles for liquid as well as solid waste. Maintenance areas should be inspected and cleaned daily.

B. On a construction site where designated equipment maintenance areas are not feasible, care must be taken during each individual repair or maintenance operation to prevent potential

pollutants from becoming available to be washed into streams or conveyance systems. Temporary waste disposal receptacles must be provided.

3.6 WASTE COLLECTION AND DISPOSAL

A. A plan shall be formulated for the collection and disposal of waste materials on a construction site. Such a plan must designate locations for trash and waste receptacles and establish a special collection schedule. Methods for ultimate disposal of waste must be specified and carried out in accordance with applicable local, state, and federal health and safety regulations. Special provisions must be made for the collection and disposal of liquid wastes and toxic or hazardous materials.

B. Receptacles and other waste collection areas must be kept neat and orderly to the extent possible. Waste should not be allowed to overflow its container or accumulate for excessively long periods of time. Trash collection points must be located where they will least likely be affected by concentrated storm runoff.

3.7 WASHING AREAS

Vehicles such as cement or dump trucks and other construction equipment must not be washed at locations where the runoff will flow directly into a watercourse or storm water conveyance system. Special areas must be designated for washing vehicles. These areas should be located where the wash water will spread out and evaporate or infiltrate directly into the ground, or where the runoff can be collected in a temporary holding or seepage basin. Wash areas must have gravel or rock bases to minimize mud generation.

3.8 STORAGE OF CONSTRUCTION MATERIALS, CHEMICALS, ETC.

Sites where chemicals, cements, solvents, paints, or other potential water pollutants are to be stored, must be isolated in areas where they will not cause runoff pollution.

Toxic chemicals and materials, such as pesticides, paints, and acids must be stored in accordance with manufacturer's guidelines. Groundwater resources must be protected from leaching by placing a plastic mat, packed clay, tar paper, or other impervious materials on any areas where toxic liquids are to be opened or stored.

3.9 DEMOLITION AREAS

Demolition projects usually generate large amounts of dust with significant concentrations of heavy metals and other toxic pollutants. Dust control techniques shall be used to limit the transport of the airborne pollutants. However, water or slurry used to control dust must be retained on the site and not allowed to run directly into watercourses or storm water conveyance systems.

3.10 SANITARY FACILITIES

All construction sites must be provided with adequate sanitary facilities for workers in accordance with applicable health regulations.

3.11 PESTICIDES

Pesticides used during construction should be stored and used in accordance with manufacturer's guidelines and with local, state and federal regulations. Overuse should be avoided and great care should be taken to prevent accidental spillage. Pesticide containers must never be washed in or near flowing streams or storm water conveyance systems.

3.12 CONSTRUCTION METHODS

A. Provide filter fabric fence systems at locations specified on PLANS in accordance with enclosed drawing. Filter fabric fence systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulate.

B. Attach the filter fabric to 1 inch by 2 inch wooden stakes spaced at a maximum of 3 feet apart and embedded a minimum of 1 foot. The wooden stakes shall be installed at a slight angle toward the source of anticipated runoff.

C. Trench in the tow of the filter fabric fence with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow or for V-trench configuration as shown on the attached detail drawing. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. The filter fabric should be provided in continuous rolls and cut to length of the Silt Fence to minimize the use of joints. When joints are necessary, the fabric should be spliced together only at a support post with a minimum 6 inch overlap, and sealed securely.

E. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once a week. Repair or replace damaged section immediately to restore the requirements of this Item. Remove sediment deposits when silt reaches one-third of the height of the fence in depth.

3.13 MEASUREMENT AND PAYMENT

A. Unless indicated in the PROPOSAL as a pay item, there will be no separate payment for work performed under this Item. Include cost of work performed under this Item in Contract prices bid for items of which this work is a component. When indicated in PROPOSAL as pay item, measure and pay for the filter fabric fence by the linear feet of completed and accepted filter fabric fence between the limits of the beginning and ending of wooden stakes. Filter fabric fence, measured as stated, will be paid for at the unit price bid for "Filter Fabric Fence, complete in place."

B. Payment for filter fabric fence will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.

END OF ITEM 1566

ITEM 1570
SWP3 - STORM WATER PROLLUTION PREVENTION PLAN

PART 1 GENERAL

1.1 PLAN REQUIREMENTS

A. This Section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the Texas Commission on Environmental Quality (TCEQ) and the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Permit, as stated in the Federal Register Vol. 57 No. 175, issued by the Environmental Protection Agency on September 9, 1992.

B. Contractor shall develop a Storm Water Pollution Prevention Plan (SWP3) in accordance with TCEQ General Permit TXR150000 which shall be specifically written to correspond to the Project. Copies of Texas General Permit TXR150000 will be made available to the contractor upon request.

C. Contractor shall review implementation of the Storm Water Pollution Prevention Plan (SWP3) in a meeting with the Engineer prior to start of construction.

D. Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, storm water management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the Drawings or specified elsewhere in this or other Specifications.

1.2 UNIT PRICES

Unless indicated in the Unit Price Schedule as a pay item, no separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items of which this work is a component.

1.3 REFERENCES

Texas Commission on Environmental Quality – “Storm Water Permits for Construction”
www.tceq.state.tx.us/nav/permits/wq_construction.html

PART 2 PRODUCTS

Storm Water Prevention Pollution Plan (SWP3) shall be prepared for all sites regardless of project size. SWP3 shall be a written document contained within a 3 ring binder or other device to permit addition of inspection worksheets. The Plan shall contain the following elements as required by TCEQ General Permit TXR150000 and EPA.:

A. Site description of project which includes the nature of construction activity, potential pollutants and sources of pollutants.
B. Proposed Project Schedule, indicate phases of construction, indicating installation of pollution control devices on the site and final cleanup of the site.
C. Acreage of the site
D. Data describing soil, and/or quality of discharge from the site.
E. General location map of the site
F. Detailed Site Map indicating drainage patters and proposed controls

G. List Erosion and sediment controls selected
H. Soil Stabilization methods

SWP3 Plan shall also describe practices to reduce pollutants on the storm water discharge, shall describe frequency of inspection of devices and shall list the person designated as the "responsible person" for such inspections

PART 3 EXECUTION

3.01 NOTICE OF INTENT

A. *Sites Greater than 5 Acres or designated as part of a "larger common plan of development" :* The Contractor shall fill out, sign, and date the Contractor's Notice of Intent (NOI). The signed copy of the Contractor's NOI shall be submitted to the Owner for signature. Contractor will complete the Owner's Notice of Intent and will submit both Contractors NOI and Owners NOI to the EPA. Submission of the NOI is required by both the Owner and the Contractor before construction operations start.

B. *Sites less than 5 Acres:* Notice to TCEQ or EPA is not required, however Contractor shall prepare SWP3 Plan and Post a "TCEQ Construction Site Notice" on site.

3.02 CERTIFICATION REQUIREMENTS

A. On the Operator's Information form attached as SWP3-1, the Contractor shall fill out name, address, and telephone number for the Contractor; the names of persons or firms responsible for maintenance and inspection of erosion and sediment control measures and all Subcontractors.

B. The Contractor and Subcontractors named in the Operator's Information form shall read, sign, and date the Contractor's/Subcontractor's Certification form, attached as SWP3-2.

C. The Operator's Information form and all certification forms shall be submitted to the Owner before beginning construction.

