Specifications

for the

Oxnard High School Transportation Facility

3400 West Gonzales Road
Oxnard, CA 93036

prepared for the
Oxnard Union High School District

Prepared by:

FLEWELLING & MOODY

815 Colorado Blvd., Suite 200
Los Angeles, CA 90041
(323)543-8300

F&M Project No. 2855

SECTION 00 00 80

PROJECT DIRECTORY

OWNER:	OXNARD UNION HIGH SCHOOL DISTRICT 309 South “K” Street Oxnard, California 93030 (805) 385-2500
ARCHITECT:	FLEWELLING & MOODY 815 Colorado Blvd., Suite 200 Los Angeles, California 90041 Scott F. Gaudineer (323) 543-8300
CIVIL ENGINEER:	ENCOMPASS CONSULTING GROUP 25115 Stanford Avenue, suite A320 Santa Clarita, CA 91355 Josiah Jenison (661) 600-9367
LANDSCAPE ARCHITECT	OASIS ASSOCIATES 3427 Miguelito Court San Luis Obispo, CA 93401 Michael Cripe (805) 541-4509
ELECTRICAL ENGINEER:	BUDLONG & ASSOCIATES, Inc. 315 Arden Avenue, Suite 23 Glendale, CA 91203 Patrick Fitzsimmons (818) 638-8780
MECHANICAL & PLUMBING ENGINEER	BUDLONG & ASSOCIATES, INC. 315 Arden Avenue, suite 23 Glendale, CA 91203 Patrick Fitzsimmons (818) 638-8780

END OF SECTION

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DIVISION 26 – ELECTRICAL

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DIVISION 32 – EXTERIOR IMPROVEMENTS

DIVISION 33 – UTILITIES

END OF SECTION

SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS
All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access Conditions and Requirements;

B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

C. The Work of this Contract consists of the following:

Grading, access road and large A.C. paved area (for immediate use as bus and vehicular parking, and possible future use as a building site), pavement markings, utility infrastructure below grade from nearest points of connection stubbed out to future building locations, site lighting, chain link fencing and gates, electric vehicle charging stations, and storm water detention basin. Disciplines involved include architecture, civil engineering, plumbing and electrical engineering work as indicated in the Drawings and Specifications.

1.03 CONTRACTS

D. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

E. Work on the Project that will be performed and completed prior to the start of the Work of this Contract:

[FILL IN OR MODIFY AS APPROPRIATE]

(1) Asbestos removal/abatement.

(2) Lead paint removal/abatement.

F. Work on the Project that will be performed by others concurrent with the Work of this Contract:

(1) _____

(2) _____

1.05 CODES, REGULATIONS, AND STANDARDS

G. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.

H. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

I. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:

(1) Contract Drawings.

(2) Specifications.

(3) Addenda.

(4) Change Orders and other modifications to the Contract.

(5) Reviewed shop drawings, product data, and samples.

(6) Field test records.

(7) Inspection certificates.

(8) Manufacturer's certificates.

J. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.

K. Contractor shall record information concurrent with construction progress.

L. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:

(1) Manufacturer's name and product model and number.

(2) Product substitutions or alternates utilized.

(3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

M. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.

N. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.

O. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

P. If unoccupied and only with District’s prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types

of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.

Q. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.

R. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.

S. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.

T. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.

U. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

V. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.

W. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

X. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.

Y. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

Z. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.

AA. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 22 00
ALTERNATES

1. ALTERNATES

1. RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Bid Form and Proposal;

D. Instruction to Bidders.

2. DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

3. GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

4. BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

5. ALTERNATES

A. _____

B. _____

The above Alternate descriptions are general in nature and for reference purposes only. The Contract Documents, including, without limitation, the Drawings and Specifications, must be referred to for the complete scope of Work.

END OF DOCUMENT

SECTION 01 26 00
CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

SECTION 01 29 00
CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): $_____

(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

END OF DOCUMENT

CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: $_____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

END OF DOCUMENT

SECTION 01 31 19
PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions; and

B. Special Conditions.

1.02 PROGRESS MEETINGS:

A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.

B. Location: Contractor's field office.

C. The Contractor shall notify and invite the following entities (“Invitees”):

(1) District Representative.

(2) Contractor.

(3) Contractor's Project Manager.

(4) Contractor's Superintendent.

(1) Subcontractors, as appropriate to the agenda of the meeting.

(2) Suppliers, as appropriate to the agenda of the meeting.

(3) Construction Manager, if any.

(4) Architect

(5) Engineer(s), if any and as appropriate to the agenda of the meeting.

(6) Others, as appropriate to the agenda of the meeting.

D. The District's and/or the Architect’s Consultants will attend at their discretion, in response to the agenda.

E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes, those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION / PERFORMANCE MEETING:

A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.

B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.

C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.

D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 32 13
SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Summary of Work; and

D. Submittals.

1.02 SECTION INCLUDES

A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.

(1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").

(2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.

(3) Submit schedules and reports as specified in the General Conditions.

B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

A. Within ten (10) days of issuance of the Notice to Proceed, and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.

B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

(1) The written statement shall identify the individual who will perform CPM scheduling.

(2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.

(3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths (¾) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

(1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.

(2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

(3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.

C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.

(1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.

(2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.

D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.

E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.

F. Software: Use District software. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.

F. Transmit each item under the form approved by District.

(1) Identify Project with District Contract number and name of Contractor.

(2) Provide space for Contractor's approval stamp and District's review stamps.

(3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.

B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.

C. Initial CPM Schedule shall be time scaled.

D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.

E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.

(1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).

(2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.

F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Analysis ("TIA") in accordance

with Article 1.12 of this Section. The TIA shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.

B. Progress Schedule shall include or comply with following requirements:

(1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.

(2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

(a) Activity durations shall be total number of actual work days required to perform that activity.

(3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.

(4) District furnished materials and equipment, if any, identified as separate activities.

(5) Activities for maintaining Project Record Documents.

(6) Dependencies (or relationships) between activities.

(7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.

(b) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.

(c) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.

(8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.

(d) Include time for fabrication and delivery of manufactured products for the Work.

(e) Show dependencies between procurement and construction.

(9) Activity description; what Work is to be accomplished and where.

(10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of

the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

(2) Resources required (labor and major equipment) to perform each activity.

(3) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.

(4) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

(5) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.

(6) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.

(7) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.

(a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.

(b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.

(c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.

(d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.

(8) Activity durations shall be in Work days.

(9) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.

C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.

(1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

(2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:

(a) Clarifications of Contract Requirements.

(b) Directions to include activities and information missing from submittal.

(c) Requests to Contractor to clarify its schedule.

(3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.

(1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:

(d) Accept schedule and cost and resource loaded activities as submitted, or

(e) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.

(2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.

(3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.

(4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

(1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.

(2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.

(3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.

(1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.

(2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.

(1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.

(2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.

(3) Contractor shall plan on the meeting taking no less than four (4) hours.

C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.

D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.

(1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.

(2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.

E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.

B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.

C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.

D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.

E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.

B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.

C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.

D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT ANALYSIS ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIA which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the

Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIA's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

C. Contractor shall be responsible for all costs associated with the preparation of TIAs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIA.

D. Once agreement has been reached on a TIA, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIA, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.

B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.

C. Failure to request time, provide TIA, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.

D. No time will be granted under this Contract for cumulative effect of changes.

E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.

F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

G. If the Contractor does not submit a TIA within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.

B. Required Reports:

(1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

(2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.

(3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.

(4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.

(5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

(1) Activities by early start.

(2) Activities by late start.

(3) Activities grouped by Subcontractors or selected trades.

(4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.

B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:

(1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.

(2) Progress made on critical activities indicated on CPM Schedule.

(3) Explanations for any lack of work on critical path activities planned to be performed during last month.

(4) Explanations for any schedule changes, including changes to logic or to activity durations.

(5) List of critical activities scheduled to be performed next month.

(6) Status of major material and equipment procurement.

(7) Any delays encountered during reporting period.

(8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.

(f) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.

(g) Contractor shall explain all variances and mitigation measures.

(9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.

(10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

A. Project name and Project number.

B. Contractor's name and address.

C. Weather, temperature, and any unusual site conditions.

D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.

E. Worker quantities for its own Work force and for Subcontractors of any tier.

F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 33 00
SUBMITTALS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

1.02 SECTION INCLUDES:

A. Definitions:

(1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.

(2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.

(3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

(1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.

(2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.

(3) Contractor shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.

(4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.

(5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and “cuts” shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.

(6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.

(7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. Also certify that Contractor-furnished equipment can be installed in allocated space. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Submittals shall not be used as a means of requesting a substitution.

(8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.

(9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

(1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.

(2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.

(3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.

(4) Contractor may be assessed $100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Trade

Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule.

1.03 SHOP DRAWINGS:

A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.

B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.

C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.

D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.

E. District shall not review Shop Drawings for quantities of materials or number of items supplied.

F. District's and/or Architect’s review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District’s and/or Architect’s review of Shop Drawings is not to be construed as approving departures from Contract Documents.

G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.

H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.

I. Submitted drawings and details must bear stamp of approval of Contractor:

(1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.

(2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.

J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.

K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.

L. Shop Drawings must clearly delineate the following information:

(1) Project name and address.

(2) Specification number and description.

(3) Architect's name and project number.

(4) Shop Drawing title, number, date, and scale.

(5) Names of Contractor, Subcontractor(s) and fabricator.

(6) Working and erection dimensions.

(7) Arrangements and sectional views.

(8) Necessary details, including complete information for making connections with other Work.

(9) Kinds of materials and finishes.

(10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.

M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.

(1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.

(2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON-REPRODUCIBLE SUBMITTALS:

A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contract must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.

B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.

C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.

D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.

B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.

(1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.

(2) Samples must show full range of texture, color, and pattern.

C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.

D. Samples to be shipped prepaid or hand-delivered to the District.

E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.

F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect’s completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.

G. District's and/or Architect’s review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.

H. After a material has been approved, no change in brand or make will be permitted.

I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.

J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.

K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

(1) Size: As Specified.

(2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.

B. One (1) copy of product or materials data will be returned to Contractor with the review status.

C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.

D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.

E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.

F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.

G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.

H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.

I. District's and/or Architect’s review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 35 13.23
SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;

B. Special Conditions;

C. Drug-Free Workplace Certification;

D. Tobacco-Free Environment Certification;

E. Criminal Background Investigation/Fingerprinting Certification;

F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

A. Drug-Free Schools and Safety Requirements:

(1) All school sites and other District Facilities have been declared “Drug-Free Zones.” No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.

(2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.

(3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.

B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

(1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

(2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.

(3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

(1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.

(2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.

(3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.

(4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;

B. Special Conditions; and

C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").

(1) California Building Standards Administrative Code, Part 1, Title 24, CCR.

(2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).

(3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).

(4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).

(5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

(6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).

(7) California Green Building Standards Code (CALGreen), Part 11, Title 24, CCR.

(8) California Referenced Standards Code, Part 12, Title 24, CCR.

(9) State Fire Marshal Regulations, Public Safety, Title 19, CCR.

(10) Partial List of Applicable National Fire Protection Association (NFPA) Standards:

(a) NFPA 13 - Automatic Sprinkler System.

(b) NFPA 14 - Standpipes Systems.

(c) NFPA 17A - Wet Chemical System

(d) NFPA 24 - Private Fire Mains.

(e) (California Amended) NFPA 72 - National Fire Alarm Codes.

(f) NFPA 253 - Critical Radiant Flux of Floor Covering System.

(g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.

(11) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:

(a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.

(b) DSA IR A-7 — Project Inspector Certification and Approval.

(c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.

(d) DSA IR A-12 — Assistant Inspector Approval.

(12) DSA Procedures ("DSA PR")

(a) DSA PR 13-01 – Construction Oversight Process

(b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

(1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.

(2) Special inspections per Section 4-333(c).

(3) Deferred Approvals per section 4-317(g).

(4) Verified reports per Sections 4-336 & 4-343(c).

(5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.

(5) Duties of the Contractor shall be per Section 4-343.

(6) Duties of Project Inspector shall be per Section 4-334.

(7) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.

(1) Contractor shall submit the following to Architect for review and endorsement:

(a) Product information on proposed material/system supplier.

(b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.

(c) All other requirements as may be required by DSA.

(2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.

(3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.

(4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 45 00
QUALITY CONTROL

PART 1 – GENERAL

1.02 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;

B. Special Conditions.

1.02 RELATED CODES:

A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.

B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.

B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:

(1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.

(2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

(3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor

shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.

B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."

C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.

B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.

C. The District will pay for first inspections and tests required by the “CCR”, and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:

(1) Tests and observations for earthwork and paving.

(2) Tests for concrete mix designs, including tests of trial batches.

(3) Tests and inspections for structural steel work.

(4) Field tests for framing lumber moisture content.

(5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.

(6) Tests and observations of welding and expansion anchors.

D. The District may at its discretion, pay and then back charge the Contractor for:

(1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.

(2) Uncovering of work in accordance with Contract Documents.

(3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.

(4) Testing done off Site.

E. Testing and inspection reports and certifications:

(1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.

(a) The District;

(b) The Construction Manager, if any;

(c) The Architect;

(d) The Consulting Engineer, if any;

(e) Other engineers on the Project, as appropriate;

(f) The Project Inspector; and

(g) The Contractor.

(2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 – PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)

B. Slump Test
ASTM C 143

C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

(1) Compressive Strength:

(a) Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).

(b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.

(c) Concrete shall test the minimum ultimate compressive strength in twenty-eight 28 days, as specified on the structural drawings.

(d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.

(e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

D. Reinforcing, Steel

E. Structural Steel Per Title 24 and as noted:

(1) Material: Steel per Table in Title 24, Section 2712.

(2) Qualification of Welders (UBC Std. 27-6).

(3) Shop fabrication (Section 2712(d). Structural steel only).

(4) Shop and field welding (Section 2712(e)).

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.02 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Site Standards; and

D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

A. Electric Power and Lighting:

(1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.

(2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.

(3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.

(4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation:

(1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

(2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.

(3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

(1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.

(2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.

(3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

(1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.

(2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

(1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

(2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

(1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.

(2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

(1) Contractor shall provide trash removal on a timely basis**.** Under no circumstance shall Contractor use District trash service.

H. Field Office:

(1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.

(2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities:

(1)

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

(1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.

(2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District’s tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.

C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

D. Tree and Plant Protection:

(1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.

(2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.

(3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.

(4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

(5) Excavation around Trees:

(a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

(b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.

(c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.

(d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.

(e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.

(f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

(1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.

(2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

(1) Equipment and impact tools shall have intake and exhaust mufflers.

(2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

(1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.

(2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.

(3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.

(4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

(1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

(1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

(2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

(1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

(1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.

(2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

(1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.

(2) Sign Surface: Minimum 3/4-inch exterior grade plywood.

(3) Rough Hardware: Galvanized.

(4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

(1) Contractor shall fabricate to provide smooth, even surface for painting.

(2) Size: 4'-0" x 8'-0", unless otherwise indicated.

(3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.

(4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

SECTION 01 50 13
CONSTRUCTION WASTE MANAGEMENT

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Administrative and procedural requirements for the following:

(1) Salvaging non-hazardous construction waste.

(2) Recycling non-hazardous construction waste.

(3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of sixty-five percent (65%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:

(1) Material category.

(2) Generation point of waste.

(3) Total quantity of waste in tons or cubic yards.

(4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.

(5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.

(6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.

(7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

I. Qualification Data: For Waste Management Coordinator.

J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

K. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:

(1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

(2) Review requirements for documenting quantities of each type of waste and its disposition.

(3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

(4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

(5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

(1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

(2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

(3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

(4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

(5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

(6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION

3.01 PLAN IMPLEMENTATION:

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

(1) Comply with Document 01 50 00 for operation, termination, and removal requirements.

B. **[**Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.**]**

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

(1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

(2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

(1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

(2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

(1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.

(a) Inspect containers and bins for contamination and remove contaminated materials if found.

(2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

(3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.

(4) Store components off the ground and protect from the weather.

(5) Remove recyclable waste off District property and transport to recycling receiver or processor.

D. Packaging:

(1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

(2) Polystyrene Packaging: Separate and bag material.

(3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.

(4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

E. Site-Clearing Wastes: Chip brush, branches, and trees on site.

F. Wood Materials:

(1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.

(2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

(1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

(1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.

(2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF DOCUMENT

SECTION 01 66 00
PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;

B. Special Conditions.

1.02 PRODUCTS

A. Products are as defined in the General Conditions.

B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.

C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.

B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.

C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.

C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.

E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 71 23
FIELD ENGINEERING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;

B. Special Conditions;

C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:

(1) Survey work required in execution of the Project.

(2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.

B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:

(1) Make no changes or relocation without prior written notice to District and Architect.

(2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

(3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.

B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.

C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;

B. Special Conditions;

C. Hazardous Materials Procedures and Requirements;

D. Hazardous Materials Certification;

E. Lead-Based Paint Certification;

F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:

(1) Make several parts fit together properly.

(2) Uncover portions of Work to provide for installation of ill-timed Work.

(3) Remove and replace defective Work.

(4) Remove and replace Work not conforming to requirements of Contract Documents.

(5) Remove Samples of installed Work as specified for testing.

(6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

(7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.

B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:

(1) The work of the District or other trades.

(2) Structural value or integrity of any element of Project.

(3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.

(4) Efficiency, operational life, maintenance or safety of operational elements.

(5) Visual qualities of sight-exposed elements.

B. Contractor's Request shall also include:

(1) Identification of Project.

(2) Description of affected Work.

(3) Necessity for cutting, alteration, or excavations.

(4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.

(5) Description of proposed Work:

(a) Scope of cutting, patching, alteration, or excavation.

(b) Trades that will execute Work.

(c) Products proposed to be used.

(d) Extent of refinishing to be done.

(6) Alternates to cutting and patching.

(7) Cost proposal, when applicable.

(8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.

(9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.

B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.

B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.

B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.

B. Contractor shall provide devices and methods to protect other portions of Project from damage.

C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

A. With respect to performance, Contractor shall:

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

(2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.

(3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.

B. Contractor shall employ original installer or fabricator to perform cutting and patching for:

(1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.

(2) Sight-exposed finished surfaces.

C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.

E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with requirements of the Contract Documents and as required to match surrounding areas and surfaces.

F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

SECTION 01 76 00
ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;

B. Special Conditions.

PART 2 – PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.

B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 – EXECUTION

3.01 EXAMINATION:

A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.

B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.

B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.

D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.

B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.

C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.

E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.

D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.

B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.

B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.

C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.

B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

SECTION 01 77 00
CONTRACT CLOSEOUT & FINAL CLEANING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of Work;

B. Special Conditions;

C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

A. Contractor shall execute final cleaning prior to final inspection.

B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.

C. Contractor shall clean equipment and fixtures to a sanitary condition.

D. Contractor shall replace filters of operating equipment.

E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.

F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.

G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

A. Contractor shall legibly mark each item to record actual construction, including:

(1) Measured depths of foundation in relation to finish floor datum.

(2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.

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

(4) Field changes of dimension and detail.

(5) Details not on original Contract Drawings

(6) Changes made by modification(s).

(7) References to related Shop Drawings and modifications.

B. Contractor will provide one set of Record Drawings to District.

C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.

C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.

E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 91 00
COMMISSIONING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

C. Submittal Procedures: Procedures for submittal of product data and quality assurance submittals.

D. Closeout Procedures: General closeout requirements.

E. Sustainable Design Closeout Documentation: Closeout requirements relating to sustainable design certification.

F. Appropriate Sections of Divisions 15 and 16 specify closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.

1.02 SECTION INCLUDES

A. Equipment and system commissioning, including the following:

(1) Completion of commissioning procedures on specific equipment and systems as indicated under "Related Documents and Provisions" above.

(2) Verification of operational and functional performance of specific equipment and systems for compliance with the "Design Intent" as described in the "Related Documents and Provisions" indicated above.

1.03 REFERENCES

A. [ASTM International (ASTM)]:

(1) [ASTM X000-00, Title of Standard].

(2) [ASTM X000-00, Title of Standard].

B. [Name of Organization (Organization Acronym)]:

(1) [Acronym, Standard or Document Number and Date of Issue, Title of Standard or Document].

1.04 DEFINITIONS

A. Commissioning: The process of verifying that the installation and performance of selected building systems meet or exceed the specified design criteria and therefore satisfy the design intent.

B. Deficiencies and Resolutions List: List of noted deficiencies discovered as result of commissioning process.

C. Final Commissioning Report: Overall final commissioning document, prepared by the Systems Commissioning Authority, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the deficiencies and resolutions list indicating that all issues discovered through the commissioning process have been verified as resolved.

D. Functional Performance Testing Process: Documented testing of system parameters, under actual or simulated operating conditions.

E. Pre-Commissioning Checklists: Installation and start-up items to be completed by the appropriate party prior to operational verification through functional testing.

F. Physical Inspection Process: On-site inspection and review of related system components for conformance to the specifications.

G. Systems Commissioning Authority (SCA): Independent entity under contract directly with the District or District's Representative responsible for performing the specified commissioning procedures.

1.05 DESCRIPTION OF CONSTRUCTION PHASE COMMISSIONING PROCESS

A. As soon as practicable after the [bid award] [start of construction] the Systems Commissioning Authority (SCA) will conduct a pre-installation commissioning "kick-off" meeting with the contractors. Parties directly affected by the commissioning work will be required to attend. The SCA will explain the commissioning process in detail, and identify specific commissioning related responsibilities of the various parties.

B. Commissioning status meetings will be scheduled to occur during construction to monitor progress and to help facilitate the commissioning process. Contractor representatives will be required to attend these meetings.

C. Once contractors have provided the SCA with written verification indicating completion of installation and startup procedures, the SCA will conduct an on-site physical inspection of the specific systems and equipment.

D. Upon confirmation of system readiness, the SCA will schedule with the contractors to perform functional compliance with the project specifications and drawings. The SCA will oversee the process and will provide the format and documentation for these tests.

E. Deficiencies noted during these tests will be documented on the Deficiencies and Resolutions list. When corrected, issues will be resolved at the time of discovery. The responsible Contractor will resolve all other issues at a later date. All deficiencies will be noted by the SCA as either resolved or pending resolution.

F. The construction commissioning process will be complete when all noted deficiencies have been corrected, proved to be compliance with the project specifications or otherwise resolved to the satisfaction of the District.

1.06 SYSTEMS COMMISSIONING AUTHORITY'S DUTIES AND RESPONSIBILITIES

A. Meet and communicate with the District's representatives, Construction Manager, if any, Contractors, equipment manufacturers' representatives, Architect, Engineer and others as needed, to facilitate the commissioning process.

B. Review commissioning related specifications, submittals and construction documents. Communicate noted deficiencies and concerns to the District, Architect and Engineer.

C. Develop detailed and specific functional testing procedures for equipment and systems to be commissioned.

D. Develop testing, adjusting and balancing (TAB) specifications. Oversee the TAB process.

E. Perform site inspections and verify contractor readiness for the functional testing process. Document deficiencies for future resolution.

F. Witness contractor performed functional testing process as appropriate to verify contractor compliance with the functional testing procedures. Document deficiencies for future resolution.

G. Provide the District, Construction Manager, Contractor, Architect, and Engineer with a Final Commissioning Report to document the commissioning process and to verify that the commissioning process is complete.

1.07 DUTIES AND RESPONSIBILITIES OF OTHERS FOR COMMISSIONING

A. The commissioning process will require the active participation of persons qualified to represent the District, Mechanical Engineer, Electrical Engineer, General Contractor, Equipment Manufacturers' Representatives, Mechanical Contractor, HVAC Contractor, Controls Contractor, TAB Contractor, Electrical Contractor, and other specific subcontractors, as deemed appropriate. The SCA will witness the final functional performance commissioning process. Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.

B. Contractor will assure the participation and co-operation of Subcontractors, as required to complete the commissioning process.

C. The District will assure the participation of their chosen representatives as required to complete the commissioning process.

D. The Architect will assure the participation of necessary representatives from the Design Team as required to complete the commissioning process. Design team members will provide prompt replies to requests for information issued during the commissioning process.

E. It is the Contractor's specific responsibility to complete their respective start-up and checkout procedures, and to insure the complete readiness of equipment and systems, prior to the start of the functional performance testing phase. The SCA shall request written confirmation of system readiness for performance testing, from the appropriate subcontractor or Contractor. Once the SCA is provided with confirmation of all related

systems completion, the actual date and times for the functional performance testing process will be confirmed. Contractors shall provide sufficient time, and qualified representatives, to complete this process.

F. After a second failure of a system to successfully meet the criteria as set forth in the functional performance testing process, the Contractor shall reimburse the District for all costs associated with any additional re-testing efforts made necessary due to remaining Contractor related system deficiencies previously reported by the Contractor as corrected. These costs shall include salary, travel costs and per diem lodging costs (where applicable) for the SCA. Rates to be used:

Mileage: $0.35/Mile
Per Diem Lodging: $115.00/Day
Salary: $100.00/Hour

G. Training on related systems and equipment operation and maintenance shall only be scheduled to commence after final performance commissioning is satisfactorily completed, and systems are verified to be 100 percent complete and functional.

1.08 SUBMITTALS

A. Submit under provisions of Document 01 33 00 Submittals.

B. Pre-Commissioning Checklist Forms: Submit two (2) signed copies of the checklist forms to the SCA upon completion of all listed items.

C. Equipment Manufacturer's Startup Forms: Submit two (2) completed copies of the installation and startup checklists provided by the equipment manufacturers to the SCA.

D. Test Reports: Submit two (2) copies of test reports for equipment and systems to the SCA.

E. Control Schematics: Submit two (2) copies of the control schematics for equipment, systems, and subsystems to the SCA.

F. Inspection Records: Submit two (2) copies of the records of inspections for code compliance, and approved permits and licenses to operate the equipment and systems to the SCA.

G. Operating Data: Submit two (2) copies of equipment and system operating data including all necessary instructions to facilitate operation to specified performance standards to the District.

H. Maintenance Data: Submit two (2) copies of equipment and system maintenance data including all necessary information required to maintain the equipment and systems in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 22 05 00
COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section provides the basic plumbing requirements that apply to the Work of Division 22.

B. Related Requirements:

1. Division 01: General Requirements.

2. Division 22: Plumbing

1.02 REGULATORY REQUIREMENTS

A. Current federal Safe Drinking Water Act (SDWA) regulations require the furnishing of lead-free pipe, solder, and flux in the installation or repair of plumbing in non-residential facilities connected to public drinking water systems. Under this regulation, solders and flux are considered lead-free when they contain 0.2 percent lead or less. Under California regulations pipes and pipe fittings are considered lead-free when they contain 0.25 percent lead or less as defined in California Assembly Bill 1953 (AB 1953). No pipe, pipe fittings, or any other fitting or fixture intended to convey or dispense water for human consumption by drinking or cooking is allowed in the domestic plumbing system, if they do not meet the low lead definition of AB 1953. Weighted average lead content of the wetted surface area of pipes, fittings and fixtures may not exceed 0.25 percent.

1. Provide lead-free water pipe, solder, and flux materials that meet the standards as outlined by the federal SDWA regulations and California AB 1953 if installed in drinking water system.

2. Collect pipe, solder, and flux material samples as required by the Project Inspector. Test samples shall be delivered to an Owner designated testing laboratory for testing of lead content.

a. Test samples for lead content by the atomic absorption spectrophotometry method.

3. Materials found not conforming to SDWA and California AB 1953 regulations shall be deemed defective Work and shall be replaced with lead-free materials.

4. Comprehensive testing of the remaining materials for their lead content shall be performed as required by the Project INSPECTOR.

A. Materials, fabrication, equipment, and installation shall comply with industry standards and code requirements. Where manufacturer's recommendations exceed industry standards, the manufacturer's recommendation shall establish the minimum standard. As a minimum, standards from the following organizations shall apply:

1. ANSI - American National Standards Institute.

2. ASME - American Society of Mechanical Engineers.

a. ASME Boiler and Pressure Vessel Code.

b. ASME B31 - Standards for Pressure Piping.

3. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers.

4. ASTM - American Society for Testing and Materials.

   a. ASTM A53 Specification for Welded and Seamless Pipe.

5. AWWA - American Water Works Association.

6. CSA - Canadian Standards Association.

7. FM Global - Factory Mutual Global

8. IAPMO - International Association of Plumbing and Mechanical Officials.

9. NFPA - National Fire Protection Association.

10. OSHA - Occupational Safety and Health Administration.

11. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association.

12. UL - Underwriters Laboratories Inc.

13. Intertek (ETL Certification).

B. Materials, fabrication, equipment, and installation shall comply with federal, state, and local codes including, but not limited to, the following:

1. CBC, California Building Code, and CMC, California Plumbing Code.

   a. Latest edition as adopted by the City of Oxnard and the State of California including amendments effective on the Effective Date of the Contract.

2. California Code of Regulations, Title 8, Industrial Relations, Division 1, Chapter 4, Division of Industrial Safety.

3OSHA - Occupational Safety and Health Administration.

4. CDPH - California Department of Public Health.

5. SCAQMD - South Coast Air Quality Management District.

C. Specifications or Drawings shall not be construed to permit deviation from the requirements of governing codes unless approval has been obtained from legally constituted authorities having jurisdiction, and the Architect. The Contract Documents may contain more stringent requirements than those legally required.

D. Permits and Fees: Refer to the General and Supplementary Conditions.

1.03 SUBMITTALS

A. Provide submittals in accordance with 01 33 00: Submittal Procedures and with specific requirements of Division 22 sections, as applicable.

B. The above information shall become the basis for inspecting and testing materials and actual installation procedures performed in the Work.

C. Shop Drawings: Submit one additional copy when control diagrams having line voltage connections are indicated. Shop Drawings shall be specifically prepared for the Work of this Project. Drawings prepared in accordance with requirements of Section 01 31 13: Project Coordination and Section 01 33 00 may be provided by the Architect to serve as a background for the Shop Drawings. Shop Drawings shall comply with the requirements of Section 01 31 13 and Section 01 33 00 and shall indicate at a minimum:

1. Complete system layout of equipment, components, plumbing fixtures, piping, indicating service clearances, and pipe sizes, fitting types and sizes and pipe elevations, distances

of pipes and equipment from building reference points and hanger support locations. The above items shall be coordinated on the shop drawings according to the requirements of Section 01 31 13.

2. Schedule and description of equipment, piping and fittings.

1.04 PROJECT RECORD DOCUMENTS

A. Comply with provisions of Section 01 77 00: Contract Closeout.

B. Project Record Drawings:

1. Provide a complete set of plumbing and fire protection drawings in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks and plotter pen color/line thickness settings on CD-ROM. Also submit one set of full size reproducible plots on vellum and 3 sets of prints.

2. Before Contract Completion, deliver corrected and completed prints to the OAR. Delivery of project record documents to the OAR does not relinquish responsibility of furnishing required information omitted from project record documents.

C. Operation and Maintenance Manuals:

1. Submit two copies of operation and maintenance manuals in required form and content. If no revisions are required, furnish one additional copy. If revisions are required, one copy shall be returned with instructions for changes; perform such changes and return three copies of manuals. Manuals shall be bound in accordance to Section 01 77 00. Deliver manuals to the OAR. Submit an electronic copy of the entire manual in PDF file format.

2. Contents of Manual:

a. Title sheet with Project name, including names, addresses and telephone number of Contractor, installer, and related equipment suppliers.

b. Manufacturer's operating instructions including, but not limited to, the following:

1) Identification of components and controls.

2) Trouble shooting checklist and guidelines.

3) Recommendations for optimum performance.

4) Warnings and safety precautions on improper or hazardous operational procedures or conditions

c. Manufacturer's product data and parts and maintenance booklet for each item of equipment furnished under Division 22 that includes the following as a minimum:

1) Manufacturer’s model, identification and serial numbers.

2) Exploded view of assembly drawings identifying each component or part with the relevant part number.

3) Directory of manufacturer’s representatives, service contractors and part distributors.

4) Maintenance and trouble-shooting instructions, including schedule for preventive maintenance, periodic inspection and cleaning criteria.

d. Project Record Drawings: Complete set of plumbing, fire protection and control system drawings in 50 percent reduced print format shall be furnished with the manual. Submit the above record drawings on CD-ROM in AutoCAD and, if available, BIM, complete with external reference drawings, fonts, blocks, and plotter pen color/line thickness settings.

e. Testing, Adjusting, and Balancing reports: Submit as specified in Section 23 05 93.

f. South Coast Air Quality Management District (SCAQMD) permits to install and operate boilers, water heaters and other fuel burning equipment and third-party source test reports as required by SCAQMD to allow start-up and operation of equipment.

g. Ventura County industrial waste permits.

h. Valve directory complete with location, function, size, and model of each valve with reference to the project record drawings.

i. Equipment and component identification chart complete with location, function, size, and model of each equipment or component with reference to the project record drawings.

1.05 COORDINATION

A. Contract Documents indicate extent and general arrangement of Work under Division 22. Contractor shall coordinate work in accordance with Section 01 31 13 requirements and make adjustments as required to provide maximum headroom, a neat arrangement to keep passageways and openings clear to provide accessibility and provisions for maintenance, and to meet code requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage: Deliver materials to Project site in their original unopened containers with labels intact and legible at time of delivery. Store in strict accordance with manufacturer's recommendations.

B. Do not store plastic pipe or materials in direct sunlight.

1.07 PRELIMINARY OPERATION

A. OAR may require any portion of plumbing Work to be operated before Substantial Completion. Such operation shall be in addition to regular tests, demonstrations and instructions required under the Contract Documents, and shall be performed as required.

B. Notify the INSPECTOR at least 24 hours in advance of lighting or re-lighting pilots.

1.08 TRAINING OF OWNER PERSONNEL

A. Training of Owner’s personnel shall include:

1. A minimum of 4 hours of on-site overview of the overall Plumbing System.

2. Refer to Division 22 sections for specific training on each of the components of the Plumbing System.

B. Contract shall include the cost of training Owner operation and maintenance personnel in operating, adjusting, maintenance, trouble-shooting, and Project site repair of each component, equipment, or system provided under this Contract.

C. Operational and maintenance training shall be conducted on the Project site, unless indicated otherwise.

D. Upon completion of Owner training, a completion certificate indicating the nature of the training and a description of the systems, complete with equipment and component lists shall be issued to each trainee. The certificate should be issued in duplicate with one copy retained by OAR.

E. An attendance sheet with the names and signatures of all participants attending the training shall be submitted to the OAR and kept as part of the project documents.

1.09 GUARANTEES AND DAMAGE RESPONSIBILITY

A. Sound of water flowing in piping shall not be transmitted to building structure. Operation of mechanical system shall not produce operational sounds that can be heard outside of rooms enclosing apparatus or equipment.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Unless otherwise specified, materials and equipment shall be new, in good and clean condition. Equipment, materials, and components shall be of the make; type and model number noted on Drawings or specified. Pieces of equipment of the same type shall be by the same manufacturer.

B. Whenever an item is listed by a single proprietary name, with or without model number and type, it shall be for purpose of design only, to indicate characteristics and quality desired. Proprietary designation listed on Drawings, or listed first in Specifications, is used as a basis for design to establish a standard for quality and performance and space requirements.

C. Equipment and materials indicated or required to be installed outdoors shall be of the type that is designed, manufactured, listed or approved by authorities having jurisdiction for outdoor installation by being resistant to the adverse effects of weather. The additional protective measures against outdoor weather required by the manufacturers' installation instructions and prevalent practice shall be provided.

D. For substitution of materials or products, refer to the General Conditions.

PART 3 – EXECUTION

3.01 SERVICE INTERRUPTIONS, OFF-SITE, GAS AND WATER

A. Schedule Work so there shall be no service interruptions of existing systems or systems during normal hours of operation of affected systems and facilities.

B. When service interruptions are mandatory, arrange in advance with the OAR as to time and date of such interruptions.

C. Systems, which are interrupted, shall be returned back into operation in such manner that they will function as originally intended.

3.02 CUTTING, NOTCHING, AND BACKING

A. Conform to California Building Code, Title 24, Part 2, for notches and bored holes in wood and for pipes and sleeves embedded in concrete and for cuts in steel, as detailed on structural Drawings.

B. Where pipes pass through, or are located within one inch of any construction element, install a resilient pad, ½ inch thick minimum, to prevent contact.

C. Furnish provisions for recesses, chases, and accesses and provide blocking and backing for proper reception and installation of plumbing Work.

3.03 LOCATION OF PIPING AND EQUIPMENT

A. Location of piping, apparatus and equipment indicated on the Drawings is approximate and shall be altered to avoid obstructions, preserve headroom, and provide free and clear openings and passageways.

B. Trenches parallel to footings shall not be closer than 18 inches to the face of footings and shall not be below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footing.

C. Pipe in tunnels shall be installed close to one side of tunnel to provide maximum space for passage. Pipe shall not be installed through crawl hole unless otherwise specified or detailed on Drawings.

D. Place equipment in locations and spaces indicated, disassemble and/or reassemble equipment as required by Project conditions.

3.04 TESTS AND TESTING

A. Tests shall be as required under the applicable sections of Division 22, including this Section.

B. Additional tests may be required in the case of products, materials, and equipment if:

1. Submitted items are altered, changed, or cannot be determined as exactly conforming to the Contract Documents.

2. Performance testing and results may also be required on certain items which are as specified, including fan, and pump performance.

C. Piping Tests:

1. Perform tests required to demonstrate that operation of plumbing systems and their parts are in accordance with Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be performed in presence of the Inspector, and representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required results are provided.

2. If required tests are not performed, Owner may provide in accordance with the Contract Documents.

3. Pressure gauges furnished in testing shall comply with CPC. Air shall be bled from lines requiring hydrostatic or water tests.

4. Systems shall be pressure-tested in accordance with pipe testing schedule below. Pipe test shall indicate no loss in pressure after a minimum duration of 4 hours at test pressures indicated. Where local codes require higher test pressures than specified herein for fire sprinkler systems, local codes shall govern.

5. Fuel gas lines shall be first tested with piping exposed, before backfilling trenches or lathing; second with piping in finished arrangement, backfilled and paved where required, and walls finished.

6. Piping systems may be tested as a unit or in sections, but entire system shall successfully meet requirements specified herein, before final testing by the Inspector.

7. Repair of damage to pipes and their appurtenances or to any other structures resulting from or caused by these tests, shall be provided.

D. Pipe Testing Schedule:

System Tested	**Test Pressure (psig)**	**Test With:**
Durham system, glass or plastic acid waste, vent and roof drain (except pipes running under a slab or underground)	Fill with water to top of highest vent; allow to stand two hours, or longer, as required by Inspector. Minimum head required for any joint shall be 10 feet in building.	Water
Cast-iron soil, waste and interior downspout, condensate drain from air conditioning equipment	10 feet of water, vertically	
Storm water disposal lines	Running water test	Water

Vacuum pump or condensate pump discharge and condensate return piping	150	Water
Domestic water piping	200	Water
Standpipes, wet or dry	300	Water
Fire sprinkler piping	200	Water
Gas piping(steel threaded or plastic)	60 (both tests)	Air
Gas piping (steel welded)	100 (both tests)	Air
Gas welding station	1-1/2 Working pressure 100 min.	Dry nitrogen
Compressed air piping	175	Air

E. Equipment Performance Assurance Tests:

1. Before operating any equipment or systems, a thorough check shall be performed to determine that systems have been flushed and cleaned as required and that equipment has been properly installed, aligned, lubricated, and serviced. Factory instructions shall be checked to verify installations have been completed and recommended lubricants have been installed in bearings, gearboxes, crankcases, and similar equipment. Particular care shall be furnished in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Equipment shall also be checked for damage that may have occurred during shipment, after delivery, or during installation. Damaged equipment, products, and materials shall be replaced or repaired as required.
2. Upon completion of the above, adjust the system settings to within normal operating conditions to prevent the system from being damaged upon start-up.
3. Run-test the equipment after start-up for five consecutive days. Tests shall include operation of all equipment and systems for a period of not less than two 8 hour periods at 90 percent of the full specified capacities.
4. Equipment Start-up Reports: For each equipment or system on which start-up is performed, submit 8 copies of start-up report for review by the Architect.
    a. The start-up report shall include the manufacturer's standard start-up form completed and signed by the start-up technician.
5. Provide, maintain, and pay costs for equipment, instruments, and operating personnel as required for specified tests.
6. Provide electric energy and fuel required for tests.
7. Final adjustment to equipment or systems shall meet specified performance requirements.
8. Equipment, systems, or Work deemed defective during testing shall be replaced or corrected as required. Test until satisfactory results are provided.

F. Specific Coordinated Plan for Test and Balance:

1. Provide a narrative of the operational intent that clearly describes the function and sequence of operation of each component, equipment, or system installed. Instruct designated Owner personnel in the operation of the installed systems.
2. Prior to final test and balance, plumbing equipment and systems shall be operated and tested as indicated in Article 3.04.F above to demonstrate satisfactory overall operation of the installed systems.

3. Welding performed as part of this Division may be subject to radiographic inspections at random in accordance with requirements specified in Section 22 05 13: Basic Plumbing Materials and Methods.

3.05 NOISE AND VIBRATION REDUCTION

A. Correct noise or vibration caused by plumbing systems. Provide all necessary adjustments to specified and installed equipment and accessories to reduce noise to the lowest possible level

B. Correct noise or vibration problems caused by failure to install work in accordance with Contract Documents. Include all labor and materials required as a result of such failure. Pay for re-testing of corrected noise or vibration problems by the project acoustical consultant including travel, lodging, test equipment expenses, etc.

3.06 PROTECTION, CARE AND CLEANING

A. In addition to storage criteria of the General Conditions, and provisions under Section 01 50 00: Construction Facilities and Temporary Controls, the following shall be provided:

1. Provide for the safety and good condition of materials and equipment until Substantial Completion. Protect materials and equipment from damage.

2. Protect installed Work.

3. Replacements: In case of damage, immediately provide repairs and/or replacements as required.

4. Protect covering for bearings, open connections to tanks, pumps, compressors and similar equipment.

5. Interior of piping shall be maintained free of dirt, grit, dust, and other foreign materials.

6. Fixtures, piping, finished brass or bronze, and equipment shall have grease, adhesive, labels, and foreign materials removed. Chromium, nickel plate, polished bronze or brass Work shall be polished. Glass shall be cleaned inside and out.

7. Before initial start-up and again before Substantial Completion, piping shall be drained and flushed to completely remove grease and foreign matter. Pressure regulating assemblies, traps, strainers, boilers, flush valves, and similar items shall be thoroughly cleaned. Tag system with an information tag listing responsible party and date of element, before initial start-up and again before Substantial Completion. Compressed air, oil, and gas piping shall be blown out with oil-free compressed air or inert gas.

END OF SECTION

SECTION 22 05 13
BASIC PLUMBING MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. This Section prescribes basic materials and methods generally common to the Work of Division 22.

B. Related Requirements:

1. Division 01: General Requirements.
2. Division 22: Plumbing.

1.02 SUBMITTALS

A. Provide in accordance with Division 01, Section 22 05 00 and specific requirements of each section of Division 22.

B. Types of welding rods to be used.

1.03 QUALITY ASSURANCE

A. Standards: Comply with applicable national, state, and local codes and standards: ASTM, ASME, and ANSI. Federal Specifications, AWWA, SISPI, NFPA, FM, UL, CPC (California Plumbing Code), CMC (California Plumbing Code), CSA.

