SECTION 01065
BIDDER'S STATEMENT

TO: _____ DATE:
_____
_____
_____

Sir:

The undersigned bidder has carefully examined the site for the work described, has become familiar with local conditions and the character and extent of the work, and has carefully examined the plans, General Conditions, Construction Drawings, Specifications, and the form of Contract, and thoroughly understands their stipulations, requirements and provisions.

The undersigned bidder has determined the quality and quantity of materials required, has verified the accuracy of the plan and actual field conditions, has investigated the location and determined the sources of supply of the materials required, has investigated labor conditions, and has arranged for the continuous execution of the work herein described.

The undersigned hereby agrees to be bound by the award of this contract. If awarded the contract on this proposal, will execute within ten (10) days after notice of aware the required contract and the required contract bonds, of which this proposal, the plans for the work, and the specifications (with any subsequent revisions made prior to the bid opening) shall be a part.

It is understood that the unit prices listed below shall be used as a basis for negotiation of changes to this contract, subsequent to the award of the contract.

The undersigned bidder shall hold and save harmless **Houston Independent School District** and **Asakura Robinson Company, LLC** from liability in connection with patents, adjoining property owners, labor and union disputes and subcontractor disputes.

The undersigned hereby proposes to furnish all of the materials and perform all of the work for the above-referenced project, together with all work incidental thereto, as shown on the drawings and described in these specifications for the following lump sum bid and the unit prices, including additive and deductive alternates, as listed below:

_____
BIDDER

END OF SECTION

SECTION 01100

SUMMARY

1.00 GENERAL

1.1 Summary

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.

1.2 Project Information

A. Project Identification: **Moreno Elementary SPARK Park**

Project Location: **620 E. Canino Rd., Houston, TX 77037**

1. Owner: **Houston Independent School District**

2. Owner's Representative: **Dillon Brady**

B. Landscape Architect: **Asakura Robinson Company**

1.3 Work Covered By Contract Documents

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. **This project consists of concrete walkway, nature play elements, landscape and drainage improvements and irrigation modifications.**

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 Access To Site

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of Project site to areas within the Contract limits. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine construction operations to areas where work is permitted.

2. Driveways, Walkways and Entrances: Keep driveways, parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 Coordination With Occupants

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.6 Work Restrictions

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 6 a.m. to 4 p.m., Monday through Friday, except as otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

1.7 Specification And Drawing Conventions

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 1 General Requirements: Requirements of Sections in Division 1 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

END OF SECTION

SECTION 01115
CONTRACTOR USE OF PREMISES

1.0 GENERAL

1.1 SECTION INCLUDES

1. Section includes general use of the site including properties inside and outside of rights-of-way, work affecting road, ramps, and driveways.

1.2 RELATED DOCUMENTS

1. Section 01310 Project Management and Coordination

1.3 USE OF SITE

1 Obtain approvals from Client 48 hours prior to any construction begin.

2. Maintain access for emergency vehicles including access to fire hydrants.

3. Avoid obstructing drainage ditches or inlets; when obstruction is unavoidable due to requirements of the Work, provide grading and temporary drainage structures to maintain unimpeded flow.

4. Locate and protect private lawn sprinkler systems that may exist on rights-of-ways within the site. Repair or replace damaged systems to condition equal to or better than that existing at the start of Work.

5. Perform daily cleanup of dirt outside the construction zone, and debris, scrap materials and other disposable items resulting. Streets, driveways and sidewalks shall be kept clean of dirt, debris and scrap materials. No area shall be permitted to remain unclean overnight. This applies to buildings, roads and streets.

6. Provide temporary walkway if necessary.

7. Contractor shall set up orange fencing to delineate construction area.

8. Contractor shall not have access to restroom facilities inside building. During the progress of the Work, Contractor shall provide adequate sanitation facilities for its work force on the Premises and shall keep the Premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work.

9. All construction workers shall wear **at all time** and in a visible area an identification badge. Identification badge shall have at a minimum employee picture, company name and shall be at least 2.5”x3.5”.

END OF SECTION

SECTION 01290
PAYMENT PROCEDURES

1.0 GENERAL

1.1 Summary

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 Schedule Of Values

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of **AIA Document G703**.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of **five** percent of Contract Sum.Round amounts to nearest whole dollar; total shall equal the Contract Sum.
4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
5. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 Applications For Payment

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Progress payments shall be submitted to Architect by the **25rd day** of the month. The period covered by each Application for Payment is one month, ending on the **last day of the month.**

D. Application for Payment Forms: Use **AIA Document G702 and AIA Document G703** as form for Applications for Payment.

E. Application for Payment Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included in the Project Manual.

F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. **Architect** will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

G. Transmittal: Submit **three** signed and notarized original copies of each Application for Payment to **Architect** by a method ensuring receipt **within 24 hours**. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Schedule of unit prices.
5. Submittal schedule (preliminary if not final).
6. List of Contractor's staff assignments.
7. List of Contractor's principal consultants.
8. Copies of building permits.
9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.

J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

END OF SECTION

SECTION 01310
PROJECT MANAGEMENT AND COORDINATION

1.0 GENERAL

1.1 Summary

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination drawings.
2. Requests for Information (RFIs).
3. Project meetings.

1.2 Definitions

A. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information from each other during construction.

1.3 Coordination

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.

8. Startup and adjustment of systems.
9. Project closeout activities.

1.4 Coordination Drawings

A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility.

1.5 Requests for Information (rfis)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: AIA Document G716

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow 7 working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within 10 days of receipt of the RFI response.

E. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect[and Construction Manager within seven 07days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and Construction Manager.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and Construction Manager's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.6 Project Meetings

A. General: Construction Manager will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, Construction Manager, and Architect, within 3 days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Sustainable design requirements.
    l. Preparation of record documents.
    m. Use of the premises
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.

t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals the first month of construction and bi-weekly intervals the following months.

1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for next period.

b. Review present and future needs of each entity present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Deliveries.
5) Off-site fabrication.
6) Access.
7) Site utilization.
8) Temporary facilities and controls.
9) Progress cleaning.
10) Quality and work standards.
11) Status of correction of deficient items.
12) Field observations.
13) Status of RFIs.
14) Status of proposal requests.
15) Pending changes.
16) Status of Change Orders.
17) Pending claims and disputes.
18) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:
1. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Landscape Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Landscape Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Landscape Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Landscape Architect’s Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Landscape Architect at Contractor’s request for Contractor's use in preparing submittals.

1. Landscape Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.

a. Landscape Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
b. Contractor shall execute a data licensing agreement in the form of AIA Document C106.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Landscape Architect reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Landscape Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required Landscape Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Landscape Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Landscape Architect
    d. Name of Contractor.
    e. Name of subcontractor.
    f. Name of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Other necessary identification.

E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01).

Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Landscape Architect.
4. Include the following information on an inserted cover sheet:

    a. Project name.
    b. Date.
    c. Name and address of Landscape Architect
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Related physical samples submitted directly.
    m. Other necessary identification.

F. Options: Identify options requiring selection by the Landscape Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Landscape Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Landscape Architect.

I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Landscape Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Use **AIA Document G810**
2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Landscape Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Landscape Architect action stamp.

K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

L. Use for Construction: Use only final submittals that are marked with approval notation from Landscape Architect action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

    a. Landscape Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit 3 paper copies of each submittal, unless otherwise indicated. Landscape Architect will return 2 copies.
3. Informational Submittals: Submit 2 paper copies of each submittal, unless otherwise indicated. Landscape Architect will not return copies.
4. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

    a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

6. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams showing factory-installed wiring.

b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.
b. 3 paper copies of Product Data, unless otherwise indicated. Landscape Architect will return 2 copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data**,** unless submittal based upon Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
3. Submit Shop Drawings in the following format:

a. PDF electronic file.
b. 2 opaque (bond) copies of each submittal. Landscape Architect will return 1 copy.
c. 3 opaque copies of each submittal. Landscape Architect will retain 2 copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.

3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time

of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit 1 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Landscape Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit 3 sets of Samples Landscape Architect will retain 2 Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project record sample.

      1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least 3 sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:

   a. PDF electronic file.
   b. 3 paper copies of product schedule or list, unless otherwise indicated. Landscape Architect will return 2 copies.

F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."

G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."

H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.

1. Submit subcontract list in the following format:

   a. PDF electronic file.

I. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

J. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.

K. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

L. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

M. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

N. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

O. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

P. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

Q. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

R. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

V. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Landscape Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 LANDSCAPE ARCHITECT'S ACTION

A. General: Landscape Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Landscape Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Landscape Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Informational Submittals: Landscape Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Landscape Architect will forward each submittal to appropriate party.

D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01400

QUALITY REQUIREMENTS

1.0 GENERAL

1.1 Summary

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

1. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.2 Definitions

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size, physical assemblies constructed at testing facility to verify performance characteristics.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 Conflicting Requirements

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 Informational Submittals

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.

1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 Reports And Documents

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 Quality Assurance

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
d. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.
2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed, unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 2 through 16.

1.7 Quality Control

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

2.0 PRODUCTS (Not Used)

3.0 EXECUTION

3.1 Repair And Protection

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 1 Section "Execution Requirements."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01635
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
i. Cost information, including a proposal of change, if any, in the Contract Sum.
j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **seven** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 14 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution will not adversely affect Contractor's construction schedule.
c. Requested substitution has received necessary approvals of authorities having jurisdiction.
d. Requested substitution is compatible with other portions of the Work.
e. Requested substitution has been coordinated with other portions of the Work.
f. Requested substitution provides specified warranty.
g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01635

SECTION 01770
CLOSEOUT PROCEDURES

GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Sections:
1. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

2.2 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
1. Advise Owner of pending insurance changeover requirements.
2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
1. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
2. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
1. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
2. Complete startup testing of systems.
3. Submit test/adjust/balance records.
4. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
5. Advise Owner of changeover in heat and other utilities.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
1. Complete final cleaning requirements, including touchup painting.
2. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

A. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Landscape Architect will either proceed with inspection or notify Contractor of

unfulfilled requirements. Landscape Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

8.2 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

A. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Landscape Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

10.2 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

    a. PDF electronic file.
    b. Three paper copies, unless otherwise indicated, Landscape Architect will return two copies.

11.2 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the

Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
1. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

A. Provide additional copies of each warranty to include in operation and maintenance manuals.

PRODUCTS

14.2 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

EXECUTION

16.2 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

a. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
b. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
c. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
d. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
e. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
f. Leave Project clean and ready for occupancy.

A. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

END OF SECTION

SECTION 01781
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.

B. Related Sections:
1. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit 1 set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal: Submit one paper copy set of marked-up record prints and one set(s) of plots from corrected record digital data files. Landscape Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
b. Final Submittal: Submit one paper copy set of marked-up record prints. Print each Drawing, whether or not changes and additional information were recorded.
c. Final Submittal: Submit one paper copy set of marked-up record prints, one set(s) of record digital data files (DWG format). Plot each drawing file, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one paper copy of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Landscape Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follow

1. Format: DWG, Version 2004 operating in Microsoft Windows operating system.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Landscape Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
3. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Landscape Architect
e. Name of Contractor.

4. Note related Change Orders and record Drawings where applicable.

D. Format: Submit record Specifications as paper copy.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Landscape Architect's reference during normal working hours.

END OF SECTION

SECTION 02200 – SITE PREPARATION

1.00 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Clearing and grubbing.
   2. Stripping and storing topsoil.

1.02 DEFINITIONS

A. Structures and Surface Features: Existing structures and surface features including buildings, pavements, curb and gutter, signs, posts, fences, trees, shrubs, landscaped surface features, and other miscellaneous items.

B. Utilities: Existing gas mains, water mains, steam lines, electric lines and conduits, telephone and other communication lines and conduits, sewer pipe, cable television, other utilities, and appurtenances.

C. Clearing and Grubbing: Cutting and disposing of trees, brush, windfalls, logs, and other vegetation, and removing and disposing of roots, stumps, stubs, grubs, logs, and other timber.

D. Salvaged Topsoil: Natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soils available from overlying portions of areas to be excavated for construction.

2.00 PRODUCTS

(Not Used)

3.00 EXECUTION

3.01 PREPARATION

A. Provide 3 working days notice, prior to beginning construction, to owners of existing utilities, and to OWNER.

B. Provide protection and support during construction for existing utilities, structures, and surface features.

3.02 CLEARING AND GRUBBING

A. Remove trees that are specified for removal on the contract drawings.

B. Clear and grub areas specified on the Drawings.

C. Remove shrubs, trees, stumps, vegetation, rubbish, and other perishable or objectionable matter during clearing and grubbing operations.

D. Grub to depth of not less than 12 in. below original ground surface or subgrade.

E. Dispose of materials removed by clearing and grubbing in accordance with applicable regulations.

3.03 STRIPPING TOPSOIL

A. Cut or mow and remove grass, weeds, and other vegetation before stripping topsoil.

B. Remove topsoil to entire depth in areas where grade is to be raised and in areas to be covered by structure, walk or paving.

C. Stripped topsoil shall be free from clay, stones, vegetation, and debris.

3.04 STORAGE OF TOPSOIL

A. Strip vegetation from stockpile area prior to stockpiling.

B. Stockpile where indicated on the Drawings or designated by ENGINEER.

C. Shape stockpile so that it will drain.

END OF SECTION

SECTION 02210 - FINE GRADING

1.00 GENERAL

1.01 Related Documents

A. Construction documents: Grading and Drainage Plans.

1.02 Work Included

A. Work in this Section includes, but is not limited to, the following:

1. Machinery restrictions.

2. Soil preparation for grass areas.

3. Finished grading.

4. Prevention of excessive weeds growth in lawns.

1.03 Related Sections

A. The following items of associated work are included in other Sections of these specifications:

1. Drainage: Section 02500

2.00 MATERIALS

2.01 Topsoil

A. Topsoil for all fine grading operations shall be classified as sandy loam, free of debris or any vegetative matter.

3.00 EXECUTION

3.01 Finished grading shall be defined as placing and grading of additional soil (topsoil 2”-3” minimum) required bringing the grade to the required grades for lawns. As well as smooth out rough areas.

A. Where practical and as directed, the use of heavy machinery shall be kept to a minimum.

3.02 Placement of Fine Grade Materials

A. Clear the subgrade of stones larger than 4 inches (4") in any dimension, and of concrete, wood, construction debris, and other deleterious matter. Excavate to a depth of 12 inches (12") all areas that have become saturated with oil, gasoline or bituminous products and backfill with clean earth.

B. Import topsoil directly to site of deposition or stockpile new topsoil on site in quantity needed to produce the required depth after spreading. Protect topsoil piles from erosion with tarpaulins and limit boards.

C. Spread topsoil to a minimum settled depth required. Feather smoothly into finished grade at edges so as to blend with adjacent ground shapes.

D. Exercise precautions to keep the topsoil friable and porous. Do not handle or work topsoil when it is excessively wet, or during a rainfall. Do not place topsoil on any subgrade that has not been loosened or tilled, or allowed for drainage. Loosen and till

the full depth of the topsoil and re-till any areas that become unduly compacted by vehicular movement.

3.03 Fine Grading

A. The Contractor shall be responsible for minor adjustments to the finished subgrade if such treatment is required in the opinion of the Landscape Architect.

B. Hand rake the surface, removing all clods and undesirable material greater than one half inch (1/2") from ground surface. Fill all low spots with specified materials and cut irregularities to the acceptance of the Landscape Architect.

C. An acceptable fine grade shall be free from depressions greater than 6 inches (6") over any given space of 25' except at grade transitions which shall be gradual and even.

D. During the finished grading operations, all swales and additional swales that may be required to drain areas shall be finished. In general, all grade adjustments shall be made so there are no areas that will have standing water.

E. To prevent excessive weed growth in the lawn areas, the Contractor should be prepared to immediately install the lawn upon the completed and acceptable finished grade.

3.04 Clean up and Protection

A. After completion of fine grading and topsoiling operations, do not drive trucks or other heavy equipment over finished areas.

B. Upon completion of the work, remove all debris and excess material from the site so that the area is left neat and clean.

END OF SECTION

SECTION 02220 - EXCAVATION AND BACKFILLING

1.00 GENERAL

1.01 Work Included

A. Work in this Section shall include, but not be limited to, the following:

1. Excavation
2. Hauling of Required Materials
3. Fill and Backfill
4. Disposition of Deleterious Material
5. Rough Grading
6. Compaction
7. Rough Grading

1.02 Related Work in Other Sections

A. The following items of associated work are included in other Sections of these Specifications:

1. Site Preparation: Section 02100
2. Fine Grading: Section 02210

1.03 Plan of Operations

A. Before commencing the work, the Contractor shall submit plan of operation for the approval by the Landscape Architect. No work under this Section shall be commenced prior to approval by the Landscape Architect and Owner. However, such approval will not relieve the Contractor of full responsibility for the adequacy and successful functioning of the works, unless otherwise specifically provided.

1.04 General Requirements

A. During the bidding period, the Contractor shall verify all governing regulations and conditions at the site, and shall examine the drawings and all adjoining work on which the work of this Contract is dependent. The submission of a proposal by the Contractor binds him to accept the site as it actually is, and will be necessary for him to do all excavations, filling, backfilling, and grading required for the completion of the work as shown on the applicable drawings and described in this Section of the specifications.

B. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for any excavated material which is used for purposes other than those designated. All spoil areas, as designated by the Owner, shall be leveled to a uniform line and section, and shall present a neat appearance before Project acceptance. The surface elevation of spoil areas shall not extend above the surface elevation of adjacent or contiguous usable areas.

1.05 Classification

All material excavated shall be defined as "Unclassified Excavation".

1.06 Rough Excavation

A. Rough excavation shall be carried to the necessary depth to obtain the specified depth of subgrade density shown on the plans.

B. Should the Contractor excavate below the designated lines, he shall replace the excavation with approved materials, in an approved manner and condition, at his own expense. The Owner shall have complete control over the excavation, moving, placing and disposition of all material, and shall determine the suitability of material to be placed in terms. All material determined unsuitable shall be disposed of in waste areas or as directed.

1.07 On-Site Drainage Problems

The Contractor should consider on-site drainage problems and subsurface water conditions in his bid. All required temporary drainage construction, including mechanical pumping and well point structures will be part of this Contract.

1.08 Those areas outside of the pavement areas in which the top layer of soil material becomes compacted due to hauling or to any other activity, the Contractor shall scarified to a depth of four inches (4"), to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers, or under-drainage, conduits, utilities, or similar underground structures, or parts thereof, the Contractor shall be responsible for and shall take all necessary precautions to protect and preserve, or provide temporary services. When such facilities are encountered, the Contractor shall notify the applicable utilities and the Owner, who shall contact the affected agencies. The Contractor shall, at his own expense, satisfactorily repair all damage to such facilities or structures which may result from any of his operation during the period of the Contract.