3.03 RETENTION OF RECORDS

A. The Contractor shall keep a copy of the Storm Water Pollution Prevention Plan (SWP3) at the construction site or at the Contractor's office from the date that it became effective to the date of project completion.

B. Contractor shall inspect and maintain erosion control devices on a periodic basis as identified in SWP3 Plan. Contractor shall keep record of such inspections and maintenance and attach to SWP3 plan for the site.

C. At project closeout, the Contractor shall submit to the Owner all NPDES forms and certifications, as well as a copy of the SWP3. Storm water pollution prevention records and data will be retained by Owner for a period of 3 years from the date of project completion.

3.04 REQUIRED NOTICES

The following notices shall be posted from the date that this SWPPP goes into effect until the date of final site stabilization:

A. Copies of the Notices of Intent submitted by the Owner and Contractor and a brief project description shall be posted at the construction site or at Contractor's office in a prominent place for public viewing.

B. Notice to drivers of equipment and vehicles, instructing them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.

C. In an easily visible location on site, post a notice of waste disposal procedures.

D. Notice of hazardous material handling and emergency procedures shall be posted with the NOI on site. Keep copies of Material Safety Data Sheets at a location on site that is known to all personnel.

E. Keep a copy of each signed certification at the construction site or at Contractor's office.

END OF ITEM 1570

SWP3-1
OPERATORS INFORMATION

Project Name: Mae Clark Elementary
Pavement Repairs

Location: 3525 Cleveland Ave,
Beaumont, TX 77703

Owner's Name & Address:
Beaumont Independent School District
3395 Harrison Avenue
Beaumont, Texas 77706
(409) 617-5000

Contractor's Name & Addresses

General Contractor _____

Telephone _____

Site Superintendent _____

Telephone _____

Erosion Control & Maintenance Inspections _____

Telephone _____

Subcontractor's Names & Addresses

_____ _____

Phone _____ Phone _____

_____ _____

Phone _____ Phone _____

SWP3-2
CONTRACTOR & SUBCONTRACTORS CERTIFICATION

Project Name	Mae Clark Elementary Pavement Repairs
Location	3525 Cleveland Ave, Beaumont, TX 77703
Owner's Name & Address	Beaumont Independent School District 3395 Harrison Avenue Beaumont, Texas 77706 (409) 617-5000

I certify that I have read and understand the Storm Water Pollution Plan (SWP3) which has been prepared for this site that authorizes the construction activities and erosion control methods and maintenance requirements and will abide by such plan.

CONTRACTOR

Signature: _____
Name (printed or typed): _____
Title: _____
Company: _____
Address: _____
_____
Phone: _____

SUBCONTRACTOR

Signature: _____
Name (printed or typed): _____
Title: _____
Company: _____
Address: _____
_____
Phone: _____

SUBCONTRACTOR

Signature: _____
Name (printed or typed): _____
Title: _____
Company: _____
Address: _____
_____
Phone: _____

SWP3-3
STORM WATER POLLUTION PLAN
INSPECTION & MAINTENANCE REPORT

Project: _____

Contractor: _____

Inspector: _____

Date: _____

Control	Location	Sediment Height	Problem Description	Maintenance Required	Repaired By / Date

ITEM 2230
SITE CLEARING

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements.

Related Sections include the following:

6. "General Erosion Control & Sedimentation" for protection facilities, and environmental protection measures during site operations.
7. "Earthwork" for soil materials, excavating, backfilling, and site grading.
8. "Backfilling " for finish grading, including placing and preparing topsoil for backfill and planting.

DEFINITIONS

Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of weeds, roots, and other deleterious materials.

MATERIALS OWNERSHIP

Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

SUBMITTALS

Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

PROJECT CONDITIONS

Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

9. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
10. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS (Not Applicable)

SOIL MATERIALS

Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Specification "Earthwork."

1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

PREPARATION

Protect and maintain benchmarks and survey control points from disturbance during construction.

Locate and clearly flag trees and vegetation to remain or to be relocated.

Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.

UTILITIES

Owner will arrange for disconnecting and sealing utilities that serve existing structures before site clearing when requested by Contractor. Verify that utilities have been disconnected and capped before proceeding with site clearing.

Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

Excavate for and remove underground utilities indicated to be removed.

CLEARING AND GRUBBING

Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.

3. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
4. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
5. Completely remove stumps, roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
6. Use only hand methods for grubbing within drip line of remaining trees.

Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

7. Place fill material in horizontal layers not exceeding 8-inch (200-mm) loose depth, and compact each layer to a density equal to adjacent original ground.

TOPSOIL STRIPPING

Remove sod and grass before stripping topsoil.

Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

Temporarily stockpile topsoil materials away from edge of excavations (if required) without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

8. Limit height of topsoil stockpiles to 72 inches (1800 mm).
9. Do not stockpile topsoil within drip line of remaining trees.
10. Dispose of excess topsoil as specified for waste material disposal.

SITE IMPROVEMENTS

Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

Remove slabs, paving, curbs, gutters, and aggregate base as indicated. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

DISPOSAL

Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF ITEM 2230

ITEM 2240
FILTER FABRIC FENCE

PART 1 - GENERAL

1.01 DESCRIPTION

This item describes the installation of erosion and sedimentation control filter fabric fences utilized during construction and prior to the final development of the site.

1.02 RELATED WORK

Related work as called for in PLANS or specified elsewhere in this or other TECHNICAL SPECIFICATION.

1.03 SUBMITTALS

Manufacturer's catalogue sheets and other pertinent information on geotextile fabric.

PART 2 - PRODUCTS

2.01 FILTER FABRIC

Provide woven or non-woven geotextile filter fabric made of either polypropylene, polyethylene, ethylene, or polyamide material. Geotextile fabric shall have a grab strength of 100 psi in any principal direction (ASTM D-4632), Mullen burst strength exceeding 200 psi (ASTM D-3786), and the equivalent opening size specified on PLANS. Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0^{o}F to 120^{o}F. Representative Manufacturers: Marifi Inc. or equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide erosion and sedimentation control systems at the location shown on PLANS. Such systems shall be of the type indicated and shall be constructed in accordance with the requirements shown on PLANS and set out in this item.

B. No clearing and grubbing or rough cutting, other than as specifically directed by the Owner to allow soil testing and surveying, shall be permitted until erosion and sedimentation control systems are in place.

C. Maintain existing erosion and sedimentation control systems located within the project site installed by others prior to start of construction under this contract until acceptance of the project or until directed by the Owner to remove and discard the existing system.

D. Inspect and repair or replace components of all erosion and sedimentation control systems as specified for each type of system. Unless otherwise directed, maintain the erosion and sedimentation control systems until the project is accepted by the Owner. Remove erosion and sedimentation control systems promptly when directed by the Owner. Discard removed materials off site.

E. Remove and dispose sediment deposits at the project spoil site. If a project spoil site is not designated on PLANS, dispose of sediment off site at a location no in or adjacent to stream or flood plain. Off-site disposal will be the responsibility of the Contractor. Sediment to be placed at the project site should be spread, compacted and stabilized in accordance with the Owner's directions. Sediment shall not be allowed to flush into stream or drainage way. If sediment has been contaminated, it shall be disposed of in accordance with existing federal, state and local regulations.