B. Conform to provisions of Section 22 0500: Common Work Results for Plumbing.

C. Manufacturer of plumbing products must be third-party certified to ANSI/NSF Standard 61, Section 9 certification, and ANSI/NSF 372 to demonstrate compliance with the federal requirements for lead contribution to drinking water, the Safe Drinking Water Act SDWA, and the California Health and Safety Code Section 116875.

D. Qualifications of Manufacturer: Products used in the Work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production as reviewed by the ARCHITECT.

1.04 COORDINATION

A. Coordinate related Work in accordance with provisions of Section 01 31 13: Project Coordination.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide the following products if they are indicated in the Contract Documents or if they are required for the proper installation, function or operation of equipment, systems or components indicated in the Contract Document.

B. Provide the following products as a complete assembly with required accessories for a complete and functioning entity in compliance with governing codes and applicable standards as specified in Section 22 05 00, manufacturer's instructions or as required.

1. Omission of minor details in the Contract Documents does not waive and/or otherwise relinquish compliance with the above requirements.

2.02 MANUFACTURERS AND MATERIALS

A. Ball Valves: 2-inch and smaller:

BV-1: Class 150, 600 psi, Bronze, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded or solder ends.

Manufacturer: NIBCO T-685-66-LF/S-685-66-LF, Hammond UP8303A/UP8513, Milwaukee UPBA400S/ UPBA450S, or equal.

BV-2: Class 150, 600 psi, Stainless Steel, CWP two piece construction with reinforced TFE seats, full port, adjustable packing gland, (no threaded stem designs allowed), threaded or solder ends.

Manufacturer: NIBCO T-585-S6-R-66-LL, Milwaukee BA260, or equal.

Ball Valves in Insulated Piping: Use extended operating handle of non-thermal conducive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation and memory stops that are fully adjustable after insulation is applied. NIBCO Nib-Seal Handle.

B. Butterfly Valves:

BFV-1 Centerline Series A, 200 psi CWP tight shut-off.

1. Body: Lug type ductile iron. Suitable for bi-directional dead-end service at rated pressure without use of downstream flange.
2. Disc: Bronze, or aluminum bronze.
3. Stem: One or two-piece, 400 series stainless steel.
4. Seat and O-Rings: EPDM.
5. Upper and Lower Stem Bearings: Copper alloy or non-metallic material.
6. Operators: Valves 6 inches and smaller, with lever handle. Valves 8 inches and larger, with manual gear operator and disc position indicator.
7. Manufacturers:
   a) Valves 2.5 to 6-inch: Milwaukee ML 233E, Hammond 6411-03, or equal.
   b) Valves 8-inch and larger: Milwaukee ML 333E, Hammond 6411-03, NIBCO LD 2000, or equal.

C. Check Valves:

1. Bronze, 2-inch and smaller:

   CHV-1: 200 psi, CWP horizontal swing, Y pattern, renewable seat and disc, threaded ends.

   Manufacturer: NIBCO T-413-Y-LF, Milwaukee UP-509, Hammond UP-904, or equal.

   CHV-2: 200 psi, CWP, bronze body, horizontal swing, Y pattern, renewable seat and disc, solder ends.

   Manufacturer: Nibco S-413-Y-LF, Hammond Up-943, or equal.

   CHV-3: Class 125, 200 psi, swing check, bronze body, Teflon disc, soldered ends.

   Manufacturer: Stockham B-310TY, Crane 1340, NIBCO S-413-Y, Milwaukee 1509-T, Hammond IB-912, or equal.

2. Cast Iron 2 1/2-inch and larger:

   CHV-4: Class 125, 200 psi, CWP, IBBM, renewable seat and disc, bolted cap, threaded ends:

   Manufacturer: Crane 372, Stockham G-927, NIBCO T-918-B, or equal.

   CHV-5: Special low-pressure check valve for installation in gas lines.

   Manufacturer: Circle Seal Products Co., 119B-xPP; 0-15 psi; #1:1/8 inch IPS; #2:1/4 inch IPS #3:3/8 inch IPS.

D. Earthquake Valve:

EQV-1: Mechanically triggered by seismic movement, complying with state of California seismic response specifications, UL listed and certified by D.S.A. Size and pressure as required or indicated on Drawings. (Minimum 1/4 psi, maximum 10 psi. Earthquake valve shall shut off gas automatically during an earthquake to prevent an explosion or fire. Valve shall be Koso California seismic valve, or equal.

1. Not sensitive to vibrations caused by passing trucks or accidental bumping.
2. Sensitive to wide amplitude G's only. Preset at factory for the correct G-rating.
3. Positive sealing from minus 10 degrees F. to 150 degrees F.
4. Visual open-close indicator.
5. Manual reset.
6. Plumb line for mounting.
7. Tripping mechanism has non-creeping rolling latch.
8. Install valve per manufacturer’s recommendations only.

E. Expansion Tank:

ET-1: Pressurized, vertical, steel expansion tank for potable water systems with FDA approved, replaceable, heavy duty, butyl rubber blend diaphragm, polypropylene lined dome, 1/2 inch, 3/4 inch, 1 inch or 1 ½-inch NPT system connection, 1/2 inch or 3/4 inch drain, 0.302 inch-32 standard automobile tire valve type charging connection, lifting rings and a floor mounting skirt for vertical installation. The tank must be constructed in accordance with Section VII of the ASME Boiler and Pressure Vessel Code and stamped for 125 psi working pressure. The tank must be also rated for a continuous working temperature of 240 degrees F. Provide weather and rust resistant coating.

Manufacturer: Bell and Gossett, Wheatley, Taco, Amtrol, or equal.

F. Flow Control Valve – Manual:

FC-1: Flow control valves: Bell and Gossett Series CB circuit setter balancing valve, line size, with integral pointer (to register degree of valve opening), differential pressure meter connections with built-in check valves and lockable memory stops. Manufacturer: Armstrong ARMFLO circuit-balancing valves, series CBV, or equal.

G. Gate Valves:

1. Bronze, 2-inch and smaller:

GV-1: Class 125, 200 psi, CWP, bronze body and bonnet, non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends:

Manufacturer: NIBCO T-113-LF, Milwaukee UP105-P2, Hammond UP645, or equal.

GV-2: Same as GV-1, except solder ends:

Manufacturer: NIBCO S-113-LF, Milwaukee UP115, Hammond UP647, or equal.

2. Bronze, 2-1/2-inch and larger:

GV-3: Class 125 250 psi CWP iron body, flanged ends, bolted bonnet with wheel handle, resilient wedge, non-rising stem.

Manufacturer: NIBCO F-619-RW, or equal.

GV-4: Class 125, 250 psi CWP iron body, flanged ends, bolted bonnet with 2-inch operating nut, resilient wedge, non-rising stem, fusion bonded epoxy coated.

Manufacturer: NIBCO F-619-RW-SON, or equal.

GV-5: Class 250, 250 psi, CWP, O S and Y, IBBM, resilient seat gate valve, flanged ends.

Manufacturer: Watts 408-OSYRW, or equal.

GV-6: Class 125, 200 psi CWP, bronze body and bonnet non-rising stem, inside screw, screw-in bonnet, solid disc, threaded ends.

Manufacturer: Hammond IB645, Crane 1701, Milwaukee 105, American 3F, NIBCO T-113, or equal.

H. Globe Valves:

1. Bronze, 2-inch and smaller:

GLV-1: Class 125, 200 psi, CWP, screw-in bonnet, Teflon disc, threaded ends:

Manufacturer: Milwaukee UP502-P2, Hammond UP440-P2, or equal.

GLV-2: Class 125, 200 psi, CWP, screw in bonnet, Teflon disc, soldered ends.

Manufacturer: Hammond UP418, Milwaukee UP1502, or equal.

I. Piping and fittings:

1. Piping shall be continuously and permanently marked with manufacturer's name, type of material, size, pressure rating, and the applicable ASTM, ANSI, UL, or NSF listing. On plastic pipe, date of extrusion must also be marked.

2. Underground non-ferrous pressure pipes shall be installed with proper color tracer wires. Refer to color code provisions in Section 22 05 53: Plumbing Identification.

P-1: Cast iron: Hubless, service weight, ASTM A888, CISPI 301, conforming to CISPI 310 and installed in accordance to IAPMO IS 6.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1a: Cast iron, soil or waste no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 2 bands for size 1 ½-inch thru 4-inch, IAPMO, ASTM C 564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1b: Cast iron, soil or waste, Heavy-duty no-hub coupling with neoprene gaskets, stainless steel corrugated shields and stainless steel clamps. 4 bands for size 5-inch thru 10-inch. IAPMO, ASTM C564 and CISPI 310.

Manufacturer: American Foundry, Tyler, AB & I, or equal.

PF-1c: Same as PF-1a with Heavy Duty Husky SD 4000 Coupling and stainless steel clamps. IAPMO, ASTM C564 and CISPI 310.

P-2: Galvanized steel, Schedule 40, ASTM A53.

Manufacturer: US Steel or equal.

PF-2: Malleable iron, Class 150, threaded, galvanized, beaded, ANSI B 16.3.

Manufacturer: Stockham, Stanley Flagg, Grinnell, or equal.

P-3: Copper drainage tube, inside structure and above grade. Type DWV hard temper, ASTM B 306.

Manufacturer: Mueller, Anaconda, Cerro Brass, Cambridge-Lee, Halstead, or equal.

PF-3: Cast brass drainage fittings ASA B 16.23, ASTM B 42.

Manufacturer: Mueller Brass, Nibco, Stanley Flagg, Lee Brass, or equal.

P-4: Copper water tube, Type L hard, ASTM B88. (For above ground use only.)

Manufacturer: Mueller, Cambridge-Lee, Halstead, or equal.

PF-4a: Copper Press-Connect pressure fittings, comply with ASME B16.51 “Copper Alloy Press-Connect Pressure Fittings”, with Ethylene Propylene Diene Monomer, EPDM O-Ring Seal in each end. Fittings with the sizes of 2-1/2” and larger shall have cross-section Grab Rings and separation rings.

Manufacturer: Viega, Mueller Industries, Apollo, or equal.

PF-4b: Wrought copper - solder type ANSI B 16.22.

Manufacturer: Mueller Brass, Nibco, Lee Brass, or equal.

PF-4c: Grooved end type– ASTM B75 or B152 and ANSI B16.22 wrought copper, bronze sand casting per ASTM B584-87 copper alloy CDA 836 per ANSIbB16.18. Couplings shall be CTS style 606 supplied with angle pattern bolt pads for rigidity, coated with copper coated alkyd enamel. Gaskets shall be pre-lubricated Flush seal type.

Manufacturer: Victaulic, or equal.

P-5: Copper water tube, Type K hard, ASTM B88.

Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

P-6: Type 316L Stainless steel chemical waste pipe, marked with manufacturer's identification and fittings. Manufacturer's representative shall instruct installers and certify them for joint installation. Piping system shall be provided with a five-year manufacturer’s material warranty.

Manufacturer: Blucher-Josam, Viega, or equal.

PF-6a: Type 316L Stainless Steel Mechanical joints. Stainless steel joint for chemical waste piping systems including drain or bottle traps.

Manufacturer: Blucher-Josam, or equal.

PF-6b: Type 316L Stainless Steel Press Fittings. For chemical waste piping systems including drain, vent or bottle traps, provide with EPDM seals. For compressed air piping systems, provide with HNBR seals. Manufacturer's representative shall instruct installers and certify them for joint installation.

Manufacturer: Viega, or equal.

P-7: Black steel pipe, Schedule 40, ASTM A53, Type E, ERW.

Manufacturer: US Steel, or equal.

PF-7a: Malleable iron, Class 125, ANSI B 16.3, threaded or welded Schedule 40 black steel for 2-inches and below and welded for 2 ½-inch and above.

Manufacturer: Stockham, or equal.

PF-7b: Grooved end type– ASTM A395 and A536 ductile iron; ASTM A234 WPB forged steel; fabricated from ASTM A53 carbon steel. Couplings shall be supplied with angle-pattern bolt pads for rigidity, except in locations where flexibility is desired. Gaskets shall be pre- lubricated.

Manufacturer: Victaulic, Galvanized or painted, or equal.

PF-7c: MegaPressG, ASME B31, Carbon Steel, – For aboveground piping 2-inches and below. Provide fittings with Hydrogenated Nitrile Butadiene Rubber, HNBR Sealing Element.

Manufacturer: Viega, or equal.

PF-7d: Malleable Iron, class 125, ANSI B 16.3, threaded schedule 80 black steel.

Manufacturer: Stockham, or equal.

P-8: Red seamless brass 85-5-5-5, iron pipe size (IPS), threaded pipe, ASTM B43.

Manufacturer: Mueller, Cerro Brass, Cambridge-Lee, Halstead, or equal.

PF-8: Bronze and brass, 250 psi, threaded, ASA B16.17 and F S WW-P-460.

Manufacturer: Mueller Brass, Lee Brass, or equal.

P-9: PVC, thick wall, cast-iron OD sized, UL, and NSF listed, comply with AWWA C900, and ASTM D1784 Cell Class 12454B, with tracer wire.

Manufacturer: Blue Brute, or equal.

PF-9: Ductile Iron conforming to AWWA C110, and AWWA C153, with bell and spigot gasket joints conforming to AWWA C111/A21.11.

Manufacturer: EBAA Iron Sales Inc. Megalug 2000PV, or equal.

P-10: CPVC (Chlorinated polyvinyl Chloride) schedule 40 pipe, conforming to ASTM D1784, and UL723 (ASTM E84).

Manufacturer: Spears, Corzan, Charlotte, or equal.

PF-10: CPVC (Chlorinated Polyvinyl Chloride) schedule 40 fittings, conforming to ASTM D1784, and UL723 (ASTM E84). The joints shall be of solvent cement type conforming to ASTM F493. Installer shall be certified by the manufacturer for this type of joint installation. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints.

Manufacturer: Spears, Corzan, Charlotte, or equal.

P-11: PVDF (Polyvinylidene Fluoride) schedule 40 chemical waste pipe, conforming to ASTM F1673, ASTM D3222 and complying with UL723 (ASTM E84). The joints shall be no-hub mechanical Joints or Socket Fusion. Installer shall be certified by manufacturer for joint installation.
Manufacturer: Orion, or equal.

PF-11a: PVDF (Polyvinylidene Fluoride), schedule 40, No-hub coupling. Each coupling shall have 300 series stainless steel outer band and 5/16 inch bolts, nuts and washers plated to meet a 100-hour salt spray test per ASTM B117. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this type of joint installation.

Manufacturer: Orion, or equal.

PF-11b: PVDF (Polyvinylidene Fluoride), schedule 40 coupling. Joined using the socket fusion system conforming to ASTM 2657. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: Orion, or equal.

P-12: FRPP (Flame Retardant Polypropylene) schedule 40 chemical waste pipe, conforming to ASTM F1412 and ASTM D4101. The joints shall be no-hub mechanical joints or Socket Fusion type. Installer shall be certified by the manufacturer for joint installation.

Manufacturer: Orion, or equal.

PF-12a: FRPP (Flame Retardant Polypropylene), schedule 40, No-hub coupling. Each coupling shall have 300 series stainless steel outer band and 5/16 inch bolts, nuts and washers plated to meet a 100-hour salt spray test per ASTM B117. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this type of joint installation.

Manufacturer: Orion, or equal.

PF-12b: FRPP (Flame Retardant Polypropylene), schedule 40 coupling. Joined using the socket fusion system conforming to ASTM 2657. Drains, bottle traps and similar devices shall be the same material and gauge as the pipe with mechanical joints. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: Orion, or equal.

P-13: Polyethylene plastic pipe, ASTM D 2513, Standard Dimension Ratio 11 rated at 80 psi working pressure and 73° Fahrenheit for 3 inches and smaller, SDR 11.5 rated at 76 psi and 73° Fahrenheit for 4 inches and above, butt or socket type fittings, joined by

heat fusion, orange or yellow color. Installer shall be certified by the manufacturer for this kind of joint installation.

Manufacturer: CPCHEM (Chevron Phillips Chemical Company LP) PE 2406, or equal.

PF-13a: Polyethylene plastic fittings, ASTM D 3261 and D 2683, Standard Dimension Ratio 11 rated at 80 psi working pressure and 73° Fahrenheit for 3 inches and smaller, SDR 11.5 rated at 76 psi at 73° Fahrenheit for 4 inches and above, butt or socket type fittings, joined by heat fusion, Installer shall be certified by manufacturer for joint installation. Color orange or yellow.

Manufacturer: CPCHEM, (Chevron Phillips Chemical Company LP), or equal.

PF-13b: Polyethylene transition risers, for PF-13a above, Transition fitting must have a minimum vertical height of 36 inches from the horizontal connection which will allow for a 6-inch steel riser above ground. Polyethylene transition risers shall be anodeless.

Manufacturer: Central Plastics Company, or equal.

P-14: PVC, schedule 40, extruded from 100 percent virgin Polyvinyl Chloride (PVC) compound, meeting requirements of class 1254-13 of ASTM D1784. (Use for irrigation systems after the control valves only.)

Manufacturer: Spears, Charlotte, or equal.

PF-14 Plastic fittings, schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466.

Manufacturer: Spears, Charlotte, Harvel Plastics Inc., or equal.

P-15: Purple pipe, PVC, schedule 40 for reclaimed or recycled water (below ground only for non-potable irrigation systems), type 1, grade 1, PVC-1120, Cell Class 12454 B.

Manufacturer: Charlotte, or equal.

PF-15: Purple Plastic fittings, schedule 40 molded from PVC type I compound, conforming to the requirements of specification ASTM D2466. Refer to section 32 84 26 “Reclaimed Water Irrigation”.

Manufacturer: Charlotte, or equal.

J. Pipe and Fitting Requirements Schedule: Unless otherwise specified or indicated on Drawings, pipe and fittings shall be installed in accordance with the following table:

TABLE I

PIPE AND FITTING SCHEDULE

Use	Limits	Pipe	Fittings
Domestic Cold Water, underground	Within 5’ from building, All sizes	P-5	PF-4a, or PF-4b
Domestic Cold Water, underground	Site distribution only, 4” and over	P-9; Refer to 33 1100	PF-9; Refer to 33 1100
Domestic Hot and Cold water, aboveground	Interior only	P-4	PF-4a, or PF-4b
Downspouts, Interior Storm Drainage	Within 5’ from building, All sizes	P-1	PF-1a, or PF-1b
Exposed Downspouts, Interior Storm Drainage	Existing Buildings and aboveground only	P-2	PF-2

Use	Limits	Pipe	Fittings
Fire Mains (Fire Hydrants), Underground	Site distribution only, 4” and over	P-9; Refer to 33 1100	PF-9; Refer to 33 1100
Fire Suppression System, Interior	All sizes	P7; Refer to 21 1313	PF-7d; Refer to 21 1313
Natural Gas, Exterior	Underground, site only	P-13	PF-13a, and PF-13b
Natural Gas, Interior, aboveground	All sizes	P-7	PF-7a, PF-7b, or PF-7c
Waste - FORCED	All sizes	P-1	PF-1c
Waste and Vent - Indirect	All sizes	P-3	PF-3
Waste and Vent – Sanitary/ Grease	All sizes	P-1	PF-1a, or 1b
Waste and Vent – Sanitary/ Grease	Underground, site only	P-1; Refer to 33 3000	PF-1a, or 1b; Refer to 33 3000

K. Pipe Isolators:

PLA-1 Absorption pad shall be not less than ½ inch thick, unloaded. Pad shall completely encompass pipe.

Manufacturer: Holdrite, LSP, Stoneman, Potter-Roemer, Trisolator, PR-Isolator, or equal.

Manufacturer: Hydra-Zorb Cushion Clamps, Acousto-Clamp, or equal.

L. Pressure Gage: Aluminum or steel case, minimum 4 ¼-inch dial; pressure type or combination vacuum-pressure type, with provisions for field calibration. Dial indicator to indicate pressure in psi with accuracy to within plus or minus 0.5 percent of maximum dial reading. Furnish gages with restriction screw, size 60, to eliminate vibration impulses. Black case and ring, bourdon tube of seamless copper alloy with brass tip and socket. Three way gage cock, constructed of brass with stuffing box, 1/2 inch couplings, with fixed or movable cap nut to shut off pressure gage.

PG-1 Pressure type, black drawn steel case, 4-1/2-inch glass dial, range approximately twice line pressure.

Manufacturer: Marsh Keckley, Trerice, Weksler, Weiss, or equal.

M. Plug Valves:

PV-1 2 inches and smaller: Rockwell No.114, lubricated plug type, 200-pound., water operating gauge pressure iron body and plug, regular pattern, threaded, with indicating arc.

Manufacturer: Walworth, Homestead, WKM, or equal.

PV-2. 2 ½-inch and larger: Rockwell No.115 and No.165 lubricated plug type, 200 pound water operating gauge. Iron body and plug, regular pattern, flanged, with indicating arc.

Manufacturer: Walworth, Homestead, WKM, or equal.

N. Safety Relief Valves:

SRV-1: Combination temperature and pressure relief type. CSA approved. Set to open at 125 psi pressure.

Manufacturer: Watts: 40L, Cash-Acme: NCLX-1, or equal.

SRV-2: Same as SRV-1, except provide on storage type water heater with anode in dip tube.

Manufacturer: Watts: 100XL, Cash-Acme: NCLX-1, or equal.

SRV-3 Spring type, ASME and NB stamped and certified with manual lifting device for air or gas.

Manufacturer: Bailey, Cash-Acme, Watts, Keckley, or equal.

O. Strainers:

STR-1 Description: Wye type with monel or stainless steel strainer cylinder (manufacturer's standard mesh), and gasketed machine strainer cap. Where indicated on Drawings, provide with valved (globe valve) blowout piping, same size as blowout plug.

1. 2-inch and smaller:
   C.M. Bailey No.100-A, 250 lb., cast iron body, threaded, Keckley: Style B, Spirax Sarco Y-type, or equal.

2. 2 ½-inch and larger:
   C.M. Bailey No.100-A, 125 lb., cast iron body, flanged, or Victaulic style 732, 300 psi, ductile iron body, grooved, fusion bonded epoxy coated.

   Manufacturer: C.M.Bailey, Armstrong, Muessco, Keckley 'A', or equal.

STR-2 Y pattern cast iron bodies, 125 psi, monel screen. Open area at least twice the cross-sectional area of IPS pipe in which strainer is installed and may be woven wire or perforated type. Screwed ends for sizes up to 2 inches, flanged ends fusion bonded epoxy coated for 2 ½-inch and larger perforations, in accordance with the following:

1. Steam service - 40 square mesh.

2. Other services - 16 square mesh.

Bailey No.100, Armstrong, RP&C, Keckley or equal.

STR-3 Flanged, bucket type, semi-steel body, 125 psi, stainless steel screen with 1/8 inch diameter perforations, all sizes.

Manufacturer: Bailey No.1, Zurn 150 Series, RP&C, Keckley GFV, or equal.

STR-4 Grooved, T-pattern, ductile iron body, 300 psi, stainless steel frame and mesh basket, grooved ends.

P. Vent Caps:

VC-1 Vandal-proof hood type, for plumbing vent lines.

Manufacturer: Stoneman Engineering and Mfg., Semco 1550, or equal.

Q. Vacuum Valves:

VV-1 Vacuum valves; for vacuum serve, 125 psig working pressure, cast iron body, spring loaded lubricated plug type.

Manufacturer: General Controls, Honeywell, Valmatic, or equal.

R. Protective Coating for Underground Steel Piping Applied to Underground Automotive:

1. Black steel or galvanized steel piping indicated for below grade installation, shall be protected as specified prior to delivery to the Project site:

   a. Sandblast black steel pipe to a gray finish. Sandblast galvanized steel pipe lightly only.

   b. Install one coat of cut back asphalt to galvanized pipe immediately after sandblasting. Pre-heat black pipe to 180 degrees F. immediately before coating.

   c. Install one coat of high-temperature (melting point of 240 degrees F. minimum) Grade B asphalt enamel.

   d. Install one wrapping of 20 mils thick glass, fiber mat, Owens-Corning Coromat or L.O.F. Blueflag with 1/4 inch overwrap. Glass fiber shall be dry at time of installation.

e. Install a second coat of asphalt enamel as specified above. Glass fiber mat shall be centered in the asphalt enamel.

f. Install an overwrap of Kraft ripple paper.

2. Total thickness of pipe wrapping shall be not less than 1/8 inch. Entire coating operation shall be accomplished by mechanical means in a continuous operation. Hand installation of protective coating is not permitted.

3. Each piece of wrapped pipe shall be legibly identified at no greater than 5 feet intervals by fabrication company. Each material submittal shall include the name of the fabrication company. Maintain one reviewed Sample on the Project Site.

4. Acceptable manufacturers of wrapping are: Hunt, Mobile, Conway or equal.

5. Fittings (including couplings), unprotected pipe adjacent to fittings, and damaged pipe protection shall be wrapped at Project site as follows:

a. Fittings and pipe to be wrapped shall be thoroughly cleaned of material foreign to pipe manufacturer.

b. Install one coat of Plicoflex No. 105 or Protecto Wrap No. 1170 adhesive primer to metal.

c. Wrap pipe and fittings with a minimum thickness of 3/32 inch of Plicoflex No. 310 pipe line butyl molding tape, or Protecto Wrap No. 200 molding tape. Install 3 layers, each layer overlapping next approximately 2/3 width of tape, without stretching. Tape and primer shall be of the same manufacturer.

d. Wrap vinyl tape, 10 mil thickness, over molding tape with 1 inch minimum overlap.

Manufacturer: J.M. Trantex, 3M Scotchwrap or equal.

5. Pipe and fittings specified to be wrapped shall be tested with a holiday detector, after pipe has been installed in trench and before backfilling, in presence of the Project Inspector. Furnish a Tinkler and Raser model E-P holiday detector, or similar equipment for this test. Work, which is deemed defective, shall be repaired or replaced. The Project Inspector may test for damaged pipe wrapping after backfilling.

6. Instead of wrapping underground steel pipe as specified above, pipe may be machine-wrapped before delivery to the Project site as follows:

a. Pipe shall be cleaned of moisture, oil, grease, scale, and other foreign material by cleaning with non-oily solvent and wire brushing. Remove metal burrs and projections.

b. Install one coat of Plicoflex No.105 adhesive primer to cleaned pipe. If thinning is required, furnish only non-oily thinners as recommended by tape manufacturer.

c. Wrap coated pipe with Plicoflex No.340-25 tape (15 mil butyl and 10 mil vinyl laminate) Tape shall be installed by machine wrapping at approved plant only. Maintain tension (minimum of 5 pounds per inch of width) on tape over entire diameter of pipe. Tape shall be permanently identified and visible on vinyl side.

d. Fittings, unprotected pipe, and damaged pipe protection shall be wrapped as indicated above.

S. Flanges: Flanges shall be furnished and installed at each flanged connection of each type of equipment, tanks, and valves. Faces of flanges being connected shall be furnished alike. Connection of a raised face flange to a flat-faced flange is not permitted. Flanges shall conform to following schedules:

TYPE OF PIPE	FLANGE
Screwed black or galvanized grooved steel pipelines.	125-pound black cast iron screwed flange, flat faced or grooved flange adapters, Victaulic Style 741, Tyco-Grinnell Fig. 71, Gruvlok Fig. 7401, or equal.
Welded or grooved steel pipe, except high pressure steam lines.	150-pound black forged steel welding flanges, 1/16 inch raised face ASTM A 105, Grade II or grooved flange adapters, Victaulic Style 741, Tyco-Grinnell Fig. 71, Gruvlok Fig. 7401, or equal.
Copper and brass pipe or tubing.	150 pound cast bronze, flat-faced flange with solder end or grooved flange adapters, Victaulic Style 641, Tyco-Grinnell Fig. 61, Gruvlok Fig. 6084, or equal.

1. Gasket material for flanged connections shall be full faced or ring type to suit facing on flanges and shall be furnished in accordance with following schedule:

SERVICE	TYPE
Cold water	1/16-inch-thick neoprene

Grooved end flange adapters supplied with pressure responsive elastomeric Gaskets supplied with grooved flange adapters shall be pre-lubricated by the manufacturer. Grade of gasket to suit intended service.

T. Unions:

1. Unions shall be furnished and installed in accordance with the following requirements (unless flanges are furnished):

   a. At each threaded or soldered connection to equipment and tanks, except in Freon or fuel gas, piping systems, whether indicated or not.

   b. Immediately downstream of any threaded connection to each manually operated threaded valve or cock, and each threaded check valve, yard box or access box except those in Freon piping systems, whether indicated or not.

   c. At each threaded connection to threaded automatic valves (except those in Freon piping systems) such as reducing valves and temperature control valves, whether indicated or not.

   d. If grooved piping is used, couplings shall serve as unions. Additional unions are not required

2. Unions shall be located so that piping can be easily disconnected for removal of equipment, tank, or valve.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions under which Work of this Section shall be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Provide all materials and equipment for the Work. Furnish and install necessary apparatus, parts, materials, and accessories.

B. Pipe Installation:

1. Install piping parallel to wall and provide an orderly grouping of proper materials and execution.

2. Piping shall clear obstructions, preserve headroom, provide openings and passageways clear, whether indicated or not. Verify the Work of other Divisions to avoid interference.

3. If obstructions or the Work of other Divisions prevent installation of piping or equipment as indicated by the Drawings, perform minor deviations as required by the ARCHITECT.

4. Install piping after excavation or cutting has been performed. Piping shall not be permanently enclosed, furred in, or covered before required inspection and testing is performed.

5. Exposed polished or enameled connections from fixtures or equipment shall be installed with no resulting tool marks or threads at fittings. Residue or exposed pipe compound shall be removed from exterior of pipe.

6. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Continental Steel & Tube Co., ULINE, Independent Metal Strap, or equal.

7. Reduce fitting where any change in pipe size occurs. Bushings shall not be furnished unless specifically reviewed by the ARCHITECT, or indicated on Drawings.

8. Piping subject to expansion or contraction shall be anchored in a manner, which permits strains to be evenly distributed. Swing joints or expansion loops shall be installed. Seismic restraints shall be installed so as not to interfere with expansion and contraction of piping. Seismic loops required at all building separations.

9. Immediately after lines have been installed, openings shall be capped or plugged to prevent entrance of foreign materials. Caps shall be left in place until removal is necessary for completion of installation.

10. Couplings shall not be installed except where required pipe runs between other fittings are longer than standard length of type of pipe being installed and except where their installation is specifically reviewed by the ARCHITECT.

11. Water piping shall be installed generally level, free of traps, unnecessary offset, arranged to conform to building requirements, clear of ducts, flues, conduits, and other Work. Piping shall be arranged with valves installed to provide for complete drainage and control of system. Piping shall not be installed which causes an objectionable noise from flow of water therein under normal conditions. Refer to Section 23 05 00: Common Work Results for Plumbing.

12. Water lines may be installed in same trench with sewer lines, provided bottom of water line is 12 inches minimum above top and to the side of sewer line.

13. Changes in pipe sizes shall be furnished with eccentric reducers, flat on top. Offsets to clear obstruction shall not be installed so as to produce air pockets.

C. Pipe Sleeves and Plates:

1. Provide pipe sleeves of Schedule 40 black steel pipe or Schedule 40 PVC plastic pipe in concrete or masonry walls, footings, and concrete floors below grade. Provide adjustable submerged deck type sleeves at locations where pipes pass through concrete floors, except concrete slab floors on grade, and at locations where soil pipe for floor type water closets passes through concrete floors.

2. Sleeves shall provide ½ inch clearance around pipes, except plastic pipe shall have 1 inch clearance. Caps of deck type sleeves shall be removed just prior to installation of pipe. Area around sleeves shall be smooth and without high or low spots. Sleeves in walls shall not extend beyond exposed surface of wall. Sleeves in concrete floors and walls shall be securely fastened to forms to prevent movement while concrete is being placed.

3. Piping installed on a roof shall clear the roof surface by 10 inches minimum, with or without insulation. Bottom of individual fittings may infringe on 10 inches clear space but not groups of fittings or fittings located within 27 inches of each other.

4. Stiles shall be provided to facilitate crossing of piping when parallel piping runs are laterally greater than 12 inches out-to-out, or any pipe is higher than 18 inches, and more than 40 feet long or runs between two or more major pieces of equipment or housings greater than 20 feet apart. Stiles shall be not less than 20 inches wide with a minimum tread depth of 10 inches. Where stiles are required, they shall be located so greatest obstructed distance is 30 feet.

5. Where pipes pass through waterproofed walls, floors, or floors on grade, sealant with Link-Seal Modular Seals, or equal, between pipe and sleeve to provide a waterproof joint. Where earth is in contact with pipe on both sides of a wall or foundation, the waterproof joint is not required. Commercial rubber compression units may be furnished instead of sealed sleeves if reviewed by the ARCHITECT.

6. A swing joint, or other required device, shall be furnished and installed in hot water lines with 10 feet of sealant or compression joint to allow for expansion.

7. Provide polished, chrome-plated flanges when plumbing pipes pass through walls at plumbing fixtures, etcetera as specified in Section 22 40 00 Plumbing. Provide polished steel, chromium-plated split floor and ceiling plates at locations where pipes pass through walls, floors, ceilings, and partitions in finished portion that neatly conceals pipe insert.

8. Pipe sleeves shall be provided where pipes intersect footings or foundation walls and sleeve clearances shall provide for footing settlement, but not less than one inch all around pipe.

D. Welding of Pipe and Qualifications of Welder:

1. Joints above grade or accessible conduit or tunnels in steel piping may be either welded or screwed unless specifically indicated otherwise on Drawings or specified. Joints in below grade steel piping, whether in insulation or not, shall not be welded, unless otherwise indicated.

2. Welded joints in pipe shall be continuous around pipe and shall comply with ASME B31: Code for Pressure Piping, unless otherwise specified.

3. Each pipe weld shall be stamped with welder's identification mark. Welding shall be performed by welders possessing a valid certificate of qualification for welding carbon steel welding pipe in horizontal position (2G) and horizontal fixed position (5G) in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code, by an OWNER-recognized, DSA approved testing laboratory.

4. Before any welder performs welding on the Work, furnish the INSPECTOR with a copy of welder's valid qualification papers and obtain verification. Welder qualification is not valid unless it has been issued while welder was performing work for current employer, and has performed type of work described by qualification in the preceding 3 months.

5. Welding performed under these Specifications is subject to special tests and inspections including rigid Ultra Sonic Testing (UT) and radiographic inspection at random, in accordance with Technique for Radiographic Examination of Welded Joints by an OWNER recognized, DSA approved testing laboratory.

E. Unacceptable Welds and Repairs to Welding:

1. Welds containing any of the following types of imperfections shall be deemed defective Work:

a. Cracks of any type.

b. Zones of incomplete (in excess of 1/32 inch) fusion or penetration.

c. Elongated slab inclusions longer than 1/4 inch.

d. Groups of slag inclusions in welds having an aggregate length greater than thickness of parent metal in a length 12 times the thickness of the parent metal.

e. Undercuts greater than 1/32 inch.

f. Overlaps, abrupt ridges or valleys.

3. When a defective weld is detected by examination as outlined above, two additional welds shall be radiographed at locations selected by the Project Inspector. If the two selected welds demonstrate compliant welding, then the two tested welds shall be deemed to be in compliance. Welding revealed by radiographs to be defective Work shall be removed, repaired, and tested by radiograph.

4. If either of the two selected welds demonstrates welding deemed to be defective Work, all welding in that portion of the Work shall be deemed defective Work and either: all welds shall be cutout, prepare new ends for welding and weld to comply with this Specification, or radiograph all welds, removing and repairing only such welding deemed to be defective Work.

5. Repair welding shall be performed in a manner in full compliance with ASME B31. The welded joints or repairs shall be spot examined with UT or radiographic tests in accordance with foregoing requirements.

6. OWNER shall cause to be performed additional random UT and radiographic examinations of welds. OWNER shall be responsible for the costs of any UT and radiographic examinations found to be in compliance with specified requirements.

7. Installer shall be responsible for the costs of UT and radiographic re-examinations of welds deemed defective Work and not in compliance with this Specification, and shall repair or replace said welds in accordance with specified requirements.

F. Welding Rods: Submit a written list of materials and proposed type of welding rods.

G. Backing Rings: Backing rings may be submitted for installation provided the Product Data is submitted with the material list.

H. Qualification Tests for Low-pressure Welding:

1. Tests shall be performed on 3-inch standard weight pipe ASTM A53, Grade A, and shall be welded by acetylene and electric arc. Each sample shall consist of 2 pieces, each 10 inches long, with 30-degree bevel at point weld.

2. Two 20-inch samples shall be performed in the 2G and two 20-inch samples in the 5G positions, with positions defined in Section IX, ASME Boiler and Pressure Vessel Code. Welds shall have the reinforcement ground or machined flush to the surface of the pipe before testing. Samples shall be tested as full section tensile.

3. Weld shall develop a load of 90 percent of 50,000 psi, i.e., 45,000 psi or shall develop a fracture in parent metal.

4. Each qualified welder shall carry an identification card listing welder's name, date of test, and type of welding tests passed; signed by the welder and the laboratory.

5. A valid certificate of qualification issued in compliance with requirements of the ASME Boiler Pressure Vessel Code Section IX shall qualify a welder for issuance of a certificate for low-pressure pipe welding.

I. Certificates of Qualification for Welding of Unfired Pressure Vessels:

1. Certificates of qualification shall be issued by a laboratory recognized by the OWNER in compliance with the requirements of the ASME Boiler Pressure Vessel Code Section IX. Qualifications shall be for both acetylene and arc welding of Schedule 40 ASTM A53, Type B, steel welded or seamless pipe in the Horizontal Position (2G) and the Horizontal Fixed Position (5G) as defined by said code.

2. Certificate described above is not valid unless it has been issued while welder was working for his current employer, and unless welder has performed type of work described by certificate in the preceding three months. Requirements for possession of

a valid certificate shall not be waived for welders fabricating unfired pressure vessels when the Specifications require compliance with ASME code or when welding pipe carries working pressures greater than 75 psi and temperatures greater than 250 degrees F.

J. Pipe Joints and Connections:

1. Pipe and tubing shall be cut per IAPMO Installation Standards. Pipe shall have rough edges or burrs removed so that a smooth and unobstructed flow shall be provided.

2. Hot tapping of gas lines is strictly prohibited.

3. Threaded Pipe: Joints in piping shall be installed according to the following service schedule:

   a. Soap Piping: Litharge and glycerine, or Expando, Gasoila, or equal.

   b. Plastic Piping: Teflon pipe joint compound tape.

   c. Oxygen Piping: Wash treads with S.P., rinse, blow-dry and apply litharge and glycerine.

   d. Cleanout Plugs: No compound shall be used. After inspection and test, plugs shall be removed, cleaned, greased, and replaced.

   e. Other services furnish sealant, suitable and as reviewed by the ARCHITECT.

4. Threads on pipe shall be cut with sharp, clean, unblemished dies and shall conform to ANSI/ASME B2.1 for tapered pipe threads.

5. Joint compounds shall be smoothly placed on male thread and not in fittings. Threaded joints shall be installed tight with tongs or wrenches and sealant of any kind is not permitted. Failed joints shall be replaced with new materials. Installation of thread cement or sealant to repair a leaking joint is not permitted.

6. Sharp-toothed Stillson, or similar wrenches, is not permitted for the installation of brass pipe or other piping with similar finished surfaces.

K. Copper Tubing and Brass Pipe with Threadless Fittings:

1. Silver brazed joints shall be used for attaching fittings to non-ferrous metallic refrigerant piping.

2. Non-pressure gravity fed condensate lines may be soldered with 95/5 solder.

3. Silver brazing alloy, Class BCUP-5. Surfaces to be joined shall be free of oil, grease, and oxides. Socket of fitting and end of pipe shall be thoroughly cleaned with emery cloth and wiped to remove oxides. After cleaning and before assembly or heating, flux shall be installed to each joint surface and spread evenly. Heat shall be applied in accordance with instructions in the Copper Tube Handbook issued by Copper Development Associates. Joints constructed of rough bronze fittings shall be provided as recommended by manufacturer.

4. Do not overheat piping and fittings when installing silver brazing.

5. Joints in non-ferrous piping for services not covered above shall be installed with solder composed of 95/5 tin/antimony, ASTM B32, Grade 5A. Surfaces to be jointed shall be free of oil, grease, and oxides. Sockets of fitting and end of pipe shall be cleaned with emery cloth to remove oxides. Solder flux shall be sparingly installed and solder added until joint is completely filled. Do not overheat. Excess solder, while plastic, shall be removed with a small brush in order to provide an uninterrupted fillet completely around joint. Random inspection of joints shall be conducted by Project Inspector to ensure joints are lead-free.

6. Grooved end joints for copper piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.

7. Pressed fittings for copper or copper alloy pipe or tubing shall have an elastomeric O-ring that forms the joint. The pipe or tubing shall be fully inserted into the fitting, and the pipe or tubing marked at the shoulder of the fitting. Pipe or tubing shall be cut square, mechanically cleaned and reamed prior to joining to remove all burrs (interior and exterior) and restore full inside diameter and a smooth, chamfered exterior surface. The fitting alignment shall be checked against the mark on the pipe or tubing to ensure the pipe or tubing is inserted into the fitting. The joint shall be pressed using the tool recommended by the manufacturer.

L. Ring-Type Pipe: Joints shall be installed in accordance with manufacturer's instructions with grooved couplings, fittings and rubber rings. Couplings and pipe shall be compatible and of the same manufacturer. Rings shall be accurately located and installed by grooves in coupling. Pipe shall be installed with zero deflection unless otherwise specified. Pressure pipe shall be furnished with thrust blocks at each offset point.

M. Welded Pipe Joints:

1. Joints in welded steel pipelines shall be installed by oxyacetylene or electric arc process. Welding shall be continuous around pipe and provided as specified.

2. Butt welds shall be of the single V-type, with ends of pipe and fittings beveled approximately 37 ½ degrees. Piping shall be aligned before welding is started with the alignment maintained during welding.

3. Welds for flanges and socket fittings shall be of the fillet type with a throat dimension not less than pipe wall thickness.

N. Grooved End Pipe Joints: Grooved end joints for carbon steel piping shall be assembled in accordance with the latest manufacturer recommendations. Pipe ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to grove for proper gasket sealing. Grooving tools shall be as manufactured by Victaulic, RIDGID, MAG Tool, or equal.

O. Joints shall be Vic-Press 304TM, or equal, made with Victaulic Series ‘PFT’ tools and the appropriate sized jaw. Pipe shall be certified for use with Vic-Press 304TM system, and shall be square cut, properly deburred and cleaned, and marked at the required location to insure full insertion into the fittings and/or couplings.

P. Polyethylene (Plastic) Pipe:

1. Joints shall be installed by the heat fusion method, in accordance with manufacturer's recommendations and IAPMO installation standard IS 12, for natural gas.