1.09 All work shall comply with the rules and regulations of the Division of Industrial Safety and all other local and State agencies having jurisdiction. Nothing contained herein shall be construed as permitting work that is contrary to such rules, regulations and codes.

1.10 All work in public property shall conform to applicable rules and regulations of the State Highway Dept., the Dept. of Public Safety, and any applicable city and/or county rules and regulations.

1.11 Protection

A. Furnish, place and maintain all supports, shoring, and sheet piling which may be required for the sides of the excavation, or for protection of adjacent existing improvements.The adequacy of such systems shall be the complete responsibility of the Contractor.

B. Maintain all benchmarks, monuments, and other reference points. If disturbed or destroyed, replace as directed.

1.12 Rough Grading

A. Rough grading is defined as grading to the final grade of subgrade, which shall be as follows (to be used as general guidelines only):

1. Hydroseed Lawns: ± One and one-fourth inches (1 1/4") from finished grade elevation

2. Solid Sod: Two and one-half inches (2 1/2") below finished grade

3. Footings: ± Two inches (2") below bottom of footing elevation, where subgrade material is not required.

4. Pavement: ± One and one-half inches (1 1/2") below subgrade material

2.00 PRODUCTS

2.01 Fills

A. All fill material shall be approved by the Landscape Architect and generally conform to the attached soil analysis. Material having a dimension greater than four inches (4") shall not be used in the upper six inches (6") of fill.

B. Topsoil for the backfill shall be material used for landscape fill purposes.

3.00 EXECUTION

3.01 Excavation shall be performed as indicated on the Contract plans to the lines, grades and elevations when and where shown. The Contractor will be responsible for staking the excavation area in accordance with the plans. The Contractor shall stake all vertical structures and grades for approval by the Landscape Architect and Owner, prior to commencing any work upon this Section.

All material encountered within the limits indicated shall be removed and disposed of, as directed. During the process of excavation, the grade shall be maintained so that it will be well-drained at all times. Temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work.If, at the time of excavation, it is not possible to place any material in its proper section of the permanent construction, it shall be stockpiled in approved areas for later use.

Unsatisfactory materials shall be disposed of, off-site or as directed by the Owner.

3.02 Trench excavation shall have banks as nearly vertical as practical, and shall be extended sufficiently on each side of walls, footage, piers, etc. to permit setting of forms, installation of sheet piling or the safe sloping of banks.

Excavation shall not be done below the grades indicated on the drawings unless so directed by the Landscape Architect, in writing.

Should the Contractor, without authorization, excavate more than shown on the drawings or as specified, such excess excavation will not be paid for as extra work, and the Contractor shall refill said excavation with stone, concrete, or hard, compacted material, as directed by the Landscape Architect. Such fill shall be tested for compaction, as delineated in these Specifications.

3.03 Where unmarked utility lines or other underground obstructions or piping may be uncovered within the work area, notify the Agencies or the Owners, or service utility companies having jurisdiction thereof, and take necessary measures to prevent interruption of service (if live). Should such lines or services be damaged, broken, or interrupted through the Contractor's own negligence, those services shall be repaired immediately and restored by him at his own expense.

Abandoned lines, meters and boxes, obstructions or piping, shall be removed, plugged, or capped, in accordance with the requirements and approval of the agencies affected. Coordinate all such work with applicable mechanical or electrical trade having responsibility. Remove all abandoned utility lines, pipes, conduits, etc. to a point five feet (5') outside new building lines, or

at property lines, if closer. All caps shall be left open until approved by the Landscape Architect or Owner. Indicate all of the above encounters on the Record Drawings.

3.04 Placement of Fill

A. The placement of fill shall be done under the supervision of the Landscape Architect.

B. All areas to receive fill shall be scarified to a depth of four inches (4") by discing a minimum of two (2) directions, as required to obtain the specified depth of loose soil.

C. Fill material shall be spread in uniform lifts of not more than six inches (6") in non-compacted thickness.

D. Disc the first lift deposited into existing soil, to provide a transition horizon.

E. Prior to commencing compaction, fills shall be brought to water content that will permit proper compaction, by either aerating the material, if it is too wet, or spraying the material with water, if it is too dry. Thoroughly mix each lift before compaction, to assure uniform distribution of water content. Bring all fills to suitable elevations above grade, to provide for anticipated settlement and shrinkage thereof.

3.05 Compaction

A. Compact each layer of fill and scarify subgrade for all pavement areas, to not less than ninety-eight percent (98%) maximum density. Compaction shall extend not less than five feet (5') beyond construction limit and pavement edges.

B. Where fill is required for planting areas, compact each layer of fill and scarify subgrade to not less than eighty-five percent (85%) maximum density.

C. All excavation, filling and compaction shall be subject to the approval of the Landscape Architect.

D. Where fill, backfill, or in-place materials are required to be compacted to a specified density, the maximum density for control shall be determined by using ASTM D1557 or ASSHO T180 methods. The results of these tests shall be the basis upon which satisfactory completion of work will be judged. Any area or portion thereof that does not meet minimum density requirements shall be re-worked and re-compacted until it meets the project density requirements.

E. No extra compensation will be made for suitable materials removed, manipulated and replaced, in order to obtain density. Any removal, manipulation, aeration, replacement, and re-compaction of suitable materials necessary to obtain the required density shall be considered as incidental to the excavation and embankment operations, and shall be performed by the Contractor at no additional cost to the Owner.

F. Stones or rock fragments larger than four inches (4") in their greatest dimension will not be permitted in the top six inches (6") of the subgrade.

3.06 Rough Grading

A. All areas covered by the project, including excavated and filled areas and adjacent transition areas shall be uniformly grades so that subgrade surfaces are at the elevations noted. The subgrade surface shall be below finished grade, as specified herein.

B. Uniformly smooth grading for all areas, including excavated and fill sections and adjacent transition areas shall be accomplished. The subgrade surface shall be reasonably smooth, compacted and free from irregular surface changes.

C. The Contractor shall raise or lower all rims of existing utility structures where there is a grade change and construct them flush with the new finished grade or in accordance with applicable government agencies.

D. Ditches and swales shall be finished to permit proper surface drainage.

E. Take precautionary methods to reduce soil erosion onto public streets and, where necessary, remove immediately.

END OF SECTION

SECTION 02310 – SITE GRADING

1.00 GENERAL

1.01 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM D1140 - Test Method for Amount of Material in Soils Finer than the No. 200 (75-µm) Sieve.
2. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
3. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
4. ASTM D4253 - Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
5. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.02 DEFINITIONS

A. Influence Zone Under Foundations, Pavements, or Sidewalks: Area below foundation or pavement and sidewalk subbase bounded by 1 horizontal to 2 vertical slope extending outward from 1-ft beyond outer edge of foundation, pavement or sidewalk.

B. Influence Zone around Piping or Electrical Ducts: Area below limits bounded by line 12 in. above pipe or duct and by 1 horizontal to 2 vertical slope extending outward from that line 1-ft beyond outer edge of pipe or duct.

C. Unsuitable Material: Topsoil, peat, organic soils, and materials containing slag, cinders, foundry sand, debris, and rubble or soil with less than required bearing capacity as determined by ENGINEER.

1.03 SUBMITTALS

A. Test results.

B. Submit in accordance with Section 01330 – Submittals.

1.04 QUALITY ASSURANCE

A. Testing shall be provided by CONTRACTOR in accordance with Section 01450 – Testing Laboratory Services and this section.

1.05 PROJECT/SITE CONDITIONS

A. Notify corporations, companies, individuals or authorities owning above or below ground conduits, wires, pipes or other utilities running to property or encountered during grading operations.

B. Cap or remove and relocate services in accordance with instructions by owners of said services.

C. Protect, support, and maintain conduits, wires, pipes or other utilities that are to remain in accordance with requirements of owners of said services.

2.00 PRODUCTS

2.01 FILL MATERIALS

A. Conform to requirements of Section 02315 – Trenching, Backfilling and Compacting.

3.00 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive fill to determine existence of areas softened by flooding or weather or of unsuitable materials.

3.02 PREPARATION

A. Fill settled areas where excavations or trenches were backfilled and holes made by demolition, tree removal, and site preparation work.

B. Natural soils or compacted fill softened by flooding or weather shall be removed, replaced, and compacted.

C. Remove unsuitable material from under walks, parking, and driveway areas.

D. Proof roll areas to receive fill material to detect soft or loose zones prior to placing fill. Remove and replace soft or loose zones.

E. Keep construction site free-draining.

F. Plow, step, or bench slopes steeper than 1 vertical to 4 horizontal.

G. Disc level surfaces.

H. Grading within influence zone of existing or future structures or piping and electrical ducts shall be in accordance with Section 02316 – Excavation and Backfill for Structures.

3.03 PLACING FILL

A. Conform to requirements of Section 02315 – Trenching, Backfilling and Compacting.

3.04 FIELD QUALITY CONTROL

A. Rough Grading Tolerances:
   1. Grade to 4 in. below finished grade in areas to receive topsoil, unless new grade is less than 4 in. above existing grade. Grade to bottom of base course in areas to receive paving or riprap. Maximum allowable variation from design elevation is 1 in. in 10 ft. Degree of finish shall be ordinarily obtainable from either blade-grader or scraper operations, except as otherwise specified.
   2. Rough grading areas, including excavated and filled sections and adjacent transition areas shall be reasonably smooth, compacted, and free from irregular surface changes.

3.05 ADJUSTMENT AND CLEANING

A. Excess Material:
   1. OWNER has first right to excess grading material suitable for backfilling or site grading, not required at job site.
   2. Remove material not required by OWNER from site.

B. Stockpile material suitable for backfill where indicated on Drawings or designated by ENGINEER. Place no fill where trenches for sewers, water lines or other utilities will be located.

C. Remove material not suitable for backfilling or site grading and unsuitable materials from site.

D. Rough grade areas within grading lines and areas which are disturbed to achieve lines and grades indicated on Drawings, with allowance for thickness of pavements, sidewalks, and topsoil.

END OF SECTION

SECTION 02315 – TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
1. Requirements for earthwork associated with the installation of underground utility lines by the open cut method.
2. Excavation requirements.
3. Backfill placement and compaction requirements
4. Material specifications for bedding and backfill.
5. Disposal requirements for excess soil

1.02 REFERENCES

A. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

B. ASTM D1556 – Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

C. ASTM D2487 – Practice for Classification of Soils for Engineering Purposes.

D. ASTM D2922 – Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

E. ASTM D3017 – Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

F. ASTM D4253 – Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

G. ASTM D4254 – Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.03 DEFINITIONS

A. Bedding Material: Select material in which pipe materials are embedded. Also, the material placed in the pipe zone.

B. Backfill Material: The material that is used to backfill the trench from the top of the pipe zone to the existing ground surface. When trenching in areas already paved or to be paved, the backfill extends up to the pavement subgrade elevation.

C. Pipe Zone: The area surrounding the piping. See the Pipe Installation Detail on the Drawings for dimensions.

1.04 SUBMITTALS

A. Submit soil classification and particle size analyses for representative sample of bedding and backfill materials to be used.

B When cement stabilized sand is called for on the Drawings, comply with the submittal requirements in Section 02341 – Cement Stabilized Sand.

C. Submit project record documents under provisions of Section 01780 - Record Documents.
1. Record location of utilities as installed referenced to survey benchmarks. Give stations, horizontal dimensions, elevations, inverts and gradients.
2. Record location of utilities encountered or rerouted. Give stations, horizontal dimensions, elevations, inverts and gradients.

1.05 QUALITY ASSURANCE

A. The material classifications specified are as defined in ASTM D2487.

B. Comply with the requirements

PART 2 PRODUCTS

2.01 BEDDING MATERIAL

A. Bedding Alternative 1
1. Use well graded sands and gravels, gravel-sand mixtures, crushed well graded rock, little or no fines. (Unified Soil Classification GW and SW)
2. Plasticity Index: Nonplastic
3. Gradation: D60/D10 greater than 4 percent. Amount passing No. 200 sieve not to exceed 5 percent. Maximum size not to exceed that recommended by pipe manufacturer or ½", whichever is less.

B. Bedding Alternative 2
1. Cement Stabilized Sand
2. Conform to requirements of Section 02341.

2.02 BACKFILL MATERIAL

A. Backfill Alternative A
1. Poorly graded gravels and sands, silty sands and gravels, little to moderate fines (GM, GP, SP, SM)
2. Plasticity Index: Nonplastic to 4 percent
3. Gradation: percent passing No. 200 Sieve - less than 5 percent (GP, SP)
4. Gradation: percent passing No. 200 Sieve - between 12 percent and 50 percent (GM, SM)

B Backfill Alternative B
1. Clayey gravels and sands, poorly graded mixtures of sand, gravel, and clay (GC, SC)
2. Plasticity Index: Greater than 7
3. Gradation: Percent passing No. 200 Sieve between 12 percent and 50 percent

C. Backfill Alternative C
1. Cement Stabilized Sand
2. Conform to requirements of Section 02341.

2.03 OTHER MATERIALS

A. Crushed Stone
   1. Crushed stone produced from oversize quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel is not acceptable. Gradation shall be within the following limits:

Sieve	Percent Retained by Weight
2-1/2 inch	0
1-3/4 inch	0 to 10
No. 4	45 to 75
No. 40	60 to 85

2.04 SOURCE QUALITY CONTROL

A. Make arrangements for sampling and testing of bedding and backfill materials to be used.

B. Determine classification and compaction characteristics of each material in accordance with ASTM D2487 and ASTM D698.

C. Comply with the requirements of Section 01450 - Testing Laboratory Services.

PART 3 EXECUTION

3.01 PREPARATION FOR WORK

A. Select materials to be used and have them analyzed. Have results reviewed and approved by the Engineer before starting work.

B Call utility companies or construction notification service at least 48 hours, excluding weekends and holidays, before starting excavation. Request them to mark locations of buried lines or cables in the vicinity of proposed work.

C. Locate survey controls. If there are questions, contact the surveyor. His phone number is provided on the survey control sheet(s). If there are problems, contact the Engineer.

3.02 TRENCHING

A. Perform excavation with hydraulic excavator or other equipment suitable for achieving the requirements of this Specification.

B. Excavation by hand is permitted, but no extra payment will be made for hand excavation unless there is a bid item for hand excavation or the ENGINEER has issued a written authorization for hand excavation.

C. Excavate trenches so that walls are vertical.

D. Conform to requirements of Section 01560 - Trench Safety Systems.

E. If rain threatens, defer additional trenching and close open trench.

F Do not allow water to pond in bottom of trench. Comply with the requirements of Section 01561 –Control of Surface Water and Ground Water during Construction.

G. Remove all ledge rock, boulders and large stones within 4 inches of sides of the pipe.

H. Minimize trench width consistent with Pipe Installation Detail on drawings. Extra width may be provided for installation of well point headers or manifolds and pumps in trenches where depth of trench makes it uneconomical, or not feasible, to pump from surface installation.

I. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify ENGINEER and obtain instructions before proceeding in such areas.

J. Protect trees, shrubs, lawns, existing structures, and other permanent objects outside of grading limits.

K. Protect above-grade and below-grade utilities which are to remain.

3.03 TRENCH BOTTOM

A. Make foundation or bottom of trench as uniform as practicable. Remove wet, soft, spongy, or otherwise unstable soils to a minimum depth of 2 feet below the trench bottom or as directed and approved by ENGINEER.

B. Remove rocks projecting above bottom of trench.

C. Bring over excavations to grade with crushed stone.

3.04 HANDLING EXCAVATED MATERIALS

A. Classify and segregate excavated materials according to classification. Place material which is suitable for backfill in piles far enough from the trench to prevent slides or cave-ins.

B. Do not use excavated material composed of large chunks, stones, debris, organic matter, or clods for backfill.

C. Provide additional backfill material in accordance with requirements of this Section if adequate quantities of suitable material are not available from excavation and trenching operations at the job site.

3.05 DEWATERING

A. When a dewatering item is shown in the Bid Form, provide a ground water dewatering system.

B. Comply with the requirements of Section 01561 – Control of Surface Water and Ground Water during Construction.

3.06 PLACEMENT OF BEDDING

A. Allow ENGINEER to observe piping and conduits before they are covered.

B. Use Bedding Alternative 1 for bedding material unless cement stabilized sand (Bedding Alternative 2) or concrete encasement (Bedding Alternative 3) is called for on the Drawings. See Pipe Installation Detail.

C. When using Bedding Alternatives 1 and 2, compact bedding to 95% of maximum Proctor density as defined by ASTM D 698.

D. For circular pipe, carefully compact haunch areas on bottom side of pipe as shown on the Drawings.

E. No bedding is required for electrical conduits.

3.07 BACKFILLING AND COMPACTION

A. If material excavated from the trench meets the specified requirements for backfill material, (Backfill Alternatives A or B) use it for backfill in unpaved areas and areas where no pavement is proposed. If the excavated soil does not meet the specified requirements, import soil that does meet the requirements.

B. Use cement stabilized sand (Backfill Alternative C) under pavements or areas to be paved. See Pipe Installation Detail in the Drawings.

C. Use equipment which will produce the degree of compaction specified. Until a minimum cover of 12 inches is obtained over pipes, conduits, and ducts, use only hand-operated tamping equipment. Do not use heavy compacting equipment until the first lift of bedding or backfill is placed over the tops of pipes, conduits, or ducts.

D. Backfill piping and conduits as shown on Drawings and restore surface as soon as practical.

E. Where damage to completed work is likely to result from withdrawal of sheeting, leave the sheeting in place. However, do not leave untreated wood sheeting in place beneath structures or pavements.

F. Remove formwork after constructing cast-in-place concrete sewers and electrical duct banks.

3.08 FIELD QUALITY CONTROL

A. Call the Owner-selected testing laboratory to arrange for in-place compaction testing of bedding and backfill materials. Comply with the requirements of Section 01450 - Testing Laboratory Services.

B. In-place density tests of compacted fill and backfill are required as follows:
   1 A minimum of one test for every 100 cubic yards of compacted bedding or backfill material.
   2. A minimum of three density tests for each full shift of work.

C. The number of tests will be increased if inspection determines that soil type or moisture content, are not uniform or if compacting effort is variable and not considered sufficient to attain specified density uniformly.

D. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at Contractor’s expense.

3.09 DISPOSAL OF EXCESS MATERIAL

A. Dispose of debris and excess materials at the Contractor's expense.

B. Do not spread excess soil in the project area. Remove it from the project area.

C. Coordinate with Owner to determine disposal location.

3.10 RESTORATION OF PROJECT AREA

A. Repair or replace improvements damaged or removed during construction at Contractor's expense. This includes but is not limited to:
   1. Driveway, parking lot and road pavements
   2. Fences and walls
   3. Landscaping
   4. Mailboxes
   5. Signs

B. Regrade shoulders, ditches and other work areas disturbed during construction work so that all areas are returned to their original grades.