F. Unless otherwise indicated, compact embankments, excavations, and trenches by mechanically blading, tamping, and rolling soil in a maximum of 8-inch layers. Compaction density shall be a minimum of 90 percent Standard Proctor Density ASTM D-698. Make at least one test per 500 cubic yards of embankment.

G. Equipment and vehicles shall be prohibited by Contractor from maneuvering on areas outside of designated construction zone. Damages caused by construction traffic to erosion and sedimentation control systems shall be repaired immediately.

H. Contractor shall employ protective measures to avoid damage to existing trees to be retained on the project site. Conduct all construction operations under this Contract in conformance with the erosion control practices described in that Item.

3.02 CONSTRUCTION METHODS

A. Provide filter fabric fence systems at locations specified on PLANS in accordance with enclosed drawing. Filter fabric fence systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulate.

B. Attach the filter fabric to 1 inch by 2 inch wooden stakes spaced at a maximum of 3 feet apart and embedded a minimum of 1 foot. The wooden stakes shall be installed at a slight angle toward the source of anticipated runoff.

C. Trench in the tow of the filter fabric fence with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow or for V-trench configuration as shown on the attached detail drawing. Lay filter fabric along the edges of the trench. Backfill and compact trench.

D. The filter fabric should be provided in continuous rolls and cut to length of the Silt Fence to minimize the use of joints. When joints are necessary, the fabric should be spliced together only at a support post with a minimum 6 inch overlap, and sealed securely.

E. Inspect sediment filter barrier systems after each rainfall, daily during periods of prolonged rainfall, and at a minimum once a week. Repair or replace damaged section immediately to restore the requirements of this Item. Remove sediment deposits when silt reaches one-third of the height of the fence in depth.

3.03 MEASUREMENT AND PAYMENT

B. Unless indicated in the PROPOSAL as a pay item, there will be no separate payment for work performed under this Item. Include cost of work performed under this Item in Contract prices bid for items of which this work is a component. When indicated in PROPOSAL as pay item, measure and pay for the filter fabric fence by the linear feet of completed and accepted filter fabric fence between the limits of the beginning and ending of wooden stakes. Filter fabric fence, measured as stated, will be paid for at the unit price bid for "Filter Fabric Fence, complete in place."

C. Payment for filter fabric fence will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.

END OF ITEM 2240

ITEM 2300
EARTHWORK

PART 4 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes the following:

1. Preparing subgrades for slabs-on-grade, lawns, and plantings.
2. Drainage course for slabs-on-grade.
3. Base course for roadway.
4. Subsurface drainage backfill for walls and trenches.
5. Excavating and backfilling trenches.

Related Sections include the following:

6. Division 2 Section "Site Clearing" for site stripping, grubbing, removing topsoil.

DEFINITIONS

Backfill: Soil materials used to fill an excavation.

7. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
8. Final Backfill: Backfill placed over initial backfill to fill a trench.

Base Course: Layer placed between the subbase course and asphalt paving.

Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.

Borrow: Satisfactory soil imported from off-site for use as fill or backfill.

Excavation: Removal of material encountered above subgrade elevations.

9. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
10. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

Fill: Soil materials used to raise existing grades.

Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

Subbase Course: Layer placed between the subgrade and base course for asphalt paving, or layer placed between the subgrade and a concrete pavement or walk.

Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

Utilities include on-site underground pipes.

SUBMITTALS

Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

11. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for select fill, fill, and backfill.
12. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

QUALITY ASSURANCE

Testing and Inspection Service – Owner will empliy a qualified independent geotechnical engineering testing company to perform required field quality control.

Testing and Inspection Service – General Contractor shall employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements.

PROJECT CONDITIONS

Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated:

13. Notify Architect not less than two days in advance of proposed utility interruptions.
14. Do not proceed with utility interruptions without Architect's written permission.
15. Contact utility-locator service for area where Project is located before excavating.

PART 5 - PRODUCTS

SOIL MATERIALS

General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

Satisfactory Soils:

1) Select fill: Non-active clay or clayey sand type substance, having a liquid limit of 36 or less, Plasticity Index (P.I.) varying from 10 to 20.

2) Backfill and Fill Materials: Non-active sandy clay or clayey sand type substance, having a Plasticity Index varying from 10 to 20.

Bedding: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

PART 6 - EXECUTION

PREPARATION

Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

DEWATERING

Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

EXCAVATION, GENERAL

Unclassified Excavation: Excavation to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.

3. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

4. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil and other materials not classified as rock or unauthorized excavation.

EXCAVATION FOR UTILITY TRENCHES

Excavate trenches to indicated gradients, lines, depths, and elevations.

Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.

5. Clearance: 12 inches (300 mm) on each side of pipe or conduit.

Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

6. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
7. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
8. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

9. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

APPROVAL OF SUBGRADE

Notify Architect when excavations have reached required subgrade.

If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

10. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof roll wet or saturated subgrades.

Reconstruct subgrades damaged by rain, accumulated water, or construction activities, as directed by Architect.

STORAGE OF SOIL MATERIALS

Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

11. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

BACKFILL

Place and compact backfill in excavations promptly, but not before completing the following:

12. Surveying locations of underground utilities for record documents.
13. Inspecting and testing underground utilities.
14. Removing concrete formwork.
15. Removing trash and debris.
16. Removing temporary shoring and bracing, and sheeting.

UTILITY TRENCH BACKFILL

Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

Place and compact initial backfill of subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.

17. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

Coordinate backfilling with utilities testing.

Fill voids with approved backfill materials while shoring and bracing, and as sheeting is removed.

Place and compact final backfill of satisfactory soil material to final subgrade.

FILL

Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.

Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

Place and compact fill material in layers to required elevations as follows:

18. Under grass and planted areas, use satisfactory soil material.
19. Under walks and pavements, use satisfactory soil material.

MOISTURE CONTROL

Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.

20. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
21. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

COMPACTION OF BACKFILLS AND FILLS

Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

22. Under proposed slabs and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
23. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

GRADING

General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

24. Provide a smooth transition between adjacent existing grades and new grades.
25. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

Site Grading: Slope grades to direct water away from proposed slabs. buildings and roadways to prevent ponding. Finish subgrades to required elevations within the following tolerances:

26. Lawn or Unpaved Areas: Plus or minus 1 inch.
27. Pavements: Plus or minus 1/2 inch.

SUBBASE AND BASE COURSES

Install separation fabric on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.

28. Place base course material over subbase.
29. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
30. Shape subbase and base to required crown elevations and cross-slope grades.
31. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
32. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

FIELD QUALITY CONTROL

Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

Allow testing agency to inspect and test subgrades and each fill or backfill layer for roadways and proposed slab areas. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

Testing agency will test compaction of soils in place. Tests will be performed at the following locations and frequencies:

33. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
34. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

PROTECTION

Protecting Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

35. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

36. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

DISPOSAL OF SURPLUS AND WASTE MATERIALS

Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

37. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF ITEM 2300

ITEM 2751
CEMENT CONCRETE PAVEMENT

PART 1 – GENERAL

6.2 RELATED DOCUMENTS

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

6.3 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Driveways.
   2. Parking lots.
   3. Curbs and gutters.
   4. Walkways.
   5. Roadways & Streets are excluded, and shall be in accordance to Plans and TxDOT Specifications

B. Related Sections include the following:
   1. Division 2 Section "Site Grading and Excavation" for subgrade preparation, grading, and subbase course.
   2. Division 3 Section "Concrete" for general building applications of concrete.