2. Pipe Riser at Meter, Regulator and Building Wall: Prefabricated, anodeless type, utilizing a grade level transition between underground polyethylene pipe and gas supply steel pipe of riser outlet, R. W. Lyall Co., or equal. Below grade to above grade transition shall be installed in a welded, epoxy coated, steel casing.

3. Connections to Existing Pipe Line or Branch:

a. Steel-to-plastic (PE): Provide manufacturer’s prefabricated standard transition fitting, transition from epoxy-coated steel pipe to plastic, R. W. Lyall Co., or equal.

b. Plastic-to-plastic, PVC to PE: Provide manufacturer’s prefabricated standard transition fitting, transition from PVC to epoxy-coated steel pipe to PE; R.W. Lyall Co., or equal.

c. Plastic-to-plastic, PE to PE: Provide manufacturer’s standard fused tapping tee assembly with shut-off feature.

4. Provide PE reinforcing sleeves where PE pipe is fused to multi-saddles, service punch tee, reducing tees, transition fittings and anodeless risers.

Q. Valves: Valves shall conform to the following:

1. Piping systems shall be furnished with valves at points indicated on Drawings and specified, arranged to provide complete regulating control of piping system throughout building and the Project site.

2. Valves shall be installed in a neat grouping, so that parts are easily accessible and maintained.

3. Valves shall be full size of line in which they are installed, unless otherwise indicated on Drawings or otherwise specified, and shall be one of types specified.

4. Provide chain operators on valves 2-inch and larger located 7 feet or more above the servicing floor level.

5. Valves for similar service shall be of one manufacturer.

6. Except where otherwise specified, valves shall be Belimo, Victaulic, Stockham, Crane, Jenkins, Milwaukee, Hammond, American, NIBCO, Hoffman, or equal.

7. Ball valves below grade in yard boxes shall have stainless steel handles.

8. Hose bibs in dense garden areas shall be ¾ inch in size with one hose bib in the lunch pavilion 1 inch in size. Other hose bibs shall be ¾ inch lock shield type. Bibs shall be furnished with vacuum breaker protection.

9. Safety valves and pressure relief valves shall have stamp of approval as required by ASME and shall be provided with annual test lever. Where a hot water storage tank is heated by means of a coil, pressure relief valve shall have a steam BTU discharge rating of the coil. Discharge pipe from safety or pressure relief valves shall be not less than one pipe size larger than inlet pipe size of valve. Discharge pipe shall terminate as indicated and shall be free of traps. In addition to locations specified, pressure relief valves shall be installed in the following locations:

   a. On discharge side of each pressure-reducing valve.

   b. On each water heater connected to a hot water storage tank and other pressure vessels.

   c. On cold water line to each water heater or hot water storage tank when there is a check valve, backflow prevention valve or similar device between water heater or hot water storage tank and meter or relief valve at the pressure reducing valve assembly.

   d. On discharge side of each air compressor.

   e. On each air receiver connected to an air compressor.

10. Temperature relief valves and combination temperature and pressure relief valves shall be as specified and furnished as set forth in this Section. Discharge pipe from relief valves shall be not less than discharge area of valve or valves it connects, based on discharge area of valves, and shall terminate as indicated and free of any traps. Valves shall be installed at following locations:

11. A combination temperature and pressure relief valve or combination of valves on each heating hot water storage tank. Temperature sending element shall extend into water inside tank.

12. Manual air vent valve assemblies shall be installed at each high point of hot water space heating and chilled water piping systems. Valves shall discharge through 1/4 inch diameter copper tubing and drain to nearest floor sink. Automatic type air vent valve shall only be installed where specifically indicated. Radiator, convectors, and finned pipe convectors shall be fitted with packless radiator valves, angle or straight pattern. Each convector or radiator installed as part of a space hot water heating system shall be furnished with a manual-type air vent valve.

R. Strainers: Strainers shall be installed on each water main (except for fire line) downstream of the meter, above grade, when a pressure regulator assembly is not installed. Main strainer shall

be of Y-flange or groove type. On closed loop chilled and heating hot water systems pump systems, a strainer shall be installed at each pump inlet and upstream of each flow control valve assembly. The control valve assembly may include a modulating temperature control valve and a flow-limiting valve, manufactured by Griswold, AutoFlow, Flow Control Industries, Inc., or equal.

S. Hangers and Supports:

1. Piping shall be securely fastened to building structure by approved iron hangers, supports, guides, anchors, and sway braces to maintain pipe alignment to prevent sagging and to prevent noise or excessive strain on piping due to uncontrolled or seismic movement under operating conditions. Hangers and supports shall conform to Manufacturer's Standardization Society Specification SP-69. Hangers shall be relocated as required to correct unsatisfactory conditions that may become evident when system is placed into operation. Appliances, heat exchangers, storage tanks, and similar equipment shall be securely fastened to structure in accordance with seismic requirements. Outdoor metal hangers and supports shall be hot-dipped galvanized steel, unless otherwise specified.

2. Hose faucets, compressed air outlets, and similar items at ends of pipe branches shall be rigidly fastened to building construction near point of connection.

3. Piping shall not be supported by wire, rope, wood, plumbers' tape, or other non-recognized devices.

4. Hangers and supports shall be designed to support weight of pipe, fittings, weight of fluid and weight of pipe insulation, and shall have a minimum factor of safety of five, based on ultimate tensile strength of material installed.

5. Burning or welding of any structural member under load is not permitted. Field welding not specified on Drawings or reviewed Shop Drawings is not permitted without review by ARCHITECT and DSA.

6. Burning holes in beam flanges or other structural members is not permitted without review by the ARCHITECT and DSA.

7. Pipe hangers on piping covered with low temperature insulation shall be installed on outside of insulation and not in contact with pipe unless otherwise detailed on Drawings. Insulation shall be protected by 18 gage galvanized steel shield, with a minimum length of 10 inches, installed completely around pipe covering between covering and hanger. Installing hangers directly on pipe and butting adjoining sections of insulation against hanger is permitted provided void and hanger rod are properly insulated and sealed so that no sweating occurs at hangers.

8. Hanger rods shall be fastened to structural steel members with suitable beam clamps. Clamps shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:

   a. Tolco I beam, Fig.62 for maximum 1000 pounds.

   b. Tolco I or WF beam, Fig. 329, for maximum of 1290 pounds.

9. Hanger rods shall be fastened to concrete inserts in concrete slabs or beams. Inserts shall be Tolco, Carpenter & Patterson, Fee and Mason, or equal, as follows:

   a. Tolco Fig.310 for maximum of 600 pounds.

   b. Tolco Fig. 309 for maximum of 1140 pounds.

10. For fastening to wood ceilings, beams, or joists, furnish Grinnell Fig. 128R, Grinnell Fig. 153, Tolco 78, or equal pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2-inch by 2-inch by 1/4 inch angle clips 3 inches long, with 2, staggered 10d nails, clinched over joist.

11. Hanger rod sizes for copper, iron, or steel pipe: 3/8 inch for pipe sizes ½ inch through 2-inch, ½ inch for pipe sizes 3-inch, 4-inch and 5-inch, 5/8 inch for pipe size 6-inch, and ¾ inch for 8-inch and 10-inch pipe.

12. Turnbuckles, if furnished, shall provide a load carrying capacity equal to that of the pipe hanger with which they are being installed.

13. Pipe hangers shall be of same size, or nearest larger manufactured size available, as pipe or tubing on which they are being installed.

14. Hangers, clamps, and guides furnished for support of non-metallic pipe shall be padded with 1/8 inch thick rubber, neoprene, or soft resilient cloth.

15. Where special pipe-supporting requirements in the Specifications conflict with any standard requirements specified herein, the Specification requirements shall govern.

16. Vertical Piping:

    a. Vertical pipe risers shall be securely supported with riser clamps of recognized type. Risers in reinforced concrete buildings shall be furnished with extension clamps fastened to pipe above each concrete floor slab with extended arms of clamp to rest on slab. Clamps shall be provided with lead or Teflon liners when installed on copper tubing. Clamps shall be plastic-coated when installed on non-ferrous pipe or tubing.

    b. Copper tubing in sizes 1 ½-inches and larger and steel pipelines passing up through building shall be supported at each floor of building or every 15 feet whichever is less.

    c. Copper tubing sizes 1 ¼-inches and smaller shall be supported at not intervals not more than 6 feet on center. Special provisions shall be installed for vertical lines subject to expansion and contraction caused by operating temperature differences.

    d. Vertical cast iron pipelines shall be supported from each floor and at its base. Malleable iron or steel pipe clamps with minimum thickness of 1/4 inch shall be furnished and fastened around pipe for support.

17. Horizontal Piping:

    a. Roof Mounted Piping: Pressure and non-pressure piping shall be supported from channels, stands, clamps, trapezes, rollers, or structures mounted on 100% rubber, UV resistant rooftop supports with reflective strips, Dura-Block, or equal. Roller type supports shall be provided below and above pipe to prevent its dislodgement. Bottom of pipes shall clear the roof surface by 10 inches.

    b. Insulated steam and space heating hot water insulated condensate lines, insulated domestic hot water supply and return piping shall be supported with Tolco Figure 4, B-Line Figure B3140, Grinnell Figure 212, or equal, steel hangers with welded eye rods to permit hinge movement at point of attachment of hangers. Hinge movement at point of support shall be provided by welded eye linked rods Tolco Figure 101L, B-Line Figure B3211X, Grinnell Figure 278, or equal.

    c. Domestic cold water piping, water supply and return piping, condenser water piping, insulated refrigerant piping gas piping, compressed air piping, cast iron soil piping, galvanized steel vents, waste and downspout piping and glass to be supported with Tolco Figure 1, B-Line Figure B3100, Grinnell Figure 260, or equal, hangers with rods, turnbuckles and inserts suitable for above hangers.

    d. Maximum hanger and support spacing shall conform to CPC schedule for horizontal piping installed above grade.

18. A hanger or support shall be installed close to the point of change in direction of a pipe run, in either a horizontal or vertical plane.

19. When practicable, supports and hangers for cast iron soil pipe shall be installed as close as possible to joints and when hangers or supports are not located within one foot of a branch line fitting, an additional hanger or support shall be installed at fitting.

20. In systems where grooved piping is used, couplings shall be provided with angle pattern bolt pads to comply with support and hanging requirements of ANSI/ASME B31.1, ANSI/ASME B31.9, and NFPA Pamphlet 13.

T. Flashings:

1. Each pipe, duct, or gas-fired equipment vent passing through roof shall be installed with waterproof flashing.

2. Flashing or flanges on pipes, vents, and ducts passing through a tile or slate roof shall be constructed of sheet lead. Flashing for pipes and heater vents passing through a roof shall be 4 pound soft sheet lead. Flashing and flanges for ducts and heater vents passing through exterior walls shall be 22 gage sheet metal. Install caps on top of heater pipes. Flanges and flashing shall be installed waterproof at point of connection with pipe or duct. No soldered joints on roof flashings will be allowed. No Stoneman lead roof flashings will be allowed.3. Lead flashing and flanges shall be constructed of 4 pound sheet lead with burned joints. Flange of lead flashing or lead flange on a duct shall extend out onto roof a minimum of 12 inches from pipe or duct. Lead flashing shall extend up the pipe or duct not less than 8 inches.

3. Sheet metal flashing shall be constructed of 24 gage galvanized sheet steel. Flanges on these flashings shall extend out onto roof a minimum of 10 inches from pipe or duct. Flanges on ducts through exterior walls shall extend out from duct a minimum of 2 ½ inches. Flanges on gas-fired equipment single-wall vents shall be of ventilated type. Type B gas vents through a roof shall be furnished with non-ventilated flashing as per NFPA Pamphlet 211.

4. Cast iron, steel, brass, and copper pipe, which terminates less than 18 inches above roof, shall be furnished with a combination counter-flashing and vandal-proof hood for protection against water, birds and foreign matter. Cast iron, steel, brass and copper pipe, which does not terminate within 18 inches of roof, shall be furnished with a counter-flashing sleeve. Pipe, which terminates more than 18 inches above roof, shall be furnished with protection against entrance of water, birds, and foreign matter.

5. Counter-flashing and combination counter-flashing sleeves and vandal-proof hoods shall be cast iron, vandal-proof, threaded, sealed or approved gas-heated sleeve type. Counter-flashing sleeves on each of these items shall extend down over flashing a minimum of ¾ inch.

6. Flashing and flanges on ducts shall be installed waterproof at point of connection to the duct by riveting and soldering. Storm collars shall be securely screwed and installed waterproof around appliance vent pipe immediately above flashing.

7. Vent piping above roof shall be furnished with a combination counter-flashing sleeve and vandal-proof hood.

U. Equipment Installation: Install roof or floor mounted equipment on level platforms, housekeeping pads or curbs and provide sound, vibration and seismic control measures per Section 23 05 48 even if not indicated on Drawings.

END OF SECTION

SECTION 22 05 53
PLUMBING IDENTIFICATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Marking and identification on mechanical piping systems, ducts, controls, valves, and apparatus.

B. Related Requirements:

1. Division 01: General Requirements

2. Section 22 05 13: Basic Plumbing Materials and Methods.

3. Section 22 20 13: Plumbing Piping.

1.02 SUBMITTALS

A. Submit in accordance with Division 01 and Section 22 05 00: Common Work Results for Plumbing.

B. Submit product data and installation instructions for each item specified.

C. Submit Samples of materials.

1.03 QUALITY ASSURANCE

A. Comply with provisions of:

1. Section 22 05 00: Common Work Results for Plumbing.

2. ANSI/ASME A13.1: Scheme for the Identification of Piping Systems.

3. APWA: Uniform Color Code.

4. IAPMO: Uniform Plumbing Code (UPC)

PART 2 – PRODUCTS

2.01 MATERIALS

A. General: Piping systems, controls, valves, apparatus, etc., except those that are installed in inaccessible locations in partitions, walls, and floors, shall be permanently identified.

2.02 VALVES

A. Furnish prepared chart or diagram for each piping system, indicating by identifying letter or model number of each valve in the system, its location, and function.

B. Install charts in aluminum frame with clear glass front and secure on wall where designated by the Project Inspector.

C. Bind copies of each chart in operating instructions manual.

D. Provide each valve with a brass, aluminum, or plastic disc, not less than 1-1/4 inches diameter bearing engraved numbers corresponding to those indicated on chart. Fasten discs to valve with No. 14 brass wire.

E. Provide an additional tag for safety valves and other valves that could be hazardous to safety and health of occupants. Distinguish these tags from regular valve tags by color (such as yellow with black letters, and marked "Danger"); submit Sample tag to the Architect for review.

2.03 INSTRUMENTS AND CONTROLS

A. Identify panel-mounted instruments and controls with engraved bakelite nameplates permanently affixed to panel boards.

B. Identify alarm indicating devices and alarm reset devices by nameplates.

C. Identify automatic valves, flow switches, and pressure switches, with embossed aluminum or plastic tape affixed to controller, indicating service and setting.

2.04 EQUIPMENT

A. Identify each major piece of equipment with engraved bakelite nameplates permanently affixed to the equipment, indicating the room numbers it services, Equipment identification designation shall be the same to its designation indicated on the “As-Built Drawings”. Room numbers in the nameplates shall correspond to the final room numbers.

2.05 ABOVE GRADE PIPE IDENTIFICATION

A. Identify pipes by means of colored labels with directional flow arrows and identification of the pipe content, in conformance to ANSI/ASME A13.1 or the UPC.

B. Materials: Precoiled acrylic plastic with clear polyester coating, all-temperature, self-adhering, as manufactured by Brady, Brimar Industries, Seton, Stranco, Inc., or equal.

C. Size:

Outside Diameter of Pipe or Insulation (in inches)	**Length of Color Field (in inches)**	**Size of Letter (in inches)**
¾ to 1 ¼	8	½
1 ½ to 2	8	¾
2 ½ to 6	12	1 ¼
8 to 10	24	2 ½
over 10	32	3 ½

D. Locations:

1. On accessible piping, whether insulated or not (including mechanical rooms, attic and ceiling spaces); except that labels shall be omitted from piping where contained material is obvious due to its connection to fixtures (such as faucets, water closets, etcetera.).

2. Near each valve and branch connection in such accessible piping.

3. At each pipe passage through wall or floor.

4. At not more than 20 feet spacing on straight pipe run between bands required in 2 and 3 above.

5. At each change in direction.

E. Application: Install on clean surfaces free of dust, grease, oil, or any material that will prevent proper adhesion. Replace non-adhering or curling labels with new labels.

F. Color Schedule:

Content of Pipe	Legend	Background Color	Lettering Color
Domestic cold water	Domestic. C.W.	Green	White
Non-potable cold water	Caution: Non-potable Water Do Not Drink (1)(2)	Purple	Black
Domestic hot-water 140ºF	Domestic H.W. 140ºF	Blue	Black
Sanitary waste	San waste	Green	White
Sanitary vent	San vent	Green	White
Storm drain or downspout	Storm drain	Green	White
Indirect drain	Ind drain	Green	White
Sump pump discharge	Pump discharge	Green	White
Fire sprinkler supply	Fire Sprinkler supply	Red	White
Fire sprinkler drain	Sprinkler drain	Red	White
Fuel oil	Diesel oil	Yellow	Black
Gas	Gas	Yellow	White
Reclaimed Water	Caution: Reclaimed Water Do Not Drink (1)(3)	Purple	Black

H. Notes on Schedule:

1. Note (1) indicates 2 ¼ inch by 1 inch yellow label with ½ inch letters reading UNSAFE WATER at one end of primary label.

   Note (2) words should read “CAUTION: NONPOTABLE WATER DO NOT DRINK.” with international *do not drink* symbol.

   Note (3) words should read “CAUTION: RECLAIMED WATER DO NOT DRINK.” with international *do not drink* symbol.

2.06 UNDERGROUND PIPE

A. Detectable Marking Tape:

1. Provide and install detectable marking tape along buried piping. Tape shall be specifically manufactured for marking and locating underground utilities with electronic equipment. Tape shall be acid and alkali resistant, and manufactured with integral wires or foil

backing, encased with protective cladding. Tape shall be a minimum of two inches in width.

2. Manufacturer: Reef Industries, Inc., Advantage Brands, Inc., Northtown Company, Mutual Industries, Inc., or equal.

3. Detectable marking tape shall be color-coded per APWA Color Code:

a. Yellow: Oil and gas.

b. Blue: Water, irrigation and slurry lines.

c. Green: Sewer and drain lines.

B. Tracer Wire:

1. Solid copper wire type THWN, 12 AWG gauge, with heat and moisture resistant insulation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Correct detrimental conditions prior to commencing the Work of this Section. Install markers and identification tags as specified with materials and installation procedures recommended by manufacturer.

B. Place tracer wire on top of non-metal utility lines allowing some slack. Do not wrap tracer wire around pipe. Fasten tracer wire in place at approximately 10 feet on centers with non-metal ties.

C. Install underground detectable pipe marking tape continuously buried 8 to 10 inches above the buried utility pipe. Wrap tape on pipe risers up to a height of 12 inches above grade.

3.02 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 05 00
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.01 SUMMARY

A. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 26. It expands and supplements the requirements specified in sections of Division 01.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Division 09 - Painting and Coating.

3. Division 31 - Excavating, backfilling and compacting for utilities.

C. Applicable Standards

1. ASTM D 709 (2007) – Laminated Thermosetting materials.

2. ANSI/NEMA FB-1 (2010) – Standard for Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

3. ANSI/NEMA 250 (2008) – Enclosure for Electrical Equipment (1000 Volts Maximum).

4. California Electrical Code (CEC).

5. UL 1 (2005) – Standard for Flexible Metal Conduit.

6. UL 1242 (2007) – Standard for Electrical Intermediate Metal Conduit.

7. UL 6 (2010) – Electrical Rigid Metal Conduit-Steel.

1.02 UL 797 (2007) – Electrical Metallic Tubing-Steel.

1.03 UL 870 (2008) – Standard for Wireways, Auxiliary Gutters, and Associated Fittings

1.04 BASIC ELECTRICAL REQUIREMENTS

A. DESCRIPTION

1. Provide all labor materials and equipment necessary for general electrical requirements where shown on the contract drawings and specified herein.

2. Included Work:

a) Provide all labor, materials, equipment, tools and appliances required to furnish and install all electrical work as shown on the Contract Drawing and the specifications. All systems must be constructed complete and operable. The scope includes but not limited to the following:

1) All construction power and lighting and power for testing equipment and systems through final acceptance of test.

2) Power and lighting raceway(s) underground inside the property line boundaries.

3) All underground power conduits on and off site per the utility company's requirements, plans and provisions.

b) Complete lighting and power system(s) including branch circuits, fixtures, outlets, lamps, switches, controllers, and auxiliary equipment.

c) Complete distribution system(s) including switchboards, panel boards, transformers, feeders, and auxiliary equipment.

d) Complete system of exterior (vandal resistant) lighting.

e) Complete Grounding System.

f) All systems to be functional and tested.

g) All control wiring and devices for equipment specified in Sections of Division 26 and other technical Sections, except where specifically indicated or noted otherwise on the Contract Drawings or in the Specifications.

h) Complete, operable and certified fire alarm system.

i) All testing for all installed systems including all owner furnished items.

j) Applicable excavating, trenching and backfilling.

A. Quality Assurance:

1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.

2. Refer to other sections of the Specifications for other qualification requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer's data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.

2. Verify final locations for rough-ins with field measurements and with the requirements of the equipment to be connected.

3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.

4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.

5. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

6. Coordinate connection of electrical systems with existing underground utilities and services.

C. Terminology:

1. Low Voltage: Applies to power systems operating at less than 600 volts.

2. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.

2. Holes required for conduit entrances into floodlight poles or other poles, shall be drilled with the conduit nipple or coupling welded to poles. Welds shall be provided by the electric arc process and shall be continuous around nipple or coupling.

F. Electrically Operated Equipment:

1. Furnished Equipment:

a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated equipment and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.

b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.

2. Equipment and Appliances Furnished by Others:

a. Equipment indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the Owner," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel or junction box unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.

b. Connections to equipment furnished under this Division shall be part of the Work of this section. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit, and connections only for equipment furnished with factory installed internal wiring, except as further limited by Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.

c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.

d. equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise.

e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.

G. Submittals:

1. Conform to applicable provisions of Division I of the General Requirements and as hereinafter specified.

2. Prepare, review and coordinate schedule of submittals, determining necessary lead time for preparation, submitting, checking, and ordering and delivering materials and equipment to the job-site for timely arrival and conformance with the overall Construction schedule.

3. All submittals will be checked for general compliance with Specifications only. Contractor will be responsible for deviations from the Drawings or Specifications and for errors or omissions of any sort in the Submittals.

4. All required submittals on electrical items and equipment shall include complete catalog information such as construction ratings. insulation systems, including manufacturer's certification that items or equipment meet or exceed and Trade Standards, and the Specifications. All items must be U.L. listed or listed per a recognized by code listing agency.

5. Conform to applicable provisions of Division I of the General Requirements and as hereinafter specified.

6. Prepare, review and coordinate schedule of submittals, determining necessary lead time for preparation, submitting, checking, and ordering and delivering materials and equipment to the job-site for timely arrival and conformance with the overall Construction schedule.

7. All submittals will be checked for general compliance with Specifications only. Contractor will be responsible for deviations from the Drawings or Specifications and for errors or omissions of any sort in the Submittals.

8. All required submittals on electrical items and equipment shall include complete

catalog information such as construction ratings. insulation systems, including manufacturer's certification that items or equipment meet or exceed and Trade Standards, and the Specifications. All items must be U.L. listed or listed per a recognized by code listing agency.

9. Equipment Floor Plans: Submit after approval of material and/or equipment is secured. Prepare for each electrical equipment room drawn to 2" = 1'-0" scale. Layout drawing shall be to exact scale.

10. Materials list of items and equipment proposed to be provided for the work of this Division and shall include at least the following as applicable:

    a. Service and distribution switchboard.

    b. Lighting panel boards.

    c. Lighting control panels.

    d. Conduits.

    e. Conductors.

    f. Electrical equipment layout at scale indicating on drawings of equipment,

    g. Clearances.

    h. Disconnect switches, pull boxes and fuses.

    i. Lighting fixtures.

    j. Control devices.

    k. All fabricated equipment.

    l. Time clocks, contactors, control switches, etc. including wiring diagrams and sequence of operation.

1. Short Circuit, Arc flash and Coordination Study.

    a. Submit, along with switchgear and distribution equipment submittal, system short circuit study based on the per unit method or in accordance with the latest IEEE recommendations, Report to be submitted with the shop drawings of the main service and the distribution system, each copy bound with a stiff cover.

    b. Provide Arc flash calculations and provide a sticker with the value and the recommended protective gear.

    c. Submit, along with the short circuit study, a coordination study of all protective devices, including the utility company protective device through all feeder devices on the secondary of each transformer downstream to each panel board and motor control center. Settings shall be incorporated with the coordination study. Study both short circuit and coordination studies~ comprising the power systems study shall be signed by California Registered Electrical Engineer who shall determine the adjustable settings for protective devices. All switchgear and distribution equipment shall comply with the results and recommendations of the studies. The ampere interrupting capacity (A.I.C.) rating of devices shall be a minimum of at least ten percent greater than the calculated value of symmetrical three-phase fault current at

that respective device. All circuit breakers shall be fully rated. Series rated breakers shall not be accepted. Feeder lengths and materials shall be determined independently by the installing contractor, and documented in the study. Studies shall include entire system from normal utility source, emergency source down to panel boards, and individual feeder loads serving specific equipment.

d. Studies to be done by switchgear manufacturer and shall include a tabular form indicating calculated fault value, the A.I.C. value and the available arc flash energy and the recommended protective gear at each equipment.

2. Special Submissions:

I. Test Reports for the following:

a. Megger Readings: Ground system, motors and feeders.

b. Voltage Readings: Distribution, service and motors.

c. Fire alarm system.

G. Protection of Materials:

1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.

H. Cleaning:

1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.

2. Thoroughly clean parts of apparatus and equipment. Exposed parts to be painted shall be thoroughly cleaned of cement, plaster, and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and corners and cracks scraped out. Exposed rough metal shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.

3. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

I. WARRANTIES

1. Provide one year warranty on all material and labor performed as a minimum, unless noted otherwise in specific sections.

PART 2 – PRODUCTS - NOT USED

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

A. Advise the Inspector before starting the Work of this Division.

B. Exposed conduits shall be painted to match the surfaces adjacent to installation.

C. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected by the Inspector. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to students and staff.

D. Electrical equipment shall be braced and anchored for CBC Seismic Design requirements, or as otherwise indicated on the Drawings.

E. LEGAL REQUIREMENTS AND STANDARDS

1. Required: Comply with the latest, as applicable and effective, during the progress of Contracted Work.

a. Latest Ventura County, Electrical, Fire and Building Codes and Supplemental addendums and requirements.

b. California State Administrative Code, Title 24, State Building Standard.

c. (CAUOSHA) California State Occupational Safety and Health Act.

d. California State Fire Marshal Standards.

e. Southern California Edison.

f. U.L. - Underwriters Laboratories Inc.

g. NEC - National Electric Code.

h. ASTM - American Society of Testing and Materials.

i. Current publications of the National Fire Protection Association.

j. National and American Standards Association.

2. General compliance as applicable

a. Drawings and specification requirements shall govern where they exceed Code requirements, in case of a conflict between the plans, the codes and the specifications, the more stringent shall apply.

b. Where requirements between governing Codes and Regulations vary, the more restrictive provision shall apply.

c. Nothing contained in Contract Documents shall be construed as authority or permission to disregard or violate legal requirements.

3.02 DELIVERY STORAGE AND HANDLING

A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.03 CUTTING AND PATCHING

A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.

B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

C. Repair or restore other work, or surfaces damaged as a result of the work performed under this contract.

3.04 PRELIMINARY OPERATIONS

A. Required; Should the District require that any portion of the systems or equipment be operated prior to the final scheduled dates for completion and acceptance of the work, the Contractor shall consent. Such operation shall be under the direct supervision of, and at the expense of the Contractor, and shall not be construed as an acceptance of any of the work by the District.

3.05 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the Owner Authorized Representative.

3.06 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.07 COMPLETION

A. Protect The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.

B. When the installation is complete and all adjustments have been made, operate the systems for a period of one week, during which time demonstrate to the Engineer that the systems are completed and operating in conformance with the Specifications.

END OF SECTION

SECTION 26 05 13
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Boxes, enclosures, keys and locks.

2. Switches.

3. Identifications and signs.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Division 26 – Electrical.

PART 2 – PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Outlet Boxes and Fittings:

1. In exposed Work, where conduit runs change direction or size, outlet boxes and conduit fittings shall be cast metal with threaded hubs cast integral with box or fitting.

3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium-plated or zinc galvanized. Castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal, and shall be free of cracks, gas holes, flaws, excessive shrinkage, and burnt-out sand.

4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for particular fitting installed.

5. Light fixture outlets shall be 4-inch octagon, 4-inch square, 2 1/8-inch deep or larger, depending upon number of conductors or conduits therein. Plaster rings shall be furnished with round opening with two ears drilledS 2 23/32 inches center to center.

8. Plaster rings shall be provided on flush-mounted outlet boxes except where otherwise indicated or specified. Plaster rings shall be same depth as finished surface. Install approved ring extension to obtain depth to finish surface.

10. Factory made knockout seals shall be installed to seal box knockouts, which are not intact.

B. Junction and Pull boxes:

1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.

2. Covers shall be fastened to box with a sufficient number of machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws if boxes are not installed plumb. Surfaces of pull and junction boxes and covers shall be labeled in black marker ink designating system, panelboard and circuit designation contained in box. In exposed Work, designation shall be installed on inside of pullbox or junction box cover.

4. Weatherproof NEMA 3R pull and junction boxes shall conform to foregoing for interior boxes with following modifications:

   a. Cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.

   b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with threaded conduit hubs.

   c. Exposed portions of boxes shall be galvanized and finished with one prime coat and one coat of baked-on gray enamel, unless already furnished with factory baked-on finish.

5. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.

6. Underground Concrete Pull Boxes:

   a. Pre-cast concrete pull boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 wheel loading, pre-cast concrete. Pull boxes with inside dimensions of 2 feet by 3 feet by 3 feet deep shall consist of a base section, top ring, and cover. Base section shall be furnished with 2 knockouts measuring 10 inch by 10 inch in each 3 feet side, and one 20 inch by 20 inch knockout in each 2-foot side. Pull boxes with inside dimension 4 feet by 4 feet by 4 feet deep shall consist of a base section, midsection, topping, and cover. Base section shall be furnished with 2 knockouts measuring 8-inch by 16-inch on each of two opposite sides, and one 20-inch by 20-inch knockout on each of other two opposite sides. Pull boxes shall be furnished with a minimum of 6-inch diameter sump knockout and one inch diameter ground rod knockout. In pull boxes, furnish and install cable racks on walls. Racks shall be furnished with 3 porcelain cable holders on vertical steel mounting bars. Pull boxes shall be furnished with 3/4 inch diameter pull irons. Covers shall be traffic-type consisting of steel safety plate bolted to frame. Covers shall be marked as electrical, power, or signal as required. Pull boxes shall be as manufactured by Oldcastle Precast, Jensen Precast, Kistner, Western Precast, or equal.

   b. Provide end bells in duct entrances. Terminate each metal conduit with insulated bushing provided with a grounding terminal.

   c. Install pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.

   d. Remove floor drain knockout and provide a depth of 24 inches of crushed rock below box extending a minimum of 12 inches beyond on all sides.

e. Permanently and effectively ground metal equipment cases, cable racks, and similar items in pull boxes to site grounding electrode system. Provide grounding conductor in compliance with CEC Article 250.

f. Provide 6-inch deep sand base under pull boxes.

g. Identify power and signal cables by tagging in manholes and pull boxes. Tie securely to cables with nylon cord.

h. Top of steel plate shall provide a minimum coefficient of static friction of 0.5 for either wet or dry locations, when tested for any shoe sole material. Test shall comply with ASTM D 1047 or F 489 or F 609 standards. Submit manufacturer's test results for Architect's review as part of materials and equipment submittals.

i. The use of underground extension boxes shall be limited to not more than 1 times the original depth of pull box.

7. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Oldcastle, Jensen, Kistner, Western Precast, or equal.

C. Keys and Locks:

1. Provide two keys with furnished door locks, including cabinet door locks and switchboard locks, two keys for lock switches on switchboards or control panels, and two keys with interlocks or other furnished lock switches. Deliver keys to Owner.

2. Locks shall be keyed to Corbin No. 60 keys for access to operate equipment and Corbin 70 keys for service access. Special keys and locks shall only be provided where specified.

2.02 RECEPTACLES AND SWITCHES

A. Receptacles:

1. Duplex receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wired with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be PVC. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts.

NEMA #	Pass & Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20	PS5362-I	HBL5362-I	5362-I
(15 amps) NEMA 5-15	PS5262-I	HBL5262-I	5262-I

2. Duplex receptacles on circuits supplied by panel boards with integral surge suppression shall be Pass & Seymour model number PS5262BL (blue), Hubbell DRUBTVSS15, Leviton 5262-SBU, 15 amps, 120 volts, or equal.

3. Single receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wire with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be

thermoplastic. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts. For circuits consisting of one single receptacle only, ampere rating of receptacle shall be same as circuit breaker or fuse.

NEMA #	Pass & Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20R	5361-I	HBL5361-I	5361-I
(15 amps) NEMA 5-15R	5261-I	HBL5261-I	5261-I

4. Provide specification grade ground-fault circuit interrupter (GFCI) type receptacles in accordance with 2010 UL standards. GFCI receptacles shall have a trip indication light. Receptacle terminal screws shall be back and side wire with internal screw pressure plates. Test and reset buttons shall match device body and shall be ivory. GFCI receptacles shall be manufactured in standard configuration for installation with stainless steel smooth plates. Exterior mounted receptacles shall be mounted inside weatherproof enclosure.

NEMA #	Pass & Seymour	Hubbell	Leviton
NEMA 5-20R	2095-I	GFR5352-IA	7899-I
NEMA 5-15R	1595-I	GFR5252-IA	8598-I

5. Provide weatherproof receptacles, except where otherwise indicated or specified, consisting of GFCI receptacles, as specified herein, and metal plates with die-cast lockable hinged lids and weatherproof mats.

C. Switches:

1. Local Switches:

a. Provide local switches, high strength thermoplastic toggle, specification industrial grade, rated 20 amps at 120-277 volts AC only, with plaster ears, external screw pressure plate back and side wired, and standard size composition cups which fully enclose mechanism. Switches shall be approved for installation at currents up to full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80 percent of rating for motor loads. Switches shall have oversized silver alloy contacts for long life and better heat dissipation. Provide switches as single pole, double pole, 3-way, 4-way, non-lock type. Provide non-lock type switches with ivory handles;

	Pass & Seymour	Hubbell	Leviton
Single pole	PS20AC1I	HBL1221I	1221-2I
Double pole	PS20AC2I	HBL1222I	1222-2I
Three way	PS20AC3I	HBL1223I	1223-2I
Four way	PS20AC4I	HBL1224I	1224-2I

b. Provide lock type switches, specification industrial grade, 20 amp, 120-277 volts with metal or nylon key guides with on/off indication, and operable by same key. Key shall be Owner standardized vertically oriented, tamper

resistant, forked key with two each 5/16-inch long forks, 5/32-inch spacing between forks and 5/16-inch width overall.

	Pass & Seymour	Arrow Hart
Single pole	PS20AC1L w/#500 Key-2L	1221L w/1201LK Key
Double pole	PS20AC2Lw/#500 Key	1222L w/1201LK Key
Three way	PS20AC3L w/#500 Key	1223L w/1201LK Key
Four Way	PS20AC4L w/#500 Key	1224L w/1201LK Key

c. Rotary lock switches shall incorporate a tumbler type lock to prevent unauthorized operation. Lock shall be tumbler type by Corbin, keyed to a HH41 key. Lock switch to be installed with pin tumblers facing downward. Key shall be removable in all positions. Each device shall be complete with 2 keys. Keys shall be delivered only to the Owner. Switches shall be rated at 20 amps, 120-277 volt AC. Switch plates shall be of stainless steel, engraved with on and off positions indicated.

	Arrow Hart
Single pole	AH1191N
Double pole	AH1192N
Three way	AH1193N

d. Pilot light switches shall be rated 20 amps and shall conform to specifications for local switches. Switches shall be furnished with red, Lexan handles that are lighted by long-lasting neon lamps. Pilot light shall light when load is on. Pilot light 120 volt switches

	Pass& Seymour	Hubbell	Leviton
Single pole	PS20AC1-RPL	HBL1221-PL	1221-PLR
Double pole	PS20AC2-RPL	HBL1222-PL	1222-PLR
Three way	PS20AC3-RPL	HBL1223-PL	1223-PLR

Same as above except rated at 20 amps at 277 volts.

	Pass & Seymour	Leviton	Hubbell
Single pole	PS20AC1-RPL	1221-7PR	HBL1221-PL7

e. Provide remote control switches for mechanically held contactors arranged for 3-wire control, toggle type, momentary contact, single pole, 3-position with center off position, rated 20 amps at 120-277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclose mechanism, and ivory handles

	Pass & Seymour	Hubbell	Leviton

1251-I	HBL1557-I	1285-I

f. Provide remote control switches for magnetically held contactors arranged for 3-wire control, toggle type, maintained contact, single pole, 3-position with center off position, rated 20 amps at 120-277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclosed mechanism, and ivory handles.

Pass and Seymour	Hubbell	Leviton
1225-I	HBL 1385	1285-I

g. Momentary Contact locking key type switch. 20A 120/277V center off. Key shall be Owner standardized vertically oriented, tamper resistant, forked key with two each 5/16" long forks, 5/32" spacing between forks and 5/16" width overall.

Arrow Hart

AH1995L w/ AH2000 key

h. Momentary Contact switch low voltage 1 pole 3A 24VAC 3 position center off. Key for locking switch shall be Owner standardized vertically oriented, tamper resistant, forked key with two each 5/16" long forks, 5/31" spacing between forks and 5/16" width overall.

Pass and Seymour

Toggle 1081I

Locking 1081KGRY w/#500 Key

2. Time Switches and Photoelectric Controls for existing construction; use section 26 09 23 for new construction.

a. Provide time switches with a 7-day, solid-state, electronic type capable of fully automatic or manual operation and housed in a sheet steel enclosure unless built into a panel or switchboard. Contacts rated for 25 amps resistive or inductive, each pole 240 VAC; 5 amps tungsten or 277 VAC pilot duty, each pole 240 VAC. Time switches to contain a non-volatile clock and non-volatile memory with a built-in rechargeable super capacitor power carry-over system. Battery carryover is not acceptable. Provide a minimum of 15 on/off set points per week. Timing to be in one minute increments with a minimum on or off time of one minute. Time switch digital displays to indicate days of week, hours, and minutes. Display to contain a load status light to indicate when equipment is in operation. Time switches; Paragon Model EC7000 Series, Tork Model EW 101B series, Intermatic ET7000 series, or equal. Features required for application:.

1) Liquid crystal display panel.

2) Holiday scheduling: Up to 40 dates may be assigned special holiday schedules, up to one year in advance.

3) Automatically adjusts to and from daylight savings time and for leap year.

4) Contact ratings: 10 amp at 240 VAC.

5) Safety override switch for each circuit to either provide shut down of circuit or to override on.

6) Selective review: All or part of schedule shall be displayed at touch of a key.

7) Super Capacitor for power carry over system.

8) Supply voltage: 120 V.

9) 365-day advance scheduling.

b. Photoelectric control: Shall be rated 2,000 watts, 120V with single pole, single throw, normally closed contact, enclosed in a die-cast aluminum gasketed enclosure with 1/2 inch conduit fitting, Tork series 2100, or equal.

3. Emergency Lighting Control Unit

a. The Emergency Lighting control Unit shall provide all required functionality to allow an standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building.

b. The emergency lighting control unit shall allow control of emergency lighting fixture in tandem with normal lighting in an area while ensuring that emergency lighting will turn on immediately to full brightness upon loss of normal power supplying the control device. Emergency lighting operation shall be independent for each controlled area and shall not require a generalized power failure for proper operation.

c. The device shall have normally closed dry contacts capable of switching 10 amp emergency ballast loads at 120-277 VAC, 60 Hz, or 2 amp tungsten loads at 120 VAC, 60Hz.

d. The device shall have universal rated voltage inputs provided for normal power sense and normal switched power at 120-277 VAC, 60 Hz.

e. The device shall provide separate LEDs to indicate the presence of normal and emergency power sources. The LEDs shall indicate the unit's current operational mode (normal or emergency)

f. The device's normal power input terminal shall be connected to the line side of the control device such that any upstream fault causing a loss of power, including the tripping of the branch circuit breaker, will force the unit into the emergency mode and turn on the emergency lighting.

g. The unit shall automatically switch emergency lighting on and off as normal lighting is switched. When normal power is not available, the unit shall force and hold emergency lighting on regardless of the state of any external control device until normal power is restored.

h. Device shall be WattStopper ELCU-100 Emergency Lighting Control Unit, LVS #EPC-PM Series, Lighting Control Design #GR 2001 series or Equal.

5. Cords and Caps:

A. Manufacturers:

1. Rome Cable Corporation

2. Hubbell

3. Or equal

Attachment Plug Construction to Conform to NEMA WD 1 match receptacle configuration to outlet provided for equipment.

B. Cord Construction: ANSII/NFPA 70, Type SO multiconductor flexible cord with identified equipment -grounding conductor. Suitable for use in damp locations and Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.03 IDENTIFICATION AND SIGNS

A. Identification Plates:

1. Provide identification plates for the following unless otherwise specified, for switchboards, unit substations, motor control centers, control panels, push-button stations, time switches, contactors, motor starters, motor switches, panelboards, and terminal cabinets.

2. Identification plates shall be of plastic stock and shall adequately describe function, voltage and phase of identified equipment. Where identification plates are detailed or described on Drawings, inscription and size of letters shall be as indicated. For lighting and power panels, identification plates shall indicate panel designation, voltage, and phase of panel. For terminal cabinets, identification plates shall indicate system contained in terminal cabinet.

3. Identification plates shall be black-and-white nameplate stock of bakelite with characters cut through black exposing white. Plates shall be furnished with beveled edges and shall be securely fastened in place with No. 4 Phillips-head, cadmium-plated steel, self-tapping screws. Characters shall be 3/16 inch high, unless otherwise indicated.

B. Markings:

1. Install identification markings to surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Provide abbreviations required along with an identifying number. Markings to be provided with locking type stencils using paint of a contrasting color. Figures shall be 3/8 inch high unless otherwise indicated. Dymo Industries Inc., self-sticking plastic labels, with embossed characters made with a typewriter may be installed instead of stencils and paint; p-touch self adhesive plastic, or Brother P-Touch self sticking laminated plastic labels may be installed.

C. Warning Signs:

1. Provide signs of standard manufacture, 18 gage steel, with porcelain enamel finish. Provide red lettering on a white background.