C. Seed all unpaved areas that were disturbed during construction operations in accordance with Section 02921.

D. Sod areas where sodding is called for on the Drawings and in accordance with Section 02920.

E. Repair utility lines damaged during construction at CONTRACTOR's expense.

* * * END OF SECTION * * *

SECTION 02330 - EMBANKMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction of embankments with excess excavated material and borrow.

B. Construction of untreated subgrade

1.02 REFERENCES

A. ASTM D 698 - Test Methods for Moisture-Density Relationships of Soils and Soil-Aggregate Mixtures Using 5.5 (2.49 kg) Pound Rammer, 12-inches (304.88 mm) Drop.

B. ASTM D 1556 - Density of Soil in Place by the Sand-Cone Method.

C. ASTM D 2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

D. ASTM D 3017 - Test Method for Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth).

PART 2 PRODUCTS

2.01 MATERIALS

A. Refer to Section 02317 - Roadway Excavation for acceptable excess materials from roadway excavation.

B. Refer to Section 02315 – Trenching, Backfilling, and Compacting for acceptable excess materials from utility excavation and trenching.

C. Refer to Section 02319 - Borrow for acceptable borrow materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify borrow and excess excavated materials to be reused are approved.

B. Verify removals and clearing and grubbing operations have been completed.

3.02 PREPARATION

A. Fill test pits, or stump holes and other surface irregularities such as small swales. Backfill and compact in designated lift depths to requirements for embankment compaction.

B. Record location and plug and fill inactive water and oil wells. Conform to Texas State Health Department, Texas Commission on Environmental Quality, and Texas Railroad Commission requirements. Notify Engineer prior to plugging wells.

C. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02315 – Trenching, Backfilling, and Compacting.

D. Complete backfill of new utilities below future grade. Conform to requirements of Sections 02315 – Trenching, Backfilling, and Compacting, 02510 - Water Mains, 02530 - Sanitary Sewers, and 02532 - Sanitary Force Mains.

3.03 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other features outside of embankment limits.

B. Protect utilities above and below grade, which are to remain.

C. Conform to protection requirements of Section 02317 - Roadway Excavation.

3.04 PLACING EMBANKMENT

A. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed 3 percent of optimum moisture content. Contractor may manipulate wet material to facilitate drying, by disking or windrowing.

B. Do not place embankment fill until density and moisture content of previously placed material comply with specified requirements.

C. Scarify areas to be filled to a minimum depth of 4 inches to bond existing and new materials. Mix with first fill layer.

D. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Each layer shall extend across full width of fill.

E. Each layer shall be homogeneous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.

F. Layers shall not exceed the following compacted thickness:
   1. Areas indicated to be under future paving or shoulders, to be constructed within 6 months: 6 inches when compacted with pneumatic rollers, or 8 inches when compacted with other rollers.
   2. Other areas: 12 inches.

G. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to the level of each bench.

H. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of 4 inches and recompact with next fill layer.

I. Construct to lines and grades shown on Drawings.

3.05 COMPACTION

A. Maintain moisture content of embankment materials to attain required density.

B. Compact to following minimum densities at a moisture content of optimum to 3 percent above optimum as determined by ASTM D 698, unless otherwise indicated on the Drawings:
   1. Areas under future paving and shoulders: Minimum density of 98 percent of maximum dry density.
   2. Other areas: Minimum density of 90 percent of maximum dry density.

3.06 TOLERANCES

A. Top of compacted surface: Plus or minus 1/2 inch in cross section or 16 foot length.

3.07 FIELD QUALITY CONTROL

A. Compaction Testing will be performed in accordance with ASTM D 1556 or ASTM D 2922 and ASTM D 3017 under provisions of Section 01400 - Testing Laboratory Services.

B. A minimum of three tests will be taken for each 1,000 linear feet per lane of roadway or 500 square yards of embankment per lift.

C. If tests indicate work does not meet specified compaction requirements, recondition, recompact, and retest at no cost to the Owner.

*** END OF SECTION ***

SECTION 02410 – LANDSCAPE DRAINAGE

1.00 GENERAL

1.01 Related Documents

A. Site grading and drainage, planting and irrigation

B. Work in this Section which is not specifically shown on the drawings shall govern extra work, if requested and approved by the owner.

1.02 Related Sections

A. Fine Grading: Section 02210

1.03 Scope

A. The work in this Section includes all material, labor, machinery and supervision required to stake out and install all drainage facilities shown on the drawings and specified herein. This work shall include, but not be limited to the following:

1. All required city permits and fees.

2. Connections to existing systems.

3. Trenching and controlled backfilling.

4. Providing and installing all pipes, including joints and fittings, cutting pipe for connection to structures and to existing system.

5. Underdrain and subsurface drainage, including connections.

6. Drainage separators and mats.

7. Drainage stone.

1.04 Reference Standards

A. American Society for Testing and Materials (ASTM)

1. D 1785-76 PVC, Schedule 40 and 80.

2. D 2564-78a Solvent cement for PVC pipe and fittings.

3. D 2665-68 PVC Plastic Drain, Waste and Pipe fittings.

4. D 2729-68 PVC pipe and fittings.

8. F-405 Corrugated Polyethylene tubing and fittings.

9. AASH70M 252 and M294 for Polyethylene corrugated drainage tubing.

B. Standard Specifications: Building Code for the City of Houston, Texas and hereafter referred to as Standard Specifications.

1.05 Submittal

A. Manufacturer's product data and installation instructions.

B. Color options.

C. Recycle concrete and pea gravel sample bag.

2.00 MATERIALS

2.01 Underdrain Pipe

A. Standard perforated "ADS" tubing shall conform to ASTM D-1248, using Class "C" for pigments (ultraviolet-resistant).

B. Refer to plan for both perforated and solid pipe sizes.

2.02 Subsurface Drainage

A. Geotextile Fabric: Shall be non woven heavy duty geotextile fabric with a minimum flow rate of 120 gpm/sf.

2.03 Drainage Gravel

A. Clean washed gravel or crushed recycled concrete graded 1” – 1 1/2”.

B. Washed pea gravel.

3.00 EXECUTION

3.01 General

A. Perform all work in accordance with the standard specifications and as per city regulations.

B. Contractor is responsible for notifying the proper city official prior to any construction within the city right-of-way and city utility easements.

3.02 Installation

A. Set drainage pipe slope elevations according to grading plans and field adjust slope elevation as necessary.

B. Set underdrain pipe to proper elevations on a minimum 3" bed of drainage material and maintain a continuous flow line between all points. Install perforated pipe so holes face bottom of trench. Refer to construction details.

C. Use fittings of same manufacturer for all joints, caps, tees, etc.

D. Fill trenches with drainage media to above pipe as indicated in the details.

E. Wrap on both sides and bottom of the gravel / recycle concrete pocket with the top potion unwrap per details.

F. Complete backfilling with acceptable onsite material in landscape areas.

G. Coordinate with other trade when setting pipe to avoid unnecessary conflicts.

H. When trench excavated to line and grade indicated in drawings encounters hardpan, rock, mud, quicksand, debris or other unsuitable material, the following shall be used:

1. "ADS Sock" for heavy-duty subdrainage, perforated.

2. For caps, reducers, couplings, tees and miscellaneous fittings, use heavy-duty "ADS" fittings.

I. Contractors are required to field test to ensure proper drainage after installation.

3.02 Sub-surface Drainage Lines:

A. Drainage Aggregate: 1-1/2 inch washed rock shall be placed in properly graded/approved trenches for the PVC pipe with lines and grades as shown on the contract drawings. The rock shall be carefully placed on the clean and graded trench bottom and brought to the appropriate level, no less than four (4") inches deep at any point.

B. The perforated sub-drainage pipe shall be placed on and the balance of drainage aggregate shall be placed over the pipe and brought up to the level shown on the contract drawings. Aggregate shall be placed along the sides of the pipe and on the top of the pipe with the pipe held in place to prevent vertical or lateral displacement by the fluid effort of the aggregate.

C. Backfill the remainder of the trench and compact as shown on the contract drawings avoiding any excessive mixing of drainage aggregates with surface planting soils.

END OF SECTION

SECTION 02632 – APPURTENANCES FOR STORM SEWER SYSTEMS

1.00 GENERAL

1.01 SECTION INCLUDES

A. Section included:
   1. Precast Inlets
   2. Precast Headwalls
   3. Precast Catch Basins
   4. Precast Junction Boxes
   5. Cast Iron Grates
   6. Fabricated Steel Grates
   7. Fabricated Steel End Treatments

1.02 QUALITY ASSURANCE

A. Comply with the requirements of the TCEQ and the local Separate Storm Sewer System (MS4) authority.

1.03 SUBMITTALS

A. Submittal shall conform to requirements of Section 01330 - Submittals.

B. Submit shop drawings for approval of design and construction details for precast concrete units. Precast units differing from the standard designs shown on the Exhibits will be rejected unless shop drawing submittals are approved.

C. Submit manufacturers' data and details for frames, grates, rings, and covers.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Comply with manufacturer's recommendations.

B. Handle precast concrete appurtenances carefully with approved handling devices. Do not drop or roll units off trucks or trailers. Materials cracked, gouged, chipped, dented, or otherwise damaged will not be approved for installation.

C. Unload units and fittings as close as practical to the location of installation to avoid unnecessary handling.

D. Keep interiors of units free of dirt and foreign matter.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Approved manufacturers for precast machine-made units are:
   1. Moor-Tex
   2. Park

2.02 PRECAST CONCRETE COMPONENTS

A. Concrete:
   1. Provide concrete for precast machine-made units meeting requirements of ASTM C 76 regarding reinforced concrete, cement, aggregate, mixture, and concrete test.

2. Minimum 28-day compressive strength shall be 4000 psi.

B. Reinforcing Steel:
   1. Place reinforcing steel as follows:
      a. Provide a positive means for holding steel cages in place throughout production of concrete units. The maximum variation in reinforcement position is plus or minus 10 percent of wall thickness or plus or minus 1/2 inch, whichever is less. Regardless of variation, the minimum cover of concrete over reinforcement as shown on the Drawings shall be maintained.
      b. Welding of reinforcing steel is not permitted unless noted on the Drawings.

C. Mortar: Conform to requirements of ASTM C 270 Type S using Portland Cement.

2.03 CASTINGS

A. Conform to ASTM A 48, Class 30. Provide locking covers if indicated on Drawings.

B. Capable of withstanding the application of an AASHTO H-20 loading without permanent deformation.

C. Clean, free from blowholes and other surface imperfections. Cast holes in covers shall be clean and symmetrical, free of plugs.

2.04 FABRICATED GRATES AND SAFETY END TREATMENTS

A. Ring grates shall be fabricated from reinforcing steel conforming to ASTM A 615.

B. Welds connecting the bars shall conform to AWS D 12.1.

C. Hot dip galvanize.

2.05 SOURCE QUALITY CONTROL

A. Tolerances: Allowable casting tolerances for concrete units are plus or minus 1/4 inch from dimensions shown on the Drawings. Concrete thickness in excess of that required will not constitute cause for rejection provided that such excess thickness does not interfere with proper jointing operations.

B. Precast Unit Identification: Mark date of manufacture and name or trademark of manufacturer clearly on the inside of inlet.

3.00 EXECUTION

3.01 EXAMINATION

A. Verify lines and grades are correct.

B. Verify compacted subgrade will support loads imposed by the precast unit.

3.02 INSTALLATION

A. Install units according to manufacturer’s recommendations and as shown on the Drawings.

B. Excavate in accordance with requirements of Section 02315 – Trenching, Backfilling and Compacting.

C. Bed precast concrete units on foundations of firm, stable material shaped to conform to the shape of unit bases.

D. Provide adequate means to lift and place concrete units.

E. Install castings according to approved shop drawings, instructions given in related specifications, and applicable directions from the manufacturer's printed materials.

F. Set castings accurately at required locations to proper alignment and elevation. Measure location accurately from established lines and grades. Brace or anchor frames temporarily in formwork until permanently set.

G. Ring grates shall be set in mortar in the mouth of the pipe bell.

3.03 CONNECTIONS

A. Connect leads to the unit as shown on the Drawings. Use jointing material as shown on the Drawings. Make connections watertight.

3.04 BACKFILL

A. Backfill the area of excavation surrounding each completed inlet according to the requirements of Section 02315 – Trenching, Backfilling and Compacting.

3.05 FIELD QUALITY CONTROL

A. Set inlets to within 0.1 ft of elevations shown on Drawings.

B. Reject precast reinforced concrete manhole components that have
1. Fractures or cracks.
2. Defects indicating imperfect proportioning, mixing, and molding.
3. Surface defects indicating honeycombed or open texture
4. Damaged ends where such damage would prevent making satisfactory joint.

END OF SECTION

SECTION 02801 – SITE RESTORATION

1.00 GENERAL

1.01 SECTION INCLUDES

A. Restoration of the Work site in public rights-of-way or easements and adjacent public or private property affected by construction operations, including pavement, esplanades, sidewalks, driveways, fences, lawns and landscaping.

1.02 REFERENCES

A. ANSI Z60.1. American Standard for Nursery Stock.

1.03 DEFINITIONS

A. Site Restoration. Replacement or reconstruction of site improvements to rights-of-way, easements, public property, and private property that are affected or altered by construction operations, with the improvements restored to a condition which is equal to, or better than, that which existed prior to construction operations.

B. Site Improvements. Includes but is not limited to pavement, curb and gutter, esplanades, sidewalks, driveways, fences, lawns, irrigation systems, and landscaping.

C. Line Segment. The length of sewer from center line to center line of manholes, inline junction structure, and bends as designated on the Drawings, and to the end of stubs or the termination of the pipe.

D. Minimum Trench Width. The allowable trench width for a corresponding pipe outside diameter as defined in Section 02315 – Trenching, Backfilling and Compacting.

1.04 SUBMITTALS

A. Make submittals in conformance with Section 01330 – Submittals.

1.05 QUALITY ASSURANCE

A. Have landscape plantings planted by qualified personnel.

1.06 SCHEDULING

A. After paving or utility work is completed on a line segment and the segment is submitted on the monthly estimate for payment, complete site restoration for that segment before the next monthly estimate for payment is submitted, unless extended in writing by the Engineer.

B. For utility work requiring testing or post-installation TV inspection, completion of the segment is not considered to include testing or TV inspection. The schedule for completion of site restoration is not determined by completion of testing or TV inspection.

1.07 WARRANTY

A. Provide a two week warranty on plants and grasses that die due to shock or damage only.

B. Replace plants that fail during the warranty period according to the specifications governing the original plants.

C. Contractor to provide a written notification to homeowner stating that homeowner is responsible for watering replaced plants and grasses.

D. Damage caused by natural hazards such as hail, high winds or storm is not covered by the warranty.

E. Existing plant material required to be moved on the site are covered under the warranty.

2.00 PRODUCTS

2.01 MATERIALS

A. Seeding. Conform to Section 02921 - Hydromulch Seeding.

B. Landscape Plantings, Trees and Shrubs. Provide trees, shrubs and plants of quantity, size, genus, species and variety of those being replaced and complying with recommendations and requirements of ANSI Z60.1.

3.00 EXECUTION

3.01 PREPARATION

A. Removing Pavements and Structures.

1. Remove the minimum pavement, curb and gutter, and other structures as required to perform the Work. Perform removals in accordance with Section 01410 – Protection of Environment and Section 01740 – Disposal of Waste and Excess Materials.

B. Remove or relocate existing fencing, if required, for construction operations. Maintain the integrity of the private property owner’s fencing if needed for protection of children, pets or property. Notify the property owner 72 hours in advance before removing fencing and coordinate security needs.

3.02 INSTALLATION

A. Pavement, Sidewalk, and Driveway Restoration.

1. Replace pavement, curb and gutter, sidewalks, and driveways removed or damaged as the result of construction operations.

B. Seeding and Sodding.

1. Clean up construction debris and level the area with bank sand so that the resulting surface of the new grass matches the level of the existing grass and maintains pre-construction drainage patterns. Level minor ruts or depressions caused by construction operations where grass is still viable by filling with bank sand.

2. Restore grass areas disturbed or damaged by construction with grass comparable with that previously existing.

3. Restore grass areas using hydromulch methods in accordance with Section 02921 - Hydromulch Seeding, except that measurement and payment shall be as specified in this Section.

C. Trees, Shrubbery and Plants.

1. Extra care shall be taken in removing and replanting trees, shrubbery and plants. Trees, shrubbery and plants shall be removed in a way that leaves soil around the roots. Trees, shrubbery and plants shall be placed outside of excavation area.

2. Replace in kind any trees, shrubbery, and plants removed or damaged by construction operations.

3. Have a nursery or landscape firm make tree replacements using balled-and-burlapped nursery stock. Within the availability of standard nursery stock, replace each removed tree with one of an equivalent species and size, but with not less than a 2-1/2-inch-diameter trunk, as measured 1-1/2 feet above natural ground.

D. Fence Removal and Replacement.

1. Replace fencing removed or damaged, including, but not limited to, posts, caps, concrete footings, concrete curb under fence, wire mesh, wood panels, top and bottom railing.

2. Reconstruct any portion of the fence disturbed by construction which is not equal to or better than that which existed prior to construction operations as evidenced by preconstruction photographs or videos.

3. Remove and dispose of damaged or substandard material.

3.03 CLEANING

A. Remove debris and trash which is the result of the Contractor’s operation to maintain a clean and orderly site.

3.04 MAINTENANCE

A. Maintain plantings, sodded areas and seeded areas through warranty period.

B. Replace plantings and seeded or sodded areas that fail to become established through the warranty period.

C. Maintain plantings as follows:

1. Initial watering shall be by Contractor. Continued maintenance shall be by homeowner.

2. Repair or replace bracing as necessary.

3. Prune as necessary.

D. If it is necessary to remove tree branches, have removal and other necessary pruning performed by an qualified nursery or landscape firm utilizing best standard practices.

END OF SECTION

SECTION 02810 - IRRIGATION SYSTEM

1.00 GENERAL

1.01 Scope

A. The work in this Section includes the installation of all materials specified herein and as shown on the contract drawings required to complete the irrigation system. Work shall include, but not be limited to:

1. Furnishing and installing a complete irrigation system.
2. Permit and fees as per **City of Houston** regulations.
3. Trenching and backfill.
3. Furnishing and installing backflow prevention devices.
4. Furnishing and installing sleeves where indicated.
5. Coordinate all activities with the installation of related electrical equipment and primary power wiring by electrical subcontractor or the owner.
6. Coordinating and installation of water meter according to plans.
7. Boring under existing paving for irrigation piping and control valve wring if additional sleeves are required.
8. Inspections and tests.
9. Install extra control and ground wires if requested by Owners.
11. Clean up and disposal.
12. Coordinate connector of controller inside of building with other trades.
13. Record “As Built” drawings if requested by Owners.
13. Warranties.