6.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

6.5 SUBMITTALS

A. Design Mixes: For each concrete pavement mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

6.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

6.7 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 7 - PRODUCTS

7.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1.
   2. Use flexible or curved forms for curves of a radius 100 feet (30.5 m) or less.

7.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.

C. Reinforcement Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

D. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.

E. Plain Steel Wire: ASTM A 82, as drawn.

F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

G. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

H. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
   1.
   2. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

7.3 CONCRETE MATERIALS

A. General: Use the same brand and type of cementitious material from the same manufacturer throughout the Project.

B. Portland Cement: ASTM C 150, Type I or II.
   1. Fly Ash: ASTM C 618, Class F or C.
   2. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

C. Aggregate: ASTM C 33, uniformly graded, from a single source, with coarse aggregate as follows:

D. Water: Obtain from a TCEQ approved public water supply.

7.4 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

7.5 CURING MATERIALS

A. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

7.6 RELATED MATERIALS

A. Pavement-Marking Paint: Alkyd-resin type; ready mixed; complying with FS TT-P-115, Type I, or AASHTO M 248, Type N.
1.
2. Color: Blue for handicapped requirements, yellow for parking striping.

7.7 CONCRETE MIXES

A. Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

B. Proportion mixes to provide concrete with the following properties:
1.
2. Compressive Strength (28 Days): 3000 psi (20.7 MPa).
3. Maximum Water-Cementitious Materials Ratio: 0.50.
4. Slump Limit: 2-4 inches or 4-7 inches with flowable concrete design mix..

C. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1.
2. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

D. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2.5 to 4.5 percent.

7.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94 and ASTM C 1116.
1.

2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
3.

PART 8 - EXECUTION

8.1 PREPARATION

A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

8.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form release agent to ensure separation from concrete without damage.

8.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating reinforcement and with recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap to adjacent mats.

8.4 JOINTS

A. General: Construct construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
1.
2. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.

1.

2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

3. Provide tie bars at sides of pavement strips where indicated.

4.

5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1.

i. Locate expansion joints as indicated on construction plans.

ii. Extend joint fillers full width and depth of joint.

iii. Terminate joint filler less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.

iv. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

v. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

vi. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

2.

D. Install dowel bars and support assemblies at joints where indicated. Provide caps at one end of dowel and lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

E. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.

F. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to the following radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces. Radius: 1/4 inch (6 mm).

1.

8.5 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcement steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not use vibrators to move concrete into place.

D. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete according to recommendations in ACI 309R.

1.

2. Consolidate concrete along face of forms and adjacent to transverse joints with a vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

E. Screed pavement surfaces with a straightedge and strike off. Commence initial floating using bull floats or darbies to form an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading dry-shake surface treatments.

F. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1.

2. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

G. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

H. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1.

2. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

3.

4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

5.

I. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

1.

2. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F (32 deg C). Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

3.

4. Cover reinforcement steel with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

5.

6. Fog-spray forms, reinforcement steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

7.

8.6 CONCRETE FINISHING

A. General: Wetting of concrete surfaces during screeding, initial floating, or finishing operations is prohibited.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots, and fill low spots. Refloat surface immediately to uniform granular texture.

1.

2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

8.7 CONCRETE PROTECTION AND CURING

A. Curing Methods: Cure concrete by moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.

4. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

8.8 PAVEMENT TOLERANCES

A. Comply with tolerances:

1.

vii. Elevation: 1/4 inch (6 mm).

viii. Thickness: Plus 3/8 inch (9 mm), minus 1/4 inch (6 mm).

ix. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).

x. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).

xi. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).

xii. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).

xiii. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).

xiv. Joint Spacing: 3 inches (75 mm).

xv. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.

xvi. Joint Width: Plus 1/8 inch (3 mm), no minus.

8.9 PAVEMENT MARKING

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

B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking.

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

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

8.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:

1.

2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.

3.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.

5.

6. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.

7.

8. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. (4 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m). One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.

9.

10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).

C. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

8.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Engineer when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF ITEM 2751

ITEM 2790
CEMENT STABILIZED SAND

0.10 CONSTRUCTION MATERIALS

Cement Stabilized Sand shall consist of sand, cement, and water as described below.

The sand shall be coarse graded sand, containing less than 8% objectionable material including, but not limited to clay lumps, coal, shale, and organic matter. The cement shall conform to A.S.T.M. C 150, Type I.

The mixture shall not be less than 1-½ sacks of cement per ton of total mixture. Use potable water as required to develop a mix suitable for mechanical tamping and mixing in an approved mixer. Any material not in place within 1-1/2 hours after mixing or that which has obtained an initial set will be rejected and removed from the site.

0.11 CONSTRUCTION METHODS

Place Cement Stabilized Sand in pipe trenches crossing street pavements, around manholes and wet wells, and in other excavation if directed by the Engineer. Under no circumstances is mixture to be placed around concrete structures until such structures have been allowed to cure for 24 hours and then only upon the direction of the Engineer. Compact mixture as directed by the Engineer.

Backfill up to original ground or bottom of pavement shall be backfilled in layers and compacted to a density of not less than 95% of compaction ratio density.

0.12 METHOD OF MEASUREMENT

Measure "CEMENT STABILIZED SAND" by cubic yard compacted in place. "CEMENT STABILIZED SAND" will be measured from spring line to the finished grade on the basis of maximum trench dimensions for pipelines. Where excavation is greater than limits set out previously, the Contractor will backfill such excavation in its entirety but will receive no extra payment for the excess.

0.13 BASIS OF PAYMENT

All work under this item shall be included in Lump Sum price bid. No separate payment will be made for any work described in this item, each item's cost being included in the unit price bid of which the work is a component, and shall be full compensation for furnishing all material, equipment and labor necessary to perform the work in accordance with these specifications.

END OF ITEM 2790

ITEM 2935
SEEDING

PART 1 - GENERAL

1.1 SUMMARY

1. Scope of work includes replacement of topsoil, seeding by broadast seeding or hydroseeding, and fertilizing of areas not covered by structures, sidewalks, or roads within the project area. Project area is indicated on the PLANS. When shown on the PLANS, Contractor shall provide soil retention protection.

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

1.
2. Division 2 Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
3. Division 2 Section "Site Grading & Excavation" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.

1.2 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract.

E. Product data for Fertilizers.

F. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

G. Qualification data for firms and persons to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of Engineers and owners, and other information specified.

H. Planting schedule indicating anticipated dates and locations for each type of planting.

I. Maintenance instructions recommending procedures for maintenance by Owner during an entire year. Submit before expiration of required maintenance periods.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful grass establishment.
1.
2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that grass planting is in progress.

B. Preinstallation Conference: Conduct conference at Project site to comply with requirements of specifications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.5 COORDINATION AND SCHEDULING

A. Planting Season: Sow seed and install sod during normal planting seasons for type of lawn work required. Correlate planting with specified maintenance periods to provide required maintenance from date of Substantial Completion.

B. Weather Limitations: Proceed with planting only when existing and forecast weather conditions are suitable for work.

1.6 MAINTENANCE

A. Begin maintenance immediately after each area is planted and continue until acceptable vegetative covering is established, and until commencement of contract and acceptance by Owner.