PART 3 – EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

A. Heights of outlets and equipment indicated on Drawings shall govern. In absence of such indications, following heights shall be maintained with heights measured to centerline unless otherwise noted:

1. Install panelboards and terminal cabinets 6 feet 6 inches from finish floor to top of cabinet.

3.02 COVER PLATES

A. Provide a plate on each switch and receptacle outlet.

C. In the following cases, and at required locations. Switch and receptacle plates shall be engraved with the device(s), or fixtures being controlled, or as indicated:.

1. Switches so located that operator cannot see fixtures, or items of equipment controlled while his hand is on the switch.

2. Receptacles operating at other than 120 V shall be identified with the operating voltage.

3. Switches operating on 277 V shall be identified with the operating voltage.

4. Where indicated on Drawings.

D. Designations shall be as indicated on Drawings or as specified by Architect.

E. Standard GFI cover plates shall be Pass & Seymour 4600, Raco 5028-0, or equal. GFI cover plates shall be provided with a CAM lock mechanism with two keys or a padlock hasp that does not protrude through the face of the cover and will allow the shank of locks keyed Corbin No. 60 keys.

3.03 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Provide descriptive nameplates or tags permanently attached to switchboards, motor control centers, transformers, panelboards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus installed for operation or control of circuits and distribution equipment points.

B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten to equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.

C. Fasten tags to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Indicate circuit, phase, and function. Tag branch circuits in panel boards and motor control centers. Tags may be manufactured of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.

D. Provide circuit identification cards and cardholders in all panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to inside of panel

door. List of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit, area and connected load.

E. Junction and pull boxes shall have covers stenciled with box number when indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.

F. Name shall be correctly engraved, with a legend indicating function or areas, when required by codes or indicated on Drawings.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 26 05 19
LOW-VOLTAGE WIRES

PART 1 – GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. Section Includes: Low-voltage wire, splices, terminations and installation.

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

PART 2 – PRODUCTS

2.01 WIRES

A. Wires shall be single conductor type THHN, THWN or THWN-2 insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at 90 degrees C. maximum continuous conductor temperature in dry locations, 90 degrees C. in wet locations for sizes 8 AWG and larger and 75 degrees C in wet locations for sizes 10 AWG and smaller, and shall be listed by UL Standard 83 for thermoplastic insulated wires, listed by Underwriter's Laboratories (UL) for installation in accordance with Article 310 of the California Electrical Code (CEC). Conductors shall be solid copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors. Conductors shall be insulated with PVC and sheathed with nylon. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering are not permitted. Wires shall be tested in accordance with the requirements of UL standard for types THWN-2, THWN or THHN.

B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

2.02 STANDARDS

A. THWN/THHN and THWN-2/THHN wires shall comply with the following standards:

1. UL 83 for thermoplastic insulated wires.

2. UL 1063 for machine tool wires and cables.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at the site shall be protected from physical damage until they are installed and walls are completed.

B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50 feet are exempt. When pulling conductors, do not exceed manufacturer’s recommended values.

C. The Project Inspector will observe installation of feeder cables. Notify the Project Inspector not less than two working days in advance of the proposed time of feeder installation.

D. At outlets for light, power, and signal equipment, provide pigtail splices with 8-inch circuit conductor leads for connection to fixtures, equipment, and devices.

E. Pressure cable connectors, pre-insulated 3M Scotchlok, Hubbell Power, O-Z/Gedney or equal, Y, R or B spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems, except public address and telephone systems.

F. Joints, splices, taps, and connections to switchboard neutral, bonding or grounding conductors, conductors to ground busses, and transformer connections for wires 6 gage and larger shall be performed with high-pressure cable connectors approved for installation with copper conductors. Connectors shall be insulated with heavy wall heat shrink WCSM, or cold-applied roll-on sleeve RVS. Insulation level shall be a minimum of 600V and joints, splices, and taps shall be qualified to ANSI C 119.1, UL, NRTL, or equal listed mechanical pressure connections.

G. Connections to any bussing and high-press cable connectors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.

H. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade five machine screws secured with constant pressure-type locking devices.

I. Wire switchboards, panel cabinets, pull boxes, and other cabinets except public address, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In switchboards, panels and terminal blocks, wires shall be fanned out to terminals. If bundles are longer than 24 inches, a maximum of nine current carrying conductors may be bundled together.

J. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.

K. Maintain the conductor required bending radius.

L. Neutral conductors larger than 6 gage, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in switchboards, cabinet, gutters or pull boxes. Neutral conductors 6 gage and smaller shall be white color identified throughout their entire length.

N. Wiring systems shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of feeder and branch circuit conductor's insulation resistance. The insulation of the conductors shall be tested prior to connections to any panelboards, switchboards, variable frequency drives, lighting control systems, ballasts, and wiring devices such as but not limited to GFI receptacles, TVSS receptacles, or equipment. Insulation testing of panelboards and switchboards shall be independently performed from the insulation testing of any conductors as specified in other sections of this specification.

1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of feeder conductors. Tests must be conducted with wires disconnected at both ends.

    a. Provide calibration program records to assure the testing instrument to be within rated accuracy. The test equipment accuracy shall be in accord with

the requirements stated by the National Institute of Standards and Technology (NIST).

b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.

c. Test reports shall include the following:

1) Identification of the testing organization.

2) Equipment identification.

3) Ambient conditions.

4) Identification of the testing technician.

5) Summary of project.

6) Description of equipment being tested.

7) Description of tests.

8) Test results.

9) Analysis, interpretation and recommendations.

2. Utilize the services of an approved independent testing laboratory or a qualified contractor's employee (Technician certified in accordance with ANSI/NETA ETT-2000 Standard for Certification of Electrical Testing Personnel) to perform megger time-resistance insulation testing of branch circuit conductors. Tests must be conducted with wires disconnected at both ends.

a. Test equipment and report requirements stipulated under paragraph 3.01.N.1 apply to branch circuit testing.

3. Tests shall be performed in the presence of the Project Inspector.

4. Insulation resistance shall not be less than 100 mega-ohms.

3.02 COLOR CODES

A. General Wiring:

1. Color code conductor insulation as follows:

SYSTEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

2. For phase and neutral conductors 6 gage or larger, permanent plastic-colored tape may be furnished to mark conductor end instead of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.

3.03 FEEDER IDENTIFICATION

A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be by Tyco Electronics, Panduit, Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers from Tyco Electronics, Panduit, Brady Perma-Code or equal. Markers shall include feeder designation, size, and description.

3.04 TAPE AND SPLICE KITS

A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.05 TAGGING

A. General: Install identification markers on ungrounded conductors of all circuits, in switchboards, panel boards, pull, junction and outlet boxes, lighting fixtures, switches, receptacles and other terminating enclosures. Grounded circuit conductors shall have identification markers in switchboards, panel boards, and all enclosures where more than one circuit grounded circuit conductor is installed. Identification shall include switchboard, panel board, or other source and circuit number. Tags shall be 3M Co. "Scotchcode" " write-on tape or shall be premarked with self-adhesive wraparound type EZ Code, Brady.

B. Tagging: Conductors shall be lagged in each junction box, pull box, wireway or auxiliary gutter and at each device, motor outlet, panel board, switchboard or other conductor termination. Tag shall show feeder number, size. Phase and origin.

3.06 MISCELLANEOUS (AS APPLICABLE)

A. Make all branch circuit and fixture joints for #10 AWG and smaller wire with UL approved connectors, listed for 600 volts. Provide Minnesota Mining and Manufacturing Co. insulated "Scotchlocks,", Ideal Co. “Wing-Nut”, or T &B Burndy Co. “Piggy" connectors.

B. Make all branch circuit joints of #8 AWG and larger with screw pressure lugs, and insulate with electrical tape to 150% of the insulating value of the conductor insulation.

C. Tape all connections made with non-insulated type connectors with half-lapped, rubber-type tape, to 1-1/2 times the thickness of the conductor insulation, then cover with Scotch #33 tape.

D. Each circuit must correspond to the branch circuit number indicated on the panel schedule shown on the drawings except where departures are approved by the Engineer.

E. Neatly group or tape together wiring within equipment enclosures.

F. Where conductors in conduit pass through exterior walls, a sealing compound of moisture-resistant material shall be applied in the ends of the conduits to seal around the conductors.

G. Megger tests shall be taken on all feeder conductors and on all conductors for motors over 15 HP. Tests shall be made in presence of the District's representative and prior to connection of equipment. Written reports of results shall be submitted to the Engineer. Conductors testing below manufacturers standard shall be replaced at no expense to the owner.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.08 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Provide and install grounding system as indicated or required.

B. Related Requirements:

1. Refer to related sections for their system grounding requirements.

2. Section 26 05 00: Common Work Results for Electrical.

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. IEEE 142 Green Book.

2. Underwriter's Laboratories (UL).

3. California Electrical Code.

4. Building Industry Consultant Services International (BICSI) (Signal).

5. EIA/TIA (Signal and power).

6. Nationally Recognized Testing Laboratory (NRTL) or equal.

7. Motorola R56 Standards.

1.03 SYSTEM DESCRIPTION

A. Metallic objects on the Project site that enclose electrical conductors, or that are likely to be energized by electrical currents, shall be effectively grounded.

B. Metal equipment parts, such as enclosures, raceways, and equipment grounding conductors, and earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.

C. Metallic systems shall be effectively bonded to the main grounding electrode system.

D. A separately derived AC source shall be grounded to the equipment grounding conductor, and to separate “made” electrode of building grounding electrode system.

E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by installation of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of required size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit shall be provided with a green insulated grounding conductor of required size.

F. Cold water, UFER ground or other utility piping systems, shall not be utilized as grounding electrodes due to the installation of insulating couplings and non-metallic pipe in such installations. In addition to bonding to cold water pipe provide at least one of the following made grounding electrodes:

1. A dedicated “made” electrode, fabricated of at least 20 feet of galvanized 1/2 inch diameter rebar encased by at least two inches of concrete, and placed next to the

bottom of a concrete foundation, or footing in direct contact with earth A welded extended portion shall surface at the location of the common grounding electrode bus bar and be extended by a 3/0 CAD welded bare copper cable, or be CAD welded directly to the bus. The CAD weld shall be at least four inches above finished floor in a dry location. The main grounding electrode and associated grounding conductors shall be in an enclosure and in conduit.

2. Grounding electrodes as specified hereafter in this section.

3. Concrete enclosed electrode, fabricated of at least 20 feet of No. 2 AWG, minimum size, bare copper conductor, encased by at least two inches of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar shall be connected to copper wire with approved connectors. An external electrode, as specified hereafter or as required by the CEC, shall be installed and connected to foundation or footing rebar.

G. Non-current carrying metal parts of high-voltage equipment enclosures, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded. Provide a CEC sized grounding conductor in every raceway.

H. Metallic or semi-conducting shields and lead sheaths of cables operating at high voltage, shall be permanently and effectively grounded at each splice and termination.

I. Neutral of service conductors shall be grounded as follows:

1. Neutral shall be grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service switchboard, or main switch.

2. Equipment and conduit grounding conductors shall be bonded to that grounding point.

3. If other buildings or structures on the Project site are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.

4. Equipment grounding conductor is installed from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to “made” electrode for that building.

5. Feeder neutrals shall be bonded at service entrance point only, neutrals of separately derived systems shall be bonded at the source only.

J. If there is a distribution transformer at a building the secondary neutral conductor shall be grounded to “made” electrode serving the building.

K. Within every building, the main switchboard or panelboard, shall be bonded to the cold water line. Metallic piping systems such as gas, fire sprinkler, or other systems shall be bonded to the cold water line.

1.04 SUBMITTALS

A. Provide in accordance with Division 01.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Furnished yard boxes shall be precast concrete and shall be approximately 14 inches wide by 19 inches long by 12 inches deep or larger, if necessary to obtain required clearances. Boxes

shall be furnished with bolt-down, checkered, cast iron covers and cast iron frames cast into boxes. Yard boxes shall be Jensen Precast, Oldcastle Precast, Western Precast, Kistner, or equal.

B. “Made” electrodes shall be copper-clad steel ground rods, minimum 3/4 inch diameter by ten feet long.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, finish elevation of concrete yard boxes shall be two inches above planting surfaces.

B. If concrete enclosed electrode is provided, grounding wire shall be terminated to a suitable copper plate with grounding lugs and must be enclosed in a raceway or box..

C. Grounding rods shall be driven to a depth of not less than eight feet. Permanent ground enhancement material, (GEM) as manufactured by Erico Electrical Products, Loresco Powerset, Tessco Ultrafil or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.

D. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.

E. When installing grounding rods, if resistance to ground exceeds 25 ohms, two or more rods connected in parallel, or coupled together shall be provided to meet grounding resistance requirements.

F. Ground rods shall be separated from one another by not less than ten feet.

G. Parallel grounding rods shall be connected together with recognized fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 TESTING

A. Provide the services of an approved independent testing laboratory to test grounding resistance of “made” electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping. Tests shall be performed as follows:

1. Visually and mechanically examine ground system connections for completeness and adequacy.

2. Perform fall of potential tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.

3. Perform the two point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal railings at building entrances and at handicapped ramps shall also be tested.

4. Test shall be performed in the presence of the Inspector.

B. Submit 3 copies of test results to the Architect. Test results shall be submitted on an official form from the independent testing laboratory recording Project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 05 33
RACEWAYS BOXES FITTINGS AND SUPPORTS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Raceways and wire ways.

2. Conduit installation.

3. Underground requirements.

B .Related Requirements:

1. Section 26 05 00: Common Work Results for Electrical.

2. Section 26 05 13: Basic Electrical Materials and Methods.

C. Applicable Standards and Codes.

1. EIA/TIA 569 Standards.

2. National American Standards Institute (ANSI).

3. National Electrical Manufacturer's Association (NEMA).

4. Nationally Recognized Testing Laboratory (NRTL).

5. California Electrical Code (CEC).

6. Uniform Building Code (UBC).

7. Underwriters Laboratory (UL).

1.02 SUBMITTALS

A. Materials List: Provide in accordance with Division 01.

PART 2 – PRODUCTS

2.01 RACEWAYS

A. Conduit Materials:

1. Metallic conduit, and tubing shall be manufactured under the supervision of an UL, or another NRTL factory inspection and label service program. Each ten-foot length of conduit and tubing shall bear the UL or another NRTL label and manufacturer's name.

2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc-coated, with an inside and outside protective coating manufactured in accordance with ANSI C 80.1. Couplings, elbows, bends, conduits, bushings and other fittings shall be the same

materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type, manufactured in accordance with ANSI C 80.1 and UL 6.

3. Electrical metallic tubing shall be steel tubing, zinc-coated with a protective enamel coating inside, manufactured in accordance with NEMA C 80.3. Fittings, couplings, and connectors shall be gland compression type, set screw couplings and connectors not permitted. All parts shall be manufactured in accordance with NEMA C80.3 and UL 6A Electrical metallic tubing is designated hereinafter as EMT. Steel and rain tight fittings shall be approved and listed for the intended application.

4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips, manufactured in accordance with UL 1.

   a. Connectors and couplings shall be required fittings of the type, which threads into convolutions of flexible conduit.

5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.

6. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.

8. Metal Clad (MC) cable system is not allowed.

B. Sleeves for Conduits: Sleeves shall be adjustable type by Carlon, U.S. Plastic, PEP Plastic or equal.

C. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, equivalent Cooper Crouse Hinds Thru-Wall, Legrand Thru-Wall, or equal.

D. Expansion Joints-Seismic Separations between building(s) and other locations as indicated on drawings:

1. Provide Thomas & Betts XJG-TB, O-Z/Gedney. type AX with bonding strap and clamps, Cooper XJGD or equal. At exterior locations, provide Thomas & Betts XJG-TB, O-Z/Gedney type EX, Cooper XJGD, or equal. Provide O-Z/Gedney type AXDX, or equal combination deflection/expansion fittings at all seismic separations. Provide manufacture’s internal and external bonding jumpers at all locations. Liquid-tight metal conduit or flexible metal conduit shall not be approved at expansion joints, separations between buildings or seismic separations.

2. Provide expansion fittings at intervals not exceeding 100 feet in conduits exposed to direct sunlight. Fittings may be installed in the conduit run or where conduit attaches to junction or pull boxes. OZ/Gedney type AX, TX or EXE series, or equivalent by Thomas and Betts, Crouse-Hinds or approved equal.

E. Conduit Seal Fittings:

1. Provide conduit seal fittings where indicated on the Drawings. Conduit seals shall be of rigid galvanized steel. Seals in horizontal conduit installations shall be Thomas & Betts

EYS, Appleton Type ESU, Crouse Hinds Type EYS, or equal. Seals in vertical conduit installations shall be Thomas & Betts EYD, Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain. When installing conduit seals make provision for percent fill space reduction in accordance with CEC.

2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are installed in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.

PART 3 – EXECUTION

3.01 CONDUIT INSTALLATION

A. General Requirements:

1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and signal systems, except as otherwise specified.

2. EMT shall not be installed in concrete, directly buried underground, outdoors or where subject to damage.

3. Flexible Steel conduit shall not exceed 1-1/2 inches in size.

5. Liquid-tight flexible steel conduit shall only be installed, except where otherwise specified, for final connection equipment terminal boxes and other equipment and shall be of sufficient length, not exceeding 36 inches.

6. Connectors for flexible metal conduit shall be made of steel, and of the types which threads into convolutions of conduit. Connectors for watertight flexible metal conduit shall be as required for installation and shall be installed to provide a watertight connection.

7. Exposed conduit shall be installed vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to equipment with suitable iron brackets and one hole pipe strap.

8. If connection is from a flush wall-mounted junction box, install an approved extension box.

9. Underground feeder distribution conduits for systems may be non-metallic conduit instead of rigid conduit except where otherwise specified or indicated.

11. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of metallic conduit to facilitate bending is not permitted. Public telephone conduit bends and offsets shall be provided with a radius which is not less than ten times trade size of conduit unless otherwise permitted. Refer to underground installation, specified in this section, for radius of bends and offsets required for underground installations.

12. Running threads are not permitted. Provide conduit unions where union joints are necessary. Conduit shall be maintained at least six inches from covering of hot water

and steam pipes and 18 inches from flues and breechings. Open ends of conduits shall be sealed with permitted conduit seals during construction of buildings and during installation of underground systems.ns.

14. Where conduits are terminated in groups at panelboards, switchboards, and signal cabinets, etc., provide templates or spacers to fasten conduits in proper position and to preserve alignment. Conduits terminating at signal cabinets shall only enter cabinets in the following locations:

    a. Conduits entering top, side, and bottom of cabinets shall be aligned in a single row, centered two inches from rear of cabinet.

    b. Conduits entering back of cabinet shall be aligned in a single row centered two inches from top of cabinet.

    c. Conduits shall not be spaced closer than three inches on centers.

15. Where auxiliary supports, saddles, brackets, etc., are required to meet special conditions, they shall be fastened rigid and secure before conduit is attached.

17. Conduits suspended on rods more than two feet long shall be rigidly braced to prevent horizontal motion or swaying. Installation shall meet zone 4 seismic requirements.

23. Factory fabricated pipe straps shall be one or two-hole formed galvanized clamps, heavy-duty type, except where otherwise specified.

24. Conduits shall be supported at intervals required by code, but not to exceed ten feet. One inch and smaller exposed conduits shall be fastened with one-hole malleable iron straps. Perforated straps and plumber's tape is not permitted for the support of conduits.

26. Bushings and locknuts for rigid steel conduit shall be steel threaded insulating type. Setscrew bushings are not permitted.

28. Flex conduits shall be cut square and not at an angle.

29. Routing of conduits may be changed providing length of any conduit run is not increased more than ten percent of the length indicated on Drawings.

B. Underground Requirements:

1. Conduits and multicell raceways installed underground shall be entirely encased in three inch thick concrete on all sides , except where otherwise specified. Provide required spacers to prevent any deflection when concrete is placed and to preserve position and alignment. Conduits and raceways shall be tied to spacers. Anchors shall be installed to prevent floating of conduits and raceways during placing of concrete. Provide red colored concrete to encase conduits of systems operating above 600 volts.

2. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the concrete envelope, unless otherwise specified.

3. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.

4. Conduits and raceways in a common trench shall be separated by at least three inches of concrete. Electrical power and/or lighting conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking, and clock systems shall maintain a separation of a minimum of six inches from these types of signal system conduits and raceways. Electrical power, lighting and signal conduits and raceways installed in a common trench with other utility lines such as gas, water, sewer and storm lines shall maintain 12 inches separation from these types of utility lines.

5. The Inspector will observe underground installations before and during concrete placement. A mandrel shall be drawn through each run of conduit in presence of the Inspector before and after placing concrete. Mandrel shall be six inches in length minimum, and have a diameter that is within 1/4 inches of diameter of conduit to be tested.

6. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1 ½-inch inclusive shall not be less than 24 inches. Bends at risers and risers shall be PVC-coated rigid steel conduit. Radius of curve of bends or offsets in non-metallic conduit for public telephone system shall be not less than ten times trade size of conduit, unless otherwise specifically permitted.

7. Furnish and install a six-inch wide, polyethylene, red underground barrier type 12 inches above full length of concrete reading, "CAUTION ELECTRIC LINE BURIED BELOW".

8. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.

9. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.

10. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a four-inch galvanized nipple with ground bushing.

11. Underground conduit for systems operating above 600 volts shall be a minimum size of four inches.

12. At portable classroom all stub ups shall be installed with a coupling flush to finish grade.

13. Underground conduits and raceways shall be swabbed prior to wire pull.

C. Slabs on Grade:

1. Unless specifically reviewed by the Architect and DSA, conduits 1 ¼-inches and larger are not permitted to be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, slabs shall be thickened at bottom where conduits occur to provide three inches of concrete between conduit and earth. Required excavation shall be part of the Work of this section.

2. If concrete slab is five inches or more in thickness with a moisture barrier plastic sheet between earth and slab, one inch and smaller conduits shall be installed in the slab with a minimum of one inch concrete between earth and conduit.

3.02 STUBS

A. Underground:

1. Underground conduit stubs shall be terminated at locations indicated, and shall extend five feet beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and non-metallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with a permitted plug. Project record drawings shall indicate location of ends of underground conduit stubs fully dimensioned and triangulated with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on project record drawings in presence of the Inspector before backfilling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.

2. Over ends of individual underground conduit stubs or groups of conduit stubs, install four-inch by 18-inch deep PVC filled with concrete, flush with finished grade in asphaltic concrete or lawns, and two inches above finished grade in planting areas. Cast a three-inch by three-inch brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or as indicated on drawings.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 08 00
ELECTRICAL SYSTEMS COMMISSIONING

PART 1 – GENERAL

1.01. SECTION INCLUDES

A. Section Includes:

1. General requirements for Commissioning (Cx) of lighting systems components, lighting controls and HVAC systems line voltage interconnection components, including installation, start-up, testing and documentation according to construction documents and Commissioning Plan (CxP).

2. Standard procedures for the execution of commissioning work shall be in conformance with Division 1, Section 01 91 13 General Commissioning Requirements. Coordinate work with the Commissioning Services Provider (CxSP).

1.02. RELATED REQUIREMENTS

A. Division 01 - General Requirements.

B. Section 01 91 13: General Commissioning Requirements.

C. Section 23 09 23: Environmental Control and Energy Management Systems.

D. Section 26 05 00: Common Work Results for Electrical.

E. Section 26 05 13: Basic Electrical Materials and Methods.

F. Section 26 05 26: Grounding and Bonding.

G. Section 26 05 19: Low Voltage Wires (600 Volt AC).

H. Section 26 50 10: Solid State (LED) Lighting.

I. Section 26 09 23: Lighting Control Systems.

1.03. REFERENCES

A. Applicable codes, standards, and references: inspections and tests shall be in accordance with the following applicable codes and standards:

1. National Electrical Testing Association – NETA.

2. National Electrical manufacturer's Association – NEMA.

3. American Society for Testing and Materials – ASTM.

4. Institute of Electrical and Electronic Engineers – IEEE.

5. American National Standards Institute – ANSI.

6. National Electrical Safety Code – NESC.

7. California Building Code – CBC.

8. California Electrical Code – CEC.

9. California Green Building Standards Code (CalGreen).

10. Conglomerate for High Performance Schools (CHPS).

11. Insulated Power Cables Engineers Association – IPCEA.

12. Occupational Safety and Health Administration – OSHA.

13. National Institute of Standards and Technology – NIST.

14. National Fire Protection Association – NFPA.

15. California Electrical Code.

16. ANSI/NFPA 70B – Electrical Equipment Maintenance.

17. NFPA 70E – Electrical Safety Requirements for Employee Work Places.

18. ANSI/NFPA 101– Life Safety Code.

1.04. SUBMITTALS

A. Submittals shall include the following:

1. Submit required Cx submittals in accordance with Division 1 Specification Sections.

2. Copy of the Architect's reviewed and accepted submittals to the CxSP via the OAR.

3. List of team members who will represent the CONTRACTOR in the Pre-functional Equipment Checks and Functional Performance Testing, at least two weeks prior to the start of Pre-functional Equipment Checks.

4. Detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, checklist documentation and field checklist forms to be used by factory or field technicians, and a copy of full details of OWNER-contracted tests, full factory testing reports, if any, and Warranty information, including responsibilities of OWNER to keep Warranty in force, clearly defined.

5. Detailed manufacturer's recommended procedures and schedules for Pre-functional Equipment Checks, supplemented by CONTRACTOR's specific procedures, and Pre-functional Tests, at least four weeks prior to the start of Pre-functional Performance Tests.

6. After facility's commission is complete, submit completed Pre-functional Equipment Checklists and Functional Performance Test checklists organized by system and by subsystem. Bind information in a single package. The results of failed tests shall be included along with a description of the corrective actions taken.

1.05. MEETINGS, SEQUENCING AND SCHEDULING

A. Meetings: Attend (Cx) meetings as required under Section 01 91 13 and the Cx Plan.

B. Sequencing and Scheduling: The work described in this Section shall begin only after work required in related Division 26 Sections has been successfully completed, and tests, inspection reports and Operation and Maintenance manuals required in Division 26 Sections have been submitted and approved. The start-up and Pre-functional Equipment Checklists shall be completed and submitted to the OWNER's Authorized Representative (OAR) prior to the functional performance tests. Refer to the project's Cx Plan for more details.

1. Coordinate electrical work with the work of other trades prior to scheduling of any Cx procedures.

2. Coordinate the completion of electrical testing, inspection, and calibration prior to start of Cx activities.

3. Cx activities shall be scheduled in accordance with project's Cx plan.

1.06. QUALITY CONTROL

A. Comply with OWNER's Quality Control Specifications, Sections 01 45 16 – 01 45 19, as applicable.

B. Incorporate manufacturer's recommended Cx procedures for the systems and equipment to be commissioned under this Section.

PART 2 – PRODUCTS

2.01. TEST EQUIPMENT

A. Equipment to be utilized in the commissioning process shall meet the following requirements:

1. Provide test equipment as necessary for the equipment and systems to be commissioned.
2. Provide testing equipment and accessories that are free of defects and certified for use.
3. Provide testing equipment with current calibration labels per NIST Standards.
4. Testing equipment shall be UL Listed.

PART 3 – EXECUTION

3.01. COMMISSIONING PROCESS REQUIREMENTS

A. Work to be performed prior to commissioning:

1. Complete all phases of the work so the system(s) can be started, tested, adjusted, balanced, and otherwise commissioned.
2. Start-up services required to bring each system into full operational state and ready for functional performance testing:
    a. Completion of authorized manufacturer representative’s start-up procedures and recommendations.
        1) Provide Manufacture’s start-up completed forms.
    b. Completion of pre-functional checklists.
    c. Copy of required manufacturer and field testing.
    d. Motor rotation check.
    e. Control sequences of operation.
    f. Full and partial load performance.
3. If modifications or corrections to the installed systems are required to bring the system(s) to acceptance levels due to CONTRACTOR’s incorrect installation or defective materials, such modifications or corrections shall be made at no additional cost to the OWNER.
4. Functional tests shall not start until each system is complete and the above items have been documented and submitted to the Engineer of Record, Cx Services Provider and OWNER for review.

B. Pre-commissioning Responsibilities: Inspection, calibration and testing of the equipment and devices necessary to commission the following systems:

1. Electrical Lighting Systems.
2. Lighting Controls.
3. HVAC line voltage electrical components.
4. Line voltage interface of Environmental Controls and Energy Management System with other systems.

C. Commissioning Process Requirements: Refer to Section 01 91 13 General Commissioning Requirements, related sections and Cx Plan for information on meetings, start-up plans, Pre-Functional and Functional Performance Testing (FPT), operations and maintenance data, and other Commissioning activities.

3.02. PREPARATION

A. Provide certified electricians and/or qualified personnel as required with adequate tools and equipment necessary to perform Cx activities.

B. Provide all equipment required for the commissioning of equipment and systems indicated in article 3.01.B.

C. Provide certified testing agency personnel or report(s) as required in the Cx Plan.

3.03. TESTING

A. Testing documentation shall include the following minimum information:

1. Test number.

2. Equipment used for the test, with manufacturer and model number and date of last calibration.

3. Date and time of the test.

4. Indication of whether the record is the first commissioning test, or a retest following correction of a previously identified issue.

5. Identification of the system, subsystem, assembly, or equipment.

6. Conditions under which the test was conducted, including (as applicable) ambient conditions, set points, override conditions, and status and operating conditions that impact the results of the test.

7. Systems and assemblies test results, performance and compliance with contract requirements.

8. Issue number and description of corrected issue that prompted retesting.

9. Name and signature(s) of witnesses and the person(s) who performed the test(s).

B. Test lighting and controls systems to verify performance, operation, functionality, light levels, energy usage, and compliance with construction documents.

1. Start up, test and document results under the observation of the CxSP.

2. Execute the Functional Performance Test (FPT) under the observation of the CxSP.

3. Provide completed and signed FPTs to CxSP for inclusion in the commissioning report.

4. Functions and Testing Conditions:

a. Occupancy sensors and timer controls for lighting:

1) Verify that specified functions and features are set up, debugged and fully operable at time of test.

2) Verify that occupant override feature functions as intended in the contract documents.

3) Verify that sensors response times/durations are set properly.

4) Test the sequence of operation for features and modes and confirm that adjustable times match the design specifications and contract documents.

5) Verify that sensors are located per manufacturer's recommendations.

b. Electric lighting dimming, photocells and controls:

1) Test the dimming controls during daytime when conditions are such that controls should be dimming electric lighting.

2) Verify that amperage changes in light fixtures are proportional to external light changes. Verify that dimmed light levels uniformity at the specified work plane remain within specified limits.

3) Verify that delays and ramp times are set and functioning so that the speed of change of light fixture output is slow enough to not bother occupants, and in compliance with the specifications.

4) Verify that dimming does not cause lower than specified light levels in adjacent "non-dimmed" spaces.

5) Verify that the controls and sensors cannot be easily overridden or disabled by occupants.

6) Verify that dimming systems in places of assembly are interfaced with the Central Fire Alarm system.

7) Verify that dimmed lighting in these areas shall come back to full bright during a fire alarm or emergency condition.

c. Illumination Levels, Night Conditions:

1) Verify that lighting throughout the building is operating automatically.

2) Test with doors closed (to simulate actual occupancy) and after finishes are complete.

d. Lighting Power Density: Verify building lighting power density. Perform the test with interior lighting turned on and any manual or automatic controls temporarily overridden. Provide statement of compliance with 100% design energy report. Measurements shall be taken at least one minute after lights are turned on.

e. Emergency Lighting System: Verify that the system operates automatically under any condition, without human intervention, and that it resets back to normal operations after the power failure or emergency condition is over or cleared.

5. Acceptance Criteria:

a. Lighting Controls: For the conditions, sequences and modes tested; dimming, occupancy, photocell, and timing controls, integral components and related equipment shall respond to changing conditions and parameters defined in the Contract Documents. .

b. Lighting Power Density: Average instantaneous lighting power density shall be within plus or minus ten percent of that indicated in the Construction Documents.

c. Power factors on lighting circuits shall be greater or equal to 0.95, or as required by lighting fixture specifications.0%.

d. Electrical equipment AIC ratings shall be as indicated in construction drawings.

e. Feeders % voltage drop. Flag feeders with voltage drop greater than 3%.

3.04. ADJUSTING

A. Incorrect installations, including improper adjustments may result in additional work being required for Cx acceptance.

1. Perform work required to correct installations not meeting contract requirements at no additional cost to the OWNER.

B. Corrective work shall be completed in a timely manner to permit completion of the Cx process.

1. Refer to the Cx Plan for retesting requirements necessary to achieve required system performance.

2. If the systems' Cx deadline, as defined in the Cx Plan, goes beyond the scheduled completion of commissioning without resolution of the problem, the OWNER reserves the right to obtain supplementary services or equipment to resolve the problem.

a. The cost of additional and/or supplementary services inquired by OWNER as a result of CONTRACTOR's lack of performance, or inability to resolve identified issues will be solely the responsibility of the CONTRACTOR.

3.05. TRAINING

A. Provide training and documentation as required in construction documents.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL SYSTEMS

PART 1 – GENERAL

1.01. SUMMARY

A. Section Includes:

1. Low-voltage lighting control system.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 26 05 00 – Common Work Results for Electrical.

3. Section 26 05 13 – Basic Electrical Materials and Methods.

4. Section 26 05 19 – Low-Voltage Wires (600 Volt AC).

5. Section 26 05 33 – Raceways, Boxes, Fittings, and Supports.

6. Section 26 08 00 – Electrical Systems Commissioning.

7. Section 26 50 00 – Lighting.

8. Section 26 50 10 – Solid State (LED) Lighting.

1.02. SUBMITTALS

A. Provide in accordance with Division 01.

B. Submit a complete one-line diagram of the proposed system configuration for Architect/Engineer's review. The riser diagram shall identify but not be limited to wiring, equipment, components, interconnection with other systems, and location and type of raceways.

C. Manufacturer's Data: Submit catalog cuts and description of each system component.

D. Provide wiring diagrams and installation details for lighting control equipment.

E. Provide a complete sequence of operation and system interface requirements with fire alarm, and other applicable systems as depicted in construction documents.

F. Shop Drawings: Submit a complete set of detailed Shop Drawings for the entire lighting control system; the shop drawings shall include but not be limited to relay panels with designations and dimensions, day light sensors locations based on manufacturer's recommendations, and system components with manufacturer's part numbers.

G. Installation Instructions: Submit manufacturer's written installation instructions, wiring diagrams. Instructions shall include recommendations for handling of equipment and parts, and protection and storage requirements.

H. Software flow diagram of and complete sequence of operation.

I. Software licenses and electronic keys, and list of assigned passwords.

J. Supplemental local or factory training schedule for post warranty support.

K. A complete list of recommended spare parts with pricing for the OWNER’s use in keeping the environmental control system downtime to a minimum.

1.03. QUALITY ASSURANCE

A. Components shall be listed and labeled by Underwriter's Laboratories (UL), or another Nationally Recognized Testing Laboratory (NRTL).

B. Lighting control system and peripheral devices with IP addresses shall be UL listed in compliance with UL-2900 – Cyber Security Network Connected Systems.

C. Lighting Control Systems shall comply with the state of California Building and Electrical Codes, and Title 24 energy requirements in effect at time of submittal for building permit.

D. Conduct a coordination meeting with the lighting control contractor, electrical contractor, EOR, Manufacturer Representative, Commissioning Agent, and the OAR to validate the location of lighting control system components, including daylight, vacancy, motion sensors. Sensors shall be located based on manufacturer’s recommendations.

E. Systems components shall be Title 24 compliant and listed as California Energy Commission approved products.

1.04. WARRANTY

A. Manufacturer shall provide a three-year material warranty.

B. Installer shall provide a two-year installation warranty.

1.05. TRAINING

A. Provide a competent instructor who is factory trained and has comprehensive knowledge of system components and operations to provide full instructions to designated personnel in the system operation, maintenance, and programming. Training shall be specifically oriented to installed equipment and systems.

B. Training shall include system overview, time schedules, override commands, emergency operation, and programming and report generation for school based non-technical personnel.

C. Provide an eight hours OWNER’s school-based personnel and Maintenance and Operations technical employees training session; this training session shall cover and provide the following:

1. As-built drawings of System layouts and point to point connection diagrams.

2. System components cut sheets.

3. Operations and maintenance data.

4. Programmer and maintenance training: database entry; trend logs application programs, diagnostic routines, reporting, failure recovery and calibration, and expose the trainees to system’s features, components, system architecture, operations, programming, report generation, communications, reading and interpreting alarms, and any other pertinent information required for the operations and maintenance of the system.

5. Training sessions shall accommodate a minimum of 20 persons and be facilitated at CONTRACTOR's training facility, which should be no more than 50 miles from the Project Site.

6. Obtain OWNER's approval for training locations exceeding 50 miles. In such cases, the CONTRACTOR shall be responsible for transportation expenses.

7. CONTRACTOR shall provide training computers for all attendees. Computers shall be ready for live training sessions.

8. Instructor(s) shall give the trainees the opportunity to practice on simulated and actual (installed) systems.

D. The training session shall have an itemized agenda covering all aspects of the training to be covered in the sessions. CONTRACTOR shall obtain agendas approval from OWNER and Commissioning Agent.

1.06. SYSTEM REQUIREMENTS

A. The system shall be furnished with transformers, control electronics, occupancy sensors, exterior light sensors, photocells, digital and analog switches, dimmer switches, conduit and wiring for a complete and functional installation.

B. Devices shall be factory pre-addressed but be able to be field addressable also. Systems requiring field addressing only are not acceptable.

C. Programs, schedules, time of day, etcetera, shall be held in non-volatile memory at power failure. At restoration of power, lighting control system shall implement programs required by current time and date.

D. System shall be capable of flashing lighting OFF/ON for any relay or lighting zone prior to the lights beings turned OFF. The warning interval time between the flash and the final lights off signal shall be definable for each zone. Occupant shall be able to override any scheduled OFF sweep using local lighting zone override switches within the zone or occupied space. Occupant override time shall be pre-programmed not to exceed two hours, or current California Title 24 requirements.

E. The system shall be capable of implementing ON, OFF, Raise (dimming), and Lower (dimming), and preset commands, group or zone by means of devices connected to programmable inputs in the lighting control system.

F. Programming and scheduling shall be done at the master LCP and/or remotely via the Internet. Remote connections shall function in real time control and real time feedback.

G. System may consist of centralized relay panels, room controllers, digital switches, analog switches, photocells, motion sensors, lumen control devices, dimmer switches, and various digital interfaces. All system components, including remote and centralized room controllers, digital switches, etc. shall operate and be integrated as a network.

H. Switches, photocells and occupancy sensors, and ancillary devices and components shall be integrated per lighting control manufacturer's instructions.

I. Location of devices and relay panels or relay controllers installed above ceilings shall be identified with a printed label attached to ceiling elements. Locate label directly below equipment location.

1.07. LIGHTING CONTROL OVERVIEW-BY AREA CONTROLLED

A. Exterior Security Lights:

1. Program exterior wall packs and security lights to be controlled via exterior light sensors, and time switches as indicated on drawings.

a. Program lights to ON state when natural lighting is below 5 foot-candles

b. Program lights to OFF when natural light level is greater than 5 foot-candles.

E. Exterior, Non-Security Lights:

1. Exterior non-security lighting in parking lots, corridors and pathways, and decorative lights shall be controlled via exterior light sensor working in conjunction with programmable controlled time schedules via the lighting control system.

a. Program lights to ON state when natural lighting is below 5 foot-candles, and when scheduled time is set to ON.

b. Program lights to OFF state when natural light level is greater than 5 foot-candles, and when scheduled time is set to OFF.

G. Emergency Lighting:

1. Provide emergency lighting controls circuitry to achieve override or bypass of manually operated switches, lighting control systems, dimmers and occupancy sensors during power failures.

2. Each area of luminaries or groups of luminaries shall be equipped with and be controlled by a UL924 listed emergency lighting control unit to allow the detection of localized power failures.

PART 2 – PRODUCTS

2.01 CENTRAL LIGHTING CONTROL PANELS

A. Panels shall be mounted type as indicated on Drawings, with a hinged door assembly. Doors shall be furnished with flush type locks, spring latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys. Panels shall include the following components or features:

1. Shall be preprogrammed and preassembled with control equipment and relays as indicated on the lighting plans.

2. Shall be equipped with suitable dividers separating Class 1 and Class 2 compartments, 120v and 277v compartments as well as “normal and emergency” compartments.

3. Lighting control relays as indicated on Drawings. Provide 10 percent spare relays for centralized relay panels up to the maximum capacity of panel.

4. Shall be equipped with a neatly typewritten schedule with number and name of rooms or areas served by the relay circuits. Room numbers and names used shall be determined at the Project site and may not be those indicated on Drawings. Schedule

shall indicate panel designation and voltage and shall be mounted in a frame under transparent plastic 1/32-inch-thick on inside of panel cabinet.

5. Each panel shall be rated for 120 or 277 VAC.

6. Shall be preassembled, preprogrammed and include relays capable of switching 20 amps lighting loads for 120 or 277 VAC.

7. Central lighting control panels, remote lighting control panels, relays, low voltage switches, interior light sensors, exterior light sensors, and associated control electronics shall be furnished by Lighting Control and Design (LC & D), Douglas Lighting Controls, or equal.

8. Approved products: Douglas Dialog Series, LC & D #GR-2400 series, or equal.

2.02 RELAYS

A. Relays shall be warranted for a minimum of three-years.

B. Relays shall be individually added or replaced. Lighting control systems incapable of replacing individual relays are not acceptable.

C. Each lighting control relay shall be capable of controlling incandesent, fluorescent, LED sources, and HID lighting loads. Relays not rated for all types of lighting loads are not acceptable.

D. Approved Products:

1. Single Pole: Douglas WR-6161, LC&D SL-277-NC, or equal.

2. Double Pole: Douglas WR-6172, LC&D SL-480-NC, or equal.

2.03 LOW VOLTAGE SWITCHES

A. Low voltage switches shall be wired in compliance with manufactures requirements. Digital switches shall be part of the lighting control system network.

1. Provide stainless steel switch plates, unless noted otherwise in construction documents.

2. Approved Products: LC&D Chelsea series, Douglas WSW-3500 series, or OWNER approved equal.

B. Physical removal of any single switch shall have no effect on the communication between relay panels in the rest of the lighting control network. Lighting control systems requiring the continuous connection of all low voltage switches are not acceptable.

C. Keyed switches shall be digital.

1. Approved products: Douglas WSK-35XX Series, LC&D KS Series, or equal.

2. Provide stainless steel switch plates, unless noted otherwise in construction documents.

2.04 EXTERIOR LIGHT SENSORS

A. One exterior light sensor shall permit different relays to switch at different light levels. Sensors offering less than 14 remotely settable trip points are note acceptable.

B. Exterior light sensor shall continuously monitor light levels and shall broadcast this level over the lighting control network. Exterior light sensor shall be fully adjustable via the networked lighting control system.

C. Sensors and controllers requiring adjustments at the sensor head are not acceptable.

D. Sensors shall be UL or NRTL listed for exterior application.

E. Approved products: Douglas WPS-3741B, LC&D PCO, or equal.

2.05 DIMMING CONTROLLER

A. Remote relay panels shall be capable of outputting 0V – 10V dimming signal for each relay provided in the remote room controller. LED Dimming drivers shall be controlled by industry standard 0V-10V control input.