1.02 Related Work

A. Costs for the following related items shall be part of the irrigation subcontract, unless otherwise specifically arranged for:

1. Contractor is required to notify **City of Houston** authorities for work within city right-of-way.
2. Contractor is required to obtain all necessary permits and pay all fees prior to any construction.
3. Water meters installation.
4. Electrification of controllers, including meters and disconnects.

1.03 Related Sections

A. Planting: Section 02950

B. Lawns: Section 02930

C. Landscape Ground Maintenance: Section 02970

1.04 Coordination of Work

A. No portion of the irrigation system shall be installed until such time that all mechanical transplanting is complete.

B. Contractor is to coordinate with other trades for construction sequence to avoid conflicts.

1.05 Inspection of Site

A. The irrigation Contractor shall inspect the site and become familiar with the conditions. Where additional site prep is required prior to irrigation work under this Contract, Contractor shall coordinate his portion of the work with all other trades under this contract. The irrigation Contractor shall not mobilize his forces until the site is suitably prepared to facilitate the completion of all work in any given portion of the site. Beginning the work of this Section without reporting unsuitable conditions to the Landscape Architect constitutes acceptance of conditions by the Contractor. Any required removal, repair, or replacement of this work caused by unsuitable conditions shall be done at no additional cost to Owner. Contractor shall take necessary precautions to protect site conditions. Should damage be incurred, this Contractor shall repair damaged to its original condition, or furnish and install equal replacement at his expense.

1.06 Requirements of Regulatory Agencies

A. All work and materials shall be in full accordance with the latest rules and regulations of safety orders of Division of Industrial Safety, the Uniform Plumbing Code published by the Western Plumbing Officials' Association, and other applicable laws or regulations, including the **City of Houston** Plumbing Code. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Should the Contract Documents be at variance with the aforementioned rules and regulations, notify Landscape Architect and get his instructions before proceeding with the work affected.

B. Furnish and maintain all warning signs, shoring, barricades, red lanterns, etc., as required by the Safety Orders of the Division of Industrial Safety, and local ordinances.

C. Procure required permits and pay required fees for water meter taps and backflow devices.

D. Arrange inspections required by local agencies and ordinances during the course of construction, as required.

1.07 Applicable Standards

A. Current published standards, specifications, tests or recommended methods of trade, industry, or governmental organizations apply to work of this Section where cited by abbreviations noted below:

1. American Society of Testing and Materials (ASTM)

1.08 Submittals

A. At least ten (10) days prior to beginning work, submit five (5) copies of manufacturer's current catalog cuts, specifications, and operating instructions of the complete list of materials and assemblies to be installed. Quantities of materials and equipment need not be included.

1.09 Substitutions

A. Specific reference to manufacturers' names and products specified in this Section are used as standards. This implies no right to substitute other material or methods, without written approval of the Landscape Architect. No substitutions should be used as a basis for bid unless otherwise allowed and authorized by bid addendum, prior to receipt of bids.

1.10 Scheduling

A. Submit a proposed work schedule to Landscape Architect at least ten (10) days prior to start of work under this Section. After approval, no delays shall be authorized to this schedule without written authorization by Landscape Architect.

B. The Contractor shall complete all irrigation and related electrical work and have complete irrigation system installed prior to the commencement of any planting.

C. The Contractor may submit an alternate plan for release of partial areas where irrigation is complete and automated for commencement of planting operations.

1.11 Product Handling

A. Protect work and materials under this Section from damage during construction and storage. Protect pipes and fittings from direct sunlight. Beds on which pipe is stored must be the full length of the pipe. Do not use any pipe or fitting which has been damaged or dented.

1.12 Record Irrigation Drawings

A. Contractor shall furnish Record Drawings of the complete irrigation system, in accordance with the General and Special Conditions. Procure from the Landscape Architect full-sized sepias of Contract Drawings. Construction drawings shall be on the construction site at all times while the irrigation system is being installed. Contractor

shall make a daily record of all work installed during each day. Actual location of valves and quick couplers and all irrigation and drainage piping shall be shown on the prints by dimensions from easily identified permanent features, such as buildings, curbs, fences, walks or property lines.

B. Drawings shall show approved substitutions, if any, of material, including manufacturer's name and catalog number. The drawings shall be made to scale and all indications shall be neat. All information noted on the print shall be transferred to the sepia by Contractor, and all indication shall be recorded in a neat, orderly way. The record sepia shall be turned over to the Landscape Architect at or before the Final Acceptance of the project.

1.13 Irrigator License

A. All work in this contract shall be performed under the direct supervision of a **Texas** licensed irrigator.

1.14 Reviews and Tests

A. The Contractor shall test lines under hydrostatic (line) pressure for a 12 hour period and repair any leaks as required by the Landscape Architect.

B. Final review shall be made in conjunction with the final review of lawn, shrub and tree planting.

C. The Contractor shall be responsible for making all repairs required to the irrigation system until the issuance of the Certificate of Substantial Completion. Upon the issuance of the Certificate, the Owner shall assume responsibility for the repair and maintenance of the irrigation system.

D. All hydrostatic testing required in this section shall be at the Contractor's expense, and part of this contract.

2.00 MATERIALS

2.01 General

A. All materials and equipment to be installed shall be new and the best of their respective kinds.

2.02 Pipe

A. All pipe shall be continuously and permanently marked with the following information: Manufacturer's name or trademark, size, schedule and type of pipe, working pressure at 73 degrees F. and National Sanitation Foundation (N.S.F.) approval.

B. Piping on pressure side of irrigation control valves:

1. Three inch (3") diameter and smaller, and all mains in sleeving Polyvinyl chloride (PVC) 1120-1220, and shall conform to ASTM #D-224.1-73

2. Four inch (4") Class 200 Solvent Weld. and larger: Polyvinyl chloride (PVC) 1120-1220 SDR 21.0, Class 200 rubber-gasketed pipe, conforming to ASTM D-1784 and ASTM D-2241. Rubber gasket shall conform to ASTM D-1869 and shall be provided by the pipe manufacturer.

C. Piping on non-pressure side of irrigation control valves:

1. Polyvinyl chloride (PVC) 1120-1220, SDR 21, Class 200, and conforming to ASTM D-2241-73. Except one-half inch (1/2") diameter pipe shall be Class 315, SDR 135.

D. Backflow Devices

1. Type K - Copper pipe

2.03 Fittings

A. Fittings for Rubber-Gasketed Pipe

1. Connections at 3" and 4" mains to 3" and 4" mains or laterals shall be Schedule 80, as provided by the same manufacturer as the pipe, and conforming to ASTM D-2466 and ASTM D-1869.

2. Connections at 3" and 4" mains to 2 1/2" and smaller mains and laterals to remote-control and quick-coupling valves shall be Schedule 40 solvent-weld socket fittings conforming to ASTM-2466.

B. Fittings for Solvent-Welded Pipe

1. Schedule 40, polyvinyl chloride, standard weight, as manufactured by "Sloane", "Lasco", or approved equal, to meet ASTM D-2466-73 and D-2467-73.

2. Threaded PVC nipples shall be Schedule 80 PVC.

3. Solvent glue shall be "Christy's Red Hot Blue Glue" with compatible primer.

C. Fittings for Polyethylene Pipe (Flex-Joints)

1. Polyalomer, as manufactured by "Flintkote" or approved equal.

2. Compression type of COVC, as manufactured by "Pepco" or equal.

D. Fittings for Sprinkler Swing Joints

1. Supply two (2) Schedule 40 "Marlex" street elbows and one (1) Schedule 40 thread-to-thread.

2. Threaded PVC Nipples shall be Schedule 80 PVC.

3. Lengths of nipples as shown on plans.

E. Fittings for Quick Coupler Swing Joints (Schedule 40)

1. Supply three (3) galvanized thread-to-thread elbows

2. Two (2) three inch (3") galvanized nipples

3. One two inch (2") threaded galvanized nipple

4. One twelve inch (12") threaded galvanized nipple

5. Use "Permatex" pipe compound for all threaded fittings

6. Eighteen inch (18") #5 rebar

7. Two (2) stainless steel hose clamps

2.04 Gate Valves

A. Up to three inch (3"): 125 lb. bronze construction, non-rising, as manufactured by "Grinnel", Red and White, or approved equal

2.05 Sleeves for Control Wire and Water Line

A. All conduits and sleeves for irrigation mains and laterals shall be six inch (6") Schedule 40 PVC, common conduit. Use two inch (2") Schedule 40 PVC for remote control wiring. For controller power feed, use 3/4" galvanized steel, unless otherwise specified on the drawings or existing in the field.

2.06 Control Wire

A. Wire

1. Solid copper wire, U.L. approved for direct burial in ground.

2. Minimum gauge: #14 U.F.

3. Common ground wire shall be white.

B. Extra Wire

1. Supply a minimum of one (1) extra wire for each direction of run to last valve.

2. Extra wire shall be of a fugitive color, loop at each valve.

C. Splicing Material

1. "Scotchlock Sealing Pack" or "Rainbird Snap-Tites" (use separate packs for each splice) or ring on step.

2.07 Valve Boxes

A. Valve boxes shall be injection-molded of polyesters and fibrous inorganic, temperature-resistant components. Box shall provide adequate clearance to operate and service valve. Box and lid to be black, as manufactured by Carson Industries, Inc., LaVerne,California.

1. Hose Connection Valve Boxes shall be rectangular, approximately ten inches by fourteen inches (10" x 14"), and shall be approximately fifteen inches (15") deep. Model #1419-12 with 1419-2 hinged cover. Extensions for rectangular boxes shall be Carson #1419E-12 or Ametek.

2. Gate Valve and Electric Valve Boxes shall be round, approximately nine inches (9") inside diameter by ten inches (10") deep. Model #910-12. Extensions for round boxes shall be Carson #910E-12 or Ametek.

2.08 Hose End Connections

A. Hose connectors shall be NIBCO # or approved equal.

B. Furnish two (2) valve keys fitted with three-quarter inch (3/4") swivel hose ells.

2.09 Control Wire Splice Boxes

A. Shall be nine inches (9") in diameter by ten inches (10") deep. Carson #910-12 or Ametek.

2.10 Sprinkler Heads

A. See plans legend for Manufacturer and Model.

2.11 Remote Control Valves

A. Valves shall be of plastic construction, slow acting "Rainbird" PE Series or approved equal. Use PRS regulators where shown on plans.

2.12 Controller(s)

A. All controllers shall be positively grounded to a three-quarter inch (3/4") copper rod, driven a minimum of forty-two inches (42") into the ground. All units shall come equipped from the manufacturer with complete lighting and power surge protection.

B. See plans legend for Manufacturer and Model.

2.13 Concrete for Thrust Blocks

A. Portland Cement

1. Shall conform to current requirements of ASTM Designation C150, Type I or II cement.

B. Coarse Aggregate

1. Coarse aggregate for regular-weight concrete shall be hard, durable, uncoated, washed, graded, cleaned and screened crushed rock or gravel, conforming to current requirements of ASTM Designation C33.

C. Concrete shall be designated to surpass compressive strength of 3,000 PSI.

2.14 Gravel Backfill

A. Gravel for backfilling quick-couplers, remote control valve boxes and rotor heads shall be three-eighths inch (3/8") diameter "pea gravel".

3.00 EXECUTION

3.01 Layout

A. No consideration shall be given to any design changes until after the awarding of the contract. Should any changes be deemed necessary after award of contract for proper installation and operation of the system, such changes shall be negotiated by the Landscape Architect, based upon the price schedule.

B. Sprinkler heads shown on the drawings are diagrammatic. It shall be the Contractor's responsibility to establish the location of all sprinkler heads on all turf areas, in order to assure proper coverage of all areas. In no case shall spacing of sprinkler heads exceed distances shown on the drawings and/or those specified. Pipe sizes shall conform to those shown on the drawings. No substitutions of smaller pipe sizes will be permitted, but substitutions of larger sizes may be approved. All pipe damaged or rejected because of defects shall be removed from the site at the time of rejection.

C. The Contractor will stake out the location of each run of pipe and all sprinkler heads for sprinkler valve locations, prior to trenching. Before installation is started in a given area, Landscape Architect shall check all locations and give his approval.

3.02 Preparation

A. Generally, all piping under concrete and special paving shall be Schedule 40 PVC. Piping under concrete or asphalt shall be installed by boring. Where any cutting or breaking of sidewalks, concrete work and/or asphalt is necessary, it shall be removed and replaced by the Contractor as part of this contract, in accordance with the Owner and/or Landscape Architects' direction, at no cost to the Owner. Where piping on the drawings is shown under paved areas, but running parallel and adjacent to planted

areas or turf areas, the intent of the drawings is to install the piping in the planted turf areas.

B. Unless otherwise specified or indicated on the drawings, the construction of the sprinkler system shall include the furnishing, installing, and testing of all mains, laterals, risers and fittings, the furnishing and installing of sprinkler heads, control valves and all necessary specialties and accessories, the removal and/or restoration of existing improvements, excavation and backfill, and all other work in accordance with the plans and specifications, as required for a complete system.

3.03 Excavating and Trenching

A. In areas where electrical conduit will be installed by the electrical contractor, coordinate all trenching activities with electrical subcontractor, so as to minimize duplication of work and/or damage to other's work.

B. Perform all excavations as required, for installation of work included under this Section, including shoring of earth banks, if necessary. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations, to their original conditions.

C. The exact location of all existing utilities and structures and/or underground utilities, which may not be indicated on the drawings, shall be determined by the Contractor and indicated on the "as built" drawings as they are encountered. The Contractor shall conduct his work so as to prevent interruption of service or damage to them.

D. The Contractor shall protect existing structures and utility services and be responsible for their replacement if damaged by him, or make necessary adjustments in their location, if required, in order to complete the work of this Contract. Minor adjustments in the system will be permitted to clear existing fixed obstructions, subject to the approval of the Owner's representative or the Landscape Architect.

E. Installation of main and lateral lines by the vibratory flow method will not be allowed.

F. Trenches for plastic pipe shall be excavated of sufficient depth (12" to top of pipe) and width to permit handling and installation of the pipe and fittings. The backfill shall be thoroughly compacted by water tamping or approved method, and evened off with the adjacent soil level. All trenches that are opened during any particular working day shall be closed and backfilled the same day. No open trenches or partially-backfilled trenches shall be left overnight, except as required for inspection.

G. Trenches shall be of sufficient depth to provide minimum cover from finish grade, as follows:

1. Over pipe, on pressure side of irrigation control valve, control wires and quick-coupling valves: twenty inches (20").

2. Over pipe, on non-pressure side of irrigation control valve: twelve inches (12").

3.04 Boring Method *(If required)*

A. All borings shall be performed with a water-lubricated rotary machine.

B. All bores shall be a minimum of eighteen inches (24") below any pavement, or at a depth required by governing code.

C. For bores greater than two inches (2"), a maximum pilot diameter of two inches (2") shall be used, with reamers for larger bores at a maximum of two inch (2") increments.

D. Sleeves shall be immediately installed, as part of the boring operation.

E. Provide shoring, if required, to eliminate subsidence from under pavement structures.

F. Report any irregularities and obstructions in the boring process to the Landscape Architect.

3.05 Water Meters

A. Make required connections to water meter per the requirements of the local water authority codes.

3.06 Backflow Prevention Device

A. Install pressure-type backflow preventer at required grade for plumbing code. All exposed main line and main line riser above PVC main elevation, shall be type "K" copper. Install one (1) brass union in riser downstream, or device. Wrap all controllers with foam-type insulators.

3.07 Line Installation

A. All pipe, fittings, and valves, etc. shall be carefully placed in the trenches. Interiors of pipe shall be kept free from dirt and debris. When pipe laying is not in progress, open ends of pipe shall be closed by approved means.

B. All lateral connections to the mainline, as well as all other connections, shall be made to the side of the mainline pipe. No connections to the tip of the line shall be allowed. Pipes shall be bedded in at least two inches (2") of finely divided material with no rocks or clods over one inch (1") diameter, to provide a uniform bearing. In common trenches, do not allow pipe to overlap.

C. Plastic pipe shall be installed in a manner so as to provide for expansion and contraction, as recommended by the manufacturer.

D. Plastic pipe shall be cut with PVC pipe cutters or hacksaw, or in a manner as to ensure a square cut. Burrs at cut ends shall be removed prior to installation, so that a smooth, unobstructed flow will be obtained.

E. All plastic-to-plastic joints, except polyethylene, shall be solvent-weld joints or slip-seal joints.

3.08 Plastic-to-Metal Joints

A. Shall be made with plastic male adaptors.

3.09 Solvent-Weld Joints for Plastic Pipes

A. Thoroughly clean the mating pipe and fitting with a clean, dry cloth.

B. Apply a uniform coat of primer to the outside of the pipe and the fitting.

C. Apply a uniform coat of solvent to the outside of the pipe first, and then inside the fitting. Apply a second coat of solvent to the outside of the pipe, and quickly insert it into the fitting.

D. Give the pipe or fitting a quarter turn to ensure even distribution of the solvent, and make sure the pipe is inserted to the full depth of fitting socket.

E. Hold in position for fifteen (15) seconds.

F. Wipe off excess solvent that appears at the outer shoulder of the fitting. Care should be taken so as not to use an excess amount of solvent, causing an obstruction to form on the inside of the pipe. The joints shall be allowed to set at least twelve (12) hours before pressure is applied to the system on PVC pipe.

3.10 Threaded Joints for Plastic Pipes

A. Use "Permatex" pipe compound on the threaded PVC fittings, except where Marlex fittings are used.

B. Use strap-type friction wrench only. Do not use metal-jawed wrench.

C. When connection is plastic-to-metal, male adaptors shall be used. The male adaptor shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be Teflon tape or equal, upon approval.

3.11 Concrete Thrust Blocks

A. Install where the rubber-gasketed irrigation main changes direction, as at ells and tees, and where the rubber-gasketed main terminates.

B. Pressure tests shall not be made for a period of thirty-six to forty-eight (36-48) hours following the completion of pouring the blocks.

C. Blocks for these mains shall be sized and placed in strict accordance with the pipe manufacturer's specifications. Blocks shall be placed to take all thrust created by the maximum internal water pressure.