B. Maintain and establish grasses by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth vegetative covering.
3.
4. 1. Replant bare areas with same materials specified for revegetated areas.
5. Add new mulch in areas where mulch has been disturbed by wind or maintenance operations sufficiently to nullify its purpose. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep grasses uniformly moist to a depth of 4 inches (100 mm).

a. Lay out temporary lawn-watering system (if required) and arrange watering schedule to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly seeded, plugged, or sprigged areas.
b. Water all areas a minimum rate of 1 inch (25 mm) per week.

PART 2 - PRODUCTS

2.1 SEED

Contractor shall provide seed mix of grasses varying throughtout the project to match existing localized plant mateials. Proposed seed mixture shall be submitted to OWNER prior for approval prior to placement.

2.2 FERTILIZER

Fertilizer shall be pellet or granular fertilizer with analysis of 16 percent nitrogen, 20 percent phosphoric acid, and zero percent potash (or 10-10-5) unless otherwise required. Percentage shall be computed by methods of the Association of Agricultural Chemists. Container labels shall show analysis. Powdered or caked fertilizer will not be permitted.

2.3 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Peat Mulch: Provide peat moss in natural, shredded, or granulated form, of fine texture, with a pH range of 4 to 6 and a water-absorbing capacity of 1100 to 2000 percent.

C. Fiber Mulch: Biodegradable dyed-wood cellulose-fiber mulch, nontoxic, free of plant growth- or germination-inhibitors, with maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

D. Asphalt Emulsion Tackifier: Asphalt emulsion, ASTM D 977, Grade SS-1, nontoxic and free of plant growth- or germination-inhibitors.

E. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application, nontoxic and free of plant growth- or germination-inhibitors.

2.4 EROSION-CONTROL MATERIALS

A. Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 – EXECUTION

3.1 EXAMINATION

Examine areas to receive grass for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations. Protect adjacent and adjoining areas from hydroseed overspraying.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 PLANTING SOIL PREPARATION

A. Limit subgrade preparation to areas that will be planted in the immediate future.

B. Loosen subgrade to a minimum depth of 4 inches (100 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter.

C. Preparation of Unchanged Grades: Where grasses are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:

D. Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.

E. Till surface soil to a depth of at least 6 inches (150 mm). Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.

F. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

G. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.

H. Grade grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1-1/2 inches (38 mm) in any dimension, and other objects that may interfere with planting or maintenance operations.

I. Moisten prepared areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

J. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.

3.4 BROADCAST SEEDING

A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray.

B. Protect seeded slopes exceeding 1:6 against erosion with jute or coir-fiber erosion-control mesh installed and stapled according to manufacturer's recommendations.

C. Protect seeded areas with slopes less than 1:6 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre (45 kg per 100 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

D. Anchor straw mulch by crimping into topsoil by suitable mechanical equipment.

E. Anchor straw mulch by spraying with asphalt-emulsion tackifier at the rate of 10 to 13 gal. per 1000 sq. ft. (41 to 53 L per 100 sq. m). Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.

F. Protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) thick and roll to a smooth surface.

3.5 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.

B. Mix slurry with nonasphaltic tackifier.

6.

1. Apply slurry uniformly to all areas to be seeded in a 1-step process. Apply mulch at the minimum rate of 1500 lb per acre (16.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate.

7.

2. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre (5.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre (11 kg per 100 sq. m).

3.6 SATISFACTORY REVEGETATION

Seeded revegetated areas will be satisfactory provided requirements, including maintenance, have been met and a healthy, uniform, close stand of grass is established, free of weeds, bare spots exceeding 5 by 5 inches (125 by 125 mm), and surface irregularities.

3.7 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by lawn work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto surface of roads, walks, or other paved areas.

B. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades throughout maintenance period until lawn is established.

END OF ITEM 2935

ITEM 2940
SODDING

1.0 GENERAL

This item includes the placement of topsoil and sodding of areas not covered by structures, sidewalks, or roads within the project area with St. Augustine grass.

2.0 MATERIALS

A. Sod shall be provided in blocks approximately square containing not less than nine square inches of live grass material, free from noxious weeds or other grasses. There shall be sufficient moist earth in each block to maintain growth. Sod shall be planted within three days from excavation of the sod materials.

B. Fertilizer shall be pellet or granular fertilizer with analysis of 16 percent nitrogen, 20 percent phosphoric acid, and zero percent potash (or 10-10-5) unless otherwise required. Percentage shall be computed by methods of the Association of Agricultural Chemists. Container labels shall show analysis. Powdered or caked fertilizer will not be permitted.

3.0 PLACEMENT

After area to receive fertilizing and sodding has been completed to lines, grades, and sections shown on the PLANS, a minimum or 2 inches of topsoil shall be placed on the surface and fertilizer shall be applied at a uniform average rate of 500 pounds per acre. The upper 3 inches of the topsoil shall be thoroughly mixed with the fertilizer until a uniform mixture of fertilizer and topsoil is obtained. Areas to be seeded shall be sprinkled with water using a fine spray to avoid washing or erosion of the soil.

Sod shall be placed after the completion of all grading operations and after application of fertilizer to the topsoil. Sod blocks shall be placed adjacent to each other to provide full coverage of the disturbed areas. The top of the sod shall match the finish grade elevations and in no case shall be more than 1/2 inch below final grade. Sodded areas shall be watered frequently and maintained in good condition until final acceptance of the work.

4.0 MEASUREMENT AND PAYMENT

Placement of topsoil, fertilizing, and sodding shall be measured by the acre, sf or lump sum as indicated in the Specifications. Payment for work under this item shall be made at the Contract price bid for "Sodding," which price shall be full compensation for all placement of topsoil, fertilizer, sod, equipment, materials, and labor necessary for fertilizing and sodding.

END OF ITEM 2940

ITEM 3050
CONCRETE

0.10 General

These specifications shall govern the materials used; for the storing, measuring, and handling of materials; and for the proportioning and mixing of concrete for appurtenances and incidental construction.

0.11 Construction Materials

The concrete shall be composed of Normal Portland Cement or High Early Strength Portland Cement, fine aggregate, coarse aggregate, and water, proportioned and mixed as hereinafter provided in these specifications.

A. Cement and Admixtures

Only one brand of cement shall be used in any one structure, except by written permission of the Engineer.

Portland Cement shall meet the requirements prescribed in the Standard Specifications for Portland Cement, A.S.T.M. C-150.

Cement shall be delivered in bags which shall be marked plainly with the brand and name of the manufacturer. In general, a bag shall contain ninety-four (94) pounds net. All bags shall be in good condition at time of use.

Bags varying more than five (5) per cent from the specified weight may be rejected; and, if the average weight of bags in any shipment, as shown by weighing fifty (50) bags taken at random is less than ninety-four (94) pounds, the entire shipment may be rejected.

All cement shall be properly protected against dampness, and no cement will be accepted which has become caked.

An air-entraining agent may be used in the concrete. The air-entraining agent used shall be one of those permitted under specifications for Air-Entraining Admixtures for Concrete A.S.T.M. C-260.

The amount of agent used shall be such as will effect the entrainment of 3 to 6 per cent of air by volume of concrete. The agent shall be added to the batch in solution in a portion of the mixing water. This solution shall be batched by means of a mechanical batcher capable of accurate measurement and in such a manner as will ensure uniform distribution of the agent throughout the batch curing the specified mixing period.