B. LED Drivers using proprietary control protocols shall not be acceptable.

C. To maximize daylight harvesting and minimize disruption to occupants, each dimming output shall provide adjustment for baseline, start point, mid point, end point, trim fade up rate, fade down rate, time delay and enable/disable masking.

D. Photocells settings must be remotely accessible.

E. Systems that provide ON, OFF with Time Delay only and systems that do not provide remote accessibility are not acceptable.

F. Mount photocells in locations indicated on plans and according to manufacturer's recommendations for daylight system type, open or closed loop. Trip points shall be able to be programmed and altered remotely via programming functions at the master Lighting Control Panel (LCP) and remote access to programming functions via computers or other intelligent communication devices.

G. Photocells requiring manual trip point adjustment, or systems that provide local adjustment only are not acceptable.

H. Photocells used for interior lighting control shall have multiple settings such as start-point, mid-point, off-point, fade-up rate, fade-down etc.

I. Approved Products: Douglas WPS-3711, Douglas WPP-INT, LC&D iPC series, or equal.

2.06 OCCUPANCY SENSORS

A. Occupancy Sensors:

2.07 UNIT INVERTERS

A. Unit Inverters shall be rapid start type consisting of emergency power packs designed to be installed in channels of new lighting fixtures.

B. Power pack construction shall be of durable polycarbonate housing.

C. Units shall be furnished with test switches and pilot lights.

D. Units shall automatically power designated lamp(s) for 90 minutes of emergency service upon failure of utility power.

E. Upon return of utility power, battery shall automatically recharge.

F. Batteries shall be field-replaceable, sealed, rechargeable, spill-proof, maintenance-free nickel cadmium.

G. High efficiency inverter/charger design shall include low-voltage disconnect to prevent deep discharge of battery and dual voltage designed for connection to either 120 or 277 volts. Chargers shall recharge fully discharged batteries to provide 90 minutes operation within 24 hours. Power pack shall not operate if shut off manually.

H. An unconditional five-year warranty is required.

I. Approved products: Dual-Lite UFO-5 Series, Bodine, Iota I series, Beghelli Luce, or equal.

PART 3 – EXECUTION

3.01 GENERAL

A. Lighting control system shall not be used for ay other purpose other than its intended use and application.

B. Provide required interconnections with other systems such as emergency power sources, fire alarm systems, and building management system as required or indicated on drawings.

C. Installation shall meet or exceed standard practice of workmanship and quality.

D. Drawings are diagrammatic in nature and indicate work to be provided, but do not provide means and methods, bends, transitions, or special fittings required to clear beams, girders or other work already in place. Investigate conditions where conduits are to be installed and furnished and install required fittings.

3.02 INSTALLATION AND SET-UP

A. Verify that conduit for line voltage wires enters panel in line voltage areas and conduit for low-voltage control wires enters panel on low-voltage areas. Refer to manufacturer's drawings for location of line and low-voltage areas.

B. Provide for digital type switches and make all connections according to lighting control manufactures requirements.

C. Central Lighting Control Panels and Remote Room Controllers shall be connected via a data line (Douglas uses a non-polarized two No. 18 and LC&D uses Cat5 four twisted pair cable, with RJ45 end connectors). Connect entire lighting control system per manufacturer’s requirements. Do not exceed manufacturer’s total data line length requirement.

D. Panels shall be located so that they are readily accessible and not exposed to physical damage.

E. Panel locations shall be furnished with enough working space around panels to comply with the California Electrical Code.

F. Panels shall be securely fastened to the mounting surface by at least four points.

G. Unused openings in the cabinet shall be effectively closed.

H. Cabinets shall be grounded in accordance with Article 250 of the California Electrical Code, and manufacturer's recommendations.

I. Lugs shall be suitable and listed for installation with the conductor being connected.

J. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

K. Maintain the required bending radius of conductors inside cabinets.

L. Clean cabinets of foreign material such as cement, plaster and paint.

M. Distribute and arrange conductors neatly in the wiring gutters.

N. Follow the manufacturer's torque values to tighten lugs.

O. Before energizing the panelboard, the following steps shall be taken:

1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been furnished.

2. Remove shipping blocks from component devices and the panel interior.

3. Remove debris from panelboard interior.

P. Follow manufacturers' instructions for installation.

3.03 OPERATING/SERVICE MANUALS

A. Service and Operation Manuals:

1. Submit operation and service manuals. Complete manuals shall be bound in flexible binders and data shall be typewritten or drafted.

2. Record drawings: Provide (3) printed and one electronic copy on flush media of as built documents in latest version of ACAD of the entire system; including, floor plans with equipment, and devices layouts and wiring, interconnections with other systems, conduit and cable runs, programmed configurations, sequence of operations, system labeling codes, system passwords, and other pertinent information.

3. Manuals shall include instructions necessary for proper operation and servicing of system and shall include complete wiring circuit diagrams of system, wiring destination schedules for circuits and replacement part numbers. Manuals shall include as-built cable Project site plot plans and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on cables. Programming forms of systems shall be submitted with complete information.

3.04 PROTECTION

A. Protect all work, equipment and components of the lighting control system until Substantial Completion.

3.05 TESTING

A. Set-up, commissioning and testing of the lighting control system, and OWNER instruction shall include:

1. Confirmation of system programming.

2. Confirmation of operation of individual relays, switches, occupancy sensors and daylight sensors.

3. Operation of system's features under normal and emergency operations.

4. Before energizing check and demonstrate in the presence of the Project Inspector that cables and wire connections are free from short circuits, ground faults, and that there is continuity, and necessary insulation.

5. Confirm system operations and functionality.

6. Check system interface response to other systems such as fire alarm and emergency power system conditions.

3.06 SPARE PARTS

A. Provide a minimum of five percent spare parts of each type of relay, sensors, switches, and peripheral devices.

3.07 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 24 16
PANELBOARDS AND SIGNAL TERMINAL CABINETS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Lighting and power distribution facilities, including panelboards.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 26 05 00: Common Work Results for Electrical.

3. Section 26 05 13: Basic Electrical Materials and Methods.

4. Section 26 26 00: Power Distribution Units.

5. Section 26 50 00: Lighting.

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.

C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

A. Panelboards:

1. Panelboards shall be wall-mounted, enclosed safety type with 120/240 volt, three-wire solid neutral 277/480 volt, four-wire or 120/208 volt, four-wire solid neutral mains as indicated on Drawings or specified. First panelboard of each building shall be provided with main or sub-feeder circuit breakers where so indicated.

2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be fully rated, with ampere rating marked on handle and shall indicate on/off and tripped positions. Ground fault interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL, or other NRTL as ground fault devices. Provide appropriate lug kit of sufficient size to accommodate the feeders.

3. Two- and three-pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, tamper-proof, ambient compensated, single handle, internal common trip, and quick-make, quick-break mechanism with silver alloy contacts. Circuit breakers shall be fully rated or as otherwise indicated on the Drawings.

4. Main and subfeeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion-resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall be furnished with interchangeable trip units. Handles of main and subfeeder circuit breakers shall be provided cabinet door. Voltage rating shall be as indicated on Drawings.

5. Circuit breakers shall be fully rated and of one-piece, bolt-on type and shall meet short-circuit interrupting capacity requirements indicated on Drawings. Series rated circuit breaker combinations are not acceptable.

6. Internal connections shall be fabricated with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. Terminals shall be furnished with copper conductors. Panelboards fed by conductors having over-current protection greater than 200 amperes shall be protected on supply side by over-current devices having a rating not greater than that of panelboards. Copper bussing shall be fully rated. Heat rated bussing is not acceptable.

7. Except where otherwise indicated, circuit breakers shall be in two vertical rows connected to bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on busses. Single pole branches shall be numbered adjacent to its circuit breaker, with odd numbers on left and even numbers on right.

8. Specified circuit breaker spaces shall be furnished with hardware required for future installation of circuit breakers.

9. Provide locking devices for individual circuit breakers. Padlocking devices shall be secured to circuit breakers and by panel dead front plates.

B. Surge Suppressors: Where indicated on Drawings, provide transient voltage surge suppressors as an integral part of panelboards. Panelboards shall be complete with 200 percent rated copper neutral bus, ground bus and isolated ground bus in addition to requirements of this section. Surge suppressors shall be as follows:

1. Surge Capacity:

   a. Line-to-neutral for wye systems: 80 KA.

   b. Line-to-ground: 80 KA.

   c. Neutral-to-ground: 80 KA, three-phase wye.

   d. Line-to-neutral plus line-to-ground: 160 KA.

2. UL 1449 2nd Edition Suppressed Voltage Rating for 208/120 Wye System:

   a. Line-to-neutral: 400 volts.

   b. Line-to-ground: 400 volts.

   c. Neutral-to-ground: 400 volts.

   d. Maximum continuous over-voltage: 150 volts.3.

4. MOVs shall be thermally protected for low current faults and shall be fused with surge-rated fuses. The surge-rated surge current passes and clears the circuit safely if the surge capacity is exceeded. Enhanced diagnostics shall continuously monitor the unit's status and shall include LEDs to signal a reduction in surge capacity or the loss of a suppression circuit. An audible alarm, with test and silence features, shall be furnished in diagnostic package.

5. Each phase or the entire unit shall be replaceable and have bolted-on, tin-plated copper connections. Unit to have UL witnessed fault current rating of 65,000 symmetrical amperes.

6. Surge suppression units shall comply with the following:

   a. UL certified.

   b. UL 1283.

   c. UL 1449.

   d. IEEE C 62.45.

   e. IEEE C 62.41.

   f. Nationally Recognized Testing Laboratory (NRTL) or equal.

C. Panelboard Cabinets:

1. Panelboard cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall be furnished with at least six-inch high gutters at top and bottom where feeder cable size exceeds four gage or where feeder cable passes through cabinet vertically. Cabinets shall be furnished with top and bottom gutters sized as required by inspection department having jurisdiction, but never less than six inches where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than four inches wide. Width of cabinets shall be 20 inches, unless otherwise indicated on Drawings.

2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys.

3. Where contactors, time switches, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at top of cabinet for such devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors keyed to Corbin No. 60 keys.

4. Provide and install panelboard manufacturer’s permanent circuit number kit option.

5. Panelboards with control devices in compartment shall arrive at the Project site completely assembled with control devices installed and wired.

6. Outdoor cabinets shall be NEMA Type 3R. Construction shall be formed from code gage galvanized steel with ANSI No. 61 gray enamel finish. Provide heavy-duty, three point latching, vault type door handles with padlocking provisions. Provide stainless steel

or galvanized butt hinges on doors. Padlocks shall be furnished, keyed to Corbin No. 60 keys.

7. Self-tapping screws and bolts not permitted.

D. Panelboard Schedule: Provide a neatly typewritten schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names shall be determined at the Project site and shall not necessarily be those indicated on the Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be installed in a frame under transparent plastic 1/32 inch thick on inside of each panelboard cabinet door.

E. Panelboard nameplate: Provide a nameplate identifying panelboard. Plates shall be black and white plastic nameplate stock, with character cut through black exposing white and shall bare designation of service. Name plate shall be mechanically fastened to switchboard.

F. Provide additional labeling on dead-front of panelboard. Label shall be a P-Touch or equal with a minimum width of 3/8 inch with black letters on white background. Label shall re-identify panelboard and also identify name and location of power source feeding this panel. Location information shall also be included.

G. Panelboard Standards: Panelboards shall be UL, or other NRTL listed and labeled. Panelboards shall meet latest revisions of following standards:

1. California Electric Code, Article 384.

2. UL 67, Panelboards.

3. UL 50, Cabinets and Boxes.

4. UL 943, GFCI.

5. UL 489, Molded Case Circuit Breakers.

6. NEMA PB1.

7. Federal Specifications W-P- 115C and WC-375B.

H. Signal Terminal Cabinets:

1. Signal terminal cabinets shall conform to the Specifications for panelboard cabinets, except as modified herein.

2. Terminal cabinets shall be flush type, with two-inch trim or surface mounted type, as indicated on Drawings. Terminal cabinets shall be furnished with sections and barriers to separate each system. Sections over 24 inches in width shall be provided with double doors and locks. Terminal cabinets, or sections of terminals housing separate systems, shall measure 12 inches long by 18 inches high by 5 ¾-inch deep, unless otherwise indicated on Drawings. Trims for sectional cabinets shall be of one-piece construction.

3. Terminal cabinets shall be furnished with ¾ inch thick plywood. Plywood shall be fastened in place with machine screws or factory installed mounting screws.

4. Flush-mounted terminal cabinets shall be finished as specified for flush-mounted panelboard cabinets. Surface and semi-flush mounted terminal cabinets shall be finished as specified for surface-mounted panelboard cabinets.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Panelboards shall be manufactured by Siemens, W.A. Benjamin, General Electric, Cutler Hammer, Square D or equal.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Panelboards shall be located so they are readily accessible and not exposed to physical damage.

B. Panelboards installed outdoors shall be specifically listed for wet locations and shall be weatherproof in NEMA Type 3R cabinets.

C. Panelboard locations shall provide sufficient working space around panels to comply with the California Electrical Code.

D. Panelboards shall be securely fastened to structure and mounted on surface by at least four points.

E. Unused openings in cabinets shall be effectively closed as required by the manufacturer.

F. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.

G. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.

H. Lugs shall be suitable and listed for installation with the conductor being connected.

I. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

J. Maintain the required bending radius of conductors inside the cabinet.

K. Clean the cabinet of foreign material such as cement, plaster, and paint.

L. Distribute and arrange conductors neatly in the wiring gutters.

M. Use the manufacturer's torque values to tighten lugs.

N. Before energizing panelboards, the following steps shall be taken:

1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.

2. Remove shipping blocks from component devices and panelboard interiors.

3. Manually exercise circuit breakers to verify they operate freely.

4. Remove debris from panelboard interior.

O. Follow manufacturer's instructions for installation.

P. Do not install in highly corrosive environments, unless rated for the application.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 26 50 10
SOLID STATE LED LIGHTING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: LED Luminaires, LED modules, drivers, wiring, and lighting controls.

B. Related Requirements:

1. Division 01 - General Requirements.

2. Section 26 05 00: Common Work Results for Electrical.

3. Section 26 05 13: Basic Electrical Materials and Methods.

4. Section 26 05 26: Grounding and Bonding.

5. Section 26 05 19: Low-Voltage Wires (<600 Volt AC).

6. Section 26 09 23: Lighting Controls Systems.

1.02 REFERENCES

A. American National Standards Institute/American National Standard Lighting Group ANSI/ANSLG – C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products.

B. American National Standards Institute/American National Standard Lighting Group ANSI/ANSLG – C82.77-2002 Harmonics Emission Limits.

C. Federal Communication Commission (FCC) 47 CFR Part 15 – Radio Frequency Devices.

D. Illuminating Engineering Society of North America (IESNA) LM-79-, LM-80-15, and TM-21.

E. National Electrical Manufacturers Association (NEMA) SSL-1-2010 Electronic Drivers for LED Devices, Arrays, or Systems.

F. SSL-3-2010 Solid State Lighting High Power LED Binning for General Illumination.

G. SSL-4-2012 Solid State Lighting Retrofit Lamps.

H. National Fire Protection Association (NFPA) NEC-70-2011

I. Underwriters Laboratories (UL) 8750-Light Emitting Diode (LED) Equipment for Use in Lighting Products.

J. Underwriters Laboratories (UL) 1598C- Light Emitting Diode (LED) Retrofit Luminaire Conversion Kits.

1.03 SUBMITTALS

A. List of Materials: Submit a complete list of proposed materials.

B. Shop Drawings: Provide detailed and dimensioned Shop Drawings indicating kind, weight and thickness of materials, method of fitting and fastening parts together, location and number of sockets, size of lamps, and complete details of method of fitting suspension and fastening luminaires in place. Provide wiring diagrams for lighting control equipment. Drawings shall

contain sufficient information to assemble and install equipment at the Project site without further instructions.

C. Prior to start of construction; provide photometric calculations with graphic of lighting foot-candle levels at work plane, ceiling and walls. Calculations shall comply with IESNA recommendations.

D. Installation Instructions: Submit manufacturer's written installation instructions for luminaires and accessories.

1.04 SUBSTITUTIONS

A. Luminaires that deviate from these requirements shall not be accepted without written approval from OWNER'S Design Standards Section and Maintenance and Operations Technical Unit. When deviating or substituting luminaires, the following information shall be submitted:

1. Substitution request form substantiating reasons and benefits to OWNER.

2. OWNER'S approval shall be obtained for any equipment or materials substitutions.

3. Submit a completed OWNER's LED luminaires evaluation form with supporting documentation for any and all fixtures' performance claims. The form can be found at the following electronic address: http://www.laschools.org/documents/file?file_id=310976408

B. Substitutions: Submittals must comply with contract general provisions.

1.05 QUALITY ASSURANCE

A. Design of lighting luminaires, accessories, supports, and method of luminaire installation shall comply with requirements for earthquake-resistant construction of the State of California.

B. Provide suspension points at no more than two feet from luminaire ends. Spacing between supports shall not exceed eight feet.

C. Components and luminaires shall be listed and approved for the intended application by Underwriter's Laboratories (UL), or other Nationally Recognized Testing Laboratory (NRTL), and in compliance with applicable industry standards and codes, including those mentioned under article 1.02 – References.

1.06 WARRANTY

A. Provide the following warranties:

1. One year labor warranty.

2. Material warranty:

a. LED modules: five years minimum.

b. Drivers: five years minimum.

c. Lighting Pole (Standards): five year minimum.

B. Warranty period shall begin at substantial completion or at project acceptance for beneficial occupancy, whichever occurs first.

C. CONTRACTOR shall warranty Luminaires, including drivers, LED modules and ancillary components via a single warranty source. Multiple warranty sources is not acceptable.

PART 2 – PRODUCTS

2.01. MATERIAL AND FABRICATION

A. Luminaires of same type shall be of one manufacturer.

B. Manufacturer and model number references are indicated as a standard of performance and quality; other manufacturers' models may be submitted for review, provided the product meets or exceeds the product's specified requirements and substantially complies with OWNER'S LED Luminaires Evaluation Requirements Form.

C. Conductors that pass over edges or through metal opening(s) shall be secured from contacting the edges, and be protected from cutting and abrasion. This requirement shall be met through one of the following:

1. Rolling the edge of the metal not less than 120 degrees.

2. A bushing or grommet of a material other than rubber at least 1.2 mm (0.047") thick.

3. Glass sleeving at least 0.025 mm (0.010") thick.

D. Lighting luminaires shall meet the following requirements:

1. Industry standards as indicated under Article 1.02.

2. Luminaire shall be from a manufacturer who has been in the business of manufacturing LED lighting luminaires for interior and exterior applications for a minimum of 5 years.

3. Luminaires shall comply with the California Health and Safety Code requirements for products containing substances identified in the California Lighting Efficiency and Toxics Reduction Act, or be in compliance with the European Restriction of Hazardous Substances (RoHS), whichever is more stringent.

4. Luminaires shall be baked-on enamel or powder-coated, unless otherwise specified in this section.

5. The luminaire(s) lens, including end caps shall be 0.187 nominal thickness.

6. Drivers shall be easily accessible without the use of special tools.

7. Wiring cavity shall be field accessible for service or repairs.

8. Luminaires shall be capable of being operated by standard motion/ vacancy sensors, daylight sensors, and dimmers.

9. Luminaires shall be provided with a manufacturer's stencil or permanent legible sticker that states manufacturer business information and date of delivery.

10. Temperature rating; -20 degrees Celsius minimum starting temperature. Luminaire accessories including LEDs and drivers shall be able to withstand temperatures in excess of 110 Fahrenheit degrees.

11. Color Rendering Index (CRI):

1) Interior Applications: +82 CRI.

2) Exterior Applications: +70 CRI

12. Power factor: Greater than 0.9 at 120V and 277V.

13. Total Harmonic Distortion: Less than 20% at 120V and 277V.

14. Color Correlated Temperature: 4000K minimum ± 275K degrees.

15. LEDs and drivers life expectancy: 50,000 minimum projected hours at 6,000 hours testing for both LEDs and drivers.

16. Luminaires in contact with insulation materials shall be IC rated.

2.02. DRIVERS AND LED MODULES

A. Drivers:

1. Approved Drivers Manufacturers:

a. Osram – Optotronic.

b. Philips – Advance and Xitanium.

c. Universal Lighting Technologies – Everline.

d. General Electric – Lightech.

e. Thomas Research Products

f. Kenall – Low Profile LED Driver

g. EldoLED

h. Equal. Only if approved by OWNER's M&O Technical Services and Design Standards units through a deviation request.

2. Driver Type and Characteristics:

a. Comply with the state of California Health and Safety Code requirements for products containing substances identified in the California Lighting Efficiency and Toxics Reduction Act, or be RoHS compliant, whichever is more stringent.

b. Dimming for 0-10 volt DC control circuits. Drivers shall be specifically compatible with the lighting control system being provided.

c. Comply with applicable state, federal, and industry standards listed under References article.

d. Wattage as stated in Luminaire's LM-79 test report.

e. Driver performance requirements:

DRIVERS PERFORMANCE CHARACTERISTICS		
No.	Characteristic	Minimum Requirements
1	Input Voltage range	120V, 277V
2	Input Overvoltage	320 VAC for 48 hours, 350 VAC for 2 hours.
3	Frequency	50/60 Hz Nominal
4	Power factor	+0.95 Minimum
5	Inrush Current	Less than 30 amps @ 120V Less than 70A @ 277V
6	Input Current Range	54A @ 120V, 23A @ 277V
7	Output Current	1670 mA Maximum
8	Maximum Power	65 Watts
9	Total Harmonic Distortion	Less than 20%
10	Leakage Current	Less than 500 mA
11	Output Protection	Short and Open Circuit Protection
12	Maximum Case Temperature	90^0 C
13	Minimum Starting Temperature	-20^0 C
14	Storage Temperature	No less than 70^0 C
15	Humidity	Rated for dry and damp locations
16	Cooling	Convection
17	Sound Rating	Class A
18	Life Expectancy	>50,000 hours at $+50^0$ C
19	Dimming, Motion Sensors and Daylight Sensors Controllability	0-10V

B. LEDs:

1. Approved Manufacturers:

a. General Electric.

b. Philips.

c. NICHIA

d. Samsung LED Co.

e. CREE

f. Equal. With OWNER's approval.

2. LEDs Characteristics:

a. Color Correlated Temperature (CCT):

1) Chromaticity target Duv and tolerance 0.001 plus/minus 0.006.

2) Nominal CCT for 4000K, target CCT 3985K ± 275K.

3) CCT measurements in compliance with ANSI C78.377-2008.

b. Lumen Maintenance: Greater than 90% at 50^0 C degrees.

c. LEDs must be from same manufacturer and batch.

d. TM-21 and LM-80 reported hours of no less than 50,000 with a minimum of 6000 hours testing.

e. LM-79 reported CCT and CRI in compliance with articles 2.01.D.11 and 14.

2.03. LUMINAIRES

A. Refer to appendix A for list of approved luminaires.

B. Luminaires types and minimum requirements:

a. , or OWNER approved equal.

2. Enclosed, Gasketed Luminaire:

APPLICATION – GARAGES AND MISCELLANEOUS DAMP/ WET LOCATIONS.

a. Luminaire shall be 20 gage steel.

b. Lens enclosure shall be heavy duty vapor tight enclosed gasketed with closed–cell foam gasketing permanently attached to luminaire housing.

c. Luminaire shall have tamperproof latches.

d. Luminaire shall be furnished with minimum one watertight hub kit for top or end conduit entry.

e. Luminaire shall have option for cable mount and safety strap

f. Wet Location listed.

g. Approved luminaires: Per Plans, or OWNER approved equal.

3. Ceiling Mounted Luminaires:

APPLICATION – EXTERIOR CANOPIES

a. Luminaire shall be die-cast aluminum.

b. Luminaire shall have reinforced four-point mounting system construction to resist breakage from impact and prying.

c. Luminaire finish shall be as indicated on drawings.

d. Lens shall be Injection molded UV stabilized, high impact resistant opal polycarbonate.

e. Luminaire shall have option trim ring to fit between housing and inside lip of trim ring for a smooth transitional look.

f. Provide luminaire with input watts as indicated on drawings.

g. Ceiling luminaires shall be supplied without eye lid option, wall mounted luminaires shall be supplied with eye lid option.

h. Approved luminaires: Per Plans, or OWNER approved equal.

4. Recessed Interior/Exterior Vandal Resistant Luminaires (Square):

a. Housing/door shall be fabricated from 16 gage cold-rolled steel, and polyester powder coated after fabrication.

b. Fully gasketed for exterior installation.

c. 0.187 inch clear polycarbonate UV stabilized safety lens.

d. Provide luminaire wattage as indicated on drawings.

e. Approved luminaires: Per Plans, or OWNER approved equal.

5. Recessed Interior/ Exterior Vandal Resistant Downlight Luminaire :

APPLICATION – EXTERIOR CANOPY

a. Luminaire shall have a die cast aluminum mounting frame suitable for dry or wet plaster ceilings of a minimum thickness of 1 1/8 inches.

b. Luminaire shall be UL listed for damp locations.

c. Lens shall be vandal resistant acrylic with flat or drop diffuser. (Refer to luminaire schedule in drawings for type of diffuser).

d. Die formed aluminum reflector.

e. Luminaire shall be provided with input wattage as indicated on drawings.

f. Approve luminaires: Per Plans, or OWNER approved equal.

6. Ceiling-Mounted Outdoor Luminaires:

APPLICATION – PARKING GARAGES

a. Pendant or Junction box mounted as indicated in construction drawings.

b. Heavy-duty, cast aluminum housing, copper-free, coated with electrostatically deposited and thermally set powdered polyester paint.

c. Luminaires shall have a wire guard option.

d. LEDs shall not be visible.

e. Luminaire shall be UL listed for outdoor use and labeled "suitable for wet locations".

f. Capable of operating in 40 centigrade ambient temperatures.

g. Approved products: Per Plans, or OWNER approved equal.

2.04. LIGHT POLES STANDARDS

A. Standards shall be 25 feet high, tapered galvanized steel.

1. Starting at the base, a minimum of 12 inches of the light standards interior and exterior surfaces shall be treated with water repellent or barrier coatings to prevent moisture contact with galvanized surface.

B. Aluminum poles are not acceptable.

C. Pole shaft shall conform to ASTM A595 Grade A and be 11 gage thickness, unless otherwise indicated on Drawings. Shaft shall be one piece construction with a full length longitudinal high frequency resistance weld.

D. The anchor base shall be constructed from structural quality hot rolled carbon steel plate conforming to ASTM A36.

E. Anchor bolts shall be fabricated from commercial quality hot rolled carbon steel bar with minimum yield strength of 55,000 PSI. Bolts shall have an L bend on one end and threaded on the opposite end. Anchor bolts shall be hot dipped galvanized with a minimum length of 12 inches on the threaded end. Four properly sized bolts furnished with two hex nuts, and flat washers, shall be provided for each pole. Contractor to obtain manufacturer required base bolt pattern prior to concrete installation.

F. A two piece base cover shall completely seal the entire base plate and be securely fastened.

G. Each pole shall have a three-inch by five-inch handle. A nut holder shall be provided near the hand-hole and shall include a ½ inch – 13 UNC HE by Head bolt and nut for grounding. The hand-hole shall be welded in the pole shaft and shall include a steel cover with attachment screws. The hand-hole shall be located 18 inches above the base of the pole.

H. Finish of pole and accessories shall be electrostatically applied, and thermally cured polyester powder coat. Color shall be selected by Architect.

I. All structural fasteners shall be galvanized high strength carbon steel.

J. Poles shall be designed to withstand wind velocity of 80 MPH and 100 MPH gusts. Concrete base shall be a monolithic concrete pour when installed.

K. Standards shall be installed plumb and straight on concrete footings. Grout and dry-pack after leveling. Concrete, grout and drypack requirements and procedures are as specified in Division 02.

1. Standards footings shall be provided with a moisture release channel to keep the interior of the standards dry and free from rain, dew or condensation. Refer to District's Standards Footing Detail. Engage a California Registered structural engineer to design the base.

L. Provide in line fuse assembly in hand-hole of each light standard with breakaway receptacle Bussmann HEY series, or OWNER approved equal. Fuse assembly shall easily disconnect power to light standard. Fuse type and rating shall be as required by each application.

M. Provide all required fixture mounting accessories.

N. Standards shall be as manufactured by Gardco, Alcastco, Lytepole, or OWNER approved equal.

PART 3 – EXECUTION

3.01. INSTALLATION

A. Install a lighting luminaire for each lighting outlet indicated and label with day of installation.

B. Luminaire voltage shall be as indicated on Drawings.

C. Install recessed and surface-mounted luminaires, with plaster frames compatible with ceiling and wall systems employed; secure luminaires mechanically to frames.

D. Align rows of suspended and surface-mounted luminaires to form straight lines at uniform elevations.

E. Recessed luminaires shall fit snugly against ceilings to prevent light leakage.

F. Luminaire installations shall comply with CBC Seismic requirements

G. Support suspended recessed luminaires in T-bar ceilings as follows: Luminaires shall be attached to ceiling grid to resist a horizontal force equal to weight of luminaires. For heavy-duty grid systems, luminaires weighing less than 56 pounds must also have two 12 gage slack safety wires from diagonal corners to the structure above; luminaires weighing more than 56 pounds shall be independently supported by not less than four taut 12 gage wires capable of supporting four times the load. For intermediate duty grid systems, luminaires shall be independently supported by not less than four taut 12 gage wires capable of supporting four times the load. Luminaire hanger wire ends shall be twisted three tight turns within a 1 ½ -inch distance. Provide positive point of attachment to T-bar ceiling with four, #8 wafer head tek screws (one at each corner), avoiding conflict with operation of the lens. Luminaire installation shall be coordinated with acoustical ceiling installation.

H. Emergency light luminaires shall be labeled “Emergency Luminaire” with one inch high letters produced with a P-touch or similar labeling system.

I. Continuous suspended luminaires:

1. Luminaire suspension device shall allow vertical adjustment of luminaire without the use of tools. Cable shall be minimum seven strand twisted stainless steel capable of supporting minimum four times the luminaire weight. For continuous linear suspended luminaires longer than eight feet, provide not less than three suspension points.

2. Top of luminaire shall be suspended as shown on the Drawings, typically 24 inches below the ceiling and a minimum of 18 inches from the ceiling.

3. Luminaire shall utilize factory furnished or approved hardware and canopy for either hard or T-bar ceilings.

4. White Board Lights shall be suspended 24 inches from the wall unless specifically shown otherwise.

J. Surface mount luminaires shall be attached to structure. Toggle bolts are NOT permitted. Provide backing where required.

K. Low level exit signs shall be installed with the bottom of the sign not less than six inches, or more than eight inches above the floor level and shall indicate the path of exit travel. For exit and exit-access doors, the sign shall be on the door or adjacent to the door with the closest edge of the sign within four inches of the door frame.

3.02. TESTING

A. Check and adjust luminaires for required illumination.

B. Replace defective LED strips and drivers.

C. Test and adjust lighting control equipment for proper operation.

3.03. SPARE PARTS

A. Furnish ten percent spare LED strips with a minimum of one spare strip of each type.

B. Furnish ten percent spare motion detectors of each type with a minimum of one spare detector of each type.

C. Furnish ten percent spare drivers of each type with a minimum one spare driver of each type.

3.04. HAZARDOUS WASTE DISPOSAL

A. Hazardous waste disposals shall be handled and disposed of by an approved, licensed contractor.

B. Products with PCBs are not acceptable. Hazardous waste shall be placed in appropriate containers provided by hazardous waste contractor labeled clearly with:

1. Project Name

2. Quantity of materials

3. Date materials became waste

C. Store, remove, transport and dispose of hazardous materials in accordance with state and federal regulations.

D. Provide Owner with copy of manifest and certificate of destruction.

3.05. PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06. CLEANUP

A. Remove rubbish, debris, and waste materials from all areas of work each day.

B. Clean luminaire surfaces of dirt, cement, plaster and debris. Furnish cleansers compatible with material surfaces being cleaned.

END OF SECTION

SECTION 31 10 00
SITE CLEARING

PART 1 – GENERAL

1.01 SUMMARY

A. This Section requires the selective removal and subsequent off-site disposal of the following:

1. Removal and offsite disposal of grass and root mat.

2. Demolition of asphalt concrete and pavements as indicated on the drawings to straight, neatly saw cut surface.

3. All other removals which may or may not been shown on plans as required for the project construction.

1.02 SITE CONDITIONS

A. Protections: Contractor shall provide temporary barricades and other forms of protection to protect general public from injury due to demolition work.

B. Traffic: Conduct demolition operations and debris removal to ensure minimum interference with roads, streets, walks, bike paths, and other adjacent occupied or used facilities. Access must be coordinated with District's Representative.

C. Utility Services: Maintain all existing utilities to remain in service and protect them against damage during demolition operations.

D. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations and County Air Pollution Control District pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as flooding and pollution.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (Green Book), latest edition.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – XECUTION

3.01 DEMOLITION

A. General: Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with governing regulations.

B. Provide services for effective air and water pollution controls as required by County Air Pollution Control District regulations.

C. Prior to commencing grading operations, soil containing debris, organics, pavement, or other unsuitable materials, shall be stripped from the foundation and pavement areas. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, tree roots, and soil disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill under observation by the Geotechnical representative.

3.02 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from Project site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off site.

B. If hazardous materials are encountered during demolition operations, contact District's Representative.

C. Burning of removed materials is not permitted on project site.

3.03 HAZARDOUS MATERIALS

A. Except as otherwise specified, in the event Contractor encounters on the Project site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, Contractor shall immediately stop Work in the area affected and report the condition to the District's Representative in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Contractor if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.

B. Construction involving asbestos cement (transite) pipe shall be performed by qualified personnel in accordance with the standards and specifications set forth by American Water Works Association (AWWA), the Occupational Safety and Health Act (OSHA) and the Environmental Protection Agency (EPA), as well as location jurisdictional codes.

3.04 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to existing condition prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION

SECTION 31 20 00
EARTHWORK

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes Excavation, Compaction and Fill.

1.02 REFERENCE

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.03 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.

1. Standard Specifications for Public Works Construction (SSPWC), latest edition.

2. CAL/OSHA Construction Safety Order Requirements.

B. Soil Testing Service

1. The District will engage a soil testing service to include testing soil materials proposed for use in the Work and for quality control testing during grading operations.

2. Samples of materials shall be furnished to the testing service by the Contractor at least one week before their anticipated use.

3. Work for this Section includes smoothing out areas for density tests and otherwise facilitate testing work, as directed.

4. Shoring Systems: Pre-engineered systems, clearly labeled as such, may be used. Refer to the Geotechnical Study for further requirements.

1.04 PROJECT CONDITIONS

A. The Contractor shall visit the site and familiarize himself with existing site conditions.

B. Additional test borings and other exploratory operations may be made by the Contractor at no cost or liability to the District.

C. Existing Utilities:

1. Where uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult District 's Representative immediately for directions. Cooperate with the District's Representative in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the District's Representative at no cost to the District. Disturbed trench sections shall be replaced in kind.

2. Contractor to coordinate with the District 's Representative to obtain all required permits and schedule inspections.

D. Protection of Subgrade: Do not allow equipment to pump, rut, or disturb subgrade, stripped areas, or other areas prepared for Project.

E. Contractor shall implement measures to prevent soil erosion, and where possible, sediment shall be retained onsite.

F. Contractor shall implement all necessary recommendations contained in the Geotechnical Study.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 SITE PREPARATION

A. General:

1. Remove vegetation, improvements, or obstructions interfering with installation of new construction. Transport and legally dispose of off site. Removal includes stumps and roots. Contractor shall utilize the best construction method to minimize the erosive effect from the removal of site vegetation.

2. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over one inch in size with tree pruning compound. Care shall be taken so as not to scar any area of the tree's bark.

3. In order to protect from sediment transfer or contamination from urban run-off during construction, the following grading and erosion control practices shall be followed:

a. If grading occurs during the rainy season (November through April), sediment traps, barriers, covers or other methods shall be used to reduce erosion and sedimentation.

b. Excavated materials shall not be deposited or stored where the material can be washed away by high water or storm run-off.

c. Grading operations on site shall be conducted so as to prevent damaging effects of sediment production and dust on the site and on adjoining properties.

d. When vegetation has to be removed on site, the methods shall be one that minimizes the erosive effects from the removal.

e. Exposure of soil to erosion by removing vegetation shall be limited to the area required for construction operations. The construction area shall be fenced to define the project.

f. Temporary mulching, seeding, or other suitable stabilization shall be used to protect areas during construction or other land disturbance activities on site.

g. Topsoil, removed from the surface in preparation for grading and construction activities on Campus is to be stored on or near the site and protected from erosion

while grading operations are underway, provided that such storage may not be located where it would cause suffocation of root systems of trees to be preserved. After completion of such grading, topsoil is to be restored to exposed cut and fill embankments of building pads so as to provide a suitable base of seeding and planting.

h. Sediment basins, sediment traps, or similar control measures shall be installed before extensive clearing and grading operations begin for site development.

i. Water or dust palliatives shall be applied to exposed earth services as necessary to control dust emissions.

j. Revegetation or stabilization of exposed earth surfaces shall take place as soon as possible.

B. Removals

1. Clear the site of trees, shrubs, and other vegetation, which is indicated to be removed.

2. Completely remove stumps, roots, and other debris to avoid problems with future utilities.

3. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.

4. Existing fills, soil containing debris, organics, pavement, or other unsuitable materials shall be excavated and removed prior to commencing grading operations. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, landscaping, and soils disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill.

5. The limits and depths for removal of existing fill materials shall be evaluated by project soils engineer during grading.

6. Revegetation or stabilization of exposed earth surface shall take place as soon as possible.

C. Removal of Improvements

1. Remove above-grade and below-grade improvements necessary to permit construction and other work as indicated.

2. Remove from site and legally dispose of off-site, existing fill materials, soil debris, or other unsuitable materials prior to commencing grading operations.

3.02 EXCAVATION

A. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown, within a tolerance of plus or minus 0.04 foot.

B. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10 foot.

3.03 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area, under the provisions of the Geotechnical Study.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the percentages of maximum dry density specified in the Geotechnical Study and in accordance with ASTM D1557-91 method of compaction.

C. Moisture Control:

1. When moisture content of exposed scarified soil and/or full material is below that sufficient to achieve recommended compaction, water shall be added to the soil and/or fill. While water is being added, soil shall be bladed and mixed to provide relatively uniform moisture content throughout the material.

2. When moisture content of exposed scarified soil and/or fill material is excessive, material shall be aerated by blading or other methods. Fill placed in pavement areas shall be compacted at near optimum moisture content. Jetting is not permitted for compaction.

3.04 FILL

A. In all excavations, use satisfactory excavated or borrow material sampled and tested by the District 's Testing Laboratory. Fill selection shall be per Geotechnical Study.

B. Fill excavations as promptly as Work permits, but not until completion of the following:

1. Acceptance by District’s Representative of construction below finish grade including, where applicable, waterproofing, damp-proofing, and drainage pipe.

2. Examination, testing, approval and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Continual dust control, as required by the District, and in accordance with County Air Pollution Control District’s Standards shall be required for the project construction.

3.05 GRADING

A. General: To provide support for building floor slabs, all existing fill and unsuitable natural soils shall be excavated and replaced as properly compacted fill.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of compaction for each area classification.

C. Fill placement and grading operations shall be performed only under the observation of the District 's Testing Laboratory.

D. The exterior grades around building areas shall be sloped to drain away from the buildings to prevent ponding of water adjacent to foundations.

E. Grading operation shall be conducted so as to prevent damaging effects of sediment product and dust on the site and adjoining properties.

3.06 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport excess excavated material and legally dispose of off site.

3.07 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: District 's Testing Laboratory will observe, test and approve subgrades and fill layers before further construction Work can be performed. The District's Representative will determine the frequency of tests. Subgrade: Allow at least one field density test of subgrade to be made for every 2000 sq. ft. of paved area, but in no case less than 3 tests.

B. Field examination and testing will be performed by the District 's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District's Representative advance notice of grading scheduling.

C. Frequency of Tests for Trenching: As specified in Geotechnical Study Section 8 and as determined by the District's Representative.

D. If in the opinion of the District's Representative, based on soil testing reports and observations, subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense to the District, and pay for retesting of the soil.

3.08 PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

END OF SECTION

SECTION 31 23 33
TRENCHING AND BACKFILLING

PART 1 – GENERAL

1.01 SUMMARY

A. Excavating trenches for construction of utilities.

B. Trench backfill materials.

C. Backfilling and compacting requirements.

1.02 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.03 SUBMITTALS

A. Materials source.

B. Sand equivalent test reports per ASTM D2419.

C. Certificates.

D. Drawings for shoring, bracing, sloping, or other provisions for worker protection for any excavation shall conform to the requirements of the CAL/OSHA Construction Safety Orders Requirements.

1.04 EXISTING UTILITIES

A. Drawings show existing major underground utilities from reference drawings. Prior to excavation, the Contractor shall notify the District's Representative to obtain any additional information which may be applicable to the Work.

B. Any incident of a utility being inadvertently damaged by the Contractor shall be immediately shutoff and then be immediately repaired by the Contractor at no cost to the District.

C. Contractor to pothole all utility connections and verify exact size, location and material prior to beginning construction and notify engineer of any discrepancies.

PART 2 – MATERIALS

2.01 APPROVALS

A. Imported material shall be approved by the District's Representative prior to being brought to the site. Provide a sample of the material in sufficient quantity for the District's Representative's use in evaluating the material.

2.02 TRENCH BACKFILL MATERIAL

A. Sand bedding shall have a sand equivalent (SE) of 30 or greater. The SE shall be evaluated during grading. Materials shall conform to the specification of the Geotechnical Study.

B. Backfill material shall conform to the requirements of Section 217-2 of the SSPWC.

C. Aggregate base course shall be per Plan.

D. Topsoil removed from trenches shall be stockpiled at locations approved by the District's Representative.

2.03 SOURCE QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Representative.

PART 3 – EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.02 TRENCH EXCAVATION

A. All saw cutting shall be neat, straight cuts and shall conform to Section 306-3 of the SSPWC. All cuts shall be square unless otherwise specifically noted on plans.

B. Trench excavation shall conform to Section 306-3 of the SSPWC and the following requirements:

1. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavations shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustments to line and grade shall be made by scraping away or filling in with sand under the body of the pipe and not by wedging or blocking.

2. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade, at no additional cost to the District per the Geotechnical Study. Place the backfill material over the full width of trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe base. If shoring is required, the trenches shall be shored and braced in accordance with the Trench Construction Safety Orders of the Division of Industrial Safety.

3. When subgrade is encountered that in the opinion of the District's Representative is unsuitable for pipe support, the District's Representative may order the excavation to be carried to an approved depth below the bottom of the pipe and backfilled with sand, to the lines and grades shown on the drawings and specified by the District's Representative.