3.12 Remote Control Valves

A. Unless otherwise specified, the installation of all valves shall include the excavation and backfill, the furnishing, installing and testing of risers, fittings and valves, and the removal and/or restoration of existing improvements, and all other work, in accordance with the plans and specifications, and as required for the completed installation.

B. Valve installation shall include setting of the specified valve box to proposed grade. All valves shall be teed off the main, to facilitate setting at six inches (6") below grade, measured at the top of the handle.

C. Install control valves in valve boxes where shown, and group together, where practical. Place no closer than eighteen inches (18") to walk edges, buildings and walls. Valve boxes shall be flush with finished grade. Set all remote control boxes in centerline of median for all esplanade applications.

D. Set valves in bead of four inches (4") of pea gravel, and fill to half of valve body.

3.13 Sprinkler Installation

A. All sprinkler heads and quick-coupling valves shall be set perpendicular to finished grade, unless otherwise designated on the drawings, or otherwise specified. Sprinkler heads adjacent to existing walls, curbs and other paved areas shall be set to grade no closer than eighteen inches (18") from such walls. Sprinkler heads which are to be installed in lawn areas where the turf is not yet established shall be set one-half inch (1/2") above the proposed finish grade.

B. Heads installed in this manner will be lowered to grade when the turf is sufficiently established to allow walking on it without appreciable destruction. Such lowering of heads shall be done by the Contractor as part of the original contract, with no additional cost to Owner. All sprinklers having an adjusting screw shall be adjusted on a lateral line or circuit, as required, for the proper arc of coverage, radius, diameter and/or gallonage discharge.

C. Backfill all rotor heads having drain holes in body with a minimum of one-half cubic foot (1/2 c.f.) of pea gravel.

D. After all new sprinkler piping and risers are in place and connected, and all necessary division work has been completed, and prior to the installation of sprinkler heads, all control valves shall be opened and a full head of water used to flush out the system. The same procedures shall apply to the polyethylene tubing. Testing of the system shall be performed after completion of each section.

3.14 Automatic Controller

A. Install specified units in specified enclosures.

B. Install per local code and manufacturer's latest printed instructions.

C. Connect remote control valves to controller in clockwise sequence to correspond with station setting, beginning with Stations 1, 2, 3, etc.

D. All controllers shall be fully grounded and have full manufacturer-approved lightening protection.

E. Contractor shall contract with licensed electrician to supply electricity for the required controllers.

3.15 Quick Couplers

A. Pre-assemble quick coupler swing joint, using brass nipples and fittings as shown on details. Use Teflon tape for all threaded joints.

B. Discard nipples and fittings with damaged threads.

C. Test swing joint and quick coupler by pressuring to specified main line pressure. All joints should withstand pressure, while still being flexible.

D. Glue pre-assembled quick coupler and swing joint to main line and stack quick coupler, as shown.

E. Stake quick coupler assembly with specified rebar and two (2) hose clamps.

F. Install specified nine inch (9") round box and pea gravel. Top of quick coupler shall be four inch (4") below top of box. Fill box with pea gravel to six inches (6") below top of box.

3.17 Sprinkler Swing Joints

A. Install swing joints, as shown on drawings.

B. All joints shall be hand-tightened to eliminate leakage, but loose enough to remain flexible.

C. All pipe and fittings shall be oriented on either a horizontal or vertical access.

D. When complete, the heads should be fully adjustable.

E. Where possible, make all connections to the bottom of the sprinkler body. Avoid side connections, except for planter box applications.

F. All head height adjustment shall be made through the swing joint. When adjusted to grade, sufficient adjustment shall remain to facilitate raising or lowering at a later date.

3.18 Control Wires

A. Install control wires with sprinkler mains and laterals in common trenches, wherever possible. Lay to the side of pipe lines. Snake wires in trench, to allow for contraction of wires. Tie wires in bundles at ten foots (10') intervals with 3/4" black electrician tape.

B. Control wire splices at remote control valves to be crimped and sealed with specified splicing materials. Line splices will be allowed only on runs of more than five hundred feet (500'). Splice each connection in a separate "Scotchlock Sealing Pack". Place all splices in nine inches (9") diameter boxes.

C. Coil control wires and extra wires at each R.V.C. connection. Coil by neatly wrapping wire around a section of pipe, ten (10) wraps before splicing. Similarly coil all control wires at each end of all sleeves and where wire changes direction.

D. Install a minimum of one (1) extra control wire to the control valve located the greatest distance from the controller in each direction, and label each blank end.

E. Pilot Wires to be red or black and white to be for all common ground wires.

3.19 Gate Valves

A. Install isolation and branch gate valves directly on main.

B. Where gate valves isolates branch mains of a smaller size, size valve to largest main and add reducing fittings down stream of valves.

C. Place gate valve on minimum of four inches (4") of pea gravel. Place to cover pipe, while leaving handle fully exposed.

D. Install specified "Carson" box and "Carson" extension over valve. Box and extensions should extend from finished grade to top of pipe.

3.20 Conduits and Sleeves

A. Furnish and install conduit where control wires pass under or through curbs.

B. Conduits to be of adequate size to accommodate retrieval for repair of wiring and shall extend twenty-four inches (24") beyond edge of walls. Minimum size shall be four inches (4").

C. Install sleeves for all pipes passing through or under walls, walks, and paving. Sleeving to be of adequate size to accommodate retrieval for repair and wiring, or piping, and shall extend twelve inches (12") beyond edge of paving or other construction, where possible. Minimum size shall be six inches (6").

3.21 Testing

A. Test piping on the non-pressure side of control valves after system is operational, by observing for leaks in pipe trenches.

B. Leaks resulting from tests shall be repaired, and tests repeated until system passes tests.

C. Completely install meter, mains, control valves and isolation valves.

D. Fill all lines with water and shut off at backflow.

E. Open all isolation valves.

F. Pressurize main to approximately 125 PSI. Monitor gauge for pressure for four (4) hours, with a maximum allowable loss of one (1) PSI per hour. Pressurize at quick coupler, or fabricate a fitting for this purpose.

G. Repair any leaks or sources of pressure loss.

H. Test all isolation valves for leakage.

I. Perform above test prior to operation of laterals.

J. Laterals to be visually inspected for leaks during operation.

3.22 Backfill and Compacting

A. After system is operating and required tests and inspections have been made, backfill excavations and trenches with clean soil, free of debris.

B. Backfill for all trenches, regardless of the type of pipe covered, shall be compacted to minimum 95% density under pavements, 85% under planted areas.

C. Compact trenches in areas to be planted, by thoroughly flooding the backfill. Jetting process may be used on those areas.

D. Dress off all areas to finish grades.

3.23 Clean up

A. Keep all areas of work clean, neat and orderly at all times. Keep paved areas clean during installation. Clean up and remove all debris from the entire work area to satisfaction of Landscape Architect prior to Final Acceptance.

3.24 Extra Materials

A. The Contractor shall provide the following extra parts as part of this contract, prior to Final Acceptance.

ITEM	QUANTITY
Quick Couplers	2
Gate Valve Box	2
Quick Coupler Box Covers	2
R.C.V. Box	2
Sprinkler Heads	3 of each type used
Quick Coupler Keys	3
Thompson Keys	3
Valve Cover Keys	3 of each type used

3.25 Warranty

A. In addition to manufacturer's guarantees or warranties, all work shall be warranted for one (1) year from the date of Substantial Completion against defects in material, equipment and workmanship by the Contractor. Warranty shall also cover repair of damage to any part of the premises resulting from leaks or other defects in materials, equipment, and workmanship, to the satisfaction of the Owner. This shall not be interpreted to include damage caused by vandalism, accident or the result of activities by other parties.

B. The irrigation Contractor shall submit a letter of warranty, through the prime Contractor, containing the following paragraph:

"We hereby guarantee that the sprinkler irrigation system that we have furnished and installed is free from defects in materials and workmanship. The work has been completed in accordance with the drawings and specifications, ordinary wear and tear and/or unusual abuse or neglect, excepted. We agree to repair or replace any defects in material or workmanship which may develop during the period of one year from the date of acceptance, and also to repair or replace any damage resulting from the repairing or replacing of such defects at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of replacements within a reasonable time, after receipt of written notice by Certified Mail

from the Owner, we authorize the Owner to proceed to have said repairs or replacements made at our expense and we will pay the costs and charges therefore upon demand."

END OF SECTION

SECTION 02900 - PLANTING MEDIA

1.00 GENERAL

1.01 Work Included

A. Provide materials, testing, equipment and labor required to prepare amended plant mediums for:

1. Planting Backfill Mix

2. Tree Planting Pit Backfill Mix

3. Shrub Bed Planting Backfill Mix

1.02 Related Section

A. Planting: Section 02950

1.03 Testing will be at the expense of the Owner.

1.04 Excavated material from tree pits and shrub beds shall not be used for preparation of backfill mix.

1.05 Quality Assurance

A. All soil components shall be tested & analysis by local testing laboratory per owner's requests.

B. For delivered material, test one grab sample for each 100 c.y. of bulk material delivered to the site.

1.06 Product Delivery, Storage and Handling

A. Deliver material to site when permitted by the Owner and only when project is ready for related work.

2.00 MATERIALS

2.01 On Site Materials

A. Specified backfill mixes shall consist of like material to that used for landscape grading.

2.02 Soil Amendments

A. Wood Residuals

1. Source

A. Shall be naturally composted stockpiled, and not have been chemically treated.

2. Physical Properties

A. Grading:

U.S. Sieve	Dry Weight Percent Passing

3/8	100
1/4"	90-100
No. 8	70-100
No. 35	0-30

3. Organic Content by Ash Analysis: 90-100% Dry Weight

4. Chemistry

   A. Saturation Extract Conductivity (EDc): Nil-3.5

   B. Reaction (pH): 3.0-5.5

5. Salinity

   A. Maximum saturation extract conductivity 1.0 millimhos per cm at 25 degrees centigrade.

B. Sand

1. Physical Properties

   A. Grading:

U.S. Sieve	Percent Passing
No. 4	100
No. 10	95-100
No. 18	90-100
No. 35	65-100
No. 60	0-50
No. 140	0-20
No. 270	0-7

2. Chemistry

   A. Saturation Extract Conductivity (EDC): Nil-3.0

   B. Sodium Absorption Ratio (SAR): Nil-6.0

   C. Boron-ppm in saturation extract sltn.: Nil-1.0

   D. Reaction (pH): 6.0-7.5

   E. Available calcium-sodium acetate extractable-ppm dry weight: Nil-2000

C. Iron Sulfate (Ferric or Ferrous)

1. Shall contain 30 to 35% iron, 35-40% sulphur and be supplied by a commercial fertilizer supplier.

D. Treble Superphosphate

1. Commercial product containing 19 to 20% available phosphoric acid.

E. Urea Formaldehyde

1. Commercial product containing 38% Nitrogen.

F. Soil Sulphur

1. Agricultural grade sulphur containing a minimum of 96% sulphur.

G. Ammonium Sulfate

1. Commercial product containing approximately 21% ammonia.

2.03 Planting Mix

A. Shall be thoroughly mixed in the following proportions:

1. Tree Planting, Shrub Bed, and Planter Backfill mixes

A. Contain sandy loam topsoil

B. .Double ground aged rice hull compost

C. #1 bank sand

D. Growers grade pine bark

E. Forest floor mulch (Black Humus)

F. All material are screened to provide 99% 1” minus sizing then blended to provide a uniform mixture. A minimum of 40% composted organic are utilized to add natural nutrients, provide aeration and optimum moisture retention capacities.

B. Actual mixes and additive may vary depending on samples extracted from actual plant sources.

C. Prepared backfill mixes shall come from a reputable source such as the following:

1. Living Earth Technology, Houston, TX (713) 466-7360

D. Contractors may select their own sources, as long as the sources are reputable. Contractors must submit sample for approval prior to ordering materials.

3.00 EXECUTION

3.01 Mixing

A. Mix soil base, amendments and chemical additives by mechanical means. Do not mix additives with excavated material at the plant pit site.

B. Thoroughly mix all amendments with soil by mechanical means.

C. Soil and sand bases shall be completely pulverized and free of lumps or aggregated material. Moisture content of base materials shall not be such that chemical, granular or pelletized additives become dissolved during the mixing process.

D. Mix media in quantities of not less than 50 cubic yards or mix total quantity required, if less than 100 cubic yards. The Contractor shall be responsible for continuity between batches.

E. For soil media mixes, do not incorporate soil from mixing area with mix.

END OF SECTION

SECTION 02910 - TOPSOIL

1.00 GENERAL

1.01 SECTION INCLUDES

A. Storing and placing topsoil for finish grading and for seeding, sodding and planting.

2.00 PRODUCTS

2.01 TOPSOIL

A. Topsoil shall be fertile, friable, natural sandy loam surface soil obtained from excavation or borrow operations having the following characteristics:
   1. pH value of between 5.5 and 6.5.
   2. Liquid limit: topsoil not to exceed 50.
   3. Plasticity index: 10 or less.
   4. Gradation: maximum of 40 percent with a passing the #200 sieve.

B. Topsoil shall be reasonably free of subsoil, clay lumps, weeds, non-soil materials and other litter or contamination. Topsoil shall not contain roots, stumps, and stones larger than 2 inches.

C. Obtain topsoil from naturally well drained areas where topsoil occurs at a minimum depth of 4 inches and has similar characteristics to that found at the placement site. Do not obtain topsoil from areas infected with a growth of, or reproductive parts of nut grass or other noxious weeds.

3.00 EXECUTION

3.01 TOPSOIL EXCAVATION

A. Conform to excavation and stockpiling requirements of Section 02200 – Site Preparation.

3.02 PLACEMENT

A. For areas to be seeded or sodded, scarify or plow existing material to a minimum depth of 4 inches, or as indicated on the Drawings. Remove vegetable material and foreign inorganic material. Place 4 inches of topsoil on the loosened material and roll lightly with an appropriate lawn roller to consolidate the topsoil.

3.03 PROTECTION

A. Protect topsoil from wind and water erosion until planting is completed.

END OF SECTION

SECTION 02921 – HYDRO-MULCH SEEDING

1.00 GENERAL

1.01 SECTION INCLUDES

A. Seeding, fertilizing, mulching, and maintenance of areas indicated on Drawings.

1.02 SUBMITTALS

A. Submittals shall conform to requirements of Section 01330 – Submittals.

B. Submit certification from supplier that each type of seed conforms to these specifications and the requirements of the Texas Seed Law. Certification shall accompany seed delivery.

C. Submit a certificate stating that fertilizer complies with these specifications and the requirements of the Texas Fertilizer Law.

2.00 PRODUCTS

2.01 MATERIALS

A. Topsoil: Conform to material requirements of Section 02910 - Topsoil.

B. Seed: Conform to U.S. Department of Agriculture rules and regulations of the Federal Seed Act and the Texas Seed Law. Seed shall be certified 90 percent pure and furnish 80 percent germination and meet the following requirements:
1. Rye: Fresh, clean, Italian rye grass seed (lollium multi-florum), mixed in labeled proportions. As tested, minimum percentages of impurities and germination must be labeled. Deliver in original unopened containers.
2. Bermuda: Extra-fancy, treated, lawn type common bermuda (Cynodon dactylon). Deliver in original, unopened container showing weight, analysis, name of vendor, and germination test results.
3. Wet, moldy, or otherwise damaged seed will not be accepted.
4. Seed requirements, application rates, and planting dates are:

TYPE	APPLICATION RATE POUNDS/A	PLANTING DATE
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88	40 40	Jan 1 to Mar 31
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88 Unhulled Common Bermuda Grass 98/88 Annual Rye Grass (Gulf)	40 40 30	Oct 1 to Dec 31

C. Fertilizer: Dry and free flowing, inorganic, water-soluble commercial fertilizer, which is uniform in composition. Deliver in unopened containers which bear the manufacturer's

guaranteed analysis. Caked, damaged, or otherwise unsuitable fertilizer will not be accepted. Fertilizer shall contain minimum percentages of the following elements:

1. Nitrogen: 10 Percent
2. Phosphoric Acid: 20 Percent
3. Potash: 10 Percent

D. Mulch:
   1. Virgin wood cellulose fibers from whole wood chips having a minimum of 20 percent fibers 0.42 inches in length and 0.01 inches in diameter.
   2. Cellulose fibers manufactured from recycled newspaper and meeting the same fiber content and size as for cellulose fibers from wood chips.
   3. Mulch shall be dyed green for coverage verification purposes.

E. Soil Stabilizer: "Terra Tack 1" or approved equal.

F. Weed control agent: Pre-emergent herbicide for grass areas, such as "Benefin," or approved equal.

3.00 EXECUTION

3.01 PREPARATION

A. Place and compact topsoil in accordance with requirements of Section 02910 - Topsoil.

B. Dispose of objectionable and waste materials in accordance with Section 01410 – Protection of Environment.

3.02 APPLICATION

A. Seed: Apply uniformly at rates given in Paragraph 2.01 B for type of seed and planting date.

B. Fertilizer: Apply uniformly at a rate of 500 pounds per acre.

C. Mulch: Apply uniformly at a rate of 50 pounds per 1000 square feet.

D. Soil Stabilizer: Apply uniformly at a rate of 40 pounds per acre.

E. Weed Control Agent: Apply at manufacturer's recommended rate prior to hydromulching.

F. Suspend operations under conditions of drought, excessive moisture, high winds, or extreme or prolonged cold.

3.03 MAINTENANCE

A. Maintain grassed areas a minimum of 90 days, or as required to establish an acceptable lawn. For areas seeded in the fall, continue maintenance the following spring until an acceptable lawn is established.

B. Maintain grassed areas by watering, fertilizing, weeding, and trimming.

C. Repair areas damaged by erosion by regrading, rolling and replanting.

END OF SECTION

SECTION 02930 - LAWNS AND GRASSES

1.00 GENERAL

1.01 Work covered in this section shall include all materials, labor, equipment and supervision required for the installation of turf grass where and as described on the Drawings and in the Specifications. This work includes, but is not limited to the following:

A. Installation of turf by the hydroseed method.

B. Establishment of turf by sodding.

C. Site clean up.

D. Maintenance and guarantee.

1.02 Related Sections

A. Fine Grading: Section 02210

B. Planting: Section 02950

1.03 Quality Assurance

A. Sod: Shall be subject to inspection and approval by Owner's representative at the site upon delivery for conformity to Specifications. Such approval shall not impair the right of inspection and rejection during progress of the work. Owner's representative reserve the right to refuse inspection at this time is in his judgement, a sufficient quantity of sod is not available for inspection.