B. Mixing Water

Water for use with cement shall be reasonable clean and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

When comparative tests are made with water of known satisfactory quality, any indication of unsoundness, marked change in the time of set, or reduction of more than ten (10) per cent in mortar strength shall be sufficient cause for the rejection of the water under test.

Water which is suitable for drinking or for ordinary household use may be accepted for use with cement without being tested.

Water from doubtful sources shall not be used until tested and approved. The Contractor shall not take water for use in concrete from shallow, muddy or marshy sources unless provision is made for the intake of the suction pipe to be enclosed in such manner as to exclude silt, mud, grass and other foreign materials. The depth of the water shall be maintained at least (2) feet below the intake of the suction pipe. In case the water is not reasonably clear, the Contractor shall make provision to free it of suspended silt before use.

C. Coarse Aggregate

The coarse aggregate shall consist of gravel or crushed stone. The maximum permissible percentages of deleterious substances shall not exceed the following percentages by weight:

Material removed by decantation A.S.T.M. C 117		1.0%
Shale, slate or other similar materials	1.0%	
Clay Lumps	0.25%	
Soft Fragments	3.0%	
Other deleterious substances including friable, thin, elongated or laminated pieces	3.0%	

The sum of all deleterious ingredients, exclusive of material removed by decantation, shall not exceed 5% by weight.

The aggregate shall be free from an excess of salt, alkali, vegetable matter, or other objectionable materials either free or as adherent coatings.

Gravel shall consist of durable particles of gravel, crushed, or uncrushed.

Crushed stone shall consist of durable particles of rock of reasonable uniform quality throughout.

When tested by approved methods, the coarse aggregate shall conform to the following grading requirements:

	% By Weight
Retained on 1-1/2" screen	0 to 5%
Retained on 3/4" screen	25 to 60%
Retained on 1/4" screen	95 to 100%

D. Fine Aggregate

Fine aggregate shall consist of sand or a combination of sand and not more than fifty (50) per cent of stone screenings.

Sand shall be composed of clean, hard, durable uncoated grains.

Stone screenings shall consist of clean, hard, durable uncoated fragments resulting from the crushing of stone.

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

Material removed by decantation (A.S.T.M. C 117)	3.0%

Clay lumps	0.5%
Other deleterious substances such as coal, shale, coated grains and soft flaky particles	2.0%

The aggregates shall be free from an excess of salt or alkali.

At the time of its use, the aggregate shall be free from frozen material and all foreign material such as wood, hay, burlap, paper, or dirt which may become mixed with the aggregate in stock piles.

When tested by approved methods, the fine aggregate shall conform to the following grading requirements:

	% By Weight
Retained on 3/8" screen	0%
Retained on 1/4" screen	0 to 5%
Retained on 20 mesh sieve	15 to 50%
Retained on 100 mesh sieve	85 to 100%

E. Storage of Cement

Unless otherwise provided, all cement shall be stored in well ventilated, weatherproof buildings which will protect the cement from dampness. The floor supporting the cement shall clear the ground a sufficient distance to prevent the absorption of moisture by the cement. Provisions for storage shall be ample, and the shipments of cement shall be segregated in such a manner as to provide easy access for identification and inspection of each shipment.

The Engineer may permit small quantities of cement to be stored in the open for a short period of time (maximum of 48 hours) if a raised storage platform and adequate waterproof covering are provided.

No cement shall be used which has become lumped or caked.

F. Storage of Aggregate

The handling and storage of concrete aggregate shall be such as to prevent the admixture of foreign materials. If the aggregates are stored on the ground, the sites for the stock piles shall be grubbed, cleared of all weeds and grass, and leveled off. The bottom layer of aggregate shall not be disturbed or used without recleaning.

When the contract requires the use of two (2) or more sizes of aggregates, the difference sizes shall be stored in such a manner as to prevent intermixing.

Material in all stock piles shall be handled and placed in such a manner that segregation of materials within the pile will be avoided.

0.12 Classification and Proportions

Concrete shall be proportioned as determined by the Engineer, by absolute volume and in accordance with the requirements hereinafter set forth. For placements of concrete involving twenty-five (25) cubic yards or less in one continuous placement, the requirements for absolute volume batch design may be waived by the Engineer, and a mix proportion may be determined by trial mixes; however, the requirements for weighing and measuring materials shall not be waived. The concrete shall be uniform and workable. The minimum cement content, maximum

allowable water content, and the maximum slump for the various classes of mixes shall conform to the following:

	Min. Cement Bags per class C.Y.	Min. 28-Day Compressive Strength Lbs./Sq. In.	Max. Water Gals. per Bag. (Net)	Max. Slump Inches
A	5.25	3,000	6.25	2 1/2 - 4 l/2
B	4.25	2,000	8.5	2 1/2 - 4
C	3.0	l,500	11.0	3 - 5
D	4.0	-	-	-

The maximum amount of coarse aggregate (dry loose volume) per cubic foot of finished concrete shall not exceed 0.82 cubic feet.

The net amount of water will be the amount added at the mixer, plus the free water in the aggregates. No water allowance will be made for evaporation after batching.

The concrete mix will be designated with the intention of producing concrete which will have compressive strengths, when tested on test specimens cured under field laboratory conditions, equal to or greater than the values in the table.

The Contractor shall be responsible for the concrete design and proportioning; the minimum cement content, maximum allowable water to be added at the mixer, and the maximum slump for the various classes of mixes shall conform to the values in the table.

A. Consistency

The quantity of water to be used will be determined by the Engineer and shall be such as to give a mixture containing the minimum amount of water consistent with the required workability. The quantity of water shall be varied only by the Engineer. In general, the consistency of concrete mixtures shall be such that:

(1) The mortar will cling to the coarse aggregate.

(2) The concrete is not sufficiently fluid to segregate when transported to the place of deposit.

(3) The concrete, when dropped directly from the discharge chute of the mixer, will flatten out at the center of the pile; but the edges of the pile will stand up and not flow.

(4) The mortar will show no free water when removed from the mixer.

(5) The concrete will settle into place when deposited in forms; and when transported in metal chutes at an angle of thirty (30) degrees with the horizontal, it will slide and not flow into place.

(6) The surface of the finished concrete will be free from a surface film of free water.

Any concrete mix failing to meet the above-outlined consistency requirements, although meeting the slump requirements, will be considered unsatisfactory; and the mix shall be changed to correct such unsatisfactory conditions. In cases where the characteristics of the aggregates furnished are such that, with the maximum allowable amount of water the specified slump and consistency requirements are not met, the Contractor may provide aggregates of an improved grading, or the

Engineer will modify the mix design to meet the slump and consistency requirements by adding cement as may be necessary.

The slump test will be made in accordance with the methods outlined in A.S.T.M. C 143.

B. Quality of Concrete

Concrete made of acceptable materials, of the proportions specified by the Engineer, and in complete accordance with the requirements of the construction methods and details specified for the class of work involved, will be considered as of satisfactory quality.

During the progress of the work, the Engineer will cast test cylinders of the number and type he may desire for testing to maintain a check on the strength of the concrete actually being placed.

The Contractor shall provide and maintain curing facilities approaching job conditions for the purpose of curing concrete test specimens. The cost of all materials used in test specimens and the cost of providing and maintaining curing facilities shall be included in the unit price bid for concrete of the various classes.