4. The minimum width of the trench at the top of the pipe zone shall be as necessary to install the pipe. The utility lines shall be centered in the trench. In the event of (1) actual physical interference between existing crossing subsurface utilities and the proposed utility lines and (2) vertical discrepancy in connecting proposed utility lines to existing utility system, a minimum clearance of 0.5 feet between the utility line and the crossing,

interfering utility shall be provided, unless otherwise indicated on the plans.

5. Where existing utilities or tree roots are to be protected, trench excavation shall be by hand. No mechanical excavating equipment shall be used within 6 inches of any utility or root.

6. Trenching machinery may be used for excavations provided the specified trench width can be maintained.

3.03 TRENCH BACKFILL

A. Pipe bedding and trench backfill materials: pipe bedding shall be either crushed rock or sand as specified on the plans. Sand bedding and backfill for utilities shall consist of material having a sand equivalent of at least 30. The backfill material shall be placed within the pipe zone that extends from the bottom of the pipe to at least 12 inches above the top of the pipe for the full width of the trench. The horizontal distance between the spring line of the pipe and the side walls of the trench shall be such that bedding material can be properly placed and compacted below the haunches of the pipe. Pipe bedding and pipe zone backfill shall be compacted to at least 95 percent relative compaction. Backfill material placement shall conform to provisions of Geotechnical Study.

B. Trench backfill placed above the pipe zone shall consist of suitable onsite or imported soil per Geotechnical Study. Mechanical compaction of trench backfill shall be performed and water consolidation (jetting) methods of compaction shall not be permitted. Trench backfill in landscape areas shall be compacted to a minimum of 90 percent relative compaction or per landscape specifications.

C. Trench Backfilling shall conform to the requirements of Sections 306-12 of the SSPWC and Geotechnical Study:

1. During the process of laying pipe in trenches, sufficient material shall be carefully placed and hand tamped about the pipe to hold it firmly to established line and grade. Oversized material, broken rock or shale, if encountered, shall not be used for backfill.

2. No motor driven mechanical compacting equipment shall be used over pipelines until the backfill has been compacted to 12 inches over the crown of the pipe.

3. All backfill material shall be deposited in horizontal layers not exceeding the thickness specified in Section 306-12 of the SSPWC and not exceeding 8 inches in thickness. The distribution of materials shall be such that all material following compaction and consolidation will form a homogeneous mass free of voids, pockets, streaks or other imperfections. Backfilling shall be done with earth free from lumps, hardpan, chunks, paving material, organic matter or other deleterious substances.

4. Jetting of bedding or backfill material to obtain specific moisture content or for compaction shall not be permitted. If encountered, existing fill in the utility excavation shall be excavated and recompacted or removed and replaced with new fill materials per requirements of Section 2.02.

5. Compaction of all backfill material for trenches, pavements or structures, shall be per provisions of the Geotechnical Study. Appropriate warning detector tape shall be placed over all utilities.

6. Prior to final cleanup or resurfacing, the District's Representative shall take compaction tests in any backfill area and at any depth, with the Contractor providing equipment and operator to assist in such test. If any such compaction test fails, the Contractor shall correct such failure and pay for any retesting that is required. The District's Representative shall make as many tests as he feels is required to receive a satisfactory and acceptable job.

3.04 STOCKPILING

A. Stockpiling of imported materials or excavated materials shall direct surface water away from approved stockpile site to prevent erosion.

B. After stockpiles are removed, leave area in a clean and neat condition.

3.05 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 – GENERAL

1.01 SUMMARY

A. Aggregate base course for curbs, gutters, sidewalks, and fire access driveway.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 32 12 16 Asphalt Concrete Paving.

C. Section 32 16 00 Curbs, Gutters, Sidewalks, and Driveways.

1.03 REFERENCES

A. Standard Specifications for Public Works (SSPWC), latest edition.

B. ASTM Standards.

C. State Standard Specifications (SSS), Caltrans, latest edition.

D. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS:

A. Submit material samples and reports in accordance with requirements of District.

B. Submit samples in sufficient quantities for material testing.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material shall be Class 2 Aggregate Base conforming to SSS Section 26-1.02A. Aggregate Base shall have a minimum sand equivalence of 22 and a minimum R-value of 78 and shall be free of organic materials and other deleterious substances.

B. Aggregate Base materials used within building areas shall be free of asphaltic materials.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.02 AGGREGATE BASE PLACEMENT

A. Aggregate base placement shall conform to the provisions of the SSPWC, Section 301-2.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Where the required aggregate base thickness is 6 inches or less, the watered base may be spread and compacted in one layer. Where the required thickness is more than 6 inches, the aggregate base material shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

E. Aggregate base course shall be dense and unyielding upon proof-rolling with full water truck.

3.03 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch.

B. Scheduled Compacted Thickness shall conform to the provisions of the SSPWC Section 301-2.2.

3.04 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.
Compaction testing will be performed in accordance with ASTM D1557, latest edition.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at Contractor's expense.

END OF SECTION

SECTION 32 12 16
ASPHALT CONCRETE PAVING

PART 1 – GENERAL

1.01 SUMMARY

A. Asphaltic concrete paving for parking lots and driveway pavements.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 32 11 23 Aggregate Base Course.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

C. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS

A. Submit asphalt concrete mix design(s) for approval of the District Representative.

1.05 TESTING AND INSPECTION

A. Testing and inspection of asphalt pavement mix(es) and testing of placed stabilizing base course and asphalt pavement will be performed by the District's Testing Laboratory. Testing and inspection will be performed so as to minimize disruption of work.

B. Allow the District's Testing Laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphaltic concrete mix.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide the aggregate base, and bituminous surface conforming to the requirements of the Standard Specifications for Public Works Construction (SSPWC).

2.02 PAVING MATERIALS

A. Asphalt Concrete: Asphalt concrete material shall be C2-PG 64-10 per SSPWC Section 203-6. The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements.

B. Asphalt Emulsion: SSPWC Section 203-3, Grade SS-1h.

C. Prime Coat: Grade SC-70 per SSPWC Section 203-2.

D. Aggregates for base course shall conform to requirements of Specification Section 32 11 23, Aggregate Base Course.

2.03 ASPHALT PAVEMENT MIX

A. Combine mineral constituents in proportions to produce a mixture conforming to requirements of the SSPWC Section 203-6.

B. Percentage by weight of asphalt cement in mixture shall be in accordance with SSPWC Section 203-6.

C. Maintain thorough and uniform mixture.

D. Bring asphalt and mineral constituents to required temperatures before mixing. Ensure aggregates are sufficiently dry so as not to cause foaming in mixture.

PART 3 – EXECUTION

3.01 GENERAL

A. Execute Work in accordance with SSPWC Section 302 and the Geotechnical Study.

3.02 PREPARATION

A. Ensure grading of subgrade to required elevation. Subgrade preparation shall be per SSPWC Section 301.

B. Before final rolling, shape entire section, add additional sub-soil if necessary, and compact subgrade to provide grades, elevation and cross-section indicated. Points of finished subgrade surface shall be within 0.04 foot of elevations indicated on the Drawings.

3.03 BASE COURSE

A. Place aggregate base in accordance with requirements of SSPWC Section 301 and to the thickness shown on the Drawings. Grade and compact in 6-inch layers to at least 95 percent of compaction (ASTM D1557).

3.04 MAINTENANCE

A. Maintain the base course until the asphaltic pavement is in place. Maintenance shall include drainage, rolling, shaping and water as necessary to maintain the course in proper condition. Maintain sufficient moisture at the surface to prevent a dusty condition. Areas of completed base course that are damaged shall be conditioned, reshaped and re-compacted in accordance with the requirements of the Specifications without additional cost to the District.

3.05 TACK COAT

A. Prior to the application of the asphalt concrete, a paint binder (tack coat) shall be applied to all surfaces of walkway, curbs, gutters, manholes and drainage structures which will be in contact with asphalt pavement per SSPWC Section 302-5.4.

B. Coat surfaces of catch basins which are to remain free of asphalt with oil, or provide equivalent protection, to prevent asphalt adhesion.

3.06 PRIME COAT

A. Prior to the application of the asphalt concrete, a prime coat shall be applied at a rate of 0.20 to 0.40 gallons per square yard.

3.07 ASPHALT CONCRETE

A. Requirements: The bituminous concrete shall consist of mineral aggregate, uniformly mixed with bituminous material in a central plant in accordance with SSPWC Section 203-6. The percentage of asphalt binder shall be in accordance with SSPWC Section 203-6. The mixing plant and construction equipment shall conform to the requirements of SSPWC Sections 203-6 and 302-5.

B. Placing: Deliver bituminous mixtures to the work site temperatures specified in SSPWC Section 302-5.5. Spread and place in accordance with SSPC Section 302-5.5. Asphalt surface shall be fog-sealed.

C. Compaction: Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with SSPWC Section 302-5.6. Compaction by vehicular traffic shall not be permitted.

3.08 JOINING PAVEMENT

A. Carefully make joints between old and new pavements or between successive days work in such manner as to insure a continuous bond between old and new sections of the course in accordance with SSPWC Section 302.

B. Expose and clean edges of existing pavement. Cut edge to straight, vertical surfaces. Paint all joints with a uniform coat of tack coat before the fresh mixture is placed. Prepare joints in the new pavement in accordance with SSPWC Section 302-5.7.

3.09 JOINING NON-PAVED AREAS

A. Where paving will join landscape or other non-hardscape area a redwood header shall be installed.

3.10 TOLERANCES

A. Flatness: Maximum variation of 1/8 inch when measured with a 10-foot straight edge.

B. Variation from True Elevation: Within 1/4 inch.

3.11 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District’s Testing Laboratory.

B. Field inspection and testing will be performed by the District's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District Representative advance notice of paving scheduling. Sufficient “Advance Notice” shall be determined by the District Representative.

C. If tests indicate materials do not meet specified requirement, replace material and retest at no additional cost to the District.

D. Frequency of Test: As determined by the District’s Testing Laboratory.

3.12 PROTECTION

A. After placement, protect pavement from mechanical injury.

END OF SECTION

SECTION 32 16 00
CURBS, GUTTERS, SIDEWALKS

PART 1 – GENERAL

1.01 SUMMARY

A. Concrete for curbs, gutters, sidewalks.

1.02 RELATED SECTIONS

A. Section 31 20 00 – Earthwork

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

C. ASTM Standards.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on admixtures and curing compounds.

2. Concrete mix design(s).

3. Certificates from the batch plant.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with the SSPWC, latest edition; and ASTM Standards, latest edition.

B. Obtain cementitious materials from same source throughout.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Section 303-5 of the SSPWC.

2.02 CONCRETE MATERIALS

A. Concrete Material for Curbs, Walk (Path of Travel), Pavement, and Cast-in-Place Catch Basin:

1. Class 560-C-3250 for cast-in-place catch basins, curbs, and gutters. Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.

2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

2.03 ACCESSORIES

A. Curing Compound shall conform to SSPWC Section 201-4. Pigmented compound shall not demonstrate any residual coloring of the concrete after one week.

2.04 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94.

B. Use accelerating admixtures in cold weather only when approved by the District's Representative. Use of admixtures will not relax cold weather placement requirements.

C. Use calcium chloride only when approved by the District 's Representative.

D. Use set retarding admixtures during hot weather only when approved by the District 's Representative.

2.05 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to SSPWC Section 201-2.

2.06 SOURCE QUALITY CONTROL

A. Provide certificates of compliance from the batch plant.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support imposed loads.

B. Verify gradients and elevations of subgrade are correct.

3.02 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete. Compact subgrade material to a depth of 12" beneath 4” of sand below concrete pavements to a minimum 90% of the maximum dry density. Refer to geotechnical report for site subgrade preparation recommendations.

B. Coat surfaces of catch basin frames with oil to prevent bond with concrete pavement.

C. Notify District’s Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with SSPWC Section 303-5.

B. Install ½" thick fiberboard expansion joint and snap cap. Seal with Sikaflex self-leveling sealant after removal of snap cap (typical).

C. Construct weakened plane joints conforming to SSPWC Section 303-5.4.3, one inch deep, at intervals not exceeding 10 feet.

D. The top edges of curbs shall have 0.5" radius.

3.05 FINISHING

A. Concrete finishes shall be per SSPWC Section 303-5.5.

B. Portland cement concrete paving shall have a medium salted finish for slopes less than 6%, and slip-resistant at slopes of 6% or greater.

C. Walkway grades in excess of 5% shall conform to requirements of Section 11B-401 of the latest edition of the California Building Code.

D. Place curing compound in accordance with SSPWC Section 303-5.6 on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.

B. District 's Testing Laboratory will perform slump and compressive strength tests.

C. Contractor shall maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.07 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, vandalism and mechanical injury.

B. It is the Contractor's responsibility to replace all concrete work subject to vandalism and graffiti at no extra cost to the District.

END OF SECTION

SECTION 32 80 00
LANDSCAPE IRRIGATION

PART 1 – GENERAL

1.01. SCOPE

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

B. Includes furnishing all labor, materials, tools and equipment required to provide and install the irrigation system specified herein and required to complete the work per the Plans.

C. Related work:

1. Section 32 90 00 – Landscape Planting;
2. Section 32 92 19 – Hydroseeding.

1.02. REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with all local and state codes, ordinances, safety orders, and regulations of all legally constituted authorities having jurisdiction over this work.

B. Obtain and pay for all necessary permits and all inspections required by authorities stated above.

C. Notify the Landscape Architect in the event any equipment or methods indicated on the Drawings or in the specifications conflict with local codes, prior to installation. In the event this notification is not performed, the Contractor must assume full responsibility for revisions necessary.

1.03. PROTECTION

A. Contractor shall call ***DIG ALERT,*** ((1) (800) 642-2444), a minimum of 48 hours prior to any excavation.

B. Contractor shall check for located existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of this operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the Landscape Architect for necessary action or decisions before resuming operations. Contractor shall be responsible for repair or replacement, at no cost to Owner, for features or condition damaged through failure to comply with above procedures.

1.04. SUBMITTALS

A. Record Drawings; Maintain information daily. Keep updated drawings onsite at all times for review by the School District Representative(s).

1. The Contractor shall maintain on a daily basis a complete and accurate set of record drawings. These drawings must be kept up-to-date at all times with the progress of the work. The District shall furnish a set of drawings on which to record changed conditions.

2. The Contractor shall indicate clearly all work installed differently from that shown on the contract drawings. By dimensioning from two permanent points of reference (building corner, sidewalk or road intersections), show connection to existing water lines, connection to existing electrical power, gate valves, pressure supply pipe, control valves, control wiring, automatic controller, quick coupler valves, sleeve locations, and other related equipment as directed by the District's representative.

3. Use appropriate eradication methods for removing original lines and dimensions where changes are made. Completed drawings shall be equal to the original drawings. Mark record set(s) with red erasable pencil.

4. Submit 14 days prior to final inspection, one set of marked-up Contract drawings.

5. After approval, the Contractor shall obtain one (1) set of the contract drawings from the Landscape Architect, and all changes as noted on the redlined set shall be drawn on the record set with waterproof ink. The Contractor shall sign the drawings as complete and accurate records of as-built work. This set of drawings shall be delivered to the Landscape Architect for final approval, after which the Contractor shall make copies for the District, Landscape Architect, and other applicable parties.

B. Controller Charts

1. Record drawings shall be approved by the Landscape Architect before charts are prepared.

2. Provide one controller chart for each controller supplied.

3. The chart shall show each area controlled by automatic controller and shall be 8-1/2" x 11" size.

4. The chart is to be a reduced drawing of the actual constructed system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable. This may involve providing more than one chart.

5. The chart will be a blackline print and a different color shall be used to show area of coverage for each station.

6. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum of 20 mils thick.

7. These charts shall be completed and approved prior to final inspection of the irrigation system.

C. Checklist

1. Provide a signed and dated checklist and deliver to the School District's Representative prior to final review of the work. Use the following format.

    a. Confirmation of service pressure: psi., by whom and date.
    b. Plumbing permits: if none required, so note.

c. Materials furnished: received by and date.
d. Material approvals: approved by and date
e. Pressure line tests: by whom and date
f. Record drawings: received by and date
g. Controller charts: received by and date
h. Operations and maintenance manuals: received by and date
i. System and equipment operation instructions: received by and date
j. Manufacturer's warranties, if required: received by and date
k. Written guarantee: received by and date

D. Manufacturers Catalogs

1. Submit for approval, manufacturers catalogs on all material to be used on the project. These catalogs are to be submitted 30 days prior to the start of any work.

E. Additional Submittals

1. For any submittals which necessitate additional research on the part of the Landscape Architect, to prove the product is acceptable, the Contractor will be charged on an hourly basis for this additional work.

F. Approvals and Rejections

1. Equipment or materials furnished or installed without prior approval of the Owner's representative may be rejected and the Contractor required to remove and replace such materials from the site at no cost to the District.

1.05. DRAWINGS

A. For purposes of legibility, sprinkler lines are essentially diagrammatic. Although size and location of irrigation equipment are drawn to scale wherever possible, the Contractor shall make use of all data in all of the contract documents and verify this information at construction site.

B. Interpretations: Drawings and specifications are intended to be fully cooperative and to agree. However, if the Contractor observes that the drawings and specifications are in conflict, he shall promptly notify the Landscape Architect in writing (prior to bidding and/or construction). The specification calling for any higher quality material or workmanship shall prevail. Questions regarding interpretation of drawings and specifications shall be clarified by the Landscape Architect.

1.06. PERFORMANCE REQUIREMENTS

A. Unless otherwise provided, irrigation system layout shown on the plan shall be considered schematic. With the Landscape Architect's approval, the Contractor may make adjustments where necessary to conform to actual field conditions. The irrigation system shall be operational, with uniform and adequate coverage of areas to be irrigated, prior to planting.

1. Utility connections shall be as shown on the plan or designated by the utility company. The Contractor shall include in his bid all costs for such

utility connections shown on the plans or designated by the utility company.

B. Water Supply

1. The sources of water supply shall be as indicated on the drawings as P.O.C., "Point of Connection".

C. Contractor Responsibility

1. The Contractor shall ensure full coverage of the irrigation system and shall make all approved modifications necessary to accomplish full coverage.

2. Contractor shall not willfully install the plumbing or sprinkler system as indicated on the drawings when it is obvious in the field that there are obstructions, grade difference and/or discrepancies in area dimensions until such conditions are brought to the attention of the Landscape Architect.

1.07. PRE-CONSTRUCTION CONFERENCE

A. The Contractor shall schedule with the Landscape Architect and Owners Representative a pre-construction conference at least seven (7) days before beginning work under this section. Purpose of this conference will be:

1. Review Contractor's questions regarding this project.
2. Review administrative and inspection procedures that will occur during construction.
3. Review Contractor's work schedule for this project.
4. Verification of Contractor's C-27 License, Bonding and Insurance.

PART 2 – PRODUCTS

2.01. GENERAL

A. All irrigation equipment: shall be new and unused prior to installation; and shall conform to the Irrigation Plan, Legend and Specifications.

B. Irrigation equipment, which has been damaged in any way, shall be replaced by the Contractor at no additional cost to the District. If equipment has already been installed, it shall be removed and replaced by the Contractor at no additional cost to District.

2.02. PLASTIC PIPE AND FITTINGS

A. Plastic Pipe

Shall be rigid, high impact, Type I, unplasticized polyvinyl chloride (PVC) extruded from virgin parent material Geon 8700A or Geon 8714. Contractor shall furnish for each shipment delivered, a statement from the manufacturer certifying use of virgin material only. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious wrinkles or dents and shall conform to the following dimensions and physical properties:

1. All plastic pipe shall be continuously and permanently marked with the manufacturer's name, kind of pipe, material size, IPS NFS approval, schedule and type, and date of extrusion.

2. Plastic pipe shall be as manufactured by Lasco, Celanese, Pacific Western, John Manville, Brownline, Inc. or approved equal.

B. Main Line

1. Piping shall be PVC Class 315, and shall conform to ASTM D-2241.

C. Lateral Lines

1. Piping under intermittent pressure shall be PVC Sch.40, and shall conform to ASTM D-1785.

D. Fittings and Connections

1. Plastic PVC fittings shall be standard weight Schedule 40 to meet ASTM D2466-73 and D2467-73.

2. All threaded fittings shall be standard weight Schedule 80 to meet ASTM 80 D2466-73 and D2467-73.

2.03. WATER METERS

A. Shall be installed by others at District's expense.

2.04. BACKFLOW PREVENTION

A. Anti-siphon valves as designated on the plan and details.

2.05. SLEEVE MATERIAL

A. For water lines: PVC Schedule 40 (minimum 2 times line diameter).

2.06. AUTOMATIC CONTROLLER

A. Automatic controller shall be of the size and type shown on the plans (battery).

1. The final hookup of any/all low-voltage control wires installed shall be the responsibility of the Landscape Contractor.

2.07. CONTROL WIRING

A. Connections between the automatic controllers and the electric control valves shall be made with direct burial wire AWG - U.F. No.14-600 volt (No.12-600v. where specified on the plans). Install in accordance with valve manufacturer's specifications.

1. Waterproof dry-splice connectors shall be 3M #DBY-054007-09053 or approved equal.

2.08. TRACER WIRES

A. No.12 Green Type TW plastic-coated copper tracer wire shall be installed with non-metallic mainlines.

2.09. ELECTRIC CONTROL VALVES

A. All electric control valves shall be as noted on plans and installed per details and manufacturer's specifications. Locate all valves in shrub areas unless otherwise noted.

2.10 BALL VALVES

B. Ball and gate valves shall be as indicated on the drawings and installed per the details and manufacturers recommendations.

2.11 PRESSURE REGULATION

C. Pressure regulator shall be as designated on the drawings with output psi as specified.

2.12 SWING CHECK VALVES

D. Swing check valves shall be made of high-impact Sch.40 PVC Type II with reinforced poppet. Install per manufacturer's recommendations.

2.13 SPRING CHECK VALVES

E. Mainline and lateral line spring check valves shall be made of high-impact Sch.40 PVC Type II with reinforced poppet (1/4 lb. spring).

2.14 SOLVENT CEMENT

F. Solvent cement used for bonding rigid PVC pipe and fittings up to 12" size shall be Weld-On #711 as manufactured by IPS Corporation or an approved equal. Primer for Weld-On #711 shall be Weld-On P-70 as manufactured by IPS Corporation or an approved equal.

2.15 MATERIALS TO BE FURNISHED

G. Prior to final inspection furnish the following materials to the District:

1. As-built drawings;
2. Controller colored sectioning chart.

PART 3 – EXECUTION

3.01. SITE CONDITIONS

A. Before starting work on the irrigation system, carefully check all dimensions and grades to determine that work may safely proceed, keeping within the specified material depths.

B. Do not willfully install the irrigation system as indicated on the drawings when it is obvious in the field that unknown obstructions or grade

differences exist, that might not have been considered in the engineering. Such obstructions or differences shall be immediately brought to the attention of the Landscape Architect.

C. The installation of all irrigation materials, including pipe shall be coordinated with the landscape drawings to avoid interfering with the trees, shrubs, or other plantings.

D. Layout system and make minor adjustments required due to differences between site and drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional cost to the Owner. When directed by the Landscape Architect, the layout shall be approved before installation.

E. Manufacturer's requirements for installation of products shall apply when;

1. No other direction is given;
2. It is a more stringent requirement than the Standard Specifications and these special provisions.

F. The Contractor shall preserve and protect all pipes that are not to be removed.

G. Work Space:

1. The Contractor shall erect fences and/or retain guards as required for the protection of the public and construction materials, and maintain same in good repair until the completion of the work under the contract.

H. Drawings of Record

1. Keep record drawings on site daily for observation by the School District Representative. All dimensions shall be taken and recorded prior to backfill. On the date of the final observation, deliver corrected drawings to the School District Representative. Final drawings shall be prepared by the Contractor on prints obtained from the School District's Representative, showing all field notes in India ink and finalized by a competent draftsperson. Delivery of prints does not relieve the Contractor of responsibility for providing any information that may have been omitted from the prints.

3.02. PIPE AND CONTROL WIRE INSTALLATION

A. Trenching

1. Dig trenches straight and support pipe continuously on bottom of ditch. Shade pipe in trench to an even grade. Trenching excavation shall follow layout indicated on drawings and as noted. Where lines occur under paved areas, these dimensions shall be considered below subgrade.

2. Provide minimum cover of 18 inches from top of pipe to finish grade for all pressure supply lines.

3. Provide minimum cover of 12 inches from top of pipe to finish grade for all non-pressure lines.

4. All lines under driveway and roadway pavement shall have a 24-inch minimum cover.

B. Cutting and Patching

1. If cutting or breaking of any paving is necessary, it shall be done and replaced with like materials, at the Contractor's expense. Paving work shall match the original work in every respect, including type, strength, texture and finish. Obtain approval from the School District's Representative prior to any cutting and/or breaking. Hydraulic driving will not be permitted under asphalt paving. All sleeves set in place under paving shall extend 18" minimum beyond such paving and be capped hand tight. No fittings, including couplings, will be permitted under surfaces to be paved except where length of the line under the paving exceeds 20-feet and/or where the lines are encased in sleeves.

2. In new paved areas, coordinate installation of piping and wires under paving with the General Contractor.

C. Backfilling

1. Backfill shall not be placed until the installed irrigation system has been inspected, tested, and approved by the Landscape Architect and Project Inspector. Trenches shall be backfilled promptly after the open trench inspection.

2. Backfill for trenching consisting of earth, loam, sandy clay, or other approved materials shall be compacted to a dry density equal to the adjacent undisturbed soil, and shall conform to the adjacent grades without dips, sunken areas, humps or other irregularities. Initial backfill on all lines (bottom 6") shall be of a fine granular material with no foreign matter larger than 1/2 inch size.

3. Irrigation lines under paving shall be backfilled with a 3" sand layer below the pipe and a 3" layer above, compacted in layers to 95% relative density, using mechanical tamping devices only. The remaining backfill shall be per Section 02200 and the Geotechnical Engineer's recommendations. Compact trenches equal to the compaction of the existing adjacent undisturbed soil and leave in a firm unyielding condition. Leave trenches flush with the adjoining grade.

D. Water Supply

1. Connections to existing outlets shall be at the approximate location (s) shown on the drawings and indicated by P.O.C. "Point of Connection".

E. Pipe Fittings and Controls

1. Plastic to Plastic Fittings

a. All plastic threaded pipe and fittings shall be assembled using Teflon tape or equivalent, applied to the male threads only.

b. All plastic slip fittings shall be solvent welded as per pipe manufacturer's recommendations. Thoroughly clean PVC pipe and fittings of dirt, dust, and moisture prior to gluing.

c. Slip-fix and/or compression fittings shall not be used to repair line breaks.

2. Plastic to Steel Fittings

a. Male thread plastic into female thread steel shall be used.

b. Work the steel connection first. A non-hardening pipe dope shall be used on threaded plastic-to-metal joints.

F. Line Clearance

1. All lines shall have a minimum clearance of 3 inches from each other, and 12 inches from lines of other trades. Parallel lines shall not be installed directly over one another.

G. Control Wires

1. Splices shall be made with 3M waterproof connectors or equal.

2. Tracer wire shall be placed on the bottom of the trench, under the mainline pipe. Wire shall be continuous length throughout the length of the pipe.

H. Thrust Blocks

1. All lines equal to or larger than 1-1/2" shall receive concrete thrust blocks at all corners, tees, elbows, and end caps. Use a minimum of 1/2 c.f. of concrete per diameter inch of pipe (i.e. 2” pipe = 1 c.f. concrete). Do not encase pipe or fittings!

I. Sleeving

1. All lines under paving (concrete and asphalt) shall be sleeved. Sleeves shall be installed in straight runs from planter to planter. Install (pre-pipe) lines in sleeves for future connections at the time of sleeving installation. Sleeves and lines shall extend a minimum of 12” beyond any existing and/or future hardscape.

J. Flushing the System

1. After new irrigation pipe lines and risers are in place and connected, all necessary division work has been completed, the control valves shall be opened and a full head of water used to flush out the system.

3.03. ELECTRIC CONTROL VALVES

A. Install as indicated on the drawings.

3.04. ADJUSTING OF SYSTEM

A. Adjust the control valve to obtain the design rated pressure for the system installed.

B. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, make necessary changes without additional cost to Owner, prior to planting.

C. The entire system shall be operating properly before any planting operations commence.

3.05. EXISTING TREES

A. Where it is necessary to excavate adjacent to existing trees, use all care possible to avoid injury to trees and tree roots. Where root diameter exceeds 2 inches, excavate by hand. Tunnel under roots 2 inches and larger in diameter (wrap root with wet burlap to prevent excessive drying while the trench is open). Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, hand-trim the wall of the trench adjacent to the tree, making clean cuts through. Paint roots 1 inch and larger in diameter with 2 coats of Tree Seal, or equal. Close trenches adjacent to tree within 24 hours; and where that is not possible, shade the side of the trench adjacent to the tree with burlap or canvas.

3.06. INSPECTION AND TESTING

A. General

1. In no event cover up any work prior to approval of the Landscape Architect. Any work covered prior to inspection shall be opened to view by the Contractor at his expense. Re-examination of questionable work may be ordered by Landscape Architect, and if so ordered, any work must be uncovered by Contractor. If the work is not in accordance with the drawings and specifications, Contractor shall pay the costs of re-examination and replacement.

2. When observations have been conducted by other than the Landscape Architect, submit documentation showing when and by whom these observations were made.

3. No site inspections shall occur without updated record drawings.

4. All observations called for by the Contractor shall be requested in writing at least seven (7) days prior to the anticipated observation.

5. Contractor shall provide “walkie-talkie” equipment and/or personnel to maintain communication from the review area to the automatic controller(s).

6. In the event the Contractor has scheduled an inspection, and the specified work is not completed or deficient, the Contractor shall pay all costs involved for re-examination.

B. Pressure Testing - All mainlines; (and lateral lines under paving)

1. As soon as lines are connected and flushed-out (and prior to attaching valves), cap all outlets and hydrostatically test at 150 psi for a continuous twenty-four (24) hour period, at the end of which the lines and joints shall be inspected by the Landscape Architect and Project Inspector (locate pressure gauge at the center of mainline system and shut off water point of connection). The Contractor shall furnish all pumping and test equipment. If leaks develop, the pipe and/or joints shall be replaced and the tests repeated in the presence of the Project Inspector until all leaks are repaired (allowable 5-psi drop in 24-hour period. Pressure must stabilize at max. 5-psi drop).

C. Operation Testing

1. Prior to planting, the entire irrigation system shall be placed in automatic operation and tested in the presence of the Landscape Architect for proper functioning and coverage. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, make necessary changes without additional cost to Owner, prior to planting.

3.07. CLEAN UP AND REPAIR

A. Upon completion of the work, make the surface level, remove excess materials, rubbish debris, and remove construction and installation equipment from the premises.

B. Replace and/or repair to the satisfaction of Landscape Architect existing paving disturbed during the course of work. New paving shall be the same type, texture, finish and be equal in every way to the material removed.

3.08. PRE-MAINTENANCE ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work. Upon pre-maintenance acceptance, the Landscape Architect will give written notification to commence 90-day maintenance period.

3.09. MAINTENANCE

A. The entire irrigation system shall be maintained for a period of 90-days following the date of pre-maintenance acceptance of the work. System shall be in good working order at the end of the maintenance period.

B. Landscape Contractor shall be responsible for any and all damage and/or vandalism to the irrigation system, which may occur during the maintenance period or the course of work (regardless of fault). Make all repairs and provide all replacement materials and labor to the satisfaction of the Owner.

3.10 FINAL ACCEPTANCE

C. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work (including maintenance). Upon final acceptance and written notification, the Owner will assume responsibility for maintenance of the work.

3.11 GUARANTEE

D. The entire irrigation system shall be guaranteed by the Contractor as to materials and workmanship, including settling of backfilled areas for a period of one (1) year following the date of final acceptance of the work. Guarantee shall also cover damage to any part of the premises resulting from leaks or other defects in, materials, equipment, and workmanship to the satisfaction of the District.

E. A guarantee form shall be re-typed in the following onto the Contractor’s letterhead and contain the following information:

“GUARANTEE FOR THE IRRIGATION SYSTEM”

We hereby guarantee that the irrigation system we have furnished and installed is free and clear from defects in materials and workmanship, and the work has been completed in accordance with the Drawings and Specifications. We agree to repair and/or replace all defects in material or workmanship which may develop during the period of one-year of acceptance and also to repair and/or replace all damages resulting from the repair of such defects at no additional cost to the School District, after receipt of written notice. In the event of our failure to make repairs or replacements within a reasonable amount of time after receipt of written notice, we authorize the School district to proceed to have said repairs and/or replacements made at our expense, and we will pay the costs and charges therefore upon demand.

Project: _____
Location: _____
Contractor/Company:___ License Number:
_____ Address:
_____ Office Phone:
_____ Cell Phone:
_____ FAX:
_____
E-mail: _____
Date of Final: _____

Acceptance: _____

Signed: _____ Date: _____

END OF SECTION

SECTION 32 90 00
LANDSCAPE PLANTING

PART 1 – GENERAL

1.01. SUMMARY

A. Provide all labor, materials, equipment and services to complete the finish grading, planting, maintenance of planting and related items, as indicated on the drawings and specified herein, providing landscaping with plants in vigorous growth condition, ready for the Owner's use.

B. Related work specified elsewhere includes but may not be limited to:

1. Section 32 80 00 - Landscape Irrigation;
2. Section 32 92 19 - Hydroseeding.

1.02. SUBMITTALS

A. Furnish original material invoices and original truck delivery tickets indicating the quantities of fertilizers and soil amendments delivered to the job site. Material invoices must be approved by the Landscape Architect prior to installation. Photocopies will not be accepted and the Landscape Architect must be on site to verify all deliveries.

B. Furnish material invoices or documentation to the Landscape Architect at least 30 days prior to start of work indicating that all plant material has been ordered.

C. Soil Fertility and Agricultural (Horticultural) Suitability Analysis:(Shall be done at least 120 days prior to planting and or amending the soil.)

1. After completion of rough grading and prior to soil preparation, the Contractor shall obtain agronomic soils tests for planting areas. A minimum of two (2) samples of planting areas shall be required. Tests shall be performed by an approved agronomic soils testing laboratory and shall include a complete soil suitability analysis with written recommendations for soil amendment, fertilizer and chemical conditioner, application rates for soil preparation, and post-maintenance fertilizer program.

2. The soils report recommendations shall take precedence over the minimum soil amendment and fertilizer application rates, as specified, when they exceed the specified minimums. Additional materials required by the soils report shall be paid for by Change Order, upon approval by district. Contractor must have written authorization and approval prior to making any changes to the soil amendments.

3. Submit the name, address, and phone number of the consulting soil testing laboratory for approval by the Landscape Architect prior to obtaining services.

1.03. PROTECTION

A. Contractor shall check for location of cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of his/her operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the Landscape Architect for necessary action or decisions before resuming operation. Contractor shall be responsible for repair or replacement, at no cost to the Owner, for features or conditions

damaged through failure to comply with above procedures.

1.04. ALTERNATES

A. Alternates will not be permitted unless authorized by the Landscape Architect at least 30 days prior to start of work. The Landscape Architect will assist the Contractor in the selection of the nearest equivalent size and variety of plant.

1.05. DRAWINGS

A. Interpretations: Drawings and specifications are intended to be fully cooperative and to agree. However, if the Contractor observes that the drawings and specifications are in conflict, (s)he shall promptly notify the Landscape Architect in writing (prior to bidding and/or construction). The specification calling for any higher quality material or workmanship shall prevail. Questions regarding interpretation of drawings and specifications shall be clarified by the Landscape Architect.

1.06. INSPECTIONS

A. The Contractor shall notify the Landscape Architect 24 hours in advance of all soil preparation, planting and maintenance inspections.

B. The Contractor shall schedule with the Landscape Architect a preconstruction conference at least 7 days before beginning work under this section. The purpose of this conference will include:

1. Review of Contractor's questions regarding this project;
2. Review administrative and inspection procedures that will occur during construction;
3. Review the Contractor's work schedule for this project;
4. Verification of Contractor's C-27 License, Bonding and Insurance.

C. Fine Grading and Soil Preparation

1. Furnish certificates for soil amendments at this time (per Section 1.2);
2. The fine grading and soil preparation of all planted areas must be approved prior to installation of plant material.

D. Plant Material

1. Plant material quality will be inspected prior to planting. Plants that are found to be rootbound, of insufficient size, or of irregular shape may be rejected by the Landscape Architect. Rejected plants will be replaced at no extra expense to the Owner.

2. The Contractor will field locate container stock before planting. The Landscape Architect will then be allowed to adjust the locations of any plant materials prior to installation.

E. Pre-Maintenance Inspection

1. The pre-maintenance inspection will occur after all work has been completed as indicated on the drawings and in the specifications. If approved, this will be the starting date of the 90-day maintenance period.

F. Final Inspection

1. The final inspection will occur after the 90-day maintenance period and all work is completed. If approved, this will be the date of final acceptance.

1.07. GUARANTEE AND REPLACEMENT

A. All 1 gallon plants shall be guaranteed for six (6) months from date of final acceptance.

B. The Contractor shall replace all dead plants and all plants not in a vigorous, thriving condition as determined by the Landscape Architect during and at the end of the guarantee period. Replacement plants shall be of the same quality as the original specified plants.

C. Landscape Contractor shall be responsible for any and all damage and/or vandalism to planting which may occur during the maintenance period or the course of work (regardless of fault). Make all repairs and provide all replacement materials and labor to the satisfaction of the Owner.

PART 2 – MATERIALS

2.01. PLANT MATERIAL

A. Plants shall be grown in nurseries inspected by the State Department of Agriculture. Plants shall be grown in accordance with good horticultural practices under climatic conditions similar to those of the project.

B. Plants shall be fresh, well-established, vigorous, of normal habit of growth, free of disease, insects, insect eggs and larvae. Plants shall be healthy, with a normal root system, well filling their containers, but not to the point of being rootbound.

C. The size of plants shall conform to the plan or the plant list. Oversized plants may be used at no additional cost to the Owner. Plants shall be well rooted in their containers. Rootbound plants and plants with poorly formed root systems, as a result of a recent shift in container size, will not be accepted.

2.02. TOPSOIL (IF REQUIRED FOR IMPORT)

A. Topsoil shall be fertile, friable, sandy loam free from weeds and seeds per USDA 7th approximation classification method. Acceptable soil from the site may be used. Should topsoil be imported, an agricultural suitability test shall be conducted by an approved soils laboratory and results submitted to the Landscape Architect for approval prior to delivery to job site.

B. Identify source location, percentages of silt, clay, sand, organic matter, pH, mineral and plant nutrient content of soil. Particle size shall fall within the following desired range:

Clay and silt, 20% - 50%; fine sand, 30% - 40%; coarse sand, 5% - 20%; gravel (maximum aggregate size 3/4"), 0% - 8%; decomposed organic matter, 2% - 50%. All sandy loam must pass through a one-inch sieve. The sand fraction shall have 85% falling within the medium to fine sand range. Soils unsuitable for planting shall be rejected.

C. Provide soils analysis expressed in parts per million including the following:

Organic content; nitrogen; phosphorous; potassium; magnesium; calcium; sodium; sulfur; zinc; manganese; copper; iron; boron; pH; ammonium; sodium absorption rate (SAR); ECe; and USDA particle size.

D. Suitability of soil and chemical deficiencies will be determined by Landscape Architect (Landscape Architect may submit a list of what additives should be installed to correct these problems). Soils deemed unsuitable for planting shall be rejected.

2.03. SOIL AMENDMENT

A. Pre-plant fertilizer shall consist of Gro-Power Plus 5-3-1 Humus Base Fertilizer & Soil Conditioner. Retain all bags for inspection by Landscape Architect prior to disposal.

B. Shrub fertilizer shall consist of Best “Best-Paks” 20-10-5 fertilizer packets, used with the backfill of every plant as follows:

1. 1 gallon - 1 packet.

C. Organic amendment shall consist of nitrolized redwood sawdust. Submit sample and analysis to Landscape Architect for approval prior to delivery to site.

1. Nitrogen stabilized: .4 - .6% N (dry weight for redwood sawdust), .56 - .84% N (dry weight for fir or cedar), .8 - 1.2% N (dry weight for fir or pine).
2. Particle size: 95 - 100% passing 6.35mm standard sieve, 80 - 100% passing 2.33mm standard sieve.
3. Salinity: Saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees centigrade.

D. Gypsum shall be granular calcium sulfate (clay soil only).

2.04. MIXES

A. Backfill mix for each plant shall consist of 6 parts native soil (or approved imported soil), 4 parts nitrolized organic amendment, Gro-Power Plus 5-3-1 fertilizer (18 lbs./c.y. fill), Agricultural Gypsum (15 lbs./c.y. fill) if clay soil, and “Best-Paks” fertilizer packets as noted.

2.05. MULCH

A. Shrub Area Mulch: Redwood or fir bark (shredded “walk-on” variety), 3” deep, ¼" to ½” diameter, free of sticks, dirt, dust or other debris (keep 2” minimum from trunk of plant).

2.06. HERBICIDE

A. Post-emergence (existing weeds): "Roundup" or equal/approved.

B. Pre-emergence (non turf areas, prior to seed germination): "Ronstar" or equal/approved.

PART 3 – EXECUTION

3.01. SOIL PREPARATION

A. Remove from all planted areas rocks over 1-inch diameter, sticks and other debris, weeds and foreign growth of any kind.

B. Contractor shall chemically eradicate all germinated weed seeds. (See Section 2.6 Herbicide A. Post-emergence.)

C. To all planting areas apply the following per 1000 s.f. and till into the top 6" of soil:

1. 200 lbs. Gro-Power Plus 5-3-1 Fertilizer;
2. 3 cubic yards of organic amendment;
3. 200 lbs. Gypsum (clay soil only).

3.02. FINISH (FINE) GRADING

A. No plant materials shall be installed until all operations in conjunction with the installation of the irrigation system have been completed, finish grades have been established and planting areas have been properly prepared and graded.

B. Finish grading operations shall include establishment and/or re-establishment of all surface drainage patterns, as indicated on the grading and drainage plans. All areas shall have a uniform gradient, with no abrupt changes and/or undulations. All low-spots shall be filled to establish positive drainage to appropriate drainage facilities.

C. Finish grade includes, but is not limited to, the removal of all foreign material of any kind, 1” and larger, within the top 6” of the soil surface.

D. Establish finish grade for planting areas 3” below header board, edging, and/or adjacent pavement in areas to receive minimum 3” layer of mulch.

E. All finish grades shall be completed and accepted by the Landscape Architect prior to any planting and sodding operations.

3.03. PLANTING - SHRUBS

A. Shrubs shall be set in the field in locations shown on the drawings. All planting locations shall be approved or adjusted as necessary by the Landscape Architect before planting holes are excavated.

B. Shrub planting shall comply with details on the plan.

C. Excavate pits of circular outline with vertical sides for all plants. Scarify sides and bottoms of all plant pits.

D. After removing plant from container, make several 1" deep vertical cuts along the root ball to scarify it to prevent root bound conditions. Protect roots or balls of plants at all times from sun and drying winds.

E. Use backfill mix to backfill plant pits (thoroughly mix prior to use). Set plants plumb and brace rigidly in position until planting soil has been tamped solidly around the ball and roots. When plant pits have been backfilled approximately 2/3 full, water thoroughly, saturating rootball, before installing remainder of the planting soil to top of pit, eliminating all air pockets.