B. Seed: The Owner's representative shall be furnished a signed copy of statement from vendor, certifying that each container or bag of seed delivered is labeled in accordance with the Federal Seed Act and is at least equal to requirement previously specified. Seed analysis shall be furnished prior to commencement of planting operations. Each lot of seed may be resampled and retested in accordance with latest Rules and Regulations under the Federal Seed Act at the discretion of the Owner's representative. If these tests reveal the seed to be below the specified pure live seed content, the Contractor shall be required to plant additional seed to compensate for the deficiency at no cost too the Owner.

C. The Owner reserves the right to take or request samples of materials for conformity to specifications at any time. Contractor shall furnish samples upon request. Rejected materials shall be immediately removed from the site at Contractor's expense. Cost of replacement of materials not meeting specifications shall be paid by Contractor.

1.04 Inspections

A. Make written request for inspection after seeding of sodding operation have been completed. Such inspection is for the purpose of establishing maintenance period.

B. Submit written requests for inspection to the Owner's representative at least 7 days prior to anticipate inspection date.

2.00 SUBMITTAL

A. Furnish required copies of manufacturers' literature, certifications, or laboratory analytical data for the following items:

1. Sod and seed source (certification)

2. Fiber mulch (laboratory analytical data)
3. Tank mix fertilizer (certification or laboratory analytical data)
4. Topdress fertilizer (certification)

3.00 MATERIALS

3.01 Seed

A. All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act in effect on the date of Invitation for Bids. All seed shall be furnished in sealed standard containers, unless exception is granted in writing by the Owner's representative. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable.

B. The minimum percentage by weight of pure live seed in each lot of seed shall be as follows and seed shall be planted at the rate per acre indicated under pure live seed required per acre

Kind of Seed	Minimum % Pure Live Seed Required	Pounds Pure Live Seed Required Per Acre
(Summer Mix)		
Common Bermuda Grass (Hulled)	85	65
Apply between September-November and/or March-May		
(Winter Mix)		
Common Bermuda Grass (Un-Hulled)	85	65
Winter Rye	90	200
Apply between October-December only.		

Note: % Pure Live Seed = % Purity X % Germination = 100

3.02 Weed seed shall not exceed ten percent (10%) by weight of the total of pure live seed and other material in the mixture. Johnson grass, nut grass, or other noxious weak seed will not be allowed.

3.03 Fertilizer for Tank Mix

A. The additives shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable state fertilizer laws, and bearing the name or trademark and warranty of the producer. Fertilizer to conform to following for 1,000 S.F.

20 lbs. (3-13-13) NPK for Turf

3.04 Wood Cellulose Fiber Mulch

A. Wood cellulose fiber mulch, for use with the hydraulic application of grass seed and fertilizer, shall consist of specially prepared wood cellulose fiber. It shall be processed in such a manner that it will not contain germination or growth-inhibiting factors. It shall be dyed an appropriate color to allow visual metering of its application. The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like groundcover which readily absorbs water and allows infiltration to the underlying soil. Weight specifications from suppliers for all applications shall refer only to air dry weight of the fiber, a

standard equivalent to 18% moisture. The mulch material shall be supplied in packages having a gross weight not in excess of 100 lbs. and be marked by the manufacturer to show the dry weight content. Suppliers shall be prepared to certify that laboratory and field testing of their product has been accomplished and that it meets all of the foregoing requirements.

3.05 Water

Shall be free from oil, acid, alkali, salt, and other substances harmful to growth of grass. The water source shall be subject to approval prior to use.

3.06 Slurry Mix Components Per Acre

Wood Cellulose Fiber Mulch . . . . . 2,000 pounds
Grass Seed . . . . . (as specified)
Fertilizer (13-13-13). . . . . .800 pound

3.07 Top Dress and Lawn Fertilizer for Existing Lawn (Delayed Application)

Complete fertilizer, fifty percent (50%) of the nitrogen to be derived from natural organic sources or urea-form. Available phosphoric acid shall be from superphosphate, bone, or tankage. Potash shall be derived from muriate of potash containing sixty percent (60%) potash with elemental 20% iron sulfate equivalent to 400 lbs/acre:

16% Nitrogen
6% Phosphoric Acid
8% Potash

3.08 Sod

A. Sod shall be one (1) year old as specified in drawings. Sod shall be dense with grass having been mowed at one and one inch (1") height before lifting from field. All sod delivered to the site for the duration of the project shall be uniformly cut by the same sod cutter or multiple machines adjusted to cut the same thickness of sod root/soil mass.

B. Sod shall be in vigorous condition, dark green in color, free of disease and harmful insects and grown on fumigated soil.

C. Do not stack for more than 24 hours between time of cutting and time of delivery.

D. The Landscape Architect reserves the right to reject any sod deemed unacceptable for installation.

4.00 EXECUTION

4.01 Hydromulch Seeding on Prepared Finished Grade

A. Bed Preparation: Immediately after the finished grade has been approved, begin hydroseeding operation to reduce excessive weed growth.

B. The Contractor shall apply seed, fertilizer and mulch by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified above.

C. Spraying Equipment: The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons per minute at a pressure of 100 pounds per square inch. The pump shall be mounted in a line which will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipelines shall be capable of providing clearance for 5/8 inch solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

D. Homogeneously mix a slurry containing up to forty (40) pounds of fiber plus a combined total of seventy (70) pounds of fertilizer solids for each one hundred (100) gallons of water.

The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which provide even distribution of the slurry on the slopes to be seeded. Nozzles or spray shall never be directed toward the ground in such a manner as might produce erosion or runoff. The slurry tank shall have a minimum capacity of eight hundred (800) gallons and shall self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded so as to provide uniform distribution without waste. The Landscape Architect may authorize equipment with smaller tank capacity provided that the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

E. Particular care shall be exercised to insure that the application is made uniformly and at the prescribed rate and to guard against miss and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area. Check on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets or paper or pans over the area at intervals and observing the quantity of material deposited thereon.

F. Operators of hydromulching equipment shall be thoroughly experienced in this type of application. Apply specified slurry mix in a motion to form a uniform mat at specified rate.

G. Keep hydromulch within areas designated and keep from contact with other plant material.

H. Slurry mixture which has not been applied within four (4) hours of mixing shall not be used and shall be removed from the site.

I. After application, the Contractor shall not operate any equipment over the covered area.

J. Immediately after application, thoroughly wash off any plant material, planting areas, or paved areas not intended to receive slurry mix. Keep all paved and planting areas clean during maintenance operations.

K. The Contractor shall guarantee a good healthy stand of grass. Areas which fail to germinate within a reasonable period of time shall be reseeded until a healthy stand of grass is attained.

4.02 Top Dress Fertilizer

A. Apply top dress fertilizer at the rate of six (6) pounds per 1,000 square feet at 25 days after seeding or sodding.

4.03 Sodding on Prepared Finished Grade:

A. Do not commence sodding operation until irrigation system is certified complete by the Landscape Architect and Owner.

B. Bed Preparation: Immediately after the finished grade has been approved, begin sodding operations to reduce excessive week growth. If soil is dry immediately prior to sod installation, dampen surface with a fine mist of water.

C. Installation:

1. Lay sod so that adjacent strips butt tightly with no spaces between strips. Sod joints shall butt evenly with no overlap. Discard sod with irregular edges, discolored, uneven thickness or insufficient topsoil. Lay sod on mounds and slopes with strips parallel to contours. Stagger joints. Sodded areas shall be flush with adjoining seeded areas.

2. Peg sod on slopes three to one or steeper with pegs driven through sod into soil until pegs are plush with turf. Space pegs 18 inches on center. Pegs to be one inch (1") square by six inches (6")long pine or six inch (6") lengths of lath or similar approved device.

3. Water sod thoroughly within 45 minutes of laying with water truck, firehouse or similar method to deliver quick application of water.

4. Trim all sod edges and planting bed edges by the end of the same day as adjacent sod is laid. Hand water trim pieces as above.

5. Immediately after installation of the sod, remove sod clumps and soil. Keep all areas clean during the maintenance period.

4.04 Repair of Existing Turf

A. All areas within this contract not disturbed by construction or where repair of grade is not required shall be overseeded with a cyclone or equivalent type machine at one half the rate of the specified hydroseed mix.
B. Apply full rate of post seeding fertilizer as specified above.

4.05 Maintenance by the Contractor

A. Maintenance under this contract shall commence immediately and include the care and periodical mowing as required to keep the site clean and presentable.

B. The Contractor's maintenance period shall begin upon issuance of the Notice to Proceed and shall not be complete until final acceptance by the Owner or Owner's representative.

C. The Contractor's maintenance of new turf planting shall consist of watering, weeding, repair of all erosion and resodding as necessary to establish a uniform stand of specified grasses. Contractor shall guarantee growth and coverage of planting under this contract to the effect that all turf areas will be covered with specified planting after sixty (60) days with no bare spots greater than four (4) square feet. Any sod panels that are dead or dying shall be replaced.

D. Mowing shall be performed by the Owner.

E. The Contractor shall not be held responsible for failures due to neglect by the Owner, vandalism, etc., during the Guarantee Period. Report such conditions to the Landscape Architect in writing.

4.06 Final Acceptance (End of Maintenance Period)

Work under this section will be accepted by Landscape Architect upon satisfactory completion of all work, but exclusive of re-application under the Guarantee Period. Final Acceptance of lawn establishment shall be as follows:

Full coverage of all areas hydroseeded with full even coat of hydroseed mulch. Thin areas shall be reapplied.

Schedule overseeding operations with Owner or Landscape Architect for observation of method and confirmation of application and conformity to rates specified.

4.07 Clean Up

Keep all areas of work clean, neat, and orderly at all times. Keep all paved areas clean during lawn installation operations. Clean up and remove all deleterious materials and debris from the entire work area prior to Final Acceptance to the satisfaction of Landscape Architect.

END OF SECTION

SECTION 02950 - PLANTING

1.00 GENERAL

1.01 Work Included

A. This Section includes specifications for furnishing and installing planting materials including:

1. Organic fertilizer
2. Chemical fertilizer
3. Mulch
4. Planting accessories
5. Inspecting material

1.02 Related Sections

A. Fine Grading: Section 02210

B. Planting Media: Section 02900

C. Irrigation: Section 02810

1.03 Standards

A. American National Standards Institute (ANSI)/American Association of Nurserymen (AAN): ANSI Z60.1 1-069 "Nursery Stock".

B. "Grades and Standards", latest edition, Texas Association of Nurserymen Specifications, Austin, Texas 78704.

C. Perform work in accordance with all applicable laws, codes, and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State, and local authorities in furnishing, transporting, and installing materials.

1.04 Material Inspections

A. Plants shall be subject to inspection and approval by Landscape Architect at place of growth and upon delivery for conformity to specifications. Landscape architect may reject plant material that in his opinion does not conform to specifications. Submit a written or verbal request for inspection of plant material to Landscape Architect at least five (5) days prior to preferred date. The Landscape Architect reserves the right to refuse inspection at this time if, in his judgment, a sufficient quantity of plants is not available for inspection. The Contractor shall submit a primary and alternate source for material. Should neither of those sources be acceptable, additional cost incurred by the Owner to find and approve suitable material shall be back-charged from this contract.

B. Substitutions of plant materials will not be permitted unless authorized in writing by Landscape Architect. If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract Price. Such proof shall be substantiated and submitted in writing to Landscape Architect at least thirty (30) days prior to start of Work under this Section. These provisions shall not relieve Contractor of the responsibility of

obtaining specified materials in advance if special growing conditions, or other arrangements must be made in order to supply specified materials.

C. Inspection: Make written request for inspection after planting operation have been completed. Such inspection is for the purpose of establishing the maintenance period.

D. Submit written request for inspections to the landscape architect 5 working days prior to anticipated inspection date.

1.05 SUBMITTALS

A. Furnish required copies of manufacturers literature, samples, certifications, or laboratory analytical data for the following items:

1. Tree, shrubs and groundcovers (Samples and / or photographs)
2. Planting backfill mix (3 lbs)
3. Mulch (manufacturer's literature and samples)
4. Tree and shrub planting fertilizer (certification or laboratory analytical data)
5. Tree paint (manufacturer's, literature)
6. Subdrainage materials (pipes, gravel, soil separator)
7. Geotextile Fabric

1.06 Plant Material Delivery, Storage and Handling

A. The following considerations for product handling shall be evaluated:

1. During hot weather and when practical, the Contractor may be required to transport plant materials between sunset and sunrise if transported in an open trailer or unrefrigerated van.

2. Dug material should be maintained and watered as required at the nursery to guarantee their vitality and health until shipping.

3. Protect from all damage trunks, stems, branches and root balls during tree tying, wrapping and loading operations.

4. Load containers onto transport vehicle and secure in a manner that protects the structural integrity of the root balls and branches.

5. The Contractor shall be solely responsible for the safe transportation of plants to the site and their condition upon arrival. Trees damaged, dehydrated or abused during transit and storage will be rejected.

6. Plant materials should not be stored on concrete or left exposed to examples of climate without adequate protection.

8. Protect the root balls and water regularly until planting. If trees are left in storage over the weekend or holiday provide a means of periodical watering and inspection of container moisture.

9. B & B material shall be stored and maintained in a manner which affords protection from dehydration and damage of root ball. Balls shall be wrapped and stored in mulch or approved containers.

B. The Landscape Architect may inspect any phase of this operation and may reject any plant material improperly handled during any point of this operation.

C. Nothing in this Section shall be interpreted as relieving the Contractor of his responsibility to provide healthy, viable plants, nor shall it have any affect upon the terms of the warranty specified herein.

1.07 Incidental Repairs

A. The Landscape Contractor shall coordinate repairs of damage to irrigation system incidental to the planting operation by either own forces or by Irrigation Subcontractor. Above repairs shall be made immediately so as to not interfere with the automatic cycling of the irrigation system. All repairs shall be permanent and include all flushing required to clean the lines of debris deposited by such damage.

B. Incidental damage to work by other subcontractors during landscape installation shall be made immediately and at no extra cost to the owner.

2.00 MATERIALS

2.01 Plants

A. Plants shall be nursery grown in accordance with good horticultural practices under climatic conditions similar to those of project for at least 12 (twelve) months unless specifically otherwise authorized by Landscape Architect in writing. Unless specifically noted otherwise, all plants shall be heavy, symmetrical, tightly knit, so trained or favored in development and appearance as to be superior in form, number of branches, compactness and symmetry.

B. Plants shall be sound, healthy and vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs, or larvae, and shall have healthy, well developed root systems. They shall be free from physical damage or adverse conditions that would prevent thriving growth.

C. Plants shall be true to species and variety and shall conform to measurements specified except that plants larger than specified may be used if approved by Landscape Architect. Use of such plants shall not increase Contract price. If larger plants are approved, the ball of earth or container size shall be increased as specified under “Applicable Standards” and subject to the approval of the Landscape Architect.

D. Plants shall be measured when branches are in their normal position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurement shall be taken at a point on the trunk six inches (6") above natural ground four inches (4") in caliper and at a point twelve inches (12") above the natural ground line for trees over four inches (4") in caliper. If a range of size is given, no plant shall be less than the minimum size and not less than 40% of the plants shall be as large as the maximum size specified. The measurements specified are the minimum size acceptable and are the measurements after pruning, where pruning is required. Plants that meet the measurements specified, but do not possess a normal balance between height and spread shall be rejected.

E. Container stock shall have grown in the containers in which delivered for at least six months, but not over two years. Samples must prove no rootbound conditions exists. No container plants that have cracked or broken balls or earth when taken from container shall be planned. Container stock shall not be pruned before delivery. Field grown plants recently transplanted into containers will not be accepted.

F. Balled and burlapped trees, when accepted, shall have a root ball size of ten (10X) times the caliper.

1. Nursery grown B&B material shall be first pruned and thinned at the place of growth immediately prior to digging as required for packaging and safe

moving. Method or pruning shall be as approved in the field by the Landscape Architect. Do not remove self-locking tags during this pruning prior to delivery to site. Final pruning shall take place at the site.

G. Trees which have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots, or fresh cuts of limbs over 3/4 "which have not completely callused, will be rejected.

H. Method of pruning shall be as approved in the field by the Landscape Architect. Do not remove self-locking tags during this pruning prior to delivery to site. Final pruning shall take place at the site.

2.02 Guying Materials

A. The Contractor shall use guying materials necessary to meet the requirements herein.

1. Pressure-treated 3" diameter lodge poles, "Wolman" treated, as provided by Bourbow Valley Company.

2. Ties: Black rubber tire or other tie, as approved.

3. Tree Guying Material: Galvanized aircraft cable (7 x 19 GAC).

4. 12D Galvanized nails.

5. Hardware

a.	Guying cable:	7 x 19 aircord, size as specified.
b.	Turnbuckles:	galvanized or dip-painted, size as specified.
c.	2 Hole Crimping Clamps:	Galvanized or copper, size as required.
d.	Plastic guy covers:	3/8 "diameter x 3 'long white plastic tubing.

2.03 Water

A. Furnished by Owner. Transport as required.

2.04 Pre-Emergence Weed Control

A. In areas of Woody Ornamental Plants Eptam or Eptam-5-G as manufactured by Greenlight Products Company, San Antonio, Texas 78217. Under no circumstances shall this be done in areas that are to be seeded.

2.05 Mulch

A. Shredded pine, oak, or hardwood bark; shall be the product of standard stripping of bark from pine trees for fiber or pulp manufacturing. Bark shall be shredded in a manner where large pieces are at a minimum. The mulch shall be free of debris.

2.06 Pipe for Watering Tube

A. Shall be perforated Polyvinyl Chloride pipe, Type (SDR 35), gray in color.

2.07 Planting Mix

A. See Section 02900 "Planting Media".

2.08 Fertilizer *(trees and shrubs)*

A. Post planting fertilization (shrubs and groundcover)

1. "Osmocote" Sierrablend. Apply at manufacturer's recommendation rate.

2.09 Steel Edging

A. Shall be equal to that manufactured by the Ryerson Steel Company.

2.10 Geotextile Fabric

A. Typar #3401 terminally spun bonded polypropylene, non woven, weed control fabric, 4.0 oz / lineal yard weight (American Excelsior or equal). Needle punched material is not acceptable.

3.00 EXECUTION

3.01 Layout and Excavation of Planting Areas

A. Layout plants in locations shown on drawings. Use wire stakes color-coded for each specie of plant material. Stake location of each tree and major shrub and outline of shrub and groundcover beds.

B. The Landscape Architect will check location of plants in the field and shall adjust to exact position before planting begins.

C. If underground obstructions are encountered notify the Landscape Architect as to whether an adjustment or change of location is possible within the design intent. If the Contractor is allowed to adjust or change location, rather than remove the obstruction, he shall make the change at no expense to the Owner. Backfill and tamp abandoned pits have obstructions which cannot be removed. See contract drawings for further information.