0.13 Construction Methods

A. Placing Concrete, General

The Contractor shall give the Engineer sufficient advance notice before starting to place concrete in any unit of the structure to permit the inspection of forms, the reinforcing steel placement, and preparations for casting. Unless authorized by the Engineer, no concrete shall be placed in any unit prior to the completion of the form work and the placement of the reinforcement.

Concrete placing shall be so regulated as to permit finishing operations to be completed in the daylight hours.

The Engineer reserves the right to order postponement of the placing operations when, in his opinion, impending weather conditions may result in rainfall or low temperatures which will impair the quality of the finished work. In case rainfall should occur after placing operations are started, the Contractor shall provide ample covering to protect the work. In case of drop in temperature, the provisions set forth in subsection B. "Placing Concrete in Cold Weather", of this item, shall be applied.

The sequence of placing concrete shall be as directed by the Engineer. The operation of depositing and compacting the concrete shall be conducted so as to form a compact, dense, impervious mass of uniform texture which shall show smooth faces on all surfaces. The placing shall be so regulated that the pressures caused by the plastic concrete shall not exceed the loads used in the design of forms.

The method and manner of placing shall be such as to avoid the possibility of segregation or separation of the aggregate or the displacement of the reinforcement. Concrete shall not have a free fall of more than three (3) feet. The spattering of forms or reinforcement bars shall be prevented if the concrete so spattered will dry or harden before being incorporated in the mass.

Each part of the forms shall be filled by depositing concrete directly as near its final position as possible. The coarse aggregate shall be worked back from the face of the forms and concrete shall be forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point in the forms and running or working it along the forms will not be allowed.

After the concrete has taken initial set, the forms shall not be jarred or any strain placed on projecting reinforcement.

Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms, or the ends of such chutes shall terminate in vertical down spouts. All chutes, troughs, and pipes shall be kept clean and free from coating of hardened concrete by a thorough flushing with water before and after each placement. Water used for flushing shall be discharged clear of the concrete in place. The use of chutes in excess of thirty-five (35) feet total length for conveying concrete will not be permitted except by specific authorization from the Engineer.

All concrete shall be well compacted and the mortar flushed to the surface of the forms by continuous working with concrete spading implements or mechanical vibrators of an approved type. Vibrators of the type which operate by attachment to forms or reinforcement will not be permitted. The vibrators shall be applied to the concrete immediately after deposit and shall be moved throughout the mass, thoroughly working the concrete around the reinforcement, embedded fixtures, and into the corners and angles of the forms until it has been reduced to a plastic mass. The mechanical vibrator shall not be operated so that it will penetrate to disturb layers placed previously which have become partially set or hardened. The vibration shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures but shall not be done to an extent that will cause segregation. Vibration shall be supplemented by hand spading if necessary to insure the flushing of mortar to the surface of all forms.

B. Placing Concrete in Cold Water

No concrete shall be placed when the atmospheric temperature is at or below 40 F. (taken in the shade away from artificial heat) unless permission to do so is given in writing by the Engineer. When such permission is given or in cases where the temperature drops below 40 F. after the concreting operations have been started, the Contractor shall furnish sufficient canvas and framework or other type of housing to enclose and protect the structure in such way that the air around the forms and fresh concrete can be kept at a temperature not less than 50 F. for a period of five days after the concrete is placed. Sufficient heating apparatus such as stoves, salamanders, or steam equipment and fuel to furnish all required heat shall be supplied.

It is understood that the Contractor is responsible for the protection of concrete placed under any and all weather conditions. Permission given by the Engineer to place concrete during freezing weather will in no way relieve the Contractor of the responsibility for satisfactory results. Should concrete placed under such conditions prove unsatisfactory, it shall be removed and replaced at the expense of the Contractor.

0.14 Method of Measurement

Unless otherwise specified, concrete furnished under this item, including all work set out herein and incidental to the furnishing, mixing, forming, placing, finishing, and curing concrete, will not be paid for directly. The Contractor will include the cost of same in the unit price bid for other items of work of which this item is a component part.

Where prices are requested on the bid sheet for "EXTRA CONCRETE" and where it is specifically authorized for use by the Engineer, such concrete will be measured by the cubic yard of the acceptable concrete, complete in place, for types specified.

0.15 Basis of Payment

"EXTRA CONCRETE" measured as set out above will be paid for at the unit price bid per cubic yard for "EXTRA CONCRETE". This price shall be full compensation for furnishing all labor, equipment, materials, hauling, mixing, forming, placing, finishing, curing, and incidentals necessary to furnish one cubic yard of concrete complete in place.

END OF ITEM 3050

ITEM 3211
REINFORCING STEEL

1.10 GENERAL

This item shall provide for the furnishing and placing of reinforcing steel of the type, size and quantity designated for use in sewers and appurtenant sewer structures as shown on the plans and in accordance with these specifications.

1.11 CONSTRUCTION MATERIALS

All bar reinforcement shall be open hearth new billet steel of structural, intermediate, or hard grade.

New billet steel shall conform to the requirements of the Standard Specifications for Billet-Steel Concrete Reinforcement Bars, A.S.T.M. A-15-39.

Unless otherwise shown on the plans, all reinforcing bars shall be deformed bars conforming to the requirements of A.S.T.M. A-305.

Wire for fabric reinforcement shall be cold-drawn from rods hot-rolled from open-hearth billets. Wire shall conform to the requirements of the Standard Specifications for Cold-Drawn Wire for Concrete Reinforcement, A.S.T.M. A-82.

In cases where the provisions of this item are in conflict with the provisions of the A.S.T.M. designations, to which reference is made, the provisions of this item shall govern.

The nominal size area and the theoretical weight of reinforcing steel bars covered by this specification are as follows:

NUMBER	NOMINAL DIAMETER INCHES	NOMINAL AREA SQUARE INCHES	WEIGHT PER LINEAR FOOT
2	1/4"	0.05	0.167
3	3/8"	0.11	0.376
4	1/2"	0.20	0.668
5	5/8"	0.31	1.043
6	3/4"	0.44	1.502
7	7/8"	0.60	2.044
8	1"	0.79	2.670
9	1.128"	1.00	3.397
10	1.270"	1.27	4.307
11	1.410"	1.56	5.308

The weight of any lot of bars shall not vary more than three and one-half (3-1/2) per cent under the theoretical weight for bars three-eighths (3/8") inches and over in nominal size or diameter; nor more than five (5) per cent under theoretical weight for bars under three-eighths (3/8") inch in nominal size or diameter. The weight of an individual bar shall not vary more than six (6) per cent under the theoretical weight for bars three-eighths (3/8") inch and over in size or diameter; nor more than ten (10) per cent under the theoretical weight for bars under three-eighths (3/8") inch in size or diameter. The theoretical weight of deformed bars shall be the same as the theoretical weight of plain round or square bars of the same nominal size. Bars or lots which vary more than the limits shown in the preceding page shall be rejected.

Where wire is ordered by gauge number, the following relation between number and diameter, in inches, shall apply unless otherwise specified.