F. Place “Best-Paks” fertilizer packets evenly distributed in plant pits when backfilled 2/3 according to the schedule specified.

G. Form water wells around shrub pits according to details on plans.

H. Mulch all water wells with a 3" layer of specified mulch.

3.04. WEED CONTROL

A. Keep all planting areas, free from weeds at all times. Contractor shall be responsible for weed control throughout the installation period and prior to the pre-maintenance acceptance.

B. After planting is completed, a pre-emergence herbicide shall be applied to all shrub areas. Water to a depth of ¼". Do not apply to seeded areas.

3.05. RODENT CONTROL

A. Control rodents in all planting and turf areas throughout the installation and maintenance periods.

B. The contractor shall be fully licensed for the applicable work performed. When rodenticides are deemed essential for adequate management, the contractor shall obtain approval from the District representative prior to making any treatment. As a general rule, rodenticide application outside buildings shall emphasize the direct treatment of rodent nesting sites and burrows wherever feasible. In all other applications, bait formulations of rodenticides, regardless of packaging, shall be placed in EPA-approved tamper-resistant bait boxes.

C. Outdoor use of bait boxes: All bait boxes shall be placed out of general view where they will not be disturbed by school operations. The lids of the boxes shall be securely locked or fastened shut. All bait boxes shall be attached or anchored to the ground, building wall or other immovable surface so that the box cannot be picked up or moved. All bait boxes shall be labeled on the inside with the Contractor’s business name and address. The Contractor’s employee shall date the outside of the box at the time of installation and after each service.

D. Whenever it is determined that a rodenticide is necessary, the least hazardous effective rodenticide shall be used.

3.06. CLEAN-UP

A. Keep all areas of work clean, neat and orderly at all times. Keep all paved areas clean during planting and maintenance operations. Clean up and remove all deleterious materials and debris from the entire work area prior to final acceptance to the satisfaction of the Landscape Architect.

B. Comply with all applicable storm water pollution prevention plans.

3.07. PRE-MAINTENANCE ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work. Upon pre-maintenance acceptance, the Landscape Architect will give written notification to commence 90-day maintenance period.

3.08. MAINTENANCE

A. After all work indicated on the drawings and specifications has been completed, inspected and approved by the Landscape Architect, the maintenance period shall begin. The Contractor shall maintain all planted areas by means of continuous watering, weeding, mowing, re-seeding, cultivation, spraying, mulching, pruning, edging and/or any

other operation necessary for their care and upkeep for the period of ninety (90) calendar days.

B. All areas shall be kept weed free during the maintenance period. Shrub areas shall be cultivated regularly to maintain a loose, attractive soil.

C. The Contractor shall immediately replace any and all plant materials, which, for any reason, die or are damaged while under his care. Replacement plants shall be of the same quality as the original specified plants.

D. Damage to planting areas shall be repaired immediately. Any settling of the soil shall be repaired, design grades re-established and areas replanted. Depressions caused by foot traffic will be filled with soil and leveled. The contractor shall be solely responsible for installing and maintaining all protective fencing, where necessary, throughout the maintenance period.

E. To all shrub areas apply a pre-emergence spray or granular application at the start and end of the maintenance period.

F. At completion of the maintenance period, all areas included in this contract shall be clean and free of debris and weeds, all plant materials shall be live, healthy and free of infestation.

3.09. FINAL ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work (including maintenance). Upon final acceptance, and written notification, the Owner will assume responsibility for maintenance of the work.

END OF SECTION

SECTION 32 92 19
HYDROSEEDING

PART 1 – GENERAL

1.01. SUMMARY

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

1. All labor, materials, tools and the transportation and the performance of all the work required as indicated on the drawings and specifications, and reasonably incidental to:

a. Furnish all plant material.

b. Preparation and seeding of hydroseeded areas.

c. Clean up.

d. Establishment period.

e. Guarantee.

B. Related Sections:

1. Landscape Planting – Section 32 90 00.

C. Requirements:

1. Obstructions to landscaping operations: If rock, plaster, concrete debris, electrical cables, conduits or utility lines are encountered and cause conflict with landscaping operations, notify the Landscape Architect immediately.

2. Guarantees: The Contractor shall repair or replace any or all of the work, together with any other adjacent work which may be displaced by so doing, that may prove to be defective in its workmanship or material for the period of 90 days for all hydroseeded areas from the end of the maintenance period.

PART 2 – PRODUCTS

2.01. HYDROSEED MIX

A. All hydroseed mixes shall consist of the following (in lbs./acre):

2000 lbs. - Wood Fiber Mulch (green in color).

900 lbs. - Gro-Power Humus Base Fertilizer 5-3-1.

400 lbs. - Gro-Power Controlled Release Fertilizer 12-8-8.

100 lbs. - R2400-400CL Tackifier, M-Binder or equal.

Seed Mix (non-irrigated in lbs./Acre.): 36 lbs. - Seed Mix

10.7 lbs	Eleocharis macrostachya	Pale Spikerush
14.3 lbs	Elymus triticoides	Creeping Wild Rye
1.0 lbs	Hordeum brachyantherum	Meadow Barley
1.0 lbs	Juncus mexicanus	Mexican Rush
9.0 lbs.	Juncus phaeocephalus	Brownhead Rush

(% seed by weight / * P.L.S. = Pure Live Seed)

B. Deliver total seed requirements in unmixed, unopened bags to the site prior to seeding, with the producer's certificates attached showing purity/germination rates and weed content.

C. Supply Landscape Architect with seed test reports from a certified testing laboratory showing purity/germination rates and weed content 30 days prior to seeding.

D. All seed certificates are to be detached by the Landscape Architect and retained for permanent records. Landscape Architect may take samples of all specified seed for testing purposes, if testing is deemed necessary at a future date.

E. Seed mix shall contain no noxious weed species. Seed will be rejected if it s found to be wet, moldy, or damaged, or if weed content exceeds 0.5% by weight.

PART 3 – EXECUTION

3.01. COMBINATION OF MATERIALS

A. Mixing shall be performed in a tank, with a continuous agitation system of sufficient operating capacity to produce a homogenous slurry of fiber, seed, fertilizer, humectant, tackifier and water in the designated unit proportion.

B. With the agitation system operation at part speed, water shall be added to the tank.

C. The seed shall be added first; then fertilizer shall be added, and then the fiber. (If a centrifugal pump and re-circulation is employed, fiber is added before seed.)

D. The fiber shall not be added until the tank is at least one-third filled with water.

E. The mixture shall be agitated at full speed when the tank is half-filled with water.

F. All fiber shall be added by the time the tank is two-thirds to three-fourths full.

G. Maximum permissible time of mix of fertilizer and seed shall be one hour in order to prevent deterioration of seed.

3.02. SOIL PREPARATION

A. The top six (6) inches of soil shall be cleared of stones, stumps, clods, weeds, concrete, roots or similar objects.

B. Upon acceptance of irrigation system by the Landscape Architect, Contractor shall apply sufficient amounts of irrigation water to initiate germination of any and/or all non-specified seeds.

C. Amend soil with 200 lbs. Gro-Power Plus 5-3-1 Fertilizer and 3 cubic yards of organic amendment, and mechanically till the area to be hydroseeded to a 6" depth.

1. Organic amendment shall consist of nitrolized redwood sawdust. Submit sample and analysis to Landscape Architect for approval prior to delivery to site.

a. Nitrogen stabilized: .4 - .6% N (dry weight for redwood sawdust), .56-.84% N (dry weight for fir or cedar), .8 - 1.2% N (dry weight for fir or pine).

b. Particle size: 95 - 100% passing 6.35mm standard sieve, 80 - 100% passing 2.33mm standard sieve.

c. Salinity: Saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees centigrade.

3.03. HYDROSEEDED AREAS

A. The areas to be hydroseeded are as shown on the drawings.

B. Soil surface in the areas to be hydroseeded shall be loose, friable and roughened to a minimum depth of 2" so that seed will remain in place prior to seeding.

C. Seed mix shall be uniformly seeded at rates specified in Section 2 - 2.1 and/or plan.

D. Seeded areas shall be irrigated to maintain adequate soil moisture: [Turf grasses - fourteen to twenty-one (14-21) days] until ninety (90) percent germination occurs unless natural germination is specified. In the event germination does not occur within these time periods, the Landscape Contractor shall re-hydroseed all deficient areas at his/her expense until germination occurs or to the satisfaction of the District.

3.04. WEED CONTROL

A. Subsequent to seed germination (and throughout the maintenance period) Contractor shall mechanically and/or chemically eradicate all weeds as soon as they can be identified.

B. Remove all weeds from site before seed is set.

3.05. GUARANTEE

A. All seeded areas shall be 100% established by the end of the maintenance period. Final acceptance will be postponed (maintenance period will be extended) until 100% establishment is achieved or approved by District.

END OF SECTION

SECTION 33 10 00
WATER UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Pipe and fittings for site water lines.

B. Valves.

C. Fire Hydrant

D. Water meter

E. Backflow preventer.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. American Water Works Association Standards (AWWA).

B. City of Oxnard - Design Standards.

C. Standard Specifications for Public Works Construction (Green Book), latest edition.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.

2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

3. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Turn over to the project manager one set of drawings with all deviations from the plans shown in neat, clean and readable red ink.

4. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

5. Disinfection Report:
    a. Type and form of disinfectant used.
    b. Date and time of disinfectant injection start and time of completion.
    c. Test locations.
    d. Name of person collecting samples.
    e. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
    f. Date and time of flushing start and completion.
    g. Disinfectant residual after flushing in ppm for each outlet tested.

6. Bacteriological Report:
    a. Date issued, project name, and testing laboratory name, address, and telephone number.
    b. Time and date of water sample collection.
    c. Name of person collecting samples.
    d. Test locations.
    e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
    f. Coliform bacteria test results for each outlet tested.
    g. Certify water conforms, or fails to conform, to bacterial standards of AWWA C651 Section 7.1 Standard Conditions

7. Water Quality Certificate: Certify water conforms to quality standards of the District's Representative, suitable for human consumption.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of piping mains, valves, connections, fire hydrant, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with City of Oxnard Standards, AWWA, Standard Specifications for Public Works Construction California, Fire Code Chapters 5 & 33 and NFPA 24.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years' experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

C. Submit bacteriologist's signature and authority associated with testing.

1.08 DELIVERY AND STORAGE

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.01 GENERAL

A. All fire water lines shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans.

B. All domestic water lines shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans.

2.02 PIPE

A. Joints: Mechanical joints shall be used for the waterline construction unless otherwise shown on plans and standard details. Gaskets for mechanical joints shall be rubber conforming to ANSI A21.11 and AWWA C111.

B. Fittings: Fittings shall be ductile iron rated for 250 psi working pressure for domestic water lines and 305 psi working pressure for fire water lines. Mechanical joint fittings shall conform to ANSI A21.10 or AWWA C110 (short short body style, not approved). Lining for fittings shall be Plastic Engineering P.E.I. 100 epoxy to a minimum thickness of 10 mils. Fittings shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapped with the polyethylene sheet.

C. Polyvinyl Chloride (PVC) potable water pipe: Pipe material shall be (Polyvinyl chloride (PVC) pressured pipe shall be manufactured in accordance with AWWA Standard Specification C-900).

2.03 GATE VALVES

A. Conform to AWWA C-509-01.

B. Gate valves shall be iron body, NRS valves with O-ring seals, and shall open when the stem is rotated counterclockwise. The valves shall be designed for a minimum working pressure of 250 psig, have a bronze stem, and have a cast iron wedge with styrene butadiene rubber permanently bonded to the wedge. The valves shall have full port openings for unobstructed flow, be designed for underground service, and be in full compliance with the latest revision of AWWA C509. The valve linings and coatings shall be in accordance with AWWA C210-84. Linings and coatings shall be factory applied. Valves shall be furnished with 2-inch square operating nut. Valve shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapping with the polyethylene sheet.

2.04 FIRE HYDRANT

A. Not Applicable.

2.05 WATER METER

A. Per City of Oxnard Plans & Specifications.

2.06 BACKFLOW PREVENTER

A. Per City of Oxnard Plans & Specifications.

B. Backflow preventer shall be lead free and USC approved.

2.07 ACCESSORIES

A. Concrete for Thrust Blocks: Contractor shall construct concrete thrust block per City of Oxnard Standard Construction Plates.

B. Thrust blocks shall be constructed to bear against undisturbed earth and shall not bear against adjacent pipe, fittings, or valves. Where concrete must be poured around adjacent pipe, a block out or a short pipe length shall be used such that a flexible joint exists within 12 inches of each side of

thrust block, unless indicated otherwise on the plans. Concrete shall not be allowed to set in contact with pipe surfaces or to enter or come in contact with any joint.

C. Valve Appurtenances: The Contractor shall furnish and install all valve appurtenances. Provide two galvanized T-handled operating wrenches, 4 feet total length or as required to easily access valve from grade.

D. Valve box body shall be per City of Oxnard Standard Construction Plates. The cover shall be marked “water.” The cover of each valve box shall be provided with a 2” diameter bronze disc and the Contractor shall stamp the valve number on the disc per the Architect’s instructions. The disc shall be mounted to the valve box cover or higher using stainless steel screws. The extension piece shall be 8” diameter SDR 35.

E. Appropriate warning detector tape shall be placed over all utilities.

1. Underground detectable warning tape shall be placed over all non-metallic underground utilities.

2. 12-gauge copper continuous location wire shall be placed on all water mains.

F. Corrosion-Protection Encasement for Piping

1. Encasement for Underground Metal Piping and Fittings: AWWA C105, Polyethylene film, 10 mil minimum thickness, tube or sheet. Plastic wrap shall be clear or black. Purple wrap shall not be used.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Maintenance records in accordance with NFPA 25.

B. Verify the existing water main sizes, class of pipes, and locations as indicated.

C. Verify piping system has been cleaned, inspected, and pressure tested.

D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to a minimum of 95 percent relative compaction.

C. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe. Jetting is not permitted to obtain required compaction.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Install access fittings to permit disinfection of water system.

D. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main in accordance with City of Oxnard Standard Plans & Specifications.

E. Protect metal restrained joint components against corrosion by applying a bituminous coating by coating with non-oxide corrosion resistant greased 10 mil plastic wrap.

F. Establish elevations of buried piping to ensure cover conforming to District Standards. The minimum cover from the finish grade to the top of pipe is 36 inches for potable and fire waterline, any shallower cover to clear with the existing utility crossings shall be reviewed and approved by the District's Representative.

G. Install 12-gauge copper continuous location wire over top of pipe.

H. Backfill trench in accordance with Specification Section 31 23 33.

I. Maintain separation of water main from sewer piping in accordance with the State Department of Health Services, Criteria for the Separation of Water Mains and Sanitary Sewers (Section 64630, Title 22 California Administrative Code), and State Regional Water Quality Control Board.

J. All pipe laid in trench, which is to be left for further extension (i.e., end of work day) shall have its open end covered to protect from possible rodent intrusion.

3.05 INSTALLATION - VALVES

A. Set valves on solid bearing per City of Oxnard Standard Plans & Specifications.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Install brass valve 1 ½" diameter tags and imprint valve number per District.

3.06 SERVICE CONNECTIONS

A. Install service connections in accordance with City of Oxnard Standard Construction Plates.

3.07 PRESSURE TEST OF WATER PIPING SYSTEM

A. Water piping system shall be pressure tested for 2 hours at 200 psi, with no allowable drop in water pressure.

B. All leakage tests shall be completed and approved prior to placing of permanent resurfacing.

C. Pressure test shall be witnessed by District's inspector.

3.08 DISINFECTION AND BACTERIA TESTING OF WATER PIPING SYSTEM

A. Water piping system shall be disinfected and flushed per AWWA Section C651.

B. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

D. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.09 TEST RECORDS

A. Records shall be in accordance with NFPA 13 & 24. Records shall be made of each piping system installation during the test. These records shall include:

1. Date of test.

2. Description and identification of piping tested.

3. Test fluid.

4. Test pressure.

5. Remarks to include such items as:

   a. Leaks (type, location).
   b. Repairs made on leaks.

6. Certification by Contractor and signed acknowledgment by the District's Representative.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

B. Perform pressure test on potable water distribution system in accordance with City of Oxnard Standard Plans & Specifications except that there is no allowable leakage for the duration of the test.

1. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

2. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

END OF SECTION

SECTION 33 30 00
SANITARY SEWERAGE UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Site sanitary sewerage piping, fittings, accessories and bedding.

B. Cleanouts.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction SSPWC (Green Book), latest edition.

B. ASTM Standards.

1.04 SUBMITTALS

A. Submit:

1. Product Data: Provide data indicating pipe, pipe accessories and appurtenances, and manhole covers.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Manufacturer’s Certificate: Certify that installers are certified for installing plastic pipe.

1.05 PROJECT RECORD DOCUMENTS

A. Submit Record Drawings: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

A. Conform to California Title 24 (CCR) Part 5, latest edition, for installation of the Work of this section.

B. Minimum separation distance and requirements between water, reclaimed water and sewer pipes per the State of California, Department of Health Services shall be established.

PART 2 – PRODUCTS

2.01 SEWER PIPE MATERIALS AND ACCESSORIES

A. Polyvinyl Chloride (PVC) Pipe for Gravity Sewer: ASTM 3034-SDR35 Ring-Tite Polyvinyl Chloride (PVC) gravity sewer pipe and fittings; inside nominal diameter as indicated on Drawings. PVC pipe shall use “locked-in” rubber sealing ring conforming to ASTM D-3212. Joints using flexible Elastomeric Seals. Minimum pipe stiffness at 5% deflection shall be 46 psi for all sizes when tested in accordance with ASTM Method of Test D2412.

2.02 CLEANOUTS

A. Form and cast-in-place, Class 618-CLE-4000 P concrete base pad, with provisions for sewer pipe end section.

B. Frame and cover shall be Christy G3 or equal, lettered “sewer”.

2.03 BEDDING MATERIALS

A. Refer to Specification Section 31 23 33 Trenching and Backfilling for Bedding Material.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that trench cut and/or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with granular fill.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated on drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth, compact to minimum of 95 percent of maximum dry density.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings and accessories in accordance with manufacturer's instructions.

B. Sewer pipeline shall be placed from downstream to upstream beginning at the downstream connection to the existing sewers.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install bedding along sides and over top of pipe to minimum compacted thickness of 12 inches; compacted to a minimum of 95 percent of maximum dry density.

E. Refer to Specification Section 31 23 33 for Trenching Requirements. Do not displace or damage pipe when compacting.

F. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe.

3.05 INSTALLATION – CLEANOUTS

A. From bottom of excavation clean and smooth to correct elevation.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

C. Mount lid and frame level in grout, secured to cone section to elevation indicated on drawings.

3.06 FIELD QUALITY CONTROL

A. Preliminary Tests: The Contractor may perform any tests desired which are not harmful to the lines before backfilling is completed.

B. Cleaning: Before final tests are performed for acceptance of any sewer pipe, clean the pipe by inflatable rubber ball method.

C. Perform air pressure test per SSPWC Section 501-6.4.

D. Repairs, if necessary: If the leakage or infiltration is greater than the amount specified, the pipe shall be overhauled and re-laid if necessary, by the Contractor, at its own expense, until the joints will hold satisfactorily.

E. Regardless of the results of the above tests, any visible evidence of individual leaks shall be corrected by the Contractor to the satisfaction of the District's Representative.

F. Cleaning Sewer: After all backfilling, compaction testing and paving is completed, sewer lines shall be cleaned by Inflatable Rubber Ball Method, flushed and cleaned, before acceptance by the District's Representative and connection to their sewer system is made.

G. The Contractor shall furnish all sewer line plugs necessary for blocking off all lines as required by the District's Representative until final acceptance.

3.07 PROTECTION

A. Protect finished installation.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Storm drainage piping, fittings, accessories, and bedding.

B. Catch basins.

C. Manholes.

D. Inlet and outlet structures.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

1.04 SUBMITTALS

A. Submit the following in accordance with provisions in Division 1:

1. Product Data: Provide data indicating pipe, pipe accessories and catch basin grates.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Layout diagram for storm drain components per plan.

1.05 PROJECT RECORD DOCUMENTS

A. Submit record drawings. Accurately record locations of pipe runs, connections, catch basins, structures, manholes and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements and elevations are as indicated on drawings.

B. Complete pothole work per plans and notify the District of any discrepancy prior to commencing construction.

1.07 COORDINATION

A. Coordinate the work with connection to existing storm drain mains, and trenching.

PART 2 – PRODUCTS

2.01 PIPE MATERIALS

A. High Density Polyethylene (HDPE) with water tight joints, per SSPWC Section 207-18.

2.02 PIPE ACCESSORIES

A. Water tight joints per SSPWC Section 207-18.4.1.

B. Fittings per SSPWC Section 207-18.4.3.

2.03 CATCH BASINS AND MANHOLES

A. Precast catch basins shall include grate, as manufactured by Jensen Precast or approved equal.

2.04 METAL

A. All exposed metal parts are to be galvanized in accordance with SSPWC, Section 210-3.

2.05 CONCRETE

A. All concrete shall be Class 560-C-3250, per SSPWC Section 201.

2.06 BEDDING MATERIALS

A. Refer to Specification Section 31 23 33 Trenching and Backfilling for Bedding Material.

2.07 FILTER FABRIC

A. Filter fabric shall be non-woven geotextile filter fabric Mirafi 140N or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with compacted bedding material.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

B. Place bedding material in trench bottom, level materials in continuous layer. Bedding shall be 4" thickness for pipe diameters less than or equal to 24” and 6” thickness for pipe diameters greater than 24” and shall be per SSPWC Section 217-1.2.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions and per SSPWC Section 207.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

C. Install backfill along sides and over top of pipe. Provide backfill over top of pipe to minimum compacted thickness of 12 inches, compacted to a minimum of 95 percent of maximum dry density.

D. Refer to Specification Section 31 23 33 for Trenching Requirements. Do not displace or damage pipe when compacting.

E. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers or equal to protect the pipe.

3.05 INSTALLATION - CATCH BASINS, MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base with provisions for storm drainage pipe end sections.

C. Level top surface of concrete base to receive shaft sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

E. Compact top 12" of native materials below the bottom of catch basins and manholes to minimum 95 percent of maximum dry density.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District’s representative.

B. Request inspection prior to and immediately after placing backfill cover over pipe.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the District.

3.07 PROTECTION

A. Protect pipe and backfill cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 – GENERAL

1.01 SUMMARY

A. Aggregate base course for curbs, gutters, sidewalks, and fire access driveway.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 32 12 16 Asphalt Concrete Paving.

C. Section 32 16 00 Curbs, Gutters, Sidewalks, and Driveways.

1.03 REFERENCES

A. Standard Specifications for Public Works (SSPWC), latest edition.

B. ASTM Standards.

C. State Standard Specifications (SSS), Caltrans, latest edition.

D. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS:

A. Submit material samples and reports in accordance with requirements of District.

B. Submit samples in sufficient quantities for material testing.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material shall be Class 2 Aggregate Base conforming to SSS Section 26-1.02A. Aggregate Base shall have a minimum sand equivalence of 22 and a minimum R-value of 78 and shall be free of organic materials and other deleterious substances.

B. Aggregate Base materials used within building areas shall be free of asphaltic materials.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.02 AGGREGATE BASE PLACEMENT

A. Aggregate base placement shall conform to the provisions of the SSPWC, Section 301-2.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Where the required aggregate base thickness is 6 inches or less, the watered base may be spread and compacted in one layer. Where the required thickness is more than 6 inches, the aggregate base material shall be spread and compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

E. Aggregate base course shall be dense and unyielding upon proof-rolling with full water truck.

3.03 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch.

B. Scheduled Compacted Thickness shall conform to the provisions of the SSPWC Section 301-2.2.

3.04 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.
Compaction testing will be performed in accordance with ASTM D1557, latest edition.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at Contractor's expense.

END OF SECTION

SECTION 32 12 16
ASPHALT CONCRETE PAVING

PART 1 – GENERAL

1.01 SUMMARY

A. Asphaltic concrete paving for parking lots and driveway pavements.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 32 11 23 Aggregate Base Course.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

C. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

1.04 SUBMITTALS

A. Submit asphalt concrete mix design(s) for approval of the District Representative.

1.05 TESTING AND INSPECTION

A. Testing and inspection of asphalt pavement mix(es) and testing of placed stabilizing base course and asphalt pavement will be performed by the District's Testing Laboratory. Testing and inspection will be performed so as to minimize disruption of work.

B. Allow the District's Testing Laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphaltic concrete mix.

PART 2 – PRODUCTS

2.01 GENERAL

A. Provide the aggregate base, and bituminous surface conforming to the requirements of the Standard Specifications for Public Works Construction (SSPWC).

2.02 PAVING MATERIALS

A. Asphalt Concrete: Asphalt concrete material shall be C2-PG 64-10 per SSPWC Section 203-6. The grading and proportioning of aggregates shall be such that the combined mineral aggregate conforms to the specified requirements.

B. Asphalt Emulsion: SSPWC Section 203-3, Grade SS-1h.

C. Prime Coat: Grade SC-70 per SSPWC Section 203-2.

D. Aggregates for base course shall conform to requirements of Specification Section 32 11 23, Aggregate Base Course.

2.03 ASPHALT PAVEMENT MIX

A. Combine mineral constituents in proportions to produce a mixture conforming to requirements of the SSPWC Section 203-6.

B. Percentage by weight of asphalt cement in mixture shall be in accordance with SSPWC Section 203-6.

C. Maintain thorough and uniform mixture.

D. Bring asphalt and mineral constituents to required temperatures before mixing. Ensure aggregates are sufficiently dry so as not to cause foaming in mixture.

PART 3 – EXECUTION

3.01 GENERAL

A. Execute Work in accordance with SSPWC Section 302 and the Geotechnical Study.

3.02 PREPARATION

A. Ensure grading of subgrade to required elevation. Subgrade preparation shall be per SSPWC Section 301.

B. Before final rolling, shape entire section, add additional sub-soil if necessary, and compact subgrade to provide grades, elevation and cross-section indicated. Points of finished subgrade surface shall be within 0.04 foot of elevations indicated on the Drawings.

3.03 BASE COURSE

A. Place aggregate base in accordance with requirements of SSPWC Section 301 and to the thickness shown on the Drawings. Grade and compact in 6-inch layers to at least 95 percent of compaction (ASTM D1557).

3.04 MAINTENANCE

A. Maintain the base course until the asphaltic pavement is in place. Maintenance shall include drainage, rolling, shaping and water as necessary to maintain the course in proper condition. Maintain sufficient moisture at the surface to prevent a dusty condition. Areas of completed base course that are damaged shall be conditioned, reshaped and re-compacted in accordance with the requirements of the Specifications without additional cost to the District.

3.05 TACK COAT

A. Prior to the application of the asphalt concrete, a paint binder (tack coat) shall be applied to all surfaces of walkway, curbs, gutters, manholes and drainage structures which will be in contact with asphalt pavement per SSPWC Section 302-5.4.

B. Coat surfaces of catch basins which are to remain free of asphalt with oil, or provide equivalent protection, to prevent asphalt adhesion.

3.06 PRIME COAT

A. Prior to the application of the asphalt concrete, a prime coat shall be applied at a rate of 0.20 to 0.40 gallons per square yard.

3.07 ASPHALT CONCRETE

A. Requirements: The bituminous concrete shall consist of mineral aggregate, uniformly mixed with bituminous material in a central plant in accordance with SSPWC Section 203-6. The percentage of asphalt binder shall be in accordance with SSPWC Section 203-6. The mixing plant and construction equipment shall conform to the requirements of SSPWC Sections 203-6 and 302-5.

B. Placing: Deliver bituminous mixtures to the work site temperatures specified in SSPWC Section 302-5.5. Spread and place in accordance with SSPC Section 302-5.5. Asphalt surface shall be fog-sealed.

C. Compaction: Initial or breakdown rolling and the final rolling of the uppermost layer of the asphalt concrete shall be in accordance with SSPWC Section 302-5.6. Compaction by vehicular traffic shall not be permitted.

3.08 JOINING PAVEMENT

A. Carefully make joints between old and new pavements or between successive days work in such manner as to insure a continuous bond between old and new sections of the course in accordance with SSPWC Section 302.

B. Expose and clean edges of existing pavement. Cut edge to straight, vertical surfaces. Paint all joints with a uniform coat of tack coat before the fresh mixture is placed. Prepare joints in the new pavement in accordance with SSPWC Section 302-5.7.

3.09 JOINING NON-PAVED AREAS

A. Where paving will join landscape or other non-hardscape area a redwood header shall be installed.

3.10 TOLERANCES

A. Flatness: Maximum variation of 1/8 inch when measured with a 10-foot straight edge.

B. Variation from True Elevation: Within 1/4 inch.

3.11 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District’s Testing Laboratory.

B. Field inspection and testing will be performed by the District's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District Representative advance notice of paving scheduling. Sufficient “Advance Notice” shall be determined by the District Representative.

C. If tests indicate materials do not meet specified requirement, replace material and retest at no additional cost to the District.

D. Frequency of Test: As determined by the District’s Testing Laboratory.

3.12 PROTECTION

A. After placement, protect pavement from mechanical injury.

END OF SECTION

SECTION 32 16 00
CURBS, GUTTERS, SIDEWALKS

PART 1 – GENERAL

1.01 SUMMARY

A. Concrete for curbs, gutters, sidewalks.

1.02 RELATED SECTIONS

A. Section 31 20 00 – Earthwork

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Final Structural Paving Sections, Oxnard Union High School District Transportation Center, dated May 13, 2020, Project No. 303278-003, prepared by Earth Systems Pacific and shall be superseded by the most current version.

C. ASTM Standards.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on admixtures and curing compounds.

2. Concrete mix design(s).

3. Certificates from the batch plant.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with the SSPWC, latest edition; and ASTM Standards, latest edition.

B. Obtain cementitious materials from same source throughout.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet.

PART 2 – PRODUCTS

2.01 FORM MATERIALS

A. Form Materials: Section 303-5 of the SSPWC.

2.02 CONCRETE MATERIALS

A. Concrete Material for Curbs, Walk (Path of Travel), Pavement, and Cast-in-Place Catch Basin:

1. Class 560-C-3250 for cast-in-place catch basins, curbs, and gutters. Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.

2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

2.03 ACCESSORIES

A. Curing Compound shall conform to SSPWC Section 201-4. Pigmented compound shall not demonstrate any residual coloring of the concrete after one week.

2.04 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94.

B. Use accelerating admixtures in cold weather only when approved by the District's Representative. Use of admixtures will not relax cold weather placement requirements.

C. Use calcium chloride only when approved by the District 's Representative.

D. Use set retarding admixtures during hot weather only when approved by the District 's Representative.

2.05 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to SSPWC Section 201-2.

2.06 SOURCE QUALITY CONTROL

A. Provide certificates of compliance from the batch plant.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support imposed loads.

B. Verify gradients and elevations of subgrade are correct.

3.02 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete. Compact subgrade material to a depth of 12" beneath 4” of sand below concrete pavements to a minimum 90% of the maximum dry density. Refer to geotechnical report for site subgrade preparation recommendations.

B. Coat surfaces of catch basin frames with oil to prevent bond with concrete pavement.

C. Notify District’s Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with SSPWC Section 303-5.

B. Install ½" thick fiberboard expansion joint and snap cap. Seal with Sikaflex self-leveling sealant after removal of snap cap (typical).

C. Construct weakened plane joints conforming to SSPWC Section 303-5.4.3, one inch deep, at intervals not exceeding 10 feet.

D. The top edges of curbs shall have 0.5" radius.

3.05 FINISHING

A. Concrete finishes shall be per SSPWC Section 303-5.5.

B. Portland cement concrete paving shall have a medium salted finish for slopes less than 6%, and slip-resistant at slopes of 6% or greater.

C. Walkway grades in excess of 5% shall conform to requirements of Section 11B-401 of the latest edition of the California Building Code.

D. Place curing compound in accordance with SSPWC Section 303-5.6 on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.

B. District 's Testing Laboratory will perform slump and compressive strength tests.

C. Contractor shall maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.07 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, vandalism and mechanical injury.

B. It is the Contractor's responsibility to replace all concrete work subject to vandalism and graffiti at no extra cost to the District.

END OF SECTION

SECTION 32 80 00
LANDSCAPE IRRIGATION

PART 1 – GENERAL

1.01. SCOPE

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

B. Includes furnishing all labor, materials, tools and equipment required to provide and install the irrigation system specified herein and required to complete the work per the Plans.

C. Related work:

1. Section 32 90 00 – Landscape Planting;
2. Section 32 92 19 – Hydroseeding.

1.02. REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with all local and state codes, ordinances, safety orders, and regulations of all legally constituted authorities having jurisdiction over this work.

B. Obtain and pay for all necessary permits and all inspections required by authorities stated above.

C. Notify the Landscape Architect in the event any equipment or methods indicated on the Drawings or in the specifications conflict with local codes, prior to installation. In the event this notification is not performed, the Contractor must assume full responsibility for revisions necessary.

1.03. PROTECTION

A. Contractor shall call ***DIG ALERT,*** ((1) (800) 642-2444), a minimum of 48 hours prior to any excavation.

B. Contractor shall check for located existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of this operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the Landscape Architect for necessary action or decisions before resuming operations. Contractor shall be responsible for repair or replacement, at no cost to Owner, for features or condition damaged through failure to comply with above procedures.

1.04. SUBMITTALS

A. Record Drawings; Maintain information daily. Keep updated drawings onsite at all times for review by the School District Representative(s).

1. The Contractor shall maintain on a daily basis a complete and accurate set of record drawings. These drawings must be kept up-to-date at all times with the progress of the work. The District shall furnish a set of drawings on which to record changed conditions.

2. The Contractor shall indicate clearly all work installed differently from that shown on the contract drawings. By dimensioning from two permanent points of reference (building corner, sidewalk or road intersections), show connection to existing water lines, connection to existing electrical power, gate valves, pressure supply pipe, control valves, control wiring, automatic controller, quick coupler valves, sleeve locations, and other related equipment as directed by the District's representative.

3. Use appropriate eradication methods for removing original lines and dimensions where changes are made. Completed drawings shall be equal to the original drawings. Mark record set(s) with red erasable pencil.

4. Submit 14 days prior to final inspection, one set of marked-up Contract drawings.

5. After approval, the Contractor shall obtain one (1) set of the contract drawings from the Landscape Architect, and all changes as noted on the redlined set shall be drawn on the record set with waterproof ink. The Contractor shall sign the drawings as complete and accurate records of as-built work. This set of drawings shall be delivered to the Landscape Architect for final approval, after which the Contractor shall make copies for the District, Landscape Architect, and other applicable parties.

B. Controller Charts

1. Record drawings shall be approved by the Landscape Architect before charts are prepared.

2. Provide one controller chart for each controller supplied.

3. The chart shall show each area controlled by automatic controller and shall be 8-1/2" x 11" size.

4. The chart is to be a reduced drawing of the actual constructed system. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable. This may involve providing more than one chart.

5. The chart will be a blackline print and a different color shall be used to show area of coverage for each station.

6. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum of 20 mils thick.

7. These charts shall be completed and approved prior to final inspection of the irrigation system.

C. Checklist

1. Provide a signed and dated checklist and deliver to the School District's Representative prior to final review of the work. Use the following format.

    a. Confirmation of service pressure: psi., by whom and date.
    b. Plumbing permits: if none required, so note.

c. Materials furnished: received by and date.
d. Material approvals: approved by and date
e. Pressure line tests: by whom and date
f. Record drawings: received by and date
g. Controller charts: received by and date
h. Operations and maintenance manuals: received by and date
i. System and equipment operation instructions: received by and date
j. Manufacturer's warranties, if required: received by and date
k. Written guarantee: received by and date

D. Manufacturers Catalogs

1. Submit for approval, manufacturers catalogs on all material to be used on the project. These catalogs are to be submitted 30 days prior to the start of any work.

E. Additional Submittals

1. For any submittals which necessitate additional research on the part of the Landscape Architect, to prove the product is acceptable, the Contractor will be charged on an hourly basis for this additional work.

F. Approvals and Rejections

1. Equipment or materials furnished or installed without prior approval of the Owner's representative may be rejected and the Contractor required to remove and replace such materials from the site at no cost to the District.

1.05. DRAWINGS

A. For purposes of legibility, sprinkler lines are essentially diagrammatic. Although size and location of irrigation equipment are drawn to scale wherever possible, the Contractor shall make use of all data in all of the contract documents and verify this information at construction site.

B. Interpretations: Drawings and specifications are intended to be fully cooperative and to agree. However, if the Contractor observes that the drawings and specifications are in conflict, he shall promptly notify the Landscape Architect in writing (prior to bidding and/or construction). The specification calling for any higher quality material or workmanship shall prevail. Questions regarding interpretation of drawings and specifications shall be clarified by the Landscape Architect.

1.06. PERFORMANCE REQUIREMENTS

A. Unless otherwise provided, irrigation system layout shown on the plan shall be considered schematic. With the Landscape Architect's approval, the Contractor may make adjustments where necessary to conform to actual field conditions. The irrigation system shall be operational, with uniform and adequate coverage of areas to be irrigated, prior to planting.

1. Utility connections shall be as shown on the plan or designated by the utility company. The Contractor shall include in his bid all costs for such

utility connections shown on the plans or designated by the utility company.

B. Water Supply

1. The sources of water supply shall be as indicated on the drawings as P.O.C., "Point of Connection".

C. Contractor Responsibility

1. The Contractor shall ensure full coverage of the irrigation system and shall make all approved modifications necessary to accomplish full coverage.

2. Contractor shall not willfully install the plumbing or sprinkler system as indicated on the drawings when it is obvious in the field that there are obstructions, grade difference and/or discrepancies in area dimensions until such conditions are brought to the attention of the Landscape Architect.

1.07. PRE-CONSTRUCTION CONFERENCE

A. The Contractor shall schedule with the Landscape Architect and Owners Representative a pre-construction conference at least seven (7) days before beginning work under this section. Purpose of this conference will be:

1. Review Contractor's questions regarding this project.
2. Review administrative and inspection procedures that will occur during construction.
3. Review Contractor's work schedule for this project.
4. Verification of Contractor's C-27 License, Bonding and Insurance.

PART 2 – PRODUCTS

2.01. GENERAL

A. All irrigation equipment: shall be new and unused prior to installation; and shall conform to the Irrigation Plan, Legend and Specifications.

B. Irrigation equipment, which has been damaged in any way, shall be replaced by the Contractor at no additional cost to the District. If equipment has already been installed, it shall be removed and replaced by the Contractor at no additional cost to District.

2.02. PLASTIC PIPE AND FITTINGS

A. Plastic Pipe

Shall be rigid, high impact, Type I, unplasticized polyvinyl chloride (PVC) extruded from virgin parent material Geon 8700A or Geon 8714. Contractor shall furnish for each shipment delivered, a statement from the manufacturer certifying use of virgin material only. The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign materials, blisters, deleterious wrinkles or dents and shall conform to the following dimensions and physical properties:

1. All plastic pipe shall be continuously and permanently marked with the manufacturer's name, kind of pipe, material size, IPS NFS approval, schedule and type, and date of extrusion.

2. Plastic pipe shall be as manufactured by Lasco, Celanese, Pacific Western, John Manville, Brownline, Inc. or approved equal.

B. Main Line

1. Piping shall be PVC Class 315, and shall conform to ASTM D-2241.

C. Lateral Lines

1. Piping under intermittent pressure shall be PVC Sch.40, and shall conform to ASTM D-1785.

D. Fittings and Connections

1. Plastic PVC fittings shall be standard weight Schedule 40 to meet ASTM D2466-73 and D2467-73.

2. All threaded fittings shall be standard weight Schedule 80 to meet ASTM 80 D2466-73 and D2467-73.

2.03. WATER METERS

A. Shall be installed by others at District's expense.

2.04. BACKFLOW PREVENTION

A. Anti-siphon valves as designated on the plan and details.

2.05. SLEEVE MATERIAL

A. For water lines: PVC Schedule 40 (minimum 2 times line diameter).

2.06. AUTOMATIC CONTROLLER

A. Automatic controller shall be of the size and type shown on the plans (battery).

1. The final hookup of any/all low-voltage control wires installed shall be the responsibility of the Landscape Contractor.

2.07. CONTROL WIRING

A. Connections between the automatic controllers and the electric control valves shall be made with direct burial wire AWG - U.F. No.14-600 volt (No.12-600v. where specified on the plans). Install in accordance with valve manufacturer's specifications.

1. Waterproof dry-splice connectors shall be 3M #DBY-054007-09053 or approved equal.

2.08. TRACER WIRES

A. No.12 Green Type TW plastic-coated copper tracer wire shall be installed with non-metallic mainlines.

2.09. ELECTRIC CONTROL VALVES

A. All electric control valves shall be as noted on plans and installed per details and manufacturer's specifications. Locate all valves in shrub areas unless otherwise noted.

2.10 BALL VALVES

B. Ball and gate valves shall be as indicated on the drawings and installed per the details and manufacturers recommendations.

2.11 PRESSURE REGULATION

C. Pressure regulator shall be as designated on the drawings with output psi as specified.

2.12 SWING CHECK VALVES

D. Swing check valves shall be made of high-impact Sch.40 PVC Type II with reinforced poppet. Install per manufacturer's recommendations.

2.13 SPRING CHECK VALVES

E. Mainline and lateral line spring check valves shall be made of high-impact Sch.40 PVC Type II with reinforced poppet (1/4 lb. spring).

2.14 SOLVENT CEMENT

F. Solvent cement used for bonding rigid PVC pipe and fittings up to 12" size shall be Weld-On #711 as manufactured by IPS Corporation or an approved equal. Primer for Weld-On #711 shall be Weld-On P-70 as manufactured by IPS Corporation or an approved equal.

2.15 MATERIALS TO BE FURNISHED

G. Prior to final inspection furnish the following materials to the District:

1. As-built drawings;
2. Controller colored sectioning chart.

PART 3 – EXECUTION

3.01. SITE CONDITIONS

A. Before starting work on the irrigation system, carefully check all dimensions and grades to determine that work may safely proceed, keeping within the specified material depths.

B. Do not willfully install the irrigation system as indicated on the drawings when it is obvious in the field that unknown obstructions or grade

differences exist, that might not have been considered in the engineering. Such obstructions or differences shall be immediately brought to the attention of the Landscape Architect.

C. The installation of all irrigation materials, including pipe shall be coordinated with the landscape drawings to avoid interfering with the trees, shrubs, or other plantings.

D. Layout system and make minor adjustments required due to differences between site and drawings. Any such deviations in layout shall be within the intent of the original drawings, and without additional cost to the Owner. When directed by the Landscape Architect, the layout shall be approved before installation.

E. Manufacturer's requirements for installation of products shall apply when;

1. No other direction is given;
2. It is a more stringent requirement than the Standard Specifications and these special provisions.

F. The Contractor shall preserve and protect all pipes that are not to be removed.

G. Work Space:

1. The Contractor shall erect fences and/or retain guards as required for the protection of the public and construction materials, and maintain same in good repair until the completion of the work under the contract.

H. Drawings of Record

1. Keep record drawings on site daily for observation by the School District Representative. All dimensions shall be taken and recorded prior to backfill. On the date of the final observation, deliver corrected drawings to the School District Representative. Final drawings shall be prepared by the Contractor on prints obtained from the School District's Representative, showing all field notes in India ink and finalized by a competent draftsperson. Delivery of prints does not relieve the Contractor of responsibility for providing any information that may have been omitted from the prints.

3.02. PIPE AND CONTROL WIRE INSTALLATION

A. Trenching

1. Dig trenches straight and support pipe continuously on bottom of ditch. Shade pipe in trench to an even grade. Trenching excavation shall follow layout indicated on drawings and as noted. Where lines occur under paved areas, these dimensions shall be considered below subgrade.

2. Provide minimum cover of 18 inches from top of pipe to finish grade for all pressure supply lines.

3. Provide minimum cover of 12 inches from top of pipe to finish grade for all non-pressure lines.

4. All lines under driveway and roadway pavement shall have a 24-inch minimum cover.

B. Cutting and Patching

1. If cutting or breaking of any paving is necessary, it shall be done and replaced with like materials, at the Contractor's expense. Paving work shall match the original work in every respect, including type, strength, texture and finish. Obtain approval from the School District's Representative prior to any cutting and/or breaking. Hydraulic driving will not be permitted under asphalt paving. All sleeves set in place under paving shall extend 18" minimum beyond such paving and be capped hand tight. No fittings, including couplings, will be permitted under surfaces to be paved except where length of the line under the paving exceeds 20-feet and/or where the lines are encased in sleeves.

2. In new paved areas, coordinate installation of piping and wires under paving with the General Contractor.

C. Backfilling

1. Backfill shall not be placed until the installed irrigation system has been inspected, tested, and approved by the Landscape Architect and Project Inspector. Trenches shall be backfilled promptly after the open trench inspection.

2. Backfill for trenching consisting of earth, loam, sandy clay, or other approved materials shall be compacted to a dry density equal to the adjacent undisturbed soil, and shall conform to the adjacent grades without dips, sunken areas, humps or other irregularities. Initial backfill on all lines (bottom 6") shall be of a fine granular material with no foreign matter larger than 1/2 inch size.

3. Irrigation lines under paving shall be backfilled with a 3" sand layer below the pipe and a 3" layer above, compacted in layers to 95% relative density, using mechanical tamping devices only. The remaining backfill shall be per Section 02200 and the Geotechnical Engineer's recommendations. Compact trenches equal to the compaction of the existing adjacent undisturbed soil and leave in a firm unyielding condition. Leave trenches flush with the adjoining grade.

D. Water Supply

1. Connections to existing outlets shall be at the approximate location (s) shown on the drawings and indicated by P.O.C. "Point of Connection".

E. Pipe Fittings and Controls

1. Plastic to Plastic Fittings

a. All plastic threaded pipe and fittings shall be assembled using Teflon tape or equivalent, applied to the male threads only.

b. All plastic slip fittings shall be solvent welded as per pipe manufacturer's recommendations. Thoroughly clean PVC pipe and fittings of dirt, dust, and moisture prior to gluing.

c. Slip-fix and/or compression fittings shall not be used to repair line breaks.

2. Plastic to Steel Fittings

a. Male thread plastic into female thread steel shall be used.

b. Work the steel connection first. A non-hardening pipe dope shall be used on threaded plastic-to-metal joints.

F. Line Clearance

1. All lines shall have a minimum clearance of 3 inches from each other, and 12 inches from lines of other trades. Parallel lines shall not be installed directly over one another.

G. Control Wires

1. Splices shall be made with 3M waterproof connectors or equal.

2. Tracer wire shall be placed on the bottom of the trench, under the mainline pipe. Wire shall be continuous length throughout the length of the pipe.

H. Thrust Blocks

1. All lines equal to or larger than 1-1/2" shall receive concrete thrust blocks at all corners, tees, elbows, and end caps. Use a minimum of 1/2 c.f. of concrete per diameter inch of pipe (i.e. 2” pipe = 1 c.f. concrete). Do not encase pipe or fittings!

I. Sleeving

1. All lines under paving (concrete and asphalt) shall be sleeved. Sleeves shall be installed in straight runs from planter to planter. Install (pre-pipe) lines in sleeves for future connections at the time of sleeving installation. Sleeves and lines shall extend a minimum of 12” beyond any existing and/or future hardscape.

J. Flushing the System

1. After new irrigation pipe lines and risers are in place and connected, all necessary division work has been completed, the control valves shall be opened and a full head of water used to flush out the system.

3.03. ELECTRIC CONTROL VALVES

A. Install as indicated on the drawings.

3.04. ADJUSTING OF SYSTEM

A. Adjust the control valve to obtain the design rated pressure for the system installed.

B. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, make necessary changes without additional cost to Owner, prior to planting.

C. The entire system shall be operating properly before any planting operations commence.

3.05. EXISTING TREES

A. Where it is necessary to excavate adjacent to existing trees, use all care possible to avoid injury to trees and tree roots. Where root diameter exceeds 2 inches, excavate by hand. Tunnel under roots 2 inches and larger in diameter (wrap root with wet burlap to prevent excessive drying while the trench is open). Where a ditching machine is run close to trees having roots smaller than 2 inches in diameter, hand-trim the wall of the trench adjacent to the tree, making clean cuts through. Paint roots 1 inch and larger in diameter with 2 coats of Tree Seal, or equal. Close trenches adjacent to tree within 24 hours; and where that is not possible, shade the side of the trench adjacent to the tree with burlap or canvas.

3.06. INSPECTION AND TESTING

A. General

1. In no event cover up any work prior to approval of the Landscape Architect. Any work covered prior to inspection shall be opened to view by the Contractor at his expense. Re-examination of questionable work may be ordered by Landscape Architect, and if so ordered, any work must be uncovered by Contractor. If the work is not in accordance with the drawings and specifications, Contractor shall pay the costs of re-examination and replacement.

2. When observations have been conducted by other than the Landscape Architect, submit documentation showing when and by whom these observations were made.

3. No site inspections shall occur without updated record drawings.

4. All observations called for by the Contractor shall be requested in writing at least seven (7) days prior to the anticipated observation.

5. Contractor shall provide “walkie-talkie” equipment and/or personnel to maintain communication from the review area to the automatic controller(s).

6. In the event the Contractor has scheduled an inspection, and the specified work is not completed or deficient, the Contractor shall pay all costs involved for re-examination.

B. Pressure Testing - All mainlines; (and lateral lines under paving)

1. As soon as lines are connected and flushed-out (and prior to attaching valves), cap all outlets and hydrostatically test at 150 psi for a continuous twenty-four (24) hour period, at the end of which the lines and joints shall be inspected by the Landscape Architect and Project Inspector (locate pressure gauge at the center of mainline system and shut off water point of connection). The Contractor shall furnish all pumping and test equipment. If leaks develop, the pipe and/or joints shall be replaced and the tests repeated in the presence of the Project Inspector until all leaks are repaired (allowable 5-psi drop in 24-hour period. Pressure must stabilize at max. 5-psi drop).

C. Operation Testing

1. Prior to planting, the entire irrigation system shall be placed in automatic operation and tested in the presence of the Landscape Architect for proper functioning and coverage. If it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage, make necessary changes without additional cost to Owner, prior to planting.

3.07. CLEAN UP AND REPAIR

A. Upon completion of the work, make the surface level, remove excess materials, rubbish debris, and remove construction and installation equipment from the premises.

B. Replace and/or repair to the satisfaction of Landscape Architect existing paving disturbed during the course of work. New paving shall be the same type, texture, finish and be equal in every way to the material removed.

3.08. PRE-MAINTENANCE ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work. Upon pre-maintenance acceptance, the Landscape Architect will give written notification to commence 90-day maintenance period.

3.09. MAINTENANCE

A. The entire irrigation system shall be maintained for a period of 90-days following the date of pre-maintenance acceptance of the work. System shall be in good working order at the end of the maintenance period.

B. Landscape Contractor shall be responsible for any and all damage and/or vandalism to the irrigation system, which may occur during the maintenance period or the course of work (regardless of fault). Make all repairs and provide all replacement materials and labor to the satisfaction of the Owner.

3.10 FINAL ACCEPTANCE

C. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work (including maintenance). Upon final acceptance and written notification, the Owner will assume responsibility for maintenance of the work.

3.11 GUARANTEE

D. The entire irrigation system shall be guaranteed by the Contractor as to materials and workmanship, including settling of backfilled areas for a period of one (1) year following the date of final acceptance of the work. Guarantee shall also cover damage to any part of the premises resulting from leaks or other defects in, materials, equipment, and workmanship to the satisfaction of the District.

E. A guarantee form shall be re-typed in the following onto the Contractor’s letterhead and contain the following information:

“GUARANTEE FOR THE IRRIGATION SYSTEM”

We hereby guarantee that the irrigation system we have furnished and installed is free and clear from defects in materials and workmanship, and the work has been completed in accordance with the Drawings and Specifications. We agree to repair and/or replace all defects in material or workmanship which may develop during the period of one-year of acceptance and also to repair and/or replace all damages resulting from the repair of such defects at no additional cost to the School District, after receipt of written notice. In the event of our failure to make repairs or replacements within a reasonable amount of time after receipt of written notice, we authorize the School district to proceed to have said repairs and/or replacements made at our expense, and we will pay the costs and charges therefore upon demand.

Project: _____
Location: _____
Contractor/Company:___ License Number:
_____ Address:
_____ Office Phone:
_____ Cell Phone:
_____ FAX:
_____
E-mail: _____
Date of Final: _____

Acceptance: _____

Signed: _____ Date: _____

END OF SECTION

SECTION 32 90 00
LANDSCAPE PLANTING

PART 1 – GENERAL

1.01. SUMMARY

A. Provide all labor, materials, equipment and services to complete the finish grading, planting, maintenance of planting and related items, as indicated on the drawings and specified herein, providing landscaping with plants in vigorous growth condition, ready for the Owner's use.

B. Related work specified elsewhere includes but may not be limited to:

1. Section 32 80 00 - Landscape Irrigation;
2. Section 32 92 19 - Hydroseeding.

1.02. SUBMITTALS

A. Furnish original material invoices and original truck delivery tickets indicating the quantities of fertilizers and soil amendments delivered to the job site. Material invoices must be approved by the Landscape Architect prior to installation. Photocopies will not be accepted and the Landscape Architect must be on site to verify all deliveries.

B. Furnish material invoices or documentation to the Landscape Architect at least 30 days prior to start of work indicating that all plant material has been ordered.

C. Soil Fertility and Agricultural (Horticultural) Suitability Analysis:(Shall be done at least 120 days prior to planting and or amending the soil.)

1. After completion of rough grading and prior to soil preparation, the Contractor shall obtain agronomic soils tests for planting areas. A minimum of two (2) samples of planting areas shall be required. Tests shall be performed by an approved agronomic soils testing laboratory and shall include a complete soil suitability analysis with written recommendations for soil amendment, fertilizer and chemical conditioner, application rates for soil preparation, and post-maintenance fertilizer program.

2. The soils report recommendations shall take precedence over the minimum soil amendment and fertilizer application rates, as specified, when they exceed the specified minimums. Additional materials required by the soils report shall be paid for by Change Order, upon approval by district. Contractor must have written authorization and approval prior to making any changes to the soil amendments.

3. Submit the name, address, and phone number of the consulting soil testing laboratory for approval by the Landscape Architect prior to obtaining services.

1.03. PROTECTION

A. Contractor shall check for location of cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of his/her operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the Landscape Architect for necessary action or decisions before resuming operation. Contractor shall be responsible for repair or replacement, at no cost to the Owner, for features or conditions

damaged through failure to comply with above procedures.

1.04. ALTERNATES

A. Alternates will not be permitted unless authorized by the Landscape Architect at least 30 days prior to start of work. The Landscape Architect will assist the Contractor in the selection of the nearest equivalent size and variety of plant.

1.05. DRAWINGS

A. Interpretations: Drawings and specifications are intended to be fully cooperative and to agree. However, if the Contractor observes that the drawings and specifications are in conflict, (s)he shall promptly notify the Landscape Architect in writing (prior to bidding and/or construction). The specification calling for any higher quality material or workmanship shall prevail. Questions regarding interpretation of drawings and specifications shall be clarified by the Landscape Architect.

1.06. INSPECTIONS

A. The Contractor shall notify the Landscape Architect 24 hours in advance of all soil preparation, planting and maintenance inspections.

B. The Contractor shall schedule with the Landscape Architect a preconstruction conference at least 7 days before beginning work under this section. The purpose of this conference will include:

1. Review of Contractor's questions regarding this project;
2. Review administrative and inspection procedures that will occur during construction;
3. Review the Contractor's work schedule for this project;
4. Verification of Contractor's C-27 License, Bonding and Insurance.

C. Fine Grading and Soil Preparation

1. Furnish certificates for soil amendments at this time (per Section 1.2);
2. The fine grading and soil preparation of all planted areas must be approved prior to installation of plant material.

D. Plant Material

1. Plant material quality will be inspected prior to planting. Plants that are found to be rootbound, of insufficient size, or of irregular shape may be rejected by the Landscape Architect. Rejected plants will be replaced at no extra expense to the Owner.

2. The Contractor will field locate container stock before planting. The Landscape Architect will then be allowed to adjust the locations of any plant materials prior to installation.

E. Pre-Maintenance Inspection

1. The pre-maintenance inspection will occur after all work has been completed as indicated on the drawings and in the specifications. If approved, this will be the starting date of the 90-day maintenance period.

F. Final Inspection

1. The final inspection will occur after the 90-day maintenance period and all work is completed. If approved, this will be the date of final acceptance.

1.07. GUARANTEE AND REPLACEMENT

A. All 1 gallon plants shall be guaranteed for six (6) months from date of final acceptance.

B. The Contractor shall replace all dead plants and all plants not in a vigorous, thriving condition as determined by the Landscape Architect during and at the end of the guarantee period. Replacement plants shall be of the same quality as the original specified plants.

C. Landscape Contractor shall be responsible for any and all damage and/or vandalism to planting which may occur during the maintenance period or the course of work (regardless of fault). Make all repairs and provide all replacement materials and labor to the satisfaction of the Owner.

PART 2 – MATERIALS

2.01. PLANT MATERIAL

A. Plants shall be grown in nurseries inspected by the State Department of Agriculture. Plants shall be grown in accordance with good horticultural practices under climatic conditions similar to those of the project.

B. Plants shall be fresh, well-established, vigorous, of normal habit of growth, free of disease, insects, insect eggs and larvae. Plants shall be healthy, with a normal root system, well filling their containers, but not to the point of being rootbound.

C. The size of plants shall conform to the plan or the plant list. Oversized plants may be used at no additional cost to the Owner. Plants shall be well rooted in their containers. Rootbound plants and plants with poorly formed root systems, as a result of a recent shift in container size, will not be accepted.

2.02. TOPSOIL (IF REQUIRED FOR IMPORT)

A. Topsoil shall be fertile, friable, sandy loam free from weeds and seeds per USDA 7th approximation classification method. Acceptable soil from the site may be used. Should topsoil be imported, an agricultural suitability test shall be conducted by an approved soils laboratory and results submitted to the Landscape Architect for approval prior to delivery to job site.

B. Identify source location, percentages of silt, clay, sand, organic matter, pH, mineral and plant nutrient content of soil. Particle size shall fall within the following desired range:

Clay and silt, 20% - 50%; fine sand, 30% - 40%; coarse sand, 5% - 20%; gravel (maximum aggregate size 3/4"), 0% - 8%; decomposed organic matter, 2% - 50%. All sandy loam must pass through a one-inch sieve. The sand fraction shall have 85% falling within the medium to fine sand range. Soils unsuitable for planting shall be rejected.

C. Provide soils analysis expressed in parts per million including the following:

Organic content; nitrogen; phosphorous; potassium; magnesium; calcium; sodium; sulfur; zinc; manganese; copper; iron; boron; pH; ammonium; sodium absorption rate (SAR); ECe; and USDA particle size.

D. Suitability of soil and chemical deficiencies will be determined by Landscape Architect (Landscape Architect may submit a list of what additives should be installed to correct these problems). Soils deemed unsuitable for planting shall be rejected.

2.03. SOIL AMENDMENT

A. Pre-plant fertilizer shall consist of Gro-Power Plus 5-3-1 Humus Base Fertilizer & Soil Conditioner. Retain all bags for inspection by Landscape Architect prior to disposal.

B. Shrub fertilizer shall consist of Best “Best-Paks” 20-10-5 fertilizer packets, used with the backfill of every plant as follows:

1. 1 gallon - 1 packet.

C. Organic amendment shall consist of nitrolized redwood sawdust. Submit sample and analysis to Landscape Architect for approval prior to delivery to site.

1. Nitrogen stabilized: .4 - .6% N (dry weight for redwood sawdust), .56 - .84% N (dry weight for fir or cedar), .8 - 1.2% N (dry weight for fir or pine).
2. Particle size: 95 - 100% passing 6.35mm standard sieve, 80 - 100% passing 2.33mm standard sieve.
3. Salinity: Saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees centigrade.

D. Gypsum shall be granular calcium sulfate (clay soil only).

2.04. MIXES

A. Backfill mix for each plant shall consist of 6 parts native soil (or approved imported soil), 4 parts nitrolized organic amendment, Gro-Power Plus 5-3-1 fertilizer (18 lbs./c.y. fill), Agricultural Gypsum (15 lbs./c.y. fill) if clay soil, and “Best-Paks” fertilizer packets as noted.

2.05. MULCH

A. Shrub Area Mulch: Redwood or fir bark (shredded “walk-on” variety), 3” deep, ¼" to ½” diameter, free of sticks, dirt, dust or other debris (keep 2” minimum from trunk of plant).

2.06. HERBICIDE

A. Post-emergence (existing weeds): "Roundup" or equal/approved.

B. Pre-emergence (non turf areas, prior to seed germination): "Ronstar" or equal/approved.

PART 3 – EXECUTION

3.01. SOIL PREPARATION

A. Remove from all planted areas rocks over 1-inch diameter, sticks and other debris, weeds and foreign growth of any kind.

B. Contractor shall chemically eradicate all germinated weed seeds. (See Section 2.6 Herbicide A. Post-emergence.)

C. To all planting areas apply the following per 1000 s.f. and till into the top 6" of soil:

1. 200 lbs. Gro-Power Plus 5-3-1 Fertilizer;
2. 3 cubic yards of organic amendment;
3. 200 lbs. Gypsum (clay soil only).

3.02. FINISH (FINE) GRADING

A. No plant materials shall be installed until all operations in conjunction with the installation of the irrigation system have been completed, finish grades have been established and planting areas have been properly prepared and graded.

B. Finish grading operations shall include establishment and/or re-establishment of all surface drainage patterns, as indicated on the grading and drainage plans. All areas shall have a uniform gradient, with no abrupt changes and/or undulations. All low-spots shall be filled to establish positive drainage to appropriate drainage facilities.

C. Finish grade includes, but is not limited to, the removal of all foreign material of any kind, 1” and larger, within the top 6” of the soil surface.

D. Establish finish grade for planting areas 3” below header board, edging, and/or adjacent pavement in areas to receive minimum 3” layer of mulch.

E. All finish grades shall be completed and accepted by the Landscape Architect prior to any planting and sodding operations.

3.03. PLANTING - SHRUBS

A. Shrubs shall be set in the field in locations shown on the drawings. All planting locations shall be approved or adjusted as necessary by the Landscape Architect before planting holes are excavated.

B. Shrub planting shall comply with details on the plan.

C. Excavate pits of circular outline with vertical sides for all plants. Scarify sides and bottoms of all plant pits.

D. After removing plant from container, make several 1" deep vertical cuts along the root ball to scarify it to prevent root bound conditions. Protect roots or balls of plants at all times from sun and drying winds.

E. Use backfill mix to backfill plant pits (thoroughly mix prior to use). Set plants plumb and brace rigidly in position until planting soil has been tamped solidly around the ball and roots. When plant pits have been backfilled approximately 2/3 full, water thoroughly, saturating rootball, before installing remainder of the planting soil to top of pit, eliminating all air pockets.

F. Place “Best-Paks” fertilizer packets evenly distributed in plant pits when backfilled 2/3 according to the schedule specified.

G. Form water wells around shrub pits according to details on plans.

H. Mulch all water wells with a 3" layer of specified mulch.

3.04. WEED CONTROL

A. Keep all planting areas, free from weeds at all times. Contractor shall be responsible for weed control throughout the installation period and prior to the pre-maintenance acceptance.

B. After planting is completed, a pre-emergence herbicide shall be applied to all shrub areas. Water to a depth of ¼". Do not apply to seeded areas.

3.05. RODENT CONTROL

A. Control rodents in all planting and turf areas throughout the installation and maintenance periods.

B. The contractor shall be fully licensed for the applicable work performed. When rodenticides are deemed essential for adequate management, the contractor shall obtain approval from the District representative prior to making any treatment. As a general rule, rodenticide application outside buildings shall emphasize the direct treatment of rodent nesting sites and burrows wherever feasible. In all other applications, bait formulations of rodenticides, regardless of packaging, shall be placed in EPA-approved tamper-resistant bait boxes.

C. Outdoor use of bait boxes: All bait boxes shall be placed out of general view where they will not be disturbed by school operations. The lids of the boxes shall be securely locked or fastened shut. All bait boxes shall be attached or anchored to the ground, building wall or other immovable surface so that the box cannot be picked up or moved. All bait boxes shall be labeled on the inside with the Contractor’s business name and address. The Contractor’s employee shall date the outside of the box at the time of installation and after each service.

D. Whenever it is determined that a rodenticide is necessary, the least hazardous effective rodenticide shall be used.

3.06. CLEAN-UP

A. Keep all areas of work clean, neat and orderly at all times. Keep all paved areas clean during planting and maintenance operations. Clean up and remove all deleterious materials and debris from the entire work area prior to final acceptance to the satisfaction of the Landscape Architect.

B. Comply with all applicable storm water pollution prevention plans.

3.07. PRE-MAINTENANCE ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work. Upon pre-maintenance acceptance, the Landscape Architect will give written notification to commence 90-day maintenance period.

3.08. MAINTENANCE

A. After all work indicated on the drawings and specifications has been completed, inspected and approved by the Landscape Architect, the maintenance period shall begin. The Contractor shall maintain all planted areas by means of continuous watering, weeding, mowing, re-seeding, cultivation, spraying, mulching, pruning, edging and/or any

other operation necessary for their care and upkeep for the period of ninety (90) calendar days.

B. All areas shall be kept weed free during the maintenance period. Shrub areas shall be cultivated regularly to maintain a loose, attractive soil.

C. The Contractor shall immediately replace any and all plant materials, which, for any reason, die or are damaged while under his care. Replacement plants shall be of the same quality as the original specified plants.

D. Damage to planting areas shall be repaired immediately. Any settling of the soil shall be repaired, design grades re-established and areas replanted. Depressions caused by foot traffic will be filled with soil and leveled. The contractor shall be solely responsible for installing and maintaining all protective fencing, where necessary, throughout the maintenance period.

E. To all shrub areas apply a pre-emergence spray or granular application at the start and end of the maintenance period.

F. At completion of the maintenance period, all areas included in this contract shall be clean and free of debris and weeds, all plant materials shall be live, healthy and free of infestation.

3.09. FINAL ACCEPTANCE

A. Work under this section will be accepted by the Landscape Architect upon satisfactory completion of all work (including maintenance). Upon final acceptance, and written notification, the Owner will assume responsibility for maintenance of the work.

END OF SECTION

SECTION 32 92 19
HYDROSEEDING

PART 1 – GENERAL

1.01. SUMMARY

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

1. All labor, materials, tools and the transportation and the performance of all the work required as indicated on the drawings and specifications, and reasonably incidental to:

a. Furnish all plant material.

b. Preparation and seeding of hydroseeded areas.

c. Clean up.

d. Establishment period.

e. Guarantee.

B. Related Sections:

1. Landscape Planting – Section 32 90 00.

C. Requirements:

1. Obstructions to landscaping operations: If rock, plaster, concrete debris, electrical cables, conduits or utility lines are encountered and cause conflict with landscaping operations, notify the Landscape Architect immediately.

2. Guarantees: The Contractor shall repair or replace any or all of the work, together with any other adjacent work which may be displaced by so doing, that may prove to be defective in its workmanship or material for the period of 90 days for all hydroseeded areas from the end of the maintenance period.

PART 2 – PRODUCTS

2.01. HYDROSEED MIX

A. All hydroseed mixes shall consist of the following (in lbs./acre):

2000 lbs. - Wood Fiber Mulch (green in color).

900 lbs. - Gro-Power Humus Base Fertilizer 5-3-1.

400 lbs. - Gro-Power Controlled Release Fertilizer 12-8-8.

100 lbs. - R2400-400CL Tackifier, M-Binder or equal.

Seed Mix (non-irrigated in lbs./Acre.): 36 lbs. - Seed Mix

10.7 lbs	Eleocharis macrostachya	Pale Spikerush
14.3 lbs	Elymus triticoides	Creeping Wild Rye
1.0 lbs	Hordeum brachyantherum	Meadow Barley
1.0 lbs	Juncus mexicanus	Mexican Rush
9.0 lbs.	Juncus phaeocephalus	Brownhead Rush

(% seed by weight / * P.L.S. = Pure Live Seed)

B. Deliver total seed requirements in unmixed, unopened bags to the site prior to seeding, with the producer's certificates attached showing purity/germination rates and weed content.

C. Supply Landscape Architect with seed test reports from a certified testing laboratory showing purity/germination rates and weed content 30 days prior to seeding.

D. All seed certificates are to be detached by the Landscape Architect and retained for permanent records. Landscape Architect may take samples of all specified seed for testing purposes, if testing is deemed necessary at a future date.

E. Seed mix shall contain no noxious weed species. Seed will be rejected if it s found to be wet, moldy, or damaged, or if weed content exceeds 0.5% by weight.

PART 3 – EXECUTION

3.01. COMBINATION OF MATERIALS

A. Mixing shall be performed in a tank, with a continuous agitation system of sufficient operating capacity to produce a homogenous slurry of fiber, seed, fertilizer, humectant, tackifier and water in the designated unit proportion.

B. With the agitation system operation at part speed, water shall be added to the tank.

C. The seed shall be added first; then fertilizer shall be added, and then the fiber. (If a centrifugal pump and re-circulation is employed, fiber is added before seed.)

D. The fiber shall not be added until the tank is at least one-third filled with water.

E. The mixture shall be agitated at full speed when the tank is half-filled with water.

F. All fiber shall be added by the time the tank is two-thirds to three-fourths full.

G. Maximum permissible time of mix of fertilizer and seed shall be one hour in order to prevent deterioration of seed.

3.02. SOIL PREPARATION

A. The top six (6) inches of soil shall be cleared of stones, stumps, clods, weeds, concrete, roots or similar objects.

B. Upon acceptance of irrigation system by the Landscape Architect, Contractor shall apply sufficient amounts of irrigation water to initiate germination of any and/or all non-specified seeds.

C. Amend soil with 200 lbs. Gro-Power Plus 5-3-1 Fertilizer and 3 cubic yards of organic amendment, and mechanically till the area to be hydroseeded to a 6" depth.

1. Organic amendment shall consist of nitrolized redwood sawdust. Submit sample and analysis to Landscape Architect for approval prior to delivery to site.

a. Nitrogen stabilized: .4 - .6% N (dry weight for redwood sawdust), .56-.84% N (dry weight for fir or cedar), .8 - 1.2% N (dry weight for fir or pine).

b. Particle size: 95 - 100% passing 6.35mm standard sieve, 80 - 100% passing 2.33mm standard sieve.

c. Salinity: Saturation extract conductivity shall not exceed 3.5 millimhos/centimeter at 25 degrees centigrade.

3.03. HYDROSEEDED AREAS

A. The areas to be hydroseeded are as shown on the drawings.

B. Soil surface in the areas to be hydroseeded shall be loose, friable and roughened to a minimum depth of 2" so that seed will remain in place prior to seeding.

C. Seed mix shall be uniformly seeded at rates specified in Section 2 - 2.1 and/or plan.

D. Seeded areas shall be irrigated to maintain adequate soil moisture: [Turf grasses - fourteen to twenty-one (14-21) days] until ninety (90) percent germination occurs unless natural germination is specified. In the event germination does not occur within these time periods, the Landscape Contractor shall re-hydroseed all deficient areas at his/her expense until germination occurs or to the satisfaction of the District.

3.04. WEED CONTROL

A. Subsequent to seed germination (and throughout the maintenance period) Contractor shall mechanically and/or chemically eradicate all weeds as soon as they can be identified.

B. Remove all weeds from site before seed is set.

3.05. GUARANTEE

A. All seeded areas shall be 100% established by the end of the maintenance period. Final acceptance will be postponed (maintenance period will be extended) until 100% establishment is achieved or approved by District.

END OF SECTION

SECTION 33 10 00
WATER UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Pipe and fittings for site water lines.

B. Valves.

C. Fire Hydrant

D. Water meter

E. Backflow preventer.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. American Water Works Association Standards (AWWA).

B. City of Oxnard - Design Standards.

C. Standard Specifications for Public Works Construction (Green Book), latest edition.

1.04 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.

2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

3. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Turn over to the project manager one set of drawings with all deviations from the plans shown in neat, clean and readable red ink.

4. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

5. Disinfection Report:
    a. Type and form of disinfectant used.
    b. Date and time of disinfectant injection start and time of completion.
    c. Test locations.
    d. Name of person collecting samples.
    e. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.
    f. Date and time of flushing start and completion.
    g. Disinfectant residual after flushing in ppm for each outlet tested.

6. Bacteriological Report:
    a. Date issued, project name, and testing laboratory name, address, and telephone number.
    b. Time and date of water sample collection.
    c. Name of person collecting samples.
    d. Test locations.
    e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
    f. Coliform bacteria test results for each outlet tested.
    g. Certify water conforms, or fails to conform, to bacterial standards of AWWA C651 Section 7.1 Standard Conditions

7. Water Quality Certificate: Certify water conforms to quality standards of the District's Representative, suitable for human consumption.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of piping mains, valves, connections, fire hydrant, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with City of Oxnard Standards, AWWA, Standard Specifications for Public Works Construction California, Fire Code Chapters 5 & 33 and NFPA 24.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years' experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

C. Submit bacteriologist's signature and authority associated with testing.

1.08 DELIVERY AND STORAGE

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.01 GENERAL

A. All fire water lines shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 305 psi unless otherwise indicated on plans.

B. All domestic water lines shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 250 psi unless otherwise indicated on plans.

2.02 PIPE

A. Joints: Mechanical joints shall be used for the waterline construction unless otherwise shown on plans and standard details. Gaskets for mechanical joints shall be rubber conforming to ANSI A21.11 and AWWA C111.

B. Fittings: Fittings shall be ductile iron rated for 250 psi working pressure for domestic water lines and 305 psi working pressure for fire water lines. Mechanical joint fittings shall conform to ANSI A21.10 or AWWA C110 (short short body style, not approved). Lining for fittings shall be Plastic Engineering P.E.I. 100 epoxy to a minimum thickness of 10 mils. Fittings shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapped with the polyethylene sheet.

C. Polyvinyl Chloride (PVC) potable water pipe: Pipe material shall be (Polyvinyl chloride (PVC) pressured pipe shall be manufactured in accordance with AWWA Standard Specification C-900).

2.03 GATE VALVES

A. Conform to AWWA C-509-01.

B. Gate valves shall be iron body, NRS valves with O-ring seals, and shall open when the stem is rotated counterclockwise. The valves shall be designed for a minimum working pressure of 250 psig, have a bronze stem, and have a cast iron wedge with styrene butadiene rubber permanently bonded to the wedge. The valves shall have full port openings for unobstructed flow, be designed for underground service, and be in full compliance with the latest revision of AWWA C509. The valve linings and coatings shall be in accordance with AWWA C210-84. Linings and coatings shall be factory applied. Valves shall be furnished with 2-inch square operating nut. Valve shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapping with the polyethylene sheet.

2.04 FIRE HYDRANT

A. Not Applicable.

2.05 WATER METER

A. Per City of Oxnard Plans & Specifications.

2.06 BACKFLOW PREVENTER

A. Per City of Oxnard Plans & Specifications.

B. Backflow preventer shall be lead free and USC approved.

2.07 ACCESSORIES

A. Concrete for Thrust Blocks: Contractor shall construct concrete thrust block per City of Oxnard Standard Construction Plates.

B. Thrust blocks shall be constructed to bear against undisturbed earth and shall not bear against adjacent pipe, fittings, or valves. Where concrete must be poured around adjacent pipe, a block out or a short pipe length shall be used such that a flexible joint exists within 12 inches of each side of

thrust block, unless indicated otherwise on the plans. Concrete shall not be allowed to set in contact with pipe surfaces or to enter or come in contact with any joint.

C. Valve Appurtenances: The Contractor shall furnish and install all valve appurtenances. Provide two galvanized T-handled operating wrenches, 4 feet total length or as required to easily access valve from grade.

D. Valve box body shall be per City of Oxnard Standard Construction Plates. The cover shall be marked “water.” The cover of each valve box shall be provided with a 2” diameter bronze disc and the Contractor shall stamp the valve number on the disc per the Architect’s instructions. The disc shall be mounted to the valve box cover or higher using stainless steel screws. The extension piece shall be 8” diameter SDR 35.

E. Appropriate warning detector tape shall be placed over all utilities.

1. Underground detectable warning tape shall be placed over all non-metallic underground utilities.

2. 12-gauge copper continuous location wire shall be placed on all water mains.

F. Corrosion-Protection Encasement for Piping

1. Encasement for Underground Metal Piping and Fittings: AWWA C105, Polyethylene film, 10 mil minimum thickness, tube or sheet. Plastic wrap shall be clear or black. Purple wrap shall not be used.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Maintenance records in accordance with NFPA 25.

B. Verify the existing water main sizes, class of pipes, and locations as indicated.

C. Verify piping system has been cleaned, inspected, and pressure tested.

D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.02 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to a minimum of 95 percent relative compaction.

C. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe. Jetting is not permitted to obtain required compaction.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Install access fittings to permit disinfection of water system.

D. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main in accordance with City of Oxnard Standard Plans & Specifications.

E. Protect metal restrained joint components against corrosion by applying a bituminous coating by coating with non-oxide corrosion resistant greased 10 mil plastic wrap.

F. Establish elevations of buried piping to ensure cover conforming to District Standards. The minimum cover from the finish grade to the top of pipe is 36 inches for potable and fire waterline, any shallower cover to clear with the existing utility crossings shall be reviewed and approved by the District's Representative.

G. Install 12-gauge copper continuous location wire over top of pipe.

H. Backfill trench in accordance with Specification Section 31 23 33.

I. Maintain separation of water main from sewer piping in accordance with the State Department of Health Services, Criteria for the Separation of Water Mains and Sanitary Sewers (Section 64630, Title 22 California Administrative Code), and State Regional Water Quality Control Board.

J. All pipe laid in trench, which is to be left for further extension (i.e., end of work day) shall have its open end covered to protect from possible rodent intrusion.

3.05 INSTALLATION - VALVES

A. Set valves on solid bearing per City of Oxnard Standard Plans & Specifications.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Install brass valve 1 ½" diameter tags and imprint valve number per District.

3.06 SERVICE CONNECTIONS

A. Install service connections in accordance with City of Oxnard Standard Construction Plates.

3.07 PRESSURE TEST OF WATER PIPING SYSTEM

A. Water piping system shall be pressure tested for 2 hours at 200 psi, with no allowable drop in water pressure.

B. All leakage tests shall be completed and approved prior to placing of permanent resurfacing.

C. Pressure test shall be witnessed by District's inspector.

3.08 DISINFECTION AND BACTERIA TESTING OF WATER PIPING SYSTEM

A. Water piping system shall be disinfected and flushed per AWWA Section C651.

B. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

D. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.09 TEST RECORDS

A. Records shall be in accordance with NFPA 13 & 24. Records shall be made of each piping system installation during the test. These records shall include:

1. Date of test.

2. Description and identification of piping tested.

3. Test fluid.

4. Test pressure.

5. Remarks to include such items as:

   a. Leaks (type, location).
   b. Repairs made on leaks.

6. Certification by Contractor and signed acknowledgment by the District's Representative.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

B. Perform pressure test on potable water distribution system in accordance with City of Oxnard Standard Plans & Specifications except that there is no allowable leakage for the duration of the test.

1. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

2. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

END OF SECTION

SECTION 33 30 00
SANITARY SEWERAGE UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Site sanitary sewerage piping, fittings, accessories and bedding.

B. Cleanouts.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction SSPWC (Green Book), latest edition.

B. ASTM Standards.

1.04 SUBMITTALS

A. Submit:

1. Product Data: Provide data indicating pipe, pipe accessories and appurtenances, and manhole covers.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Manufacturer’s Certificate: Certify that installers are certified for installing plastic pipe.

1.05 PROJECT RECORD DOCUMENTS

A. Submit Record Drawings: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

A. Conform to California Title 24 (CCR) Part 5, latest edition, for installation of the Work of this section.

B. Minimum separation distance and requirements between water, reclaimed water and sewer pipes per the State of California, Department of Health Services shall be established.

PART 2 – PRODUCTS

2.01 SEWER PIPE MATERIALS AND ACCESSORIES

A. Polyvinyl Chloride (PVC) Pipe for Gravity Sewer: ASTM 3034-SDR35 Ring-Tite Polyvinyl Chloride (PVC) gravity sewer pipe and fittings; inside nominal diameter as indicated on Drawings. PVC pipe shall use “locked-in” rubber sealing ring conforming to ASTM D-3212. Joints using flexible Elastomeric Seals. Minimum pipe stiffness at 5% deflection shall be 46 psi for all sizes when tested in accordance with ASTM Method of Test D2412.

2.02 CLEANOUTS

A. Form and cast-in-place, Class 618-CLE-4000 P concrete base pad, with provisions for sewer pipe end section.

B. Frame and cover shall be Christy G3 or equal, lettered “sewer”.

2.03 BEDDING MATERIALS

A. Refer to Specification Section 31 23 33 Trenching and Backfilling for Bedding Material.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that trench cut and/or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with granular fill.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated on drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth, compact to minimum of 95 percent of maximum dry density.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings and accessories in accordance with manufacturer's instructions.

B. Sewer pipeline shall be placed from downstream to upstream beginning at the downstream connection to the existing sewers.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install bedding along sides and over top of pipe to minimum compacted thickness of 12 inches; compacted to a minimum of 95 percent of maximum dry density.

E. Refer to Specification Section 31 23 33 for Trenching Requirements. Do not displace or damage pipe when compacting.

F. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe.

3.05 INSTALLATION – CLEANOUTS

A. From bottom of excavation clean and smooth to correct elevation.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

C. Mount lid and frame level in grout, secured to cone section to elevation indicated on drawings.

3.06 FIELD QUALITY CONTROL

A. Preliminary Tests: The Contractor may perform any tests desired which are not harmful to the lines before backfilling is completed.

B. Cleaning: Before final tests are performed for acceptance of any sewer pipe, clean the pipe by inflatable rubber ball method.

C. Perform air pressure test per SSPWC Section 501-6.4.

D. Repairs, if necessary: If the leakage or infiltration is greater than the amount specified, the pipe shall be overhauled and re-laid if necessary, by the Contractor, at its own expense, until the joints will hold satisfactorily.

E. Regardless of the results of the above tests, any visible evidence of individual leaks shall be corrected by the Contractor to the satisfaction of the District's Representative.

F. Cleaning Sewer: After all backfilling, compaction testing and paving is completed, sewer lines shall be cleaned by Inflatable Rubber Ball Method, flushed and cleaned, before acceptance by the District's Representative and connection to their sewer system is made.

G. The Contractor shall furnish all sewer line plugs necessary for blocking off all lines as required by the District's Representative until final acceptance.

3.07 PROTECTION

A. Protect finished installation.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 – GENERAL

1.01 SUMMARY

A. Storm drainage piping, fittings, accessories, and bedding.

B. Catch basins.

C. Manholes.

D. Inlet and outlet structures.

1.02 RELATED SECTIONS

A. Section 31 20 00 Earthwork.

B. Section 31 23 33 Trenching and Backfilling.

1.03 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. ASTM Standards.

1.04 SUBMITTALS

A. Submit the following in accordance with provisions in Division 1:

1. Product Data: Provide data indicating pipe, pipe accessories and catch basin grates.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Layout diagram for storm drain components per plan.

1.05 PROJECT RECORD DOCUMENTS

A. Submit record drawings. Accurately record locations of pipe runs, connections, catch basins, structures, manholes and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements and elevations are as indicated on drawings.

B. Complete pothole work per plans and notify the District of any discrepancy prior to commencing construction.

1.07 COORDINATION

A. Coordinate the work with connection to existing storm drain mains, and trenching.

PART 2 – PRODUCTS

2.01 PIPE MATERIALS

A. High Density Polyethylene (HDPE) with water tight joints, per SSPWC Section 207-18.

2.02 PIPE ACCESSORIES

A. Water tight joints per SSPWC Section 207-18.4.1.

B. Fittings per SSPWC Section 207-18.4.3.

2.03 CATCH BASINS AND MANHOLES

A. Precast catch basins shall include grate, as manufactured by Jensen Precast or approved equal.

2.04 METAL

A. All exposed metal parts are to be galvanized in accordance with SSPWC, Section 210-3.

2.05 CONCRETE

A. All concrete shall be Class 560-C-3250, per SSPWC Section 201.

2.06 BEDDING MATERIALS

A. Refer to Specification Section 31 23 33 Trenching and Backfilling for Bedding Material.

2.07 FILTER FABRIC

A. Filter fabric shall be non-woven geotextile filter fabric Mirafi 140N or approved equal.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive Work and excavations, dimensions, and elevations are as indicated on Drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with compacted bedding material.

B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.03 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated on Drawings.

B. Place bedding material in trench bottom, level materials in continuous layer. Bedding shall be 4" thickness for pipe diameters less than or equal to 24” and 6” thickness for pipe diameters greater than 24” and shall be per SSPWC Section 217-1.2.

3.04 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions and per SSPWC Section 207.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

C. Install backfill along sides and over top of pipe. Provide backfill over top of pipe to minimum compacted thickness of 12 inches, compacted to a minimum of 95 percent of maximum dry density.

D. Refer to Specification Section 31 23 33 for Trenching Requirements. Do not displace or damage pipe when compacting.

E. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers or equal to protect the pipe.

3.05 INSTALLATION - CATCH BASINS, MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base with provisions for storm drainage pipe end sections.

C. Level top surface of concrete base to receive shaft sections.

D. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

E. Compact top 12" of native materials below the bottom of catch basins and manholes to minimum 95 percent of maximum dry density.

3.06 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District’s representative.

B. Request inspection prior to and immediately after placing backfill cover over pipe.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to the District.

3.07 PROTECTION

A. Protect pipe and backfill cover from damage or displacement until backfilling operation is in progress.

END OF SECTION