3.02 Excavation to Subgrade for Planting Area and Verification of Finished Grade

A. Excavate all planting areas (pit and beds) to required depth as hereinafter specified and stockpile enough material to prepare planting mix for all plants. Remove excess material from site.

B. Verify that required grades are within two (2”) inches of required subgrade provided under a separate contract, and excavate further as may be required.

C. Subsoil shall not be worked when moisture content is so great that excessive compaction will occur, nor when it is so dry that clods will not break readily. Water shall be applied, if necessary, to bring soil to an optimum moisture content before tilling and planting.

D. Do not excavate tree pits more than 24 hours in advance of planting operation. Excavate container grown tree pits to the following dimensions:

Excavation for	Width	Depth
Boxed Trees	Box + 24 in.	Ball + 6 in.
Container grown Trees	Cont. + 18 in.	Ball + 6 in.
B&B Trees	Ball + 12 in.	Ball + 6 in.
Container grown Shrubs	Cont. + 12 in.	Ball + 4 in

1. Excavation for trees pits in areas of select fill (crushed and compacted limestone or similar) shall be twice as wide and twice as deep as given root ball. Fill bottom four inches of tree pit with gravel and cover with soil separator before backfilling pit.

E. Excavate shrub and ground cover beds to the following depths:

Excavation for	Width	Depth
Shrubs &	Entire Bed	Cont. + 4 in., not to be less than
Groundcover	Entire Bed	Cont. +4 in., not less than 8 in

F. Rip or cultivates subgrade in pits and beds to a depth of three (3”) inches minimum.

3.03 Drainage, Detrimental Soils and Obstructions

A. Test drainage of plant beds and pits by filling with water twice in succession. Conditions permitting the retention of water in planting beds for more than twenty-four (24) hours or percolation of less than one (1") inch per hour shall be brought to the attention of the Landscape Architect.

B. Notify the Landscape Architect of all soil or drainage conditions Contractor considers detrimental to growth of plant material. (State condition and submit proposal and cost estimate for correcting condition.)

C. If rock, hardpan, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits and beds, alternate locations may be selected by Landscape Architect. Where locations cannot be changed, submit cost required to remove the obstructions to a depth of not less than six (6") inches below the required pit or bed depth. Proceed with work after approval.

3.04 Preparing Plant Materials for Planting

A. Container grown stock shall be removed carefully and handled only by the root ball. Do not lift or handle container plants by tops, stems, or trunks at any time.

B. Do not bind or handle any plant with wire or rope at any time so as to damage bark or break branches. Lift and handle plants only from bottom of ball.

C. Balled and burlapped (B&B) plants shall have firm balls of earth. Plants moved with a ball will not be accepted if the ball is cracked or broken before or during planting operations. B&B material shall be dug only when dormant. Pre-dug stored B&B material shall be inspected and approved at the storage site.

3.05 Installation of Pit Planted Materials

A. Do not commence any planting until the irrigation system is completely automated or can be operated manually.

B. Fill plant pits with soil mix to compact depth to receive plant root ball, so top of root ball is two (2") inches above finished grade.

C. Install PVC watering tubes in tree pits, vertically, at edge of pit as shown.

D. Scarify the walls and bottom of all plant pits immediately prior to the placement of plant and backfill mix. The Contractor shall remove all glazing caused by an auger or mechanical hole digger.

E. For boxed & container grown material, break vertical bands and remove top and bottom of container. Carefully lower plant into pit with backhoe or approved method and adjust elevation. Cut horizontal banks and remove sides. Prune away girdled roots and tease root hair masses. Carefully fill pit and compact by watering in to support root ball.

F. Place B&B plants carefully in the prepared planting pit. Do not disturb root ball or untie twine or roping until backfill settlement is complete and tree is staked, if applicable. Fill planting pit by flooding each eight (8") inches of backfill for balls greater than 24" diameter. Wrap trunks with double layer of tree wrap.

G. Smooth planted areas to conform to specified grades after full settlement has occurred. Contractor shall bear final responsibility for proper surface drainage of planted areas. Any discrepancy in the drawings or specifications, obstructions on the site, or prior work done by another party, which Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Landscape Architect in writing.

H. Mulch circles shall not exceed width of root mass by more than 4". Mulch circles shall meet lawn or bed grades evenly and smoothly.

I. Water all plants immediately again after planting.

J. Apply pre-emergent weed control material in areas to receive mulch.

K. Spread mulch in required areas to the compacted depth of two (2") inches.

3.06 Installation of Bed Planted Materials

A. Install landscape edging where shown. Anchor with metal stakes spaced not more than three (3') feet O.C. or as per often as necessary to have smooth radius or straight tangent. Drive stake to one (1") inch below top of edging.

B. Fill all shrub and groundcover beds with plant bed mix to finished grade (compacted) plus two (2") inches minimum.

C. Excavate in planting mix for individual plant and install as required. Set plant plumb and brace rigidly in position until planting soil mix has been tamped solidly around the ball and roots.

D. When plant pits have been backfilled approximately two-thirds (2/3) full, fertilizer per manufacturer'' recommendations at the maximum rate.

D. Water plant thoroughly, saturating root ball, before installing remainder of the planting soil to top of pit, eliminating all air pockets. Top of root ball shall be two (2") inches above finished grade.

E. Smooth planting areas to conform to specified grade after full settlement has occurred. Contractor shall bear final responsibility for proper surface drainage of planting areas.

F. Water all plants immediately again after planting.

G. Apply pre-emergent weed control material over entire area to receive mulch.

H. Mulch all shrub and groundcover beds to three (3") thick.

3.07 Surface Drainage of Planting Areas

A. Contractor shall bear final responsibility for proper surface drainage of planted areas. Any discrepancy in the drawings or specifications, obstructions on the site, or prior work

done by another party, which Contractor feels precludes establishing proper drainage, shall be brought to the attention of the Landscape Architect in writing.

3.08 Post Planting Fertilization

A. Tree Planting

1. Apply fertilizer 30 - 45 days after installation.

2. Inject material specified in Section 2 with a high pressure injector into soil at depth and diameter shown below.

Tree Caliper	Application Points	Radius	Depth	Application Rate Per Tree
Under 2"	3	4" - 6"	16" - 18"	1-1/2
2" - 4"	3	4" - 6"	18" - 24"	2
4" - 5"	4	4" - 6"	2' - 3'	2-1/2
5" - 6"	5	4" - 6"	3' - 4'	3
Above 6"	3' 0. C.	4" - 6"		5 gal./100 sq.ft. Root Area (Drip Line)

3.09 Pruning

A. Prune containerized plants only at time of planting and according to standard horticultural practice to preserve the natural character of the plant. Prune by removing entangled branching and by removing crotches. Avoid removing branch tips wherever possible. Pruning shall be done under supervision of the Landscape Architect.

B. Remove all dead wood, suckers, and broken or badly bruised branches. Use only clean, sharp tools.

C. Prune lower branching from trees to a height of 18" above ground per 1 1/4" caliper.

D. Prune B&B material in addition to place of growth as may be directed by Landscape Architect by removing a percentage of interior branching proportional to the root loss during digging (up to 1/3).

3.10 Staking

A. The Contractor, will be responsible for material remaining plumb and straight for all given conditions through the guarantee period. Tree support shall be done as outlined on the following tables and as illustrated on the details.

B. Trees should be staked during the same day as planting. Plants shall stand plumb after staking.

C. Stake all trees under 3 inches caliper in accordance with the following table:

Tree Caliper	Stakes	Length	Stake Size
To 1-3/4 in.	2	8'	Lodge/pole (2" dia)
2 in. to 3 in.	2	8'	Lodge/pole (2" dia)

3.11 Guying

A. Guying shall be completed immediately after planting in accordance with the following table. Where manufactured product is specified, install per manufacturer's instructions. Plants shall stand plumb after guying.

B. Guy trees at points of branching with guys spaced equally around and outside perimeter of ball. Wrap rubber tire straps at points of contact with bark positioned at crotches and fasten to a deadman with specified cable with double crimp clamp. One turnbuckle shall be provided for each guy.

Tree Caliper at 12" Above Grade	No. Guys	Cable Size	Deadmen
3-1/4" to 4-1/2"	3	1/8" Diam. 7 x 7 Galvanized Steel Cable	Duck Bill Earth Anchor Model 68 DTS Kit
4-3/4" to 6"	3	1/8" Diam. 7 x 7 Galvanized Steel Cable	Duck Bill System Model 68 DTS Kit
6-1/4" to 8"	3	3/16" Diam.	Duck Bill System Model 88 DTS Kit

3.12 Maintenance by the Contractor

A. The Contractor shall begin maintenance after each plant is installed and continue until Final Acceptance.

B. The Contractor's Maintenance Period shall begin upon inspection and approval at Substantial Completion and shall be for **90 days.**

C. The Contractor's maintenance of new planting shall consist of watering, cultivating, weeding, mulching, re-staking, tightening and repair of guys, resetting plants to proper grades or upright position, and furnishing and applying such pesticide sprays and invigorates as are necessary to keep the plantings free of insects and disease and in thriving condition.

D. Protect planting areas and plants at all times against damage of all kinds for duration of maintenance period. Maintenance includes temporary protection barriers and signs as required for protection. If any plants become damaged or injured, because sufficient protection was not provided, treat or replace as directed by Landscape Architect at no additional cost to Owner.

3.13 Final Acceptance

A. Work under this Section will be accepted by Landscape Architect upon satisfactory completion of all work, including maintenance, but exclusive of replacement of plant materials under the Warranty Period. Upon termination of maintenance period, the Owner will assume responsibility for maintenance of the work.

3.14 Warranty

A. Planting shall be warranted by the Contractor to remain alive and healthy for a period of 12 months after the date of Substantial Completion. Plants in an impaired, dead or dying condition after initial acceptance or within 12 months shall be removed and replaced. New planting and method of placing shall comply with the requirements of the specifications. Plants replacing those removed during the guarantee period shall

also be guaranteed to remain alive and healthy for an additional 12 months after installation and acceptance.

B. Contractor shall not be held responsible for failure due to neglect by Owner, vandalism, Acts of God, during Warranty Period. Report such conditions to the Landscape Architect in writing when discovered.

C. Submit a letter of warranty containing the following information:

1. "We hereby guarantee that the landscape planting we have furnished and installed is free from disease and in good condition, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse, or neglect excepted.

We agree to repair or replace any defects in material or workmanship which may develop during the period of one (1) year from acceptance, and also to repair or replace any damage resulting from the repairing or replacing of such defects, at no additional cost to the Owner. We shall make such repairs or replacements within a reasonable time, as determined by the Owner, after receipt of written notice.

In the event of our failure to make such repairs or replacements within a reasonable time after receipt of written notice from the Owner by Certified Mail, we authorize the Owner to proceed to have said repairs or replacements made at our expense, and we will pay the costs and charges therefore, upon demand."

3.15 Clean Up

A. Clean up all areas as required for complete and acceptable inspection.

B. It is Contractor's responsibilities to replace or restore any damaged or disturbed areas during planting operation back to it's original condition.

3.16 Inspections

A. Make written request for inspections after planting operations are completed.

B. Submit requests for inspections to the Landscape Architect at least five (5) days prior to anticipated inspection date.

END OF SECTION

SECTION 02970 - LANDSCAPE GROUND MAINTENANCE

1.00 GENERAL

1.01 Scope

A. Maintenance required under this contract shall conform to the specifications and criteria in this section. Items included in this section include, but are not limited to, the following:

1. Mowing, edging and trimming of lawn areas
2. Application of pesticides, as required
3. Weeding, cultivating and cleaning of all plantings
4. Application of herbicides
5. Adjustment of irrigation clocks for weather and growth conditions
6. General site clean up. Removal of trash and products of maintenance
7. Hand watering of machine-transplanted trees
8. Truck watering of trees and turf, via manual system

1.02 Contract Period

A. These specifications shall govern all maintenance work on completed and partially completed project areas, commencing at the Notice to Proceed and terminating **90 days** after the issuance of Notice of Substantial Completion.

1.03 Intent of the Contract

A. It is the intent of the contract to provide the Owner with a project site that is attractive in appearance, and to keep all plant materials and lawns in a healthy and vigorous condition.

1.04 Contractor's Performance

A. The Contractor shall perform all work as often as necessary to fulfill the spirit and intent of the contract. The workmen shall be neat in appearance, perform their work in a professional manner, keep noise to a minimum, and stage their work from a location on the site out of the way of the mainstream of the users. In general, the Contractor's presence on the site shall be as inconspicuous as possible.

1.05 Neglect and Vandalism

A. Turf, shrubs, trees or plants that are damaged or killed due to Contractor's operations, negligence, or chemicals shall be replaced at no expense to the Owner.

B. Sprinklers or structures that are damaged due to the Contractor's operation must be replaced by the Contractor promptly.

C. All damage to, or thefts of landscape elements not caused or allowed by the Contractor subsequent to the issuance of the Certificate of Substantial Completion shall be

corrected by the Contractor at the Owner's expense, upon receipt of written authorization to proceed.

D. Damage due to thefts or vandalism prior to the date of the Certificate of Substantial Completion shall be at the Contractor's expense.

1.06 Emergencies

A. The Contractor shall answer emergency or complaint calls regarding conditions in landscaped areas regarding fallen trees or branches, or shrubs or trees that obstruct the driveways, and shall correct the problem or place warning signs and advise the Owner of the need for major work to be performed.

2.00 MATERIALS

2.01 Machinery

A. Machinery requirements listed under this Section are not intended to be restrictions of specific manufacturers or models unless so stated. Specific mention of manufacturers is intended as a guide to illustrate the final product of maintenance operations desired.

1. Lawn Mowers

a. Shall be of the rotary-type, in good working order, finely turned to protect the lawn from excessive exhaust fumes.

b. Blades shall be sharp, to reduce shredding of the cut grass.

2. Lawn Edgers

a. Shall be of a rigid or flexible blade-type that will produce a fine, clean edge where lawns meet walkways, pavements, or curbs.

3. Fertilizer Spreaders

a. Cyclone-type spreader, or equal.

b. No visible underlapping of applications will be permitted.

4. Pruning Tools

a. Shall be maintained in good working order.

b. Cutting edges shall be sharp.

c. Disinfect all tools when used for the removal of diseased limbs with a solution of Clorox and water, mixed at a 1:5 ratio.

5. Watering Truck & Pump

a. Minimum 1200 gal. tank/pump.

b. Pressure at nozzle: 35 PSI (1 1/2" outlet).

3.00 EXECUTION

3.01 General

A. All maintenance operations shall be performed by the Contractor's own force, superintended by personnel familiar with the job. Subcontracting of maintenance work shall not be allowed.

B. Maintenance Period shall commence immediately upon the issuance of the contract. It will be the Contractor's sole responsibility to maintain plantings in original intended condition throughout the Maintenance Period of this contract.

C. Accidental damage to the landscape plantings beyond the control of the Contractor shall be reported immediately to the Owner.

3.02 Irrigation System

A. Irrigation system maintenance shall generally be construed as any activity or activities necessary to keep the system 100% operational. Irrigation system maintenance shall include, but not be limited to:

1. Replacement of equipment damaged by Contractor operations.

2. Repair of other equipment damaged or malfunctioning on a time and material basis. (As requested by the Owner.)

3. Adjustment and cleaning of heads so as to correct miss-directional throw, improper coverage and damage to equipment.

B. The Contractor shall monitor and program the irrigation controllers to maintain optimum moisture levels in all planted areas.

C. Irrigation cycles shall be set to take place after 11:00 pm and prior to sunrise (4:00 am - 5:00 am), unless otherwise instructed by the Owner, except during visits of grounds maintenance personnel. During such visits, the irrigation system may be operated as desired by those personnel.

D. Irrigation cycles should gradually be reduced from September to the winter, in order to generally reduce late season plant growth and vigor, and to stimulate hardening off and dormancy of plant material.

3.03 Staking and Guying

A. Contractor shall maintain staking and guying of trees at all times, and shall be responsible for any damage to trees or plant materials caused by chafing or breaking of foliage or limbs coming in contact with stakes, ties, guys, eye bolts, or bracing materials. Periodically, adjust broken stakes and ties as needed. If ties are too tight, they must be replaced or adjusted. All labor and material costs shall be considered in base bid for the initial **one year** maintenance period.

B. Trees and large shrubs that may require guys, stakes or special care during the winds and rains shall receive the required care prior to and immediately after anticipated and actual occurrences, to insure that no damage results to the plant material.

3.04 Pruning

A. Contractor shall prune regularly, as required. Remove dead wood and aesthetically horticulturally balance the planting, as directed by the Landscape Architect. All suckers and undesired growth shall be removed immediately.

B. Do not prune limbs from trunks more than 12" above ground per 1" caliper (min. 8").

C. Pruning of shrubs should create a uniformly dense plant. Selectively thin and tip back annually. Prune to enhance natural branching effect of plants. Do not change shape of shrubs by pruning. Refer to schedule.

3.05 Turf Maintenance

A. Mowing

1. During periods of cool weather, mow at one and one-half inches (1 1/2"), but during hot weather should not be lower than two inches (2") from the soil.

2. Regular weekly mowing is strongly recommended. Never scalp the lawn, or cut more than one-third (1/3) of the existing top growth in one mowing.

3. Remove excessive clippings, never allowing clippings to remain on lawn surface for more than four (4) hours.

B. Watering

1. Provide a regular, deep watering program. The established turf should not be kept wet, but should dry out under regular conditions. If it is hot or windy, water more often.

2. In very hot weather, a fast watering with fine spray will cool the turf zone and can supplement the regular deeper watering program.

3. In shaded areas caused by trees or shrubs, water more frequently because of the competition for soil moisture.

4. If lawn wilts (shows gray-brown), water more frequently.

C. In areas of new planting and lawns, allow new lawn to grow over tree ball. Maintain height of grass at tree trunk with hand clippers. Do not use weed whips around tree trunks.

3.06 Manual Watering

A. Manual watering is required for all existing trees and grass areas and will start when existing irrigation system is scheduled to be shut off for modifications.

B. Watering schedule to be based on season, and shall be adjusted accordingly due to weather conditions.

1. April – September
Trees: 3 minute saturation every other day.
Grass: Saturation as needed every other day.

2. October – December
Trees: 3 minute saturation 3 times a week.
Grass: Saturation as needed 3 times a week.

3. January– March
Trees: 3 minute saturation 2 times a week.
Grass: Saturation as needed 2 times a week.

3.07 General Clean Up

A. The Contractor shall dispose of all waste materials or refuse from his operations off the property, except where other arrangements have been made with the Owner.

B. Keep all expansion and score joints free of any vegetation which may appear, and apply appropriate herbicide to discourage future growth in these areas.