GAUGE NUMBER	EQUIVALENT DIAMETER INCHES	GAUGE NUMBER	EQUIVALENT DIAMETER INCHES
0	.3065	8	.1620
1	.2830	9	.1483
2	.2625	10	.1350
3	.2437	11	.1205
4	.2253	12	.1055
5	.2070	13	.0915
6	.1920	14	.0800
7	.1770		

The dimensions of the wire on any diameter shall not vary more than 0.003 inches from the specified nominal diameter. The difference between the maximum and minimum diameters, as measured on any given cross section of the wire, shall not be greater than 0.003 inches. Wire not meeting these requirements shall be rejected.

A. Storing

Steel reinforcements shall be stored above the surface of the ground upon platforms, skids, or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. Where placed in the work, it shall be free from dirt, scale, dust, paint, oil, or other foreign material.

1.12 CONSTRUCTION METHODS

A. Bending

The reinforcement shall be bent cold to shapes indicated on the plans. Bends shall be true to the shapes indicated, and irregularities in bending shall be cause for rejection. Unless otherwise shown on the plans, bends for stirrups and ties shall be made around a pin having a diameter of not less than two (2) times the minimum thickness of the bar.

B. Splices

No splicing of bars, except when shown on the plans, will be permitted without the written approval of the Engineer. Splices which are permitted shall have a lapped length of not less than forty (40) times the nominal size or diameter of the reinforcement except for bars meeting A.S.T.M. A-305 for which laps may be reduced to 20 diameters. Laps shall be well distributed or located at points of low tensile stress. No splices will be permitted at points where the section is not sufficient to provide a minimum distance of two inches between the splice and the nearest adjacent bar or the surface of the concrete. Bars shall be rigidly clamped or wired at all splices in a manner approved by the Engineer.

C. Placing

Steel reinforcement shall be placed in the exact position as shown on the plans and held securely in place during the placing of the concrete. Vertical stirrups shall always pass around the main tension members and be securely attached thereto. All horizontal reinforcing steel shall be spaced

vertically by means of approved galvanized metal spacers or approved precast mortar or concrete blocks.

All reinforcing steel shall be wired together at all intersections. Before any concrete is placed, all mortar shall be cleaned from the reinforcement. Precast mortar or concrete blocks to be used for holding steel in position adjacent to formed surfaces shall be cast in individual molds meeting the approval of the Engineer and shall be cured by covering with wet burlap until aged sufficiently to be removed from the molds, at which time the blocks shall be immersed in water for the remainder of at least a four-day curing period. The blocks shall preferably be cast with the sides beveled and in such manner that the size of the block increases away from the area to be placed against the forms. Blocks in the form of a frustum of a cone or pyramid are preferred. A suitable tie wire shall be provided in each block, such wire to be used for anchoring the block to the steel in order to avoid displacement in placing the concrete. Except in unusual cases, and when specifically otherwise authorized by the Engineer, the size of the surface to be placed adjacent to the forms shall not exceed two and one-half inches square or the equivalent thereof in cases where circular or rectangular areas are provided. Blocks shall be accurately cast to the thickness required, and the surface to be placed adjacent to the forms shall be a true plane free of surface imperfections.

Sheets of wire mesh or fabric shall overlap each other sufficiently to maintain a uniform strength and shall be securely fastened at the ends and edges.

No concrete shall be deposited until the Engineer shall have inspected the placing of the reinforcing metal and given permission to place concrete.

1.13 METHOD OF MEASUREMENT

The measurement of the quantities of bar or fabric reinforcement furnished and placed will be based on the calculated weights of the steel actually placed in accordance with the plans and these specifications, with no allowance made for added bar lengths for splices requested by the Contractor nor for extra metal used when bars larger than those specified are substituted with the permission of the Engineer. The wires and supporting devices will not be included in the calculated weights. The calculated weight for bar reinforcement will be determined, using the theoretical bar weights set forth above, with no allowance for overruns or underruns. The calculated weight for fabric reinforcement will be based on the theoretical weight of the fabric based on the nominal gauge of the wires and on the basis of steel weighting 0.2833 pounds per cubic inch. No allowance will be made for overruns or underruns due to variations from the nominal gauges.

1.14 BASIS OF PAYMENT

Reinforcing steel for slabs, and other structures will not be paid for directly. The cost of this reinforcing steel shall be included in the Lump Sum price bid for other items of work of which this item is a component part. The price bid for these items shall be full compensation for furnishing, bending, fabricating, and placing the reinforcement, for all clips, blocks, metal spacers, ties, wire or other materials used for fastening reinforcement in place, and for all tools, labor, equipment, and incidentals necessary to complete the work.

END OF ITEM 3211

ITEM 3300

SITE PAVEMENT MARKING

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE:

A. Cement Concrete Pavement

B. All work to comply with Texas Department of Licensing and Regulation requirements where designating reserved parking stalls, pathways and ramps for wheelchair or disabled access. Compliance includes color contrast requirements, spacing of lines and extent of markings

C. All spacing and character size of text for fire zone indications shall be as required by the City of Beaumont Fire Marshall's guidelines.

D. Included walkway paths where noted on drawings.

1.2 SUBMITTALS:

A. Provide manufacturer's production information, color, and rates and methods of application.

B. Provide certification that materials meet or exceed the requirements of these specifications.

1.3 PRODUCT DELIVERY, DATA AND SAMPLES:

A. Deliver materials to project site with manufacturer's labels intact and legible.

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Provide the best quality pigmented binder normally used for traffic paint.

B. Provide pigment which does not settle or cake in the container nor show change in consistency during storage.

C. Provide a non-reflectorized pigmented binder conforming to the following composition requirements.

1.

Component	Percentage by Weight	
	Minimum	Maximum
Pigment	55	65
Vehicle	35	45

Provide a vehicle containing minimum 38 percent nonvolatile material by weight.

2. Weight: Minimum 12.0 pounds per gallon at 77'F.

3. Viscosity: Minimum 65, maximum 80 Krebs unit at 77'D.

4. Drying Time: Provide a binder which, when applied under normal field conditions at the required rate and at air temperatures above 50'F, will dry in 15 minutes so there are not pickup by traffic.

PART 3 - EXECUTION

3.1 CLEANING: Clean surfaces completely; leave dry and free from oil, grease and dirt.

3.2 PREPARATION: Thoroughly mix ingredients before application.

3.3 THINNING: If thinning is necessary, add no more than 1/2 pint of thinner per gallon of binder.

3.4 TEMPERATURE: Apply when temperature is 50'F or above.

3.5 HUMIDITY: Apply when relative humidity is less than 85 percent.

3.6 LINE WIDTHS: Provide line widths not deviating more than 1/8 inch from width shown.

3.7 TRAFFIC PAINT COVERAGE RATE BY LOCATION:

Location	Binder Wet Film
Parking Stalls	8 mils minimum
Handicapped Markers	10 mils minimum
Traffic Lanes	15 mils minimum
Crosswalks	20 mils minimum
Graphics	10 mils minimum

3.8 TRAFFIC PAINT COVERAGE RATE

Wet Film Thickness (mils)	Linear Feet of 4-Inch Line per Gallon	Square Feet of Coverage per Gallon
8	601.8	200.6
9	534.9	178.3
10	481.2	160.4
11	437.7	145.9
12	401.1	133.7
13	370.2	123.4
14	343.8	114.6
15	321.0	107.0
16	300.9	100.3
17	283.2	94.4

18	267.3	89.1
19	253.2	84.4
20	240.6	80.2

END OF ITEM 3300