C. Leaves, papers, grass clippings or other debris shall be removed weekly, or at each visit from all areas.

D. Remove dead animals from the site immediately, as they are encountered.

4.00 SCHEDULE

4.01 Schedules

A. The Schedule as included herein shall be used as a guide for the work specified, which may fall within the post-construction maintenance period. Should the Contractor require an alteration of the Schedule, contact the Landscape Architect.

SCHEDULE "A"

FUNCTIONS	FREQUENCY											
	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.	Oct.	Nov.	Dec.
Mowing 3	3	4	5	5	5	4	4	5	4	4	4	
Edging	1	1	4	5	5	4	4	4	5	4	1	1
Debris Removal	2	2	4	4	5	5	5	5	5	5	4	4
Pruning		1								1		
Weed Control Beds			1	1	1	1	1	1	1	1	1	1
Clean/Sweep Curbs/Gutters	2	2	4	4	5	4	5	4	4	5	4	4
Overseed Rye									1*			
Index Irrigation	1	1	1	1	1	1	1	1	1	1	1	1
Spray for Borers			1		1		1		1			

* Depending on Prevailing Weather

END OF SECTION

SECTION 03100 - CONCRETE FORMWORK

1.00 GENERAL

1.01 Related Sections

A. Fine Grading: Section 02210

B. Site Concrete and Reinforcement: Section 03310

1.02 Job Built and Prefabricated Forms

A. Codes & Standards: Unless otherwise shown or specified, design, construct, erect, maintain, & remove forms & related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard "Recommended Practice for Concrete Formwork".

1.03 Design of Formwork

A. Design, erect, support, brace & maintain formwork so that it will safely support all lateral loads that might be applied.

B. Support form facing materials by structural members spaced sufficiently close to prevent deflection of the form facing material. Fit forms placed in successive units for continuous surfaces to accurate alignment to assure a smooth completed surface, free from irregularities and within the allowable tolerances. Final position of all structural members to be at elevations shown on drawings.

C. Design formwork to be readily removable without impact, shock or damage to the cast-in-place concrete surfaces and adjacent materials.

D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt all joints & provide backup material at joints as may be required to prevent leakage & fins.

1.04 Form Materials

A. Forms for Exposed Finish Concrete: Unless otherwise shown on specified, construct all formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood-faced, or other plywood type materials acceptable to the Owner or their Agent, to provide continuous, straight smooth exposed surfaces. Furnish in the largest practicable sizes to minimize number of joints and to conform to the joint system shown on the drawings. Provide form material with sufficient thickness to withstand the pressure of newly placed concrete without bow or deflections.

1.05 Form Construction

A. Construct forms to the exact sizes, shapes, lines & dimensions shown, & as required to obtain accurate alignment, locations, grades level & plumb work in the finished structures.

B. Carefully form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete. Back joints with extra studs or girt as required to maintain true and square intersections.

C. Do not use metal cover plates for patching holes or defects in forms.

D. Cleaning & Tightening: Thoroughly clean forms & adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is to be placed.

Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

1.06 Preparation of Form Surfaces

A. Coat the contact surfaces of forms with a form-coating compound before reinforcement is placed. Provide commercial formulation form-coating compounds that will not bind with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds. Thin form-coating compounds only with the thinning agent of the type, and in amount, and under the conditions of the form-coating compound manufacturer's directions.

B. Do not allow excess form coating material to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with the manufacturer's instructions.

1.07 Removal of Forms

A. Formwork not supporting the weight of concrete, such as sides of beams. Walls and similar parts of the work, may be removed 12-24 hours after placing the concrete, providing the concrete is sufficiently hard not to be damaged by the form removal operations, & provided that curing & protection operations are maintained.

B. Form facing material may be removed 4 days after placement, only if the shores & other vertical supports have been arranged to permit removal of the form facing material without loosening or disturbing the shores & supports.

C. These periods represent the cumulative number of days of fractions thereof, not necessarily consecutive, during which the temperature of the concrete is above 50 degrees F.

END OF SECTION

SECTION 03200 - CONCRETE REINFORCEMENT

1.00 MATERIALS

1.01 Reinforcing Bars

A. Comply with the requirements of ASTM A 615.

B. Provide Grade 60, for bars No. 3 to 18, except for beam stirrups which may be Grade 40.

1.02 Supports for Reinforcement

A. Provide supports for reinforcement including bolsters, chairs, spacers and other devices suitable for proper spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with PS 7-66. Wood devices will not be acceptable.

B. For slabs on grade, use supports with sand plates or horizontal runners where wetted base materials will not support chair legs. Brick scrap will not be acceptable.

2.00 FABRICATION

2.01 General

A. Shop-Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabricating tolerances complying with ACI 315. In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

2.02 Identification

A. Deliver all reinforcement to the project site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

2.03 Rejected Materials

A. Reinforcing with any of the following defects will not be permitted in the Work:

B. Bar lengths, depths, and bends exceeding the specified fabrication tolerances. Bends or kinks not indicated on drawings or final shop drawings. Bars with reduced cross-section due to excessive rusting or other cause.

3.00 PLACING

3.01 Comply with the specified codes and standards, and the Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

3.02 Clean reinforcement to be free from loose rust, mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

3.03 Accurately position, support, and secure reinforcement against displacements by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

3.04 Place reinforcement to obtain the detailed or specified coverage for concrete protection. Arrange, space, and securely tie bar supports together with 16 gauge wire to hold reinforcement

accurately in position during concrete placement operations. Set wire ties so that ends are directed into the concrete, not toward exposed concrete surfaces.

3.05 Provide sufficient numbers of supports & of strength to carry the reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment & similar construction loads.

3.06 Space reinforcing bars to comply with ACI 318-71, Section 7.4. Reinforcing bars may be relocated as necessary to avoid interference with other reinforcement, conduit, or other embedded items. However, if any reinforcing bar is moved a distance exceeding one bar diameter or the specified placing tolerance, the resulting rearrangement of the reinforcement will be subject to acceptance by the Landscape Architect.

3.07 Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Comply with the requirements of ACI 318-77, Section 12.15 through 12.20 for minimum lap of spliced bars.

Lapped ends of bars may be placed in contact and securely wired or may be separated sufficiently to permit the embedding of the entire surface of each bar in concrete. Splices in bars No. 11 and smaller may be welded or lapped. Splices in adjacent bars shall be staggered.

END OF SECTION

SECTION 03310 – SITE CONCRETE

1.00 GENERAL

1.01 Work Included

A. This Section specifies the requirements for forming and placing reinforced concrete pavement and sidewalks to the lines and grades shown on the drawings and constructed as specified herein.

1.02 Applicable Publications

A. The following specifications and standards of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this specification to the extent indicated by the references thereto:

1. Texas State Department of Highways and Public Transportation 1982 Standard Specifications for Construction of Highways, Streets and Bridges (TXDOT):

a. Item 360 concrete pavement (water cement ratio.)

b. Item 526 membrane curing.

2. American Society for Testing and Materials Standards (ASTM):

a. D 1751 preformed expansion joint filler for concrete paving and structural construction.

b. A 525 steel sheet, zinc-coated (galvanized).

c. C 309 liquid membrane forming compounds for curing concrete.

d. A 615 standard specification for deformed billet-steel bars for concrete reinforcement.

e. C 94 ready mixed concrete

f. C 31 method of making and curing concrete compression on flexure test specimens in the field

g. C 39 method of test for compress strength of molded concrete cylinders

h. A 186 welded steel wire, fabric, plain, for concrete reinforcement

1.03 Related Sections

A. Fine Grading: Section 02210

2.00 MATERIAL

2.01 Concrete

A. Cement, aggregates, admixtures, and water shall conform to the specifications of TXDOT, Item 421. Preparation of concrete mix shall be in accordance with article 360.3 of TXDOT, Item 360, plus the following:

1. Concrete strength shall be designed to produce a 2,000 psi minimum compressive strength at 7 days and a 3,000 psi minimum compressive strength at 28 days.

B. Maximum size of aggregate 1-1/2 inches.

C. Slump shall range from 1 to 3 inches.

D. Air entrainment concrete mixture shall have an air content by volume of 4.5 percent plus or minus 1.5%.

E. Concrete shall be mixed in accordance with TXDOT, Item 522.

F. Ready mixed concrete conforming to ASTM C 94 may be used.

G. The concrete mix shall be designed by a commercial testing laboratory, and submitted for approval.

2.02 Reinforcement

A. Reinforcing steel shall meet the specifications of ASTM A615, Grade 60. Bars shall be deformed billet steel free of defects.

2.03 Board Filler

A. Timber Boards shall meet the specifications of TXDOT Item 433.2(5)(a).

B. Impregnated asphalt board shall conform to TXDOT Item 433.2(5)(b).

C. Board filler shall be free of defects which will impair their usefulness as expansion joint filler.

2.04 Preformed Bituminous Expansion Board

A. Preformed bituminous expansion boards shall meet the specifications for ASTM D 1751.

2.05 Joint Sealing Material

A. Curbs and Pavement joint sealing material shall meet the requirements and specifications of TXDOT Items 360.3(F).

B. Sidewalk joint sealing materials shall be “Sonolastic Sealant Two-part”, as manufactured by Sonneborn-Contech, Building product division, Contech, Inc. or approved equal. Color shall match adjacent concrete work.

2.06 Deformed Contraction Joint Metal Strips

A. Deformed contraction joint metal strips shall be 28 ga. steel, galvanized 1.25 oz. per square foot or heavier and meet the specifications of ASTM A 525.

2.07 Curing Compound

A. Curing compound shall conform to the specifications of ASTM C 309, Type 1 or Type 2, white pigmented.

2.08 Load Transmission Devices For Expansion And Contraction Joints

A. Load Transmission devices shall be as detailed on plans and conform to the properties specified in ASTM A615, Grade 60 steel.

2.09 Steel Dowel Bars

A. Steel dowel bars and steel reinforcement shall be deformed or smooth bars conform in properties to ASTM A615 Grade 40. Unless otherwise shown on the plans all reinforcing

steel shall be deformed bars, all dowel bars at joints shall be smooth bars, and all curb dowels shall be deformed bars.

3.00 EXECUTION

3.01 General

A. The sidewalk pavement shall be constructed to the lines and grades shown on the drawings.

3.02 Pavement

A. Preparation of subgrade

1. The subgrade shall be a previously prepared subgrade, stabilized if required, compacted to a minimum of 95% standard density ASTM D-698, and graded to the required section and grades shown on the drawings and as specified.

2. Rolling and sprinkling shall be performed to maintain the specified moisture content of the subgrade as necessary prior to placing the concrete curbs. Refer to section 31 2216, Fine Grading for applicable specifications for materials and placement.

B. Placing and removing Forms

1. Forms shall be of wood or metal, properly treated to insure concrete does not adhere to the forms, straight, clean, free from warp or defect, and of sufficient depth. The forms shall be so placed that when placed each form section will be firmly in contact for its whole length and base width and exactly at the established grade. Any subgrade under the forms below established grade shall be corrected using suitable material, placed, sprinkled, and rolled.

2. Forms shall be securely staked and tightly jointed and keyed to prevent displacement.

3. Sufficient stability of forms to support equipment operated thereon and to withstand its vibration without springing shall be required.

4. Forms shall remain in place not less than 24 hours after concrete is placed.

C. Joints in Concrete Pavement

1. Shall be constructed in the pavement slab at locations and according to details as shown on the drawings. Stakes, braces, brackets or other devices shall be used as necessary to keep the entire joint assembly in true vertical and horizontal position.

2. When prefabricated plastic strips are used to form joints, they shall be placed after the concrete surface has been leveled and before the finishing is completed. The strips shall be of a type specifically manufactured for the purpose of forming joints in concrete pavement and to the dimensions as required to form the specified joints. The strips shall be removed after the concrete has set per the manufacturer's recommendations. Any blemishes caused by the removal of the strips shall be repaired immediately using approved methods.

D. Tie Bars And Load Transmission Devices

1. Shall be accurately placed and held securely (parallel to pavement surface and perpendicular to joint) during placing and finishing of pavement.

E. Expansion Joints

1. Shall be constructed with board filler and sealed at top. Board filler must be perpendicular to plane of concrete slab. Alignment of joint shall not vary more than 1/4 inch in 10 feet.

F. Reinforcing Steel

1. Shall be accurately placed as shown on drawings and secured in place. Each bar intersection shall be tied. All bars shall be supported on steel or plastic bar chairs. Laps shall be a minimum of ten (10) inches and tied. Wire fabric may not be used in vehicular pavement.

G. Concrete Placing And Finishing

1. Concrete not placed as herein prescribed within 90 minutes after mixing shall be rejected.
2. Concrete shall not be placed when temperature is below 40o F and falling, but may be placed when the temperature is above 35o F and rising, the temperature being taken in the shade and away from artificial heat.

3. Concrete shall not be placed before the time of sunrise, and shall not be placed later than will permit the finishing of the pavement during sufficient natural light.

4. Concrete shall be consolidated by a mechanical vibrator to remove all voids. Special care shall be exercised in placing and spading concrete against forms and at all joints to prevent the forming of honeycombs and voids and to prevent displacement of steel reinforcement and load transmission devices.

5. The concrete shall be struck off with an approved strike-off screed to such elevation that when consolidated and finished, the surface of pavement shall conform to the required section and grade. In no case shall the maximum ordinate from a 10 foot straight edge to the pavement be greater than 1/8 inch.

6. The strike template shall be moved forward with a combined transverse and longitudinal motion in the direction the work is progressing, maintaining the template in contact with the forms, and maintaining a slight excess of material in front of the cutting edge.

7. After completion of a strike-off, consolidation and transverse screeding, a hand-operated longitudinal float shall be operated to test and level the surface to the required grade.

8. Workmen shall operate the float from approved bridges riding on the forms and spanning the pavement. The longitudinal float shall be held in contact with the surface and parallel to the center line, and operated with short longitudinal strokes while being passed from one side of the pavement to the other. If contact with the pavement is not made at all points, additional concrete shall be placed if required, and screeded, and the float shall be used to produce a satisfactory surface. After a section has been smoothed so that the float maintains contact with the surface at all points in being passed from one side to the other, the bridges may be moved forward half the length of the float, and the operations repeated.

9. After completion of the straightedge testing, a pass with a burlap drag shall be made as soon as construction operations permit and before the water sheen has disappeared from the surface. This shall be followed by as many passes of the drag as required to produce the desired surface texture.

10. After completion of dragging and about the time the concrete becomes hard, the edge of the slab and joints shall be left smooth and true to line.

H. Curing

1. Concrete pavement shall be cured by protecting it against excessive loss of moisture for a period of not less than 72 hours from the beginning of curing operation.

2. Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered and cured in accordance with the requirements of "Membrane Curing", TXDOT Item 360.4(6) and Item 360.11(3).

3. Special care should be exercised to keep spraying curing compound out of pavement joints.

3.03 Application Of Joint Sealing Compound

A. Joints shall be thoroughly cleaned of loose scale, dirt, dusts and curing compound. When necessary, existing joint material shall be removed to the depth as shown on the plans.

B. Joints shall be filled to the full depth of the joint opening. Pouring shall be done in a neat and workman like manner to give satisfactory results. Sufficient joint sealer shall be poured into the joints so that upon the completion of the work the surface of sealer within the joint shall be 1/4" above top of the pavement surface.

4.00 TESTS

A. Test cylinders for compressive strength shall be taken and cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. At least 3 cylinders shall be made for each day for each 100 c.y. of concrete or fraction thereof, placed. A testing laboratory for the tests shall be selected and paid for by the owner.

B. Testing Of Concrete Surface

1. After finishing is complete and while the concrete is still workable, the surface shall be tested for trueness with an approved 10' steel straightedge.

2. The straightedge shall be operated from the side of the pavement placed parallel to the pavement center line and passed across the slab to reveal any high spots or depressions.

3. The straightedge shall be advanced along the pavement in successive stages of not more than 1/2 its length. A tolerance of 1/8" in 10' must be met.

4. Any correction of the surface required shall be accomplished by adding concrete if required and by operating the longitudinal float over the area.

5. The surface test with the straightedge shall then be repeated.

4.01 Opening Pavement To Traffic

A. The pavement shall be closed to all traffic, including vehicles of the contractor, until the concrete is at least 10 days old or has attained a minimum average of 3000 psi compressive strength.

B. Any damage to the pavement prior to acceptance by the owner shall be repaired by the contractor at no extra cost to the owner.

C. This does not relieve the contractor from the normal liabilities and maintenance responsibilities, implied or otherwise, for the pavement or other items.

END OF SECTION

SECTION 07920 – JOINT SEALANTS

1.00 GENERAL

1.01 Work Included

A. Cold-applied joint sealants.

B. Hot-applied joint sealants.

1.02 Related Sections

B. Site Concrete: Section 03310

1.03 Submittals

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each kind and color of joint sealant required.

1.04 Quality Assurance

A. Work shall be performed by skilled workmen familiar with published recommendations of the manufacturer of the materials being used.

B. Lack of skill on the part of installers shall be sufficient grounds to reject installation and require immediate removal and reinstallation at no cost to the Owner.

1.05 Products Handling

A. Protection

1. Protect materials before, during and after installation.

2. Protect installed work and materials of other trades.

B. Replacement

1. In event of damage, make necessary repairs and replacements.

C. Storage

1. Store materials and equipment under conditions recommended by manufacturer.

2. Do not use materials stored for a period of time exceeding recommended shelf life of material.

2.00 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of exposed joint sealants: As indicated by manufacturer's designations

2.01 Cold-Applied Joint Sealants

A. Single-component, Nonsag, silicone joint sealant for concrete: ASTM D 5893, Type NS.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone.

b. Dow Corning Corporation; 888.

c. Pecora Corporation; 301 NS.

B. Single-component, Self-leveling, silicone joint sealant for concrete: ASTM D 5893, Type SL.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.

b. Dow Corning Corporation; 890-SL.

c. Pecora Corporation; 300 SL.

C. Multi-component, Pourable, Traffic-grade, urethane joint sealant for concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Pecora Corporation; Urexpan NR-200.

2.02 Hot-Applied Joint Sealants

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Crafco Inc., an ERGON company; Superseal 444/777.

B. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Meadows, W. R., Inc.; Sealtight Hi-Spec Sealtight 3405.

b. Right Pointe; D-3405 Hot Applied Sealant.

2.03 Joint-Sealant Backer Materials *if applicable*

A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.04 Primers

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

3.00 EXECUTION

3.01 Installation

A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.

C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.

2. Do not stretch, twist, puncture, or tear joint-sealant backings.

3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint sealants so they directly contact and fully wet joint substrates.

2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

G. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

H. Clean off excess joint sealant or sealant smears adjacent to joints as the work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION