SECTION 01562  
WATER FOR COMPACTION & DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION  
A. The work to be performed under this Section shall consist of furnishing all labor, materials, tools, transportation, supplies, equipment, appurtenances, fuel, and power, unless specifically excepted, necessary or required for the application of water for compaction and dust control within the limits of the work as shown in the plans and as described in these Specifications.

1.02 REFERENCED STANDARDS  
A. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to work of this Section where cited by abbreviations noted below.

   1. State of California, California Code of Regulations, Title 22, (CCR Title)

1.03 SUBMITTALS  
A. Test Reports: Furnish laboratory test reports where required to conform to the Specifications.

1.04 QUALITY ASSURANCE  
A. Materials and equipment specified by reference to standard specifications, trade association publications, and Manufacturer's catalogs and installation recommendations shall refer to the latest issue in effect at the date of the contract, except where building codes refer on specific items to an earlier issue. All referenced standard specifications shall be considered an integral part of this Specification as if repeated in full herein.

PART 2 - PRODUCTS

2.01 WATER  
A. Water for compaction and dust control shall be fresh, clean, and free from injurious amounts of oil, acid, and organic matter.

B. If the Contractor wishes to use reclaimed water for compaction and dust control purposes, a CCR Title 22 water quality analysis shall be submitted to the Architect for Approval. The County reserves the right to prohibit the use of reclaimed water.
2.02 CHEMICAL ADDITIVES

A. If the Contractor elects to use chemical additives in water for compaction or dust control, it shall be at his sole expense. The County reserves the right to prohibit the use of a particular type of additive.

PART 3 - EXECUTION

3.01 PREPARATION

A. The Contractor shall arrange for water from the appropriate utility serving the site.

B. The Contractor shall construct and install connections to water systems, air gap devices, backflow prevention devices, meters, storage tanks, truck fill risers, or other equipment as required by the utility company or as shown on the plans.

C. The Contractor shall pay for all costs in conjunction with connecting to the water system as well as utility company charges for water used.

D. The Contractor shall submit a plan for control of dust generated from the execution of the work covered by this Contract for approval prior to commencing work. The Dust Control Plan shall cover dust resulting from the Contractor’s performance of the work, either inside or outside the limits for work. In addition to work days, the plan shall include dust control for weekends and holidays.

3.02 WATER FOR COMPACTION

A. Water for compacting excavations, trenches, embankment material, subbase, base, surfacing materials, and dust control shall be applied by means of pressure distributors or pipelines equipped with spray systems or nozzles that will insure uniform application of water.

B. All equipment used for applications of water shall be equipped with a positive means of shut off.

C. Water shall be applied in amounts and at locations necessary for compaction.

D. Care shall be taken not to flood excavations or trenches with water used for compaction.

3.03 DUST CONTROL

A. Water used for dust control shall be applied by means of pressure distributors or pipelines equipped with spray systems or nozzles that will insure uniform application of water.

B. Dust resulting from the Contractor’s performance of the work, either inside or outside the limits for work, shall be controlled. Water shall be applied in amounts and at locations
necessary to control dust.

If in the opinion of the Construction Manager, the Contractor's operations are creating unreasonable dust, the Contractor shall apply supplemental water for dust control in areas so designated.

C. The Contractor shall have at least one mobile unit with a minimum capacity of 1,000 gallons available for applying water on the project at all times.

D. The Construction Manager has the right to require the Contractor to apply a dust palliative if, in the opinion of the Construction Manager, the dust control plan is insufficient. The cost of application of dust palliative shall be at the Contractor's sole expense.

END OF SECTION
SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Material and equipment incorporated in the work shall be:

1. New, unless otherwise specified.
2. In a condition acceptable to the County and Construction Manager.
3. Suitable for the intended use.
4. Match existing adjacent material as required.

B. No material or equipment shall be used for purposes other than that for which designed or specified.

C. Definitions:

1. "Products" are purchased items for incorporation into the work.
2. "Materials" are products which must be substantially worked, mixed, fabricated, processed, or applied.
3. "Equipment" is defined as products with operational parts.
4. Definitions in this paragraph are not intended to negate the meaning of other terms such as "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory or have recognized meanings in the construction industry.

D. To the greatest extent possible for each unit of work, provide products, materials, or equipment of a generic kind from a single source. For example, provide toilet accessories from a single manufacturer unless otherwise specified.

E. Where more than one choice is available, select an option which is compatible with other products and materials already selected.
F. Labels:

1. Except as otherwise indicated, do not allow conspicuous labels advertising any manufacturer or trade name on products in occupied spaces or on exterior of building.

2. Locate required labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.

3. Provide permanent nameplate on each item of service-connected or power-operated equipment. Indicate manufacturer, product name, model number, serial number, capacity, speed, ratings and similar essential operating data. Locate nameplates on an easily accessed surface which, in occupied areas, is not conspicuous.

G. Where available, provide standard products of types which have been produced and used previously and successfully on other projects and in similar applications.

H. Where additional amounts of a product, by nature of its application, are likely to be needed by Owner at a later date for maintenance and repair or replacement work, provide a standard, domestically produced product which is likely to be available to Owner at such later date.

I. When specified in individual Sections, provide extra stock of products, materials, or equipment, stored at locations designated by the Construction Manager.

1.02 TRANSPORTATION AND HANDLING

A. Manufactured products shall be delivered in the manufacturer’s original unbroken containers or packaging, with identifying labels intact and legible.

B. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and verify that products are properly protected and undamaged.

C. Handle products and packages in a manner to avoid soiling or damaging.

D. Promptly remove damaged or defective products from the site, and replace at no increase in Contract Sum.

E. Transport and handle products in accordance with the manufacturer’s instructions.
1.03 STORAGE

A. Store manufactured products in accordance with the manufacturer’s instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weathertight enclosures.

2. Maintain temperature and humidity within the ranges specified by the manufacturers.

3. Control delivery schedules to minimize long-term storage at site, particularly for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

B. Exterior Storage:

1. Store fabricated products above the ground on blocking or skids to prevent soiling and staining.

2. Cover products subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

3. Store loose granular material in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. Arrange storage to facilitate inspection.

D. Periodically inspect stored products to assure that specified conditions are maintained and the products are free from damage or deterioration.

E. Protection after Installation:

1. Provide coverings necessary to protect installed products from damage due to traffic or construction operations. Remove coverings when no longer needed.

2. Maintain temperature and humidity conditions for interior equipment and finish products in accordance with the manufacturers’ instructions.

3. Temperature and humidity conditions required for interior equipment and finishes shall be maintained at no additional cost to the Owner, and shall not be reason for unusually severe weather time extensions.

1.04 WORKMANSHIP

A. Attachments, connections, fastenings, and inserts of any nature shall be properly and permanently secured in conformance with best practice and the Contractor is responsible
for providing them according to these conditions. Drawings show only special conditions to assist the Contractor; they do not illustrate every such detail.

B. Finished work shall be firm, well anchored, in true alignment, plumb, level, with smooth, clean, uniform appearance without waves, distortions, holes, marks, cracks, stains, or discoloration. Joints shall be close fitting, neat, well scribed. Finish work shall not have exposed unsightly anchors or fastenings and shall not present hazardous, unsafe, or unfinished protrusions, offset, burrs, raw edges, or sharp corners. All work shall have provisions for expansion, contraction, and shrinkage as necessary to prevent cracks, buckling, and warping.

C. No work defective in construction or quality or deficient in any requirement of the drawings and specifications will be acceptable in consequence of the Owner's or the Architect's failure to discover or to point out defects or deficiencies during construction; nor will the presence of Inspectors on the work relieve the Contractor from responsibility for securing the quality and progress of work as required by the Contract. Defective work revealed within the item required by guarantees shall be replaced by work conforming with the intent of the Contract. No payment, whether partial or final, shall be construed as an acceptance of defective work or improper materials.

D. Materials and workmanship specified by reference to number, symbol, or title of a specific standard such as Commercial Standard, a Federal Specification, a Trade Association Standard, or other similar standard, shall comply with requirements in latest edition or revision thereof and with any amendment or supplement thereto in effect on the date of origin of this project's specifications. Such standard, except as modified herein, shall have full force and effect as though printed in the specifications.

E. The Contractor shall waive "common practice" and "common usage" as construction criteria whenever Contract Documents or codes, ordinances, etc., require greater quantity or better quality than common practice or common usage would require.

F. If at any time before commencement of work, or during progress thereof, the Contractor's methods, equipment, or appliances are inefficient or inappropriate for securing the quality of work or rate of progress intended by the Contract Documents, the Owner may order the Contractor to improve their quality or increase their efficiency. This will not relieve the Contractor or his sureties from their obligations to secure the quality of work and rate of progress specified in the Contract.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for air systems balancing and water systems balancing.

1.02 QUALITY ASSURANCE

A. Testing and balancing shall be performed by an independent testing agency, not associated with the installers and acceptable to the Construction Manager and the Architect in accordance with procedures described in the Associated Air Balance Council (AABC), National Standards for field measurement and instrumentation form No. 81766, as published by AABC.

B. Provide necessary personnel, equipment, and services, and perform necessary tests to demonstrate integrity of the completed installation to the approval of the County and all authorities having jurisdiction.

C. Make adjustments necessary to balance the completed systems in accordance with the data indicated.

D. The completed balanced systems shall be documented in a "Balancing Report" and two (2) copies shall be submitted to the County.

E. Owner's Right to Retesting:

1. Should the Contractor refuse or neglect to make tests necessary to demonstrate the integrity of the completed systems, the Owner may retain the services of an outside consultant to make such tests and their resulting adjustments and balance.

2. The costs for such services will be deducted from the amounts owing to the Contractor and shall not be borne by the Owner.

PART 2 - PRODUCTS

Not Used.
PART 3 - EXECUTION

3.01 WATER SYSTEMS BALANCING

A. After satisfactory completion of required pressure testing, operate the completed piping systems for not less than three (3) consecutive eight-hour days.

B. Balance the circulation of hydraulic systems as required to achieve a consistent and uniform pattern of operation.

C. Pumps: Make the following tests and include data in the "Balancing Report".
   1. Water flow (GPM) and pump head.
   2. Motor speed and input ampere reading.

D. Include the flow rate at each balancing valve in the "Balancing Report".

3.02 AIR SYSTEMS BALANCING

A. Prior to balancing, clean systems, lubricate and service equipment, and clean installed filters.

B. After completion of installation, test and regulate components of the air systems to conform to the air volumes indicated.

C. Where necessary to change fan speed in order to achieve specified air volume, provide fans with larger or smaller pulleys at no additional cost to Owner.

D. Each piece of equipment in system shall be adjusted to insure proper functioning of all controls, proper distribution of air, elimination of drafts, noise, and vibration. If necessary, add dampers at no additional cost to the Owner.

E. For each component of the system, where applicable, make the following tests and include data in the "Balancing Report".
   1. Air volume at each supply, return, and exhaust outlet.
   2. Total cfm supplied by each supply fan.
   3. Total cfm exhausted by each exhaust fan.
   4. Total static of each fan.
   5. Motor speed, fan speed, and input ampere reading of each fan.
   6. Average velocity on intake side of each fan.
F. Procedures:

1. Make air tests by means of velometer or anemometer readings. Obtain air outlet factors from manufacturer and use according to manufacturer's recommendations.

2. Make static pressure tests by means of pilot tube readings.

3. Make ampere readings by means of an integrating watt or ampere reading.

G. Completely balance the air systems, including testing and retesting as specified.

END OF SECTION
SECTION 01660

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the procedures to be followed in requesting Substitutions to specified items. ALL SUBSTITUTIONS MUST BE APPROVED WITHIN FIFTEEN (15) DAYS OF BID OPENING AND PRIOR TO AWARD OF CONTRACT.

B. Definitions:

1. The manner of specification shall determine whether a submittal shall be considered a Substitution, to be accepted or rejected according to criteria stated in this section.

   a. Where specification is by manufacturer's trade name or model designation, item which bears different trade name or model designation will be considered a Substitution.

   b. Where specification is by reference to standards of trade, industry, or governmental organizations, item not in compliance with standards referenced will be considered a Substitution.

   c. Item which does not conform with descriptive, performance, or dimensional requirements shown or noted will be considered a Substitution.

   Where specification is by combination of descriptive material, reference to standards, performance criteria, or manufacturer's trade names and there are discrepancies or conflicts between requirements specified, the Architect reserves the right to consider item a Substitution which fails to satisfy one or more requirements of the specification. Bidders who discover such discrepancies should request clarification by addendum during the bidding period.

2. An equal shall qualify as such where material, product, or system proposed as equal conforms with descriptive, performance, or proprietary requirements of the specifications and requirements shown or noted in the drawings. In determining equals, the Architect's judgement shall be final and he reserves the right to consider unequal any material, product, or system which, though in conformity with Contract requirements, exhibits features which the Architect deems objectionable even though not specifically disallowed by the Contract Documents.
3. Failure by the Contractor to order materials or equipment in a timely manner will not constitute justification for a Substitution.

1.02 PRODUCT

A. The term "product" includes materials, systems, and equipment. Products shall be new, undamaged, of the types specified, and furnished in ample quantities to facilitate proper execution of the work.

B. An "equal" product is any material, product, thing, or service which is in all respects equal to the item specified, including, but not limited to, size, quantity, guarantees, and materials. The final determination of whether or not a proposed product is "equal" to the specified product rests with the Architect.

C. A "Substitution" is any material, product, thing, or service which may or may not be equal, as determined by the Architect, in all respects to the specified item but which is proposed by the Contractor to be used in lieu of the specified item.

D. Where available, provide standard products or types which have been produced and used previously and successfully on other Projects and in similar applications.

1.03 CONTRACTOR'S OPTIONS

A. The Contractor has the following options:

1. For products specified only by reference standards, select any product meeting those standards, by any manufacturer.

2. For products specified by naming several products or manufacturers, select one of the specified products or manufacturers or submit a request, as required by this Section, for Substitution, for any product not specifically named. Where only one manufacturer is specified but other manufacturers are listed as acceptable, their products shall be treated as a Substitution and submitted in accordance with the requirements specified in this Section.

3. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equal", "equal to", "or approved equal", or "equivalent to", submit a request, as required by this Section, for Substitution, for any product not specifically named.

4. If it is known that a specified product is not a feasible or acceptable selection, notify the Construction Manager in writing before proceeding with the purchase of the product.

5. Where only compliance with an imposed standard, code, or regulation is required, select any product satisfying the requirement.
6. Where matching with an existing sample is required, the final decision whether a proposed product matches the sample satisfactorily is the Architect's judgement.

7. Except as otherwise indicated, where Specifications include the statement "... as selected from manufacturer's standard colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic product (complying with Specifications) is the Contractor's option, and the selection of color, pattern, and texture shall be the Architect's selection.

1.04 REQUIREMENTS FOR SUBSTITUTIONS

A. Products proposed for Substitution shall comply with specific performances indicated and/or specified, and which are recommended by the manufacturer (in published product literature or by individual certification) for application indicated. Overall performance of a product is implied where product is specified with only certain specific performance requirements.

B. Products proposed for Substitution shall have been produced in accordance with prescriptive requirements, using specified ingredients and components, and complying with specified requirements for fabricating, finishing, testing, and similar operations in manufacturing process.

C. A proposed Substitution shall not be purchased or installed by the Contractor without written acceptance from the Architect. Acceptance of any Substitution shall not relieve the Contractor from responsibility for the proper execution of the work and any other requirements specified in the Contract Documents.

D. The Contractor shall be responsible for the effect of a Substitution of related work in the Project, and shall pay additional costs generated by a Substitution, including the costs of the Architect's or Construction Manager's additional services.

E. The burden of proving that the proposed Substitution is "equal" to the specified product is upon the Contractor and such proof shall include sufficient factual and comparative data and information necessary to establish that the requested Substitution is equal in quality, utility, structural strength, mechanical and technical performance, finish, arrangement of plan, repair and maintenance, compatibility with other existing or specified items, and any other relevant data.

F. By making a request for Substitution, the Contractor:

1. Represents that he has personally investigated the proposed substitute product and has determined that it is equal or superior in all respects to the specified product.

2. Represents that he will provide the same warranty for the Substitution that he would have for the specified product.
3. Certifies that the cost data presented is complete and includes all related costs under the contract.

4. Waives all claims for additional costs or schedule impact related to the Substitution which subsequently become apparent.

5. Will coordinate the installation of the substitute, making sure changes as may be required for the work to be complete in all respects.

6. Represents and certifies that the proposed substitute complies with all applicable regulatory requirements. The Contractor is solely responsible for securing regulatory approvals for Substitutions.

G. Adjacent materials have been designed and detailed to accommodate the established standard manufacturer's products. If one of the other approved manufacturers is selected by the Contractor, the Contractor shall design and detail all changes in all adjacent materials necessary to accommodate the selected products, shall submit such changes for review by the Architect, shall pay for all changes to the Contract Documents to accommodate the selected products, and when approved shall make such changes to the work at no cost to the County.

H. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings or product data submittals without formal request submitted in accordance with this Section.

2. Acceptance will require substantial revision of the Contract Documents.

3. The proposed product is inferior to the specified product as judged by the Architect.

4. Request does not include sufficient data for the Architect to make a reasonable judgement regarding the acceptability of the proposed Substitution.

5. Proposed Substitutions increase the cost of work or contract time.

I. The Architect will be judge of the acceptability of proposed Substitutions, and his determination will be final.

J. Approval of a Substitution shall not relieve the Contractor from responsibility for the proper execution of the work and other requirements of the Contract Documents.

K. If a Substitution is rejected, provide the product originally specified.
A. Submit four copies of a written request for a Substitution and data substantiating the request to the Construction Manager in enough advance notice to allow a thorough evaluation by the Construction Manager and the County. Use the form at the end of this section. Each request shall include the following:

1. Complete technical data of all characteristics of the originally specified item, including drawings, reference standards, performance specifications, cost data, samples, and test reports of the product proposed for Substitution. Submit additional information if requested by the Architect. Annotate the specific salient characteristics which are being compared to those of the originally specified item. The mere submission of catalog cuts and/or other data without the annotation is not acceptable. See the following paragraph which requires line-by-line comparison.

2. Data similar to that specified for the item for which the Substitution is proposed. Include a line-by-line comparison of characteristics between specified item and proposed substitute documenting equal status. Highlight by underlining or other means characteristics that are different from those of the specified item. Equivalency will be based on salient characteristics as determined by the Architect.

3. Effect on the Progress Schedule.

4. Complete breakdown of costs indicating the cost amount to be added to or deducted from the Contract Sum if the proposed Substitution is accepted.

5. Certification by the Contractor that the proposed Substitution is in compliance with the Contract Documents and applicable regulatory requirements.

6. List of other work, if any, which may be affected by the Substitution.

7. Availability of maintenance service and source of replacement materials.

8. Samples, if requested, of both the originally specified product and the proposed substitute product.

9. Name and address of similar Projects on which the proposed substitute product was used. Include name, address, and telephone numbers of the Owner and the Architect for each Project.

10. Sample of standard form of guarantee or warranty offered by the manufacturer for the substitute product proposed.
1.06 REQUESTS FOR SUBSTITUTIONS AFTER TIME SPECIFIED

A. No Substitutions of materials, products, or equipment will be considered after the time described in the above paragraphs unless the specified material cannot be delivered or incorporated into the work in the time allowed due to conditions beyond the control of the Contractor.

B. The Contractor shall reimburse the County’s cost for additional services required by the Construction Manager and/or the Architect to review and process Substitutions.

C. Written requests for Substitutions shall include reasons for the request, proof that delivery is impossible, complete description and data of the proposed substitute necessary for a complete evaluation of costs, delivery time, and other necessary information.

D. Costs of delays which could have been avoided by the timely submission of requests for Substitutions shall be borne by the Contractor.

1.07 DOCUMENTATION

A. The Contractor shall support his proposal with sufficient information, test data, certificates, samples, or other means to permit the Architect’s making fair, equitable, and informed judgements.

B. The burden of proof that a Substitution is equal or otherwise acceptable shall be upon the Contractor. The Architect may withhold or refuse approval for reason of insufficient documentation. The County may also require additional tests and inspections for which cost the Contractor shall be responsible.

A. Where agencies such as State Fire Marshal, International Conference of Building Officials, or the Office of Statewide Health Planning and Development exercise jurisdiction over use of specific material or method, the Contractor shall submit certification of their approval of proposed Substitution.

1.08 THE CONTRACTOR’S RESPONSIBILITY FOR ACCEPTED SUBSTITUTIONS

A. Acceptance of Substitutions shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents.

B. The Contractor shall be responsible for changes in other parts of the work occasioned by his Substitutions and shall bear their expense, including the cost of the County’s additional services.
A. The Architect, acting as the County's designated agent for design of this project, shall be the sole judge of whether the Contractor's proposed Substitution is equal and shall make his judgement in accordance with the following criteria:

1. Whether Substitution proposed conforms with description or performance specified;

2. Whether Substitution proposed is equal in quality;

3. Whether Substitution proposed is comparable in appearance and artistic effect where these are considerations;

4. Whether Substitution proposed affords comparable operation, maintenance, and performance;

5. Whether Substitution proposed will provide equal longevity and service under conditions of climate and usage;

6. Whether Substitution proposed will fit into space allocated or operate from mechanical or electrical services provided without necessitating changes in details and construction of related work;

7. Whether Substitution proposed is otherwise in the County's interest, offering advantages in cost and time.

B. A determination by the Architect that the Contractor's proposed Substitution is not equivalent for any single characteristic, figure, or quality as described in the above is sufficient ground for rejection.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
SECTION 01700

CLOSE OUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements and the administrative procedures for closing out the work, which includes but is not limited to substantial completion, final completion, and acceptance.

1.02 PREPARATION FOR SUBSTANTIAL COMPLETION

A. When the work is substantially complete, submit the following to the Construction Manager:

1. A written notice that the work is substantially complete.

2. A detailed, complete, and comprehensive list of items to be completed or corrected.

3. Certification that all mechanical, electrical, plumbing, security, communications (see Section 01400), and hardware equipment has been tested and is operational. The Contractor will provide copies of all test results and reports including a binder by division fully indexed, outlining all equipment and performance tests (see Section 01400). In addition, the Contractor will certify the Owner's maintenance and operational personnel have received the specified training (see Section 01730).


B. After receipt of the above items, the Construction Manager shall set up an inspection to determine whether or not the Project, or portion of the Project if required by the Construction Manager, is ready for Punch List Inspection.

C. Should the Construction Manager determine that the work is so incomplete that it does not warrant a punch list inspection, the Construction Manager will:

1. Within a reasonable amount of time notify the Contractor in writing that the work is incomplete. Charges may be assessed for reinspection.

2. Instruct the Contractor to promptly remedy the deficiencies in the work, and send a second notice of substantial completion to the Construction Manager.

1.03 ACHIEVING SUBSTANTIAL COMPLETION

A. When the Construction Manager determines that the work is ready for the Punch List Inspection, the Construction Manager will arrange for the inspection by the Construction Manager and representatives of the Architect as necessary.
B. The Inspectors and representatives of the Architect shall prepare a coordinated Punch List and will determine which items shall be completed by the Contractor to achieve substantial completion.

C. The Construction Manager will transmit the hand written Punch Lists to the Contractor. The Contractor will within five working days upon receipt computerize the punch lists with the format approved by the Construction manager and provide three copies. The Contractor will add items to the computerized punch list as they are provided by the Construction Manager. The Contractor will update the punch list status weekly as provided by the Construction Manager.

The Contractor will provide a Punch List status each week indicating progress until all items are complete. When all items are complete, the Contractor will request a second Punch List inspection. The Owner and Architect will inspect to verify completion by the Contractor and will advise items to complete to reach substantial completion.

D. Beneficial Occupancy and Substantial Completion are not one and the same. The County has the right to beneficially occupy any portion of the Project, or the Project as a whole, at any time in accordance with the General Conditions.

1.04 SUBSTANTIAL COMPLETION

A. When the specific Punch List items have been completed and accepted, the Construction Manager, Architect, Owner and the Construction Manager will prepare a Certificate of Substantial Completion. The Construction Manager and the Architect will provide a punch list to be completed for final completion. Other items which do not conform to the Contract Documents may be added to the list at any time.

B. At Substantial Completion, the County may move in furnishings and equipment, and initiate its transition. On all final Punch List work after the Substantial Completion, the Contractor's work force, equipment, and material may be subject to security procedures, including searches. Any delay associated with this process is part of the base Contract and will not be considered as an extra cost under the Contract.

1.05 PRE-WARRANTY ISSUES

A. During the transition period between Substantial Completion and Final Completion, the Owner's maintenance and operations personnel may find omissions and defects. They will issue the omissions and defects report using the warranty procedure. The Contractor will provide a weekly computerized status log of these issues and will update. This process will provide training in the warranty procedures for the Owner and Contractor.

B. It should be noted that the pre-warranty issues do not create acceptance and do not initiate the formal warranty period as prescribed by the Contract. The pre-warranty issues must be considered as another form of a Punch List that must be complete prior to final completion and/or acceptance or a credit charge will be taken for their value.
1.06 FINAL COMPLETION

A. When the Contractor considers the work to be complete for final inspection, he shall submit written certification that:

1. Contract Documents have been reviewed.
2. Work has been inspected for compliance with the Contract Documents.
3. Work has been completed in accordance with the Contract Documents.
4. Work is completed and ready for final inspection.
5. Submit certified copy of final Punch List of itemized work to be completed or otherwise resolved for acceptance, endorsed and dated by the Construction Manager.
6. Obtain the required "Certificate of Occupancy".

B. After receipt of the above, the Construction Manager will set up an inspection with representatives of the Architect to determine whether or not the Project is ready for final inspection. The review shall consist of verifying that the remaining Punch List items from the Substantial Completion inspection have been completed.

C. Should the Construction Manager find the work to be incomplete, the Construction Manager shall advise the Contractor in writing that the work is not acceptable. The Contractor may be assessed for additional inspection costs.

D. The Contractor shall send another Certificate when the work is complete.

E. After the Construction Manager and the Architect have completed the final inspection and when the Construction Manager finds that the work is complete under the Contract Documents, the Construction Manager shall determine the "Date of Final Completion" and shall notify the Contractor, the Owner, and the Architect. The Contractor shall proceed to prepare for final closeout/acceptance and shall make final Close Out Submittals.

1.07 CLOSE OUT/ACCEPTANCE

A. Prior to acceptance by the Construction Manager and the Architect, the Contractor shall:

1. Submit a statement showing accounting of changes to the Contract Sum.
2. Submit warranties, maintenance agreements, final certifications, and similar documents required by the Contract Documents.
3. Advise the Construction Manager of pending insurance change-over requirements.
4. Obtain and submit releases enabling the Owner’s full and unrestricted use of the work.
and access to services and utilities, including where required occupancy permits, operating certificates, and similar releases. Provide all release of liens and claims from subcontractors and suppliers. List all outstanding claim issues that will be litigated (see below).

5. Submit final record documents, maintenance manuals, damage or settlement surveys, property surveys, and similar final record information as required by the Contract Documents.

6. Deliver tools, spare parts, extra stocks of materials, and similar physical items to the Construction Manager.

7. Make final change-over of locks and forward keys to the Construction Manager. Advise the Owner’s personnel of change-over in security provisions.

8. Remove all temporary facilities and services, along with construction tools and equipment, mock-ups, and similar elements.

9. Prepare final Application for Payment in accordance with the General Conditions and these Specifications.

10. The Contractor shall provide a final completion report in a 3-ring binder which shall consist of the following:

    a. A summary time analysis providing a justification for any time extensions being requested which have not been approved. Printout and graphic for original base line and final as-built schedule to Substantial Completion.

    b. A summary of all potential claims from the Contractor against the Owner. Attach copies all claims made to date and new claims which are being submitted.

    c. A copy of all record documents and/or transmittals of record documents previously submitted.

    d. A copy of operation and maintenance manuals and/or transmittals of operation and maintenance manuals previously provided.

    e. A copy of all training information and information establishing dates training was provided to the Owner.

    f. All materials, parts, and keys and/or a copy of Transmittals of items previously provided to the Owner.

    g. A summary of all change requests which the Contractor believes are outstanding and are not included in the aforementioned claims.

    h. A copy of the Punch List with all items initialed off by the Owner.
i. An unconditional release of all liens, stop notices, and claims from the subcontractors and suppliers.

j. Contractor's request for final payment.

k. Additional copies of all warranties and guarantees.

l. Documents confirming all final testing and start-up operations which were conducted.

B. After acceptance of the work by the Owner and Notice of Completion has been filed by the county, and the proper time has elapsed, the final payment will be made (less any outstanding items).

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
SECTION 01710
CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for cleaning.

1. Keep premises and public properties free from accumulations of waste, debris, and rubbish caused by operations.

2. At completion of work, remove waste materials, rubbish, tools, equipment, machinery, weeds, and surplus materials, and clean all exposed surfaces; leave Project clean and ready for occupancy.

3. Note payment requirements (Section 01150) for cleaning.

1.02 SAFETY REQUIREMENTS

A. Standards: Maintain the Project in accordance with State and local safety and insurance standards.

B. Hazards Control:

1. Store volatile wastes in covered metal containers, and remove from premises daily.

2. Prevent accumulations of wastes which create hazardous conditions.

3. Provide adequate ventilation during use of volatile or noxious substances.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on Project Site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

3. Do not dispose of wastes into streams or waterways.

PART 2 - PRODUCTS
2.01 MATERIALS

A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION

A. Keep premises and public properties free from accumulations of waste materials and rubbish.
B. Wet down materials and rubbish to lay dust and prevent it from blowing.
C. At least once a week, or sooner if required, clean site and public properties, and dispose of waste materials, debris, and rubbish off the site in a legal manner. Remove combustible material such as paper and cardboard daily.
D. Provide on-site containers for collection of waste materials, debris, and rubbish. Provide a collection can at each location used as an eating area. Pick up all garbage daily.
E. Remove waste materials, debris, and rubbish from site and legally dispose of at legal public or private dumping areas off County's property. Do not bury or burn waste materials at the site.
F. Vacuum clean interior areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.
G. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.
I. Remove all weeds at least once per month.

3.02 FINAL CLEANING

A. Employ experienced workmen or professional cleaners for final cleaning.
B. In preparation for Substantial Completion or Occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
C. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior finished surfaces; polish bright surfaces to shine finish.

D. Repair, patch, and touch-up marred surfaces to specified finish to match adjacent surfaces.

E. Broom clean paved surfaces; rake clean other surfaces of grounds. Remove all weeds.

F. Keep Project clean until it is occupied by Owner.

G. Wipe surfaces of mechanical and electrical equipment clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.

H. Replace all used filters.

I. Clean non-occupied spaces and limited-access spaces (such as plenums, shafts, equipment vaults, attics, and similar spaces), broom clean and free of surface dust.

J. Vacuum clean carpeted surfaces and similar soft surfaces.

K. Clean plumbing fixtures to a sanitary condition, free of stains including those resulting from water exposure.

L. Clean light fixtures and lamps so as to function with full efficiency.

M. Wash exterior surfaces to remove dirt, dust, efflorescence, and stains.

N. Except as otherwise indicated or requested by Architect, remove temporary protection devices and facilities.

O. Comply with safety standards and governing regulations for cleaning operations. Do not burn waste materials at site, or bury debris or excess materials on County's property, or discharge volatile or other harmful or dangerous materials into drainage system; remove waste materials from site and dispose of in a lawful manner.

P. Where extra materials of value remain, dispose of these to Owner's best advantage as directed.

Q. Clean all electronic detectors so as to function with full efficiency.

R. Clean stains from paved areas and repair damage.

END OF SECTION
I.01 DESCRIPTION

A. This Section describes the requirements for maintaining records of actual conditions in the field and for changes in the work.

B. The purpose of final Project Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modifications of the work to proceed without lengthy and expensive site measurement, investigation, and examination.

1.02 DOCUMENTS REQUIRED

A. Maintain at the site the following record documents to be turned over to the County upon Close Out:

1. Drawings.
2. Specifications.
3. Change Orders and other modifications to the Contract.
4. Field Instructions and other written instructions from the Construction Manager.
5. Reviewed Shop Drawings, product data, and samples.
6. Test Reports.
7. Requests for Information.
8. Claims.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store record documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.
2. Provide locked cabinets or secure storage space for storage of samples.
B. File documents and samples in a manner acceptable to the Construction Manager.

C. Make documents and samples available at all times for inspection by the Construction Manager.

D. Update the document within twenty-four (24) hours after receiving information that a change has occurred or clarification has been issued.

1.04 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color approved by the Construction Manager.

1.05 RECORDING

A. Label each document "PROJECT RECORD" in neat, large, printed letters.

B. Record information concurrently with the construction process.

1. Do not conceal any work until required information is recorded.

2. Completely, accurately, and legibly record, to the satisfaction of the Construction Manager, all deviations in construction, especially pipe and conduit locations, and any deviations caused by approved changes and/or clarifications to the work.

3. Use additional copies of prints, if necessary, to insure legible recording of data.

4. Date all entries.

5. Call attention to the entry by drawing a "cloud" around the area affected.

6. In the event of overlapping changes, use different colors for each change.

C. Legibly mark drawings to record actual construction:

1. Depths of various elements of foundation in relation to finish first floor datum.

2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

3. Locations of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

4. Field changes of dimension and detail.

5. Changes made reflecting approved changes to the work.
6. Details not on original contract drawings.

D. Legibly mark each Section of the Specifications to record:

1. Manufacturer' trade name, catalog number, and supplier of each product and item of equipment installed.

2. Changes made reflecting approved changes to the work.

E. Maintain shop drawings as record drawings. Legibly annotate shop drawings to record changes made after approval.

F. Prior to submitting each request for payment, secure approval from the Construction Manager of the current status of record documents.

G. Periodic payments or portions thereof to the Contractor may be withheld until the Construction Manager verifies that all as-built information to date has been properly recorded on project record documents.

1.06 CONVERSION OF SCHEMATIC LAYOUTS

A. The drawings, arrangements of conduits, circuits, piping, ducts, and similar items are shown schematically and are not intended to portray precise physical layout. The final physical arrangement is determined by the Contractor, subject to the approval of the Architect, and shall be accurately recorded by the Contractor on the record documents.

B. Show on the job set of record drawings, by dimension accurate to one inch, the centerline of each run of all items specified in the preceding paragraph.

1. Clearly identify the item by accurate note such as "cast iron drain" or "galvanized flashing", etc.

2. Show by symbol or note the vertical location of the item ("6 inches below slab", "in ceiling plenum", "exposed", etc.).

3. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.

C. Coordinate with the Coordination Drawings.

1.07 FINAL PROJECT RECORD DOCUMENTS

A. At a time nearing Substantial Completion of the work, obtain from the Architect one set of mylar reproducibles from the original transparencies and note all changes thereon for the final record documents to be submitted to the County.
B. Obtain approval from the Construction Manager of all data recorded on the record set of prints.

C. After Substantial Completion, carefully transfer all data shown on the job set of Record Drawings to the corresponding transparencies, coordinating the information as required.

D. Clearly indicate at each affected detail and other drawings a full description of changes made during construction, and the actual location of items as previously specified.

E. "Cloud" all affected areas.

F. Stamp each record drawing with the following information:
   1. Project Record Document.
   2. Prepared by: Contractor's name, permanent address.
   3. Date prepared:
   4. Contractor's signature.

1.08 SUBMITTEDS

A. Submit the complete set of Project Record Documents to the Construction Manager ten (10) days after final inspection.

B. Participate in review meetings with the Construction Manager and the Architect as required.

C. Make the required changes and promptly deliver the final Project Record Documents to the Construction Manager.

D. Accompany submittal with transmittal letter as specified in Section 01340 -Submittals. Include a signed certification that each document, as submitted, is complete and accurate.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

No used.
PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section describes the requirements for furnishing product data and related information appropriate for County Maintenance and operation of products furnished under the Contract. Prepare operating and maintenance data as specified in this Section and as referenced in other Sections. Check other Specification Sections for special requirements. The more restrictive will govern.

B. Instruct County personnel in the maintenance of products and in the operation of equipment and systems.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel trained and experienced in maintenance and operation of the described products, completely familiar with specified requirements, skilled as a technical writer to the extent required to communicate essential data, and skilled as a draftsman competent to prepare required drawings.

1.03 FORM OF O & M SUBMITTAL

A. Prepare a detailed training plan agenda for each instructional session for all mechanical, electrical, plumbing, hardware, communications, and systems to be approved by the County. Each training session will be divided into two parts: classroom training and on-the-job operational instructions of the equipment. Prepare data in the form of an instruction manual for use by County personnel and the Contractor’s instructors for classroom and job site training. The instructional/users manual will be prepared to organize and synthesize documents along with operating instructions and functional information. The manual will be used as the single source of information about the equipment and systems, operations, and functions.

B. Format:

1. Size: 8-1/2 inch x 11 inch.

2. Paper: 20 pound minimum, white, for typed pages.

3. Text: Manufacturers’ printed data, or neatly typewritten.

4. Drawings: provide reinforced punched binder tab, bind in with text. Fold larger drawing to the size of the text pages.
5. Provide fly-leaf for each separate product, or each piece of operating equipment. Provide typewritten description of product, and major component parts of equipment. Provide indexed tabs.


C. Binders:


1.04 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in a systematic order by specification number.

B. For each specification section provide:

1. Contractor, name of responsible principal, address and telephone number.

2. A list of each product and certification warranty/guarantee required to be included, indexed to the content of the volume.

3. List, with each product, the name, address, and telephone number of:
   a. Subcontractor or installer.
   b. Maintenance contractor, as appropriate.
   c. Identify the source of responsibility of each.
   d. Local source of supply for parts and replacements with address, telephone and fax number.

4. Identify each product by product name and other identifying symbols as set forth in the Contract Documents.

5. Product data, drawings, written text, etc. Include description of equipment, operating procedures, maintenance procedures, service schedule, etc. For materials and finishes give product information, instructions for care, etc.

C. Product Data:

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:
   a. Clearly identify the specific product or part installed.
   b. Clearly identify the data applicable to the installation.
   c. Delete references to inapplicable information.
   d. Content will include names listed in Paragraphs 1.05 and 1.06 below.

D. Drawings:
   1. Supplement product data with drawings as necessary to clearly illustrate:
      a. Relations of component parts of equipment and systems.
      b. Control and flow diagrams.
   2. Coordinate drawings with information on Project Record Documents to assure correct illustration of completed installation.
   3. Do not use Project Record Documents as maintenance drawings.

E. Written text is required to supplement product data for the particular installation for all mechanical, electrical, plumbing, heating, air conditioning, security, hardware, and communication systems.
   1. Organize in a consistent format under separate headings for different procedures.
   2. Provide a logical sequence of instructions for each procedure.

F. Copy of each warranty, bond, and service contract issued.
   1. Provide information sheet for County personnel; include:
      a. Proper procedures in the event of failure.
      b. Instances which might affect the validity of warranties or bonds.

G. Provide copies of performance tests.

1.05 O & M MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit three copies of complete manual in final form.

B. Content for each unit of equipment and system, as appropriate:
1. Description of unit and component parts.
   a. Function, normal operating characteristics, and limiting conditions.
   b. Performance curves, engineering data, and tests.
   c. Complete nomenclature and commercial number of all replaceable parts.

2. Operating procedures:
   a. Start-up, break-in, routine and normal operating instructions.
   b. Regulation, control, stopping, shut-down, and emergency instructions.
   c. Summer and winter operating instructions.
   d. Special operating instructions.

3. Maintenance procedures:
   a. Routine operations.
   b. Guide to "trouble-shooting".
   c. Disassembly, repair, and reassembly.
   d. Alignment, adjusting, and checking.
   e. Schedule for recommended service and preventative maintenance.

4. Servicing and lubricating schedule.
   a. List of lubricants required.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by control manufacturer.

7. Original manufacturer's part list, illustrations, assembly drawings, and diagrams required for maintenance.
   a. Predicted life of parts subject to wear.
   b. Items recommended to be stocked as spare parts.

8. As-installed control diagrams by controls manufacturer.
   a. As-installed color coded piping diagrams.

10. Charts of valve tag numbers, with the location and function of each valve.

11. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

C. Content, for each electrical and electronic system, as appropriate:

1. Description of system and component parts.
   a. Function, normal operating characteristics, and limiting conditions.
   b. Performance curves, engineering data, and tests.
   c. Complete nomenclature and commercial number of replaceable parts.

2. Circuit directories of panel boards.
   a. Electrical service.
   b. Controls.
   c. Communications.

3. As-installed color coded wiring diagrams.

4. Operating procedures:
   a. Routine and normal operating instructions.
   b. Sequences required.
   c. Special operating instructions.

5. Maintenance procedures:
   a. Routine operations.
   b. Guide to "Trouble-Shooting".
   c. Disassembly, repair, and reassembly.
   d. Adjustment and checking.
e. Schedule for preventative maintenance.

6. Manufacturer's printed operating and maintenance instructions.

7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.

8. Other data as required under pertinent Specification Sections.

D. Prepare and include additional data when the need for such data becomes apparent during instruction of County personnel.

E. Additional requirements for operating and maintenance data: The respective Specifications Sections.

F. Provide complete information for operating products and equipment specified in each Section.

1.06 O & M MANUAL FOR MATERIALS AND FINISHES

A. Submit three copies of complete manual in final form.

B. Content, for architectural products, applied materials and finishes:

1. Manufacturer's data, giving full information on products.
   a. Catalog number, size, composition.
   b. Color and texture designations.
   c. Information required for re-ordering specially manufactured products.

2. Instructions for care and maintenance.
   a. Manufacturer's recommendation for types of cleaning agents and methods.
   b. Cautions against cleaning agents and methods which are detrimental to the product.
   c. Recommended schedule for cleaning and maintenance.

C. Content, for moisture-protection and weather-exposed products:

1. Manufacturer's data, giving full information on products.
   a. Applicable standards.
b. Chemical composition.

c. Details of installation.

2. Instructions for inspection, maintenance, and repair.

D. Additional requirements for maintenance data: the respective Sections of Specifications.

E. Provide complete information for finished products or surfaces specified in each Section.

1.07 SUBMISSION SCHEDULE

A. Submit three copies of completed data in final form 30 days prior to the estimate date of Substantial Completion for the Architect's review. Data will be used by the inspectors and for training of County personnel. Make all corrections noted by the Owner and agents prior to their use for training and return for review. Upon acceptance provide training prior to substantial completion. Two copies will be returned after the Substantial Completion.

B. Submit three copies of accepted data in final form ten days after Final Inspection.

1.08 INSTRUCTION OF COUNTY PERSONNEL

A. Prior to Construction Manager's inspection for Substantial Completion, fully instruct County designated operating and maintenance personnel in the operation, adjustment and maintenance of all products, equipment and systems including hospital equipment, mechanical, electrical, plumbing, heating, or air conditioning, security, communications, and hardware systems based on the reviewed maintenance manuals.

B. The user's operating and maintenance manual, training plan, and agenda shall constitute the basis of instruction with the Contractor for each piece of equipment and/or system. The Contractor will provide training schedules seven days in advance of all training for approval by Owner.

1. The Contractor will arrange for on-site training and review of each piece of equipment and system to explain the "hands-on" operation of the systems. The Contractor will provide at least 40 hours for the on-site instruction for each of the mechanical, electrical, plumbing, heating or air conditioning, security, communications, and hardware systems and equipment. In addition, the Contractor will provide at least 40 hours of classroom instruction for each of the mechanical, electrical, plumbing, heating or air conditioning, communications, and hardware systems and equipment. The on-site and classroom instruction as contained in this Section are considered a minimum requirement. If conflict exists between this requirement and the technical specifications. Divisions 2 through 16, the more restrictive requirement will be followed.
2. Review contents of Owner's O&M Manual with personnel in full detail to explain all aspects of operation and maintenance both in the field and in the classroom.

C. The Contractor will provide, in addition to the three copies of the operation and maintenance manuals required for the official file, as many additional copies as are necessary for instructing the County personnel (ten maximum).

D. Submit six copies of the master schedule, training plan, and agendas for each training session for each piece of equipment and system for mechanical, electrical, plumbing, heating or air conditioning, communications, and hardware and hospital equipment thirty days prior to the estimated date of substantial completion for review and approval by the County and the Construction Manager.

E. The user's operating and maintenance/user's manual, which will be used for instructional purposes, shall provide for each system the theory of operation, detailed diagrams and parts lists, preventive maintenance instruction, and corrective maintenance.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
SECTION 01740

GUARANTEES/WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Requirements Included:

1. Compile specified guarantees, warranties, and bonds.

2. Compile specified service and maintenance contracts.

3. Co-execute submittals when so specified.

4. Review submittals to verify compliance with Contract Documents.

5. Submit for review and transmittal to Construction Manager.

1.02 SUBMITTAL REQUIREMENTS

A. Provide list and assemble all guarantees/warranties, bonds, and service and maintenance contracts, executed by the Contractor and each of the respective manufacturers, suppliers, and subcontractors. Submit within ten days after Final Inspection.

B. Number of original signed copies required: two (2) each.

C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.

1. Product or work item.

2. Firm, with name of principal, address and telephone number.

3. Type and duration of guarantee or warranty.

1.03 FORM

A. In addition to other requirements of the Contract Documents regarding the general two-year warranty, as a condition precedent to certifying final payment, the Contractor shall provide extended guarantees/warranties for certain work, as specified in the applicable Specification Sections, on the following form written on the Contractor's own letterhead. The guarantees/warranties shall commence on the Date of Substantial Completion of the Work by the County, unless specifically indicated otherwise.
Guarantee/Warranty for
(Phase or portion of work under warranty identified by Specification Section.)

Project: ________________________________

Address: ________________________________

Date: ________________________________

We hereby warrant and the Contractor guarantees that the ____________________________, which we have installed in the ____________________________ has been performed in accordance with the Drawings and Specifications and that the work as installed will fulfill the requirements of the guarantee/warranty included in the Specifications.

We agree to repair or replace any or all of our work, together with any or all other work which may be damaged or displaced by so doing, that may prove to be defective in its workmanship, materials, or failure to conform to Contract provisions and requirements within a period of two years from the Date of Substantial Completion of the above named structure by the County without expenses whatever to the said County, ordinary wear and tear and unusual abuse or neglect excepted.

In the event of our failure to comply with the foregoing conditions within ten days after being notified in writing by the County, we collectively or separately do hereby authorize the County to proceed to have said defects repaired and made good at our expense and we will honor and pay the costs and charges therefor upon demand.

Signed: ________________________________ Date: ________________________________
(Contractor)

Signed: ________________________________ Date: ________________________________
(Subcontractor)

Countersigned: __________________________ Date: ________________________________
(Contractor)

Include the following, if specified:

Countersigned: __________________________ Date: ________________________________
(Manufacturer)
1.04 CORRECTION OF GUARANTEED/WARRANTED WORK

A. Unless repair is agreed to by Owner, Construction Manager, and Architect, Contractor shall correct failed work by removal and replacement of the failed portions with new materials.

B. In connection with Contractor's correction of warranted work which has failed, remove and replace other work of Project which has been damaged as a result of such failure, or which must be removed and replaced to provide access for correction of warranted work.

C. Except as otherwise indicated or required by governing regulations, special Project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract) which occurs as a result of failure of warranted work.

D. Except as otherwise indicated, when costs of replacing or restoring failing warranted units or products is Contractor's obligation, without regard for whether Owner has already benefitted from use through a portion of anticipated useful service lives.

E. Except as otherwise indicated, costs of replacing or restoring failing warranted units or products is Contractor's obligation, without regard for whether Owner has already benefitted from use through a portion of anticipated useful service lives.

F. Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for materials or units of work for Project where a special Project warranty, specified product warranty, certification, or similar commitment is required, until it has been determined by the contractor that entities required to countersign such commitments are willing to do so.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
OWNER:

STANISLAUS COUNTY
Chief Executive Office
County Administrative Building
1100 H Street, 2nd Floor
Modesto, California 95353

TENANT

STANISLAUS COUNTY
Probation Department
2215 Blue Gum Avenue
Modesto, California 95358

ARCHITECT:

LRS ARCHITECTS, INC.
1121 SW Salmon Street, Suite 100
Portland, Oregon 97205
Phone: (503) 221-1121
Fax: (503) 221-2077
Contact: Paul Boundy

CIVIL ENGINEER:

GARCIA, DAVIS, RINGLER ENGINEERS
3641 Mitchell Road Suite D
Ceres, California 95307
Phone: (209) 538-3360
Fax: (209) 538-7370
Contact: Rick Ringler

LANDSCAPE ARCHITECT:

KNOX LANDSCAPE ARCHITECTURE
PO Box 272
Sonora, California 5370
Phone: (209) 532-2856
Fax: (209) 532-9510
Contact: Tom Holloway

SECURITY PLANNING & DESIGN:

THE RESOURCE GROUP
75342 Montecito Drive
Indian Wells, California 92210
Phone: (760) 862-0050
Fax: (760) 862-0027
Contact: William “Harry” H. Munyon (“Harry”)

STRUCTURAL:

THE CROSBY GROUP
726 Main Street
Redwood City, California 94063
Phone: (650) 367-8100
Fax: (650) 367-8189
Contact: Ken Campbell

MECHANICAL ENGINEER:

ARTHUR L. ZIGAS & ASSOCIATES
55 New Montgomery, Suite 626
San Francisco, California 95105
Phone: (415) 882-7805
Fax: (415) 882-7758
Contact: Arthur “Art” L. Zigas

ELECTRICAL ENGINEER:

CERBATOS & ASSOCIATES
55 New Montgomery, Suite 402
San Francisco, California 94105
Phone: (415) 541-9344
Fax: (415) 541-9464
Contact: Richard Cerbatos (“Dick”)
DIVISION 2 SITE CONSTRUCTION

02300  Earthwork
02302  Earthwork For Site Utilities
02621  Foundation Drainage Piping
02630  Storm Drainage
02660  Water Distribution System
02720  Storm Drainage System
02742  Bituminous Concrete Pavement
02776  Cement Concrete Pavement
02813  Irrigation Systems
02821  Chain Link Fences and Gates
02900  Landscaping
02915  Landscape Finish Grading

DIVISION 3 CONCRETE

03100  Concrete Formwork
03200  Concrete Reinforcement
03300  Cast-In-Place Concrete
03450  Precast Architectural Concrete

DIVISION 4 MASONRY

04100  Masonry Mortar and Grout
04220  Concrete Masonry Units

DIVISION 5 METALS

05120  Structural Steel
05300  Metal Deck
05400  Cold-Formed Metal Framing
05500  Metal Fabrications
05800  Expansion Control

DIVISION 6 WOOD AND PLASTICS

06100  Rough Carpentry
06400  Architectural Woodwork

DIVISION 7 THERMAL AND MOISTURE PROTECTION

07190  Water Repellent
07210  Building Insulation
07410  Metal Roof and Wall Panels
07510  Built-Up Bituminous Roofing
07620  Sheet Metal Flashing and Trim
07812  Cementitious Fireproofing
07840  Firestopping
07900  Joint Sealers

LRS Architects, Inc.
DIVISION 8 DOORS AND WINDOWS

08000 Door and Window Schedule
08110 Steel Doors and Frames
08120 Aluminum Shower Doors and Frames
08313 Access Doors
08320 Detention Doors and Frames
08510 Steel Windows
08781 Detention Hardware
08800 Glazing

DIVISION 9 FINISHES

09000 Room Finish Schedule
09220 Portland Cement Plaster
09260 Gypsum Board Assemblies
09300 Tile
09510 Acoustical Ceilings
09680 Carpet
09900 Painting

DIVISION 10 SPECIALTIES

10115 Markerboards
10520 Fire Protection Specialties
10810 Toilet Accessories

DIVISION 11 EQUIPMENT

11000 Furnishings and Accessory Schedule
11132 Projection Screens
11190 General Requirements for Detention Equipment
11191 Detention Furnishings
11192 Security Screws

DIVISION 12 FURNISHINGS (Not Applicable)

DIVISION 13 SPECIAL CONSTRUCTION (Not Applicable)

DIVISION 14 CONVEYING SYSTEMS (Not Applicable)

DIVISION 15 MECHANICAL

15010 Mechanical General Requirements
15140 Supports and Anchors
15170 Motors
15280 Mechanical Insulation
15330 Sprinkler System
15400 Plumbing
15780 HVAC Equipment
15890 Ductwork and Accessories
15950 Controls
### DIVISION 16 ELECTRICAL

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<td>General Electrical Provisions</td>
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<td>Basic Electrical Materials and Methods</td>
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<td>16100</td>
<td>Underground Distribution</td>
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### DIVISION 17 DETENTION ELECTRONICS

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<td>Detention Electronics</td>
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<tr>
<td>17001</td>
<td>Closed Circuit TV System</td>
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END OF TABLE OF CONTENTS
PART 1  GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns, and plantings.
   2. Excavating and backfilling for buildings and structures.
   3. Drainage course for slabs-on-grade.
   4. Subbase course for cement concrete walks and pavements.
   5. Base course for bituminous concrete pavement.
   6. Excavating and backfilling trenches.

B. Related Sections.
   1. Section 01500: Construction Facilities and Temporary Controls.
   2. Section 02621: Foundation Drainage Piping, for drainage systems at foundations.
   3. Section 02810: Irrigation System, for excavation and backfilling for irrigation piping.
   4. Division 15 and 16 Sections for excavating and backfilling buried mechanical and electrical utilities and buried utility structures.

1.2 DEFINITIONS

A. Backfill: Soil materials used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

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

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

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

E. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations.
   1. Additional Excavation: Excavation below subgrade elevations as directed by Architect. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, will not be compensated.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material and boulders 3/4 cu. yd. or more in volume that exceeds a standard penetration resistance of 100 blows/2 inches according to ASTM D 1586.

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

J. Subbase Course: Layer placed between subgrade and base course for bituminous concrete pavement, or layer placed between subgrade and cement concrete pavement or walks.

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

L. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 SUBMITTALS

A. Product Data: For the following:

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 698 [ASTM D 1557] for on-site or borrow soil material proposed for fill and backfill.

1.4 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing.

B. Preexcavation Conference: Conduct conference at Project site to comply with requirements for Project meetings in Section 01310.

1.5 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless temporary utility services has been arranged for and agreed to by Architect.
   1. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed.
   1. Coordinate with utility companies to shut off services if lines are active.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

B. Satisfactory Soils: ASTM D 2487 soil classification groups GW, GP, GM, SW, SP, and SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, and PT, or a combination of these group symbols.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
D. Backfill and Fill: Satisfactory soil materials.

E. Subbase: ASTM D 2940; Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

F. Base: ASTM D 2940; Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

G. Engineered Fill: ASTM D 2940; Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

H. Bedding: ASTM D 2940; Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, 1-inch minus with not more than 8 percent passing a No. 200 sieve.

I. Drainage Fill: ASTM D 448; Self-draining, washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; 3/4 inch minus with not more than 3 percent passing a No. 200 sieve.

J. Filter Material: ASTM D 448; Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; 1-inch minus with not more than 5 percent passing a No. 4 sieve.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

L. Topsoil: Imported or approved on-site natural, fertile, friable, sandy loam with at least 10 percent humus; free of rock, clay subsoil, clods, lumps, plants, roots, sticks, weeds, seeds, and other deleterious material.

2.2 ACCESSORIES

A. Drainage Fabric: ASTM D 4759; Nonwoven geotextile made from polyolefins, polyesters, or polyamides, with the following minimum properties:

1. Grab Tensile Strength: 110 lbf; ASTM D 4632.
2. Tear Strength: 40 lbf; ASTM D 4533.
5. Apparent Opening Size: No. 50; ASTM D 4751.

B. Separation Fabric: ASTM D 4759; Woven geotextile made from polyolefins, polyesters, or polyamides, with the following minimum properties:

1. Grab Tensile Strength: 200 lbf; ASTM D 4632.
2. Tear Strength: 75 lbf; ASTM D 4533.
5. Apparent Opening Size: No. 30; ASTM D 4751.

C. Irrigation Sleeves: PVC pipe, Schedule 40; sizes as indicated.
PART 3 EXECUTION

3.1 PREPARATION

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

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

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

3.2 DEWATERING

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

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

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 WATERING

A. Furnish and apply water for the following:

1. Compaction and preparation of excavations, subgrades, subbases, base course, and surfacing.

2. Alleviation or prevention of dust nuisance.

B. Perform watering at any hour of day, and on any day of week, as necessary for protection of work and for alleviation of dust nuisance.

3.4 EXCAVATION, GENERAL

A. Excavation to subgrade elevations is classified as earth and rock.

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

2. Rock excavation includes removal and disposal of rock.

   a. Do not excavate rock until it has been classified and cross-sectioned by Architect.

   b. Rock excavation will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.

B. Use suitable material taken from excavations for embankments, subgrade, and backfilling.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with borrow materials.
2. When volume of excavation is not sufficient for construction fill to grades indicated, supply deficiency from borrow sources at locations authorized by Architect.
3. When volume of earth excavation exceeds that for embankments, subgrade, and backfilling, use excess to grade areas of ultimate development, or waste, as directed by Architect.
4. Do not use topsoil or strippings in fills or subgrades.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations within a tolerance of plus or minus 1 inch.
   1. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Excavations for Footings and Foundations:
   1. Do not disturb bottom of excavation.
   2. Excavate by hand to final grade just before placing concrete reinforcement.
   3. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: As indicated.

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

3.8 APPROVAL OF SUBGRADE

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

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

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect.
3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill may be used when approved by Architect.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow materials and satisfactory excavated soil materials.

1. Stockpile soil materials without intermixing.
2. Place, grade, and shape stockpiles to drain surface water.
3. Cover to prevent windblown dust.
4. Stockpile soil materials away from edge of excavations.
5. Do not store within drip line of trees to remain.

3.11 BACKFILL

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

1. Construction below finish grade.
2. Surveying locations of underground utilities for record documents.
3. Inspecting and testing underground utilities.
4. Removing concrete formwork, including temporary shoring and bracing, and sheeting.
5. Removing trash and debris.

3.12 UTILITY TRENCH BACKFILL

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

B. Backfill trenches excavated under footings and within 18 inches of bottom of footings; fill with concrete to elevation of bottom of footings.

C. Provide 4-inch-thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways.

1. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

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

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

E. Coordinate backfilling with utilities testing.

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

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

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

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

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under building slabs, use engineered fill.
4. Under footings and foundations, use engineered fill.

3.14 COMPACTION OF BACKFILLS AND FILLS

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

1. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
2. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
3. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

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

C. Compact soil to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 92 percent.
3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill material at 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes.

1. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
2. Provide a smooth transition between adjacent existing grades and new grades.
3. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
4. Slope grades to direct water away from buildings and to prevent ponding.

B. Site Grading: Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.
C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBSURFACE DRAINAGE

A. Drainage pipe is specified in Section 02621: Foundation Drainage Piping.

B. Subsurface Drain:

1. Place a layer of drainage fabric around perimeter of drainage trench.
2. Place a 6-inch course of filter material on drainage fabric to support drainage pipe.
3. Encase drainage pipe in a minimum of 12 inches of filter material and wrap in drainage fabric, overlapping sides and ends at least 6 inches.
4. Compact each course of filter material to 95 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill:

1. Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade.
2. Overlay drainage backfill with one layer of drainage fabric, overlapping sides and ends at least 6 inches.
3. Compact each course of filter material to 95 percent of maximum dry density according to ASTM D 698.
4. Place and compact impervious fill material over drainage backfill to final subgrade.

3.17 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course on [separation fabric over] prepared subgrade as follows:

1. Place base course material over subbase.
2. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.
3. Shape subbase and base to required crown elevations and cross-slope grades.
4. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
5. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

B. Pavement Shoulders:

1. Place shoulders along edges of subbase and base course to prevent lateral movement.
2. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.18 DRAINAGE COURSE

A. Place minimum 6 inches drainage fill under building slabs-on-grade.

1. Grade aggregate base to drain to top of perimeter foundation wall footings.
2. Compact drainage course to required cross sections to not less than 95 percent of maximum dry unit weight according to ASTM D 698.
3. When compacted thickness of drainage course is 6 inches or less, place materials in a single layer.

4. When compacted thickness of drainage course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.19 FIELD QUALITY CONTROL

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

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

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.

2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.

3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for each 150 feet or less of trench length, but no fewer than two tests.

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

3.20 PROTECTION

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

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

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

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

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

3.21 REPAIR OF DAMAGED AREAS

A. Replace existing pavement areas damaged due to hauling or to any other construction activity.
B. Restore disturbed areas due to construction activity outside pavement area to their original condition prior to final acceptance of Project.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

END OF SECTION
PART 1  GENERAL

1.1  SUMMARY

A. Section includes building perimeter foundation subsoil drainage piping.

B. Related Sections:

1. Section 02300: Earthwork, for excavating, trenching, and backfill.
2. Section 02630: Storm Drainage Systems, for connections to storm drainage system.

1.2  SUBMITTALS

A. Product Data: For each type of pipe.

1.3  DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe in direct sunlight.

1.4  PROJECT CONDITIONS

A. Verify existing utility locations.

1.5  COORDINATION

A. Coordinate foundation drainage piping installation with excavating and backfilling specified in Section 02300.

B. Coordinate piping termination with storm drainage system.

PART 2  PRODUCTS

2.1  MATERIALS

A. Perforated Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D 2729, bell and spigot ends, for loose joints.

B. Cast-Iron Soil Pipe and Fittings: ASTM A 74, Service class, hub and spigot ends, gray, cast iron, for gasketed joints.

C. Cleanouts: ASME A112.36.2M, with round-flanged, cast-iron housing, and secured, scoriated, medium duty loading class, cast-iron cover.

1. Include cast-iron ferrule and countersunk, brass cleanout plug.

PART 3  EXECUTION

3.1  EXAMINATION

A. Examine surfaces and areas for suitable conditions where foundation drainage piping is to be installed.

1. Do not proceed until unsatisfactory conditions have been corrected.
6. Verify location of existing underground utilities and protect from damage during installation of drainage piping.

3.2 PIPING APPLICATIONS

A. Foundation Drainage System: 6 inch perforated polyvinyl chloride (PVC) sewer pipe and fittings, for loose, bell and spigot joints.

B. Cleanouts and Riser Extensions: Service class cast-iron soil pipe and fittings.

C. Join pipe made of different materials and dimensions with special couplings made for specific application, compatible with both pipe materials and dimensions.

3.3 INSTALLATION

A. Refer to Drawings for location and details of foundation drainage system.

1. Refer to Section 02300: Earthwork, for bedding, drainage fill, filter fabric and backfilling materials and installation for foundation drainage system.

B. Foundation Drainage System: Install piping beginning at low points of system, true to grades and alignment indicated.

1. Install piping pitched down in direction of flow at a minimum slope of 1 percent, except where otherwise indicated.
   a. Install on bedding and in drainage fill as described in Section 02300.

2. Install gaskets and couplings according to manufacturer’s instructions, and as follows:

3. Install perforated pipe with perforations down.

4. Extend piping and connect to storm drainage system.

C. Cleanouts: Install cleanouts and riser extensions from foundation drainage piping to cleanouts at grade.

1. Install fittings so that cleanouts open in direction of flow in piping.

2. Set cleanout frames and covers in earth in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep.
   a. Set with tops 1 inch above grade.

3. Set cleanout frames and covers in pavement with tops flush with paving surface.

END OF SECTION
PART 1  GENERAL

1.1 DESCRIPTION

A. Work includes furnishing and installing:

1. Corrugated steel pipe (csp), reinforced concrete pipe (rcp), and corrugated plastic drainage pipe and accessories

2. Stone riprap at culverts, drainage ditches and slope protection, as noted on the drawings

3. Precast concrete drop inlets and catch basins.

1.2 SUBMITTALS

A. Submit source of rock slope protection material for inspection by the Geotechnical Engineer.

1.3 TRENCHING AND BACKFILL

A. Specified in Section 02321.

1.4 REFERENCES:

A. AASHTO T180 - Moisture Density Relations of Soils Using a 10-lb. (4.54 kg) Rammer and an 18-inch (457 mm) Drop.

B. ASTM A444/A444M - Steel Sheet, Zinc-Coated (galvanized by the Hot Drip Process for Storm Sewer and Drainage Pipe.

C. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.

D. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

E. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

F. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Lb. (2.49 Kg) Rammer and 12-inch (304.8 mm) Drop.

G. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 Lb. (4.54 Kg) Rammer and an 18-inch (457 mm) Drop.

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

I. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.


PART 2  PRODUCTS

2.1 SINGLE WALL CORRUGATED POLYETHYLENE PIPE:

A. This specification applies to high density polyethylene corrugated pipe, Type C.
B. This specification is applicable to nominal sizes 3-24 inch diameter. Requirements for test methods, dimensions and markings are those found in ASTM Designations F405 and F667.

C. Pipe and fittings shall be made of polyethylene compounds which meet or exceed the requirements of Grade P33 or P34, Class C per ASTM D1248 with the applicable requirements defined in ASTM D-1248. Clean reworked material may be used.

D. Minimum parallel plate pipe stiffness values shall be as follows:

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*Per ASTM Test Method D-2412 at 5%

E. The pipe and fittings shall be free of foreign inclusions and visible defects. For pipe sizes 12 inches diameter and greater, designed drainage perforations shall be permitted in corrugation valleys only. All holes of any kind in the corrugation crests or sidewalls shall be considered unacceptable. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

F. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Architect.

G. Joints for 3 inches – 6 inches shall be made with snap couplings. Joints for 8 inches – 24 inches shall be made with split couplings to engage the pipe corrugations. Joints shall be watertight.

H. Installation shall be in accordance with ASTM Recommended Practice D2321, or as specified by the local approving agency.

I. A manufacturer's certification that the product was manufactured, tested and supplied in accordance with this specification shall be furnished to the Architect upon request.

2.2 BEDDING AND COVER MATERIALS:

A. Bedding: Common fill, as specified in Section 02321, or as approved by the Geotechnical Engineer.
2.3 INLET AND OUTLET STRUCTURES:

A. Inlet and outlet structures shall be as shown on the drawings. Materials shall be compatible with the conduit material. Joints and connections between the structure and the culvert shall be grouted, caulked, welded, or otherwise sealed to provide a smooth transition of flow and a solid, water-tight connection.

B. Drain inlets shall be precast concrete 'boxes' with standard grates and appurtenances, as manufactured by Christy Concrete Products, Inc., or approved equal, of type or models designated on the drawings.

C. Grates and frames shall be steel construction meeting requirements for HS-20 traffic loading, as shown on the drawings.

D. Precast manholes for storm drains and sanitary sewers shall be as manufactured by Cook Products, Redding CA, or approved equal, and shall conform to the details shown on the drawings.

E. Concrete for cast-in-place structure shall conform to Section 90 of Standard Specifications, Class 'B', 5-sack transit mix with a compressive strength of 2,500 psi at 28 days, three-inch (3") slump and maximum 3/4" aggregate.

2.4 RIPRAP

A. Well-graded angular quarry stones, sound and hard, resistant to water and weathering. Stones for slope protection shall conform to Cal-Trans specification Section 72 facing class and have the following gradation:

- 200 lb. 0-5% larger than 75 lb. 50-100% larger than 25 lb. 90-100% larger than

B. Stones for rock-lined ditches and drainage outfalls shall be cobble class with a uniform mixture of 4-inch to 12-inch angular rock.

2.5 FILTER FABRIC

A. Fabric shall be a nonwoven geotextile conforming to the following properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight, oz./sq. yd.</td>
<td>ASTM 03776</td>
<td>6 oz. Min.</td>
</tr>
<tr>
<td>Grab tensile strength, lbs.</td>
<td>ASTM D4632</td>
<td>90 Lb. Min.</td>
</tr>
<tr>
<td>Grab elongation, lbs.</td>
<td>ASTM D4632</td>
<td>50 Lb. Max.</td>
</tr>
<tr>
<td>Puncture, lb.</td>
<td>ASTM D4833</td>
<td>55 Lb. Min.</td>
</tr>
<tr>
<td>Opening size, U.S. sieve</td>
<td>ASTM D4751</td>
<td>70</td>
</tr>
</tbody>
</table>

Fabric shall be AMOCO 4545 or approved.
PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that trench cut and excavations are ready to receive work, and excavations, dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION
A. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING
A. Excavate culvert trench to three inches below pipe invert, in accordance with Section 02321, for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
B. Place bedding material at trench bottom, and shape to conform to culvert pipe. Level fill materials in one continuous layer not exceeding 6 inches compacted depth. Compact to 95%, as specified in Section 02321.
C. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95%, as specified in Section 02321.
D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION – PIPE
A. Install pipe and accessories in accordance with manufacturer’s instructions.
B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
C. Shore pipe to required position; retain in place until after compaction of adjacent fills. Ensure pipe remains in correct position and to required slope and elevations.
D. Repair surface damage to galvanized pipe protective coating with two coats of compatible bituminous paint coating, or galvanized paint.
E. Install cover material at sides and over top of pipe. Provide top cover to minimum compacted thickness as shown on the Drawings. Backfilling shall be in accordance with the requirements of Section 02321.
F. Install culvert end treatments, where specified.

3.5 ERECTION TOLERANCES:
A. Lay pipe to alignment and slope gradients noted on the drawings, with maximum variation from true slope of 0.10 per 100 foot length.
B. Maximum variation from intended elevation of culvert invert: 0.10 foot.
C. Maximum offset of pipe from true alignment: 0.10 foot.
3.6 PIPE PROTECTION:

A. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

3.7 ROCK SLOPE PROTECTION

A. Excavate foundation to lines and grades, as shown on plans. Obtain Geotechnical Engineer's approval of foundation before placing rock slope protection.

B. Place filter fabric over prepared excavation and secure in place.

C. Place stones into place to form the proper cross section. The exposed surface of riprap shall be reasonably uniform and free from bulges, humps, or cavities.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Trench excavation for underground utilities.
2. Trench backfill for underground utilities.

B. Related Sections:

1. Section 02300: Earthwork

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.


   a. C 33 Concrete Aggregate
   b. D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. (4.5KG) Rammer and 18-in. (457-mm) Drop
   c. D 2911 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
   d. D 3017 Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

1.3 SUBMITTALS

A. Shoring and Sheeting Plan: Before starting work submit a shoring and sheeting plan.

1.4 DELIVERY AND STORAGE

A. Deliver and store materials in a manner to prevent contamination or segregation.

PART 2 PRODUCTS

2.1 NATIVE MATERIAL

A. Material obtained from trench excavation which shall be free of debris (including asphalt), roots, wood, scrap material, vegetable matter, refuse, soft unsound particles, frozen, deleterious, or other objectionable materials.

2.2 SELECT NATIVE MATERIAL

A. Shall conform to the general requirements for native material above with a sand equivalent not less than 20 and lumps over 2 inch diameter shall be removed.
2.3 BEDDING

A. Bedding shall be 6" of crushed stone, crushed gravel or sand from bottom of pipe.

3.1 GENERAL EXCAVATION

A. Shall be to the elevations and dimensions indicated or otherwise specified. Keep excavations free from water while construction is in progress. Make trench sides as nearly vertical as practicable and safe. Sides of trenches shall not be sloped from the bottom of the trench up to the elevation of the top of the pipe and conduit. Excavate hard material to an over-depth at least 4 inches below the bottom of the pipe, conduit, and appurtenances unless otherwise indicated or specified. Stabilize soft, weak, or wet excavations by excavating an additional 6-inches and placing compacted bedding material. Use bedding material to refill over-depths to the proper grade and place in 6-inch maximum layers. Grade bottom of trenches accurately to provide uniform bearing and support for each section of pipe, conduit, and structures on undisturbed soil, or bedding material as indicated or specified at every point along its entire length except for portions where it is necessary to excavate for bell holes and for making proper joints. Dig bell holes and depressions for joints after trench has been graded and dimension as required for properly making the particular type of joint to ensure that the bell does not bear on the bottom of the excavation. Dimensions as indicated or specified.

B. Excavations shall be backfilled before leaving work for the night.

3.2 BEDDING

A. Shall be of the materials and depths as indicated or specified. Ensure that bedding is placed completely under pipe haunches. Place bedding in 6-inch maximum loose lifts. Provide uniform and continuous support for each section of structure except at bell holes or depressions necessary for making proper joints.

B. Refill: Is defined as material placed in excavation to correct over-cut in depth.

3.3 GENERAL BACKFILLING

A. Shall be as indicated or specified. Place in 6-inch maximum loose lifts. Bring up evenly on each side, and for the full length, of the structure. Ensure that no damage is done to structures or protective coatings thereon. Place the backfill in 6-inch maximum loose lifts. Compact each loose lift as specified in Paragraph "General Compaction" before placing the next lift. Do not backfill in freezing weather, where the material in the trench is already frozen or is muddy, except as authorized. Where unacceptable settlements occur in trenches and pits due to improper compaction, excavate to the depth necessary to rectify the problem, then backfill and compact the excavation as specified herein and restore the surface to the required elevation.
3.4 COMPACTION

A. Use hand-operated plate type vibratory or other suitable hand tampers in areas not accessible to larger rollers or compactors. Be careful to avoid damaging pipes and protective pipe coatings. If necessary, the Contractor's selected equipment and construction procedure shall be altered, changed or modified in order to meet the specified compaction requirements. See trench detail on drawings for required compaction. Compaction is expressed as a percentage of maximum density as determined by ASTM D 1557, Method D.

3.5 SPECIAL EARTHWORK INSTALLATION REQUIREMENTS

A. Manholes and Other Appurtenances: Provide at least 12 inches clear from outer surfaces to the ground. Remove unstable soil that is incapable of supporting the structure to an over-depth of one foot and refill with crushed stone to the proper elevation. Refill over-depths with crushed stone to the required grade and compact to 95 percent of ASTM D 1557, Method D, maximum density.

3.6 FINISH OPERATIONS

A. Grading: Shall be to finished grades indicated within one tenth of a foot. Existing grades which are to remain but not disturbed by the Contractor's operations shall be graded as directed.

B. Disposition of Surplus Material: Surplus or other soil material not required or suitable for filling, backfilling, or grading shall be removed.

C. Protection of Surfaces: Protect newly graded areas from traffic, erosion, and settlements that may occur. Repair or re-establish damaged grades, elevations, or slopes.

3.7 TESTING

A. Compaction density testing shall be measured in accordance with ASTM D 2922 and D 3017, and shall be taken at locations selected by the Architect, or his authorized representative. In order to test the relative density in the critical area immediately around the pipe, the Contractor may be required at his expense, to spot excavate down to the installed pipeline so that proper compaction tests can be obtained. This will only be required if the inspector feels the pipe and backfill was not installed in accordance with the specifications. After testing, the area shall be compacted as indicated above.

END OF SECTION
PART 1  GENERAL

1.1 DESCRIPTION

A. Work includes furnishing and installing:

1. Corrugated steel pipe (csp), reinforced concrete pipe (rcp), and corrugated plastic drainage pipe and accessories

2. Stone riprap at culverts, drainage ditches and slope protection, as noted on the drawings

3. Precast concrete drop inlets and catch basins.

1.2 SUBMITTALS

A. Submit source of rock slope protection material for inspection by the Geotechnical Engineer.

1.3 TRENCHING AND BACKFILL

A. Specified in Section 02321.

1.4 REFERENCES:

A. AASHTO T180 - Moisture Density Relations of Soils Using a 10-lb. (4.54 kg) Rammer and an 18-inch (457 mm) Drop.

B. ASTM A444/A444M - Steel Sheet, Zinc-Coated (galvanized by the Hot Drip Process for Storm Sewer and Drainage Pipe.

C. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.

D. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

E. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

F. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 Lb. (2.49 Kg) Rammer and 12-inch (304.8 mm) Drop.

G. ASTM D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10 Lb. (4.54 Kg) Rammer and an 18-inch (457 mm) Drop.

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

I. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.


PART 2  PRODUCTS

2.1 SINGLE WALL CORRUGATED POLYETHYLENE PIPE:

A. This specification applies to high density polyethylene corrugated pipe, Type C.
B. This specification is applicable to nominal sizes 3-24 inch diameter. Requirements for test methods, dimensions and markings are those found in ASTM Designations F405 and F667.

C. Pipe and fittings shall be made of polyethylene compounds which meet or exceed the requirements of Grade P33 or P34, Class C per ASTM D1248 with the applicable requirements defined in ASTM D-1248. Clean reworked material may be used.

D. Minimum parallel plate pipe stiffness values shall be as follows:

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Pipe Stiffness</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>30 psi</td>
</tr>
<tr>
<td>4&quot;</td>
<td>30 psi</td>
</tr>
<tr>
<td>6&quot;</td>
<td>30 psi</td>
</tr>
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<tr>
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<td>42 psi</td>
</tr>
<tr>
<td>18&quot;</td>
<td>40 psi</td>
</tr>
<tr>
<td>24&quot;</td>
<td>34 psi</td>
</tr>
</tbody>
</table>

*Per ASTM Test Method D-2412 at 5%

E. The pipe and fittings shall be free of foreign inclusions and visible defects. For pipe sizes 12 inches diameter and greater, designed drainage perforations shall be permitted in corrugation valleys only. All holes of any kind in the corrugation crests or sidewalls shall be considered unacceptable. The ends of the pipe shall be cut squarely and cleanly so as not to adversely affect joining.

F. The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe. Corrugated fittings may be either molded or fabricated by the manufacturer. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Architect.

G. Joints for 3 inches - 6 inches shall be made with snap couplings. Joints for 8 inches - 24 inches shall be made with split couplings to engage the pipe corrugations. Joints shall be watertight.

H. Installation shall be in accordance with ASTM Recommended Practice D2321, or as specified by the local approving agency.

I. A manufacturer's certification that the product was manufactured, tested and supplied in accordance with this specification shall be furnished to the Architect upon request.

2.2 BEDDING AND COVER MATERIALS:

A. Bedding: Common fill, as specified in Section 02321, or as approved by the Geotechnical Engineer.
2.3 INLET AND OUTLET STRUCTURES:

A. Inlet and outlet structures shall be as shown on the drawings. Materials shall be compatible with the conduit material. Joints and connections between the structure and the culvert shall be grouted, caulked, welded, or otherwise sealed to provide a smooth transition of flow and a solid, water-tight connection.

B. Drain inlets shall be precast concrete ‘boxes’ with standard grates and appurtenances, as manufactured by Christy Concrete Products, Inc., or approved equal, of type or models designated on the drawings.

C. Grates and frames shall be steel construction meeting requirements for HS-20 traffic loading, as shown on the drawings.

D. Precast manholes for storm drains and sanitary sewers shall be as manufactured by Cook Products, Redding CA, or approved equal, and shall conform to the details shown on the drawings.

E. Concrete for cast-in-place structure shall conform to Section 90 of Standard Specifications, Class ‘B’, 5-sack transit mix with a compressive strength of 2,500 psi at 28 days, three-inch (3”) slump and maximum 3/4” aggregate.

2.4 RIPRAPP

A. Well-graded angular quarry stones, sound and hard, resistant to water and weathering. Stones for slope protection shall conform to Cal-Trans specification Section 72 facing class and have the following gradation:

   200 lb.  0-5% larger than
   75 lb.   50-100% larger than
   25 lb.   90-100% larger than

B. Stones for rock-lined ditches and drainage outfalls shall be cobble class with a uniform mixture of 4-inch to 12-inch angular rock.

2.5 FILTER FABRIC

A. Fabric shall be a nonwoven geotextile conforming to the following properties:

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Fabric shall be AMOCO 4545 or approved.
PART 3 EXECUTION

3.1 EXAMINATION
A. Verify that trench cut and excavations are ready to receive work, and excavations, dimensions and elevations are as indicated on Drawings.

3.2 PREPARATION
A. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING
A. Excavate culvert trench to three inches below pipe invert, in accordance with Section 02321, for Work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, and shape to conform to culvert pipe. Level fill materials in one continuous layer not exceeding 6 inches compacted depth. Compact to 95%, as specified in Section 02321.

C. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95%, as specified in Section 02321.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION – PIPE
A. Install pipe and accessories in accordance with manufacturer’s instructions.

B. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.

C. Shore pipe to required position; retain in place until after compaction of adjacent fills. Ensure pipe remains in correct position and to required slope and elevations.

D. Repair surface damage to galvanized pipe protective coating with two coats of compatible bituminous paint coating, or galvanized paint.

E. Install cover material at sides and over top of pipe. Provide top cover to minimum compacted thickness as shown on the Drawings. Backfilling shall be in accordance with the requirements of Section 02321.

F. Install culvert end treatments, where specified.

3.5 ERECTION TOLERANCES:
A. Lay pipe to alignment and slope gradients noted on the drawings, with maximum variation from true slope of 0.10 per 100 foot length.

B. Maximum variation from intended elevation of culvert invert: 0.10 foot.

C. Maximum offset of pipe from true alignment: 0.10 foot.
3.6 PIPE PROTECTION:

A. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

3.7 ROCK SLOPE PROTECTION

A. Excavate foundation to lines and grades, as shown on plans. Obtain Geotechnical Engineer's approval of foundation before placing rock slope protection.

B. Place filter fabric over prepared excavation and secure in place.

C. Place stones into place to form the proper cross section. The exposed surface of riprap shall be reasonably uniform and free from bulges, humps, or cavities.

END OF SECTION
PART 1  GENERAL

1.1  SUMMARY

A. Fire Sprinkler System
   1. Furnish and install fire service including connections to existing mains, post indicator
      valves, fire department connection, fire hydrants, on-site watermains and connecting to
      building fire service; including all fittings an appurtenances required to install the water
      lines shown on the drawings.

B. Domestic Water System
   1. Furnish and install domestic service including connections to existing mains, installation
      of on-site watermains, backflow preventers, thrust blocks, and connecting to building
      service; including all fittings an appurtenances required to install the water lines shown
      on the drawings.

1.2  APPLICABLE PUBLICATIONS

A. The publications listed below form apart of this specification to the extent referenced. The
   publications are referred to in the text by the basic designation only.

B. American Society for Testing Materials (ASTM) Publications:
   1. F 477  Elastomeric Seals (Gaskets) for Joining Plastic Pipe

C. American Water Works Association (AWWA) Publications:
      Liquids (ANSI/A21.10)
   2. C 111  Rubber Gasket Joints for Ductile-iron and Gray-iron Pressure Pipe and
      Fittings (ANSI/AWWA C111/A12.11)
   3. C 153  Ductile-Iron Compact Fittings, 3 in. Through 16 in., for Water and other
      Liquids
   4. C 503  Wet-Barrel Fire Hydrants
   5. C 509  Resilient Seated Gate Valves for Water Service
   6. C 510  Double Check Backflow Prevention Assembly
   7. C 511  Reduced Pressure Principle Backflow Prevention Assembly
   8. C 600  Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances
      (ANSI/AWWA C600)
   10. C 900  Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water
   11. C 901  Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch Through 3 inch, for
       Water Service.

D. UNIB-3  Installation of Polyvinyl Chloride (PVC) Pressure Pipe Complying with AWWA
           Standard C-900

1.3  GENERAL REQUIREMENTS

A. Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts and data.
1.4 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

A. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

B. Handling: Handle pipe, fittings, valves, hydrants, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry pipe to the trench; do not drag it. Do not leave rubber gaskets and plastic piping that are not to be installed immediately out in the sunlight, but store undercover out of direct sunlight.

PART 2 MATERIALS

2.1 PIPING 4-INCH DIAMETER AND LARGER:

A. Polyvinyl Chloride (PVC) Plastic Water Pipe and Associated Fittings:
1. Pipe and Fittings: Pipe to be installed below ground shall conform to AWWA C900 and shall be plain end or gasket bell end, Pressure Class 150. Pipe shall have cast iron pipe equivalent OD. Fittings shall be gray iron or ductile iron conforming to AWWA C110 or C153, and shall have cement mortar lining conforming to AWWA C104, standard thickness.

2. Joints and Jointing Materials: Joints for pipe shall be push-on joints. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111. Each joint connection shall be provided with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe shall conform to ASTM F 477. Gaskets for mechanical joints for joint connections between pipe and metal fittings, valves, and other accessories shall be specified in AWWA C111.

B. Piping 3-Inch Diameter And Smaller
1. Pipe: Pipe to be installed below ground shall conform to AWWA C901 and shall be plain end, Pressure Class 160.

2. Joints and Jointing Materials: Joints for pipe shall be insert fittings in conformance with AWWA C901, Section A.4.

C. Valves and Fittings:
1. Conform to AWWA Specifications.

2. All valves and fittings shall be designed for an operating pressure larger than the design pressure of lines on which they are installed.

D. Gate Valve
1. Double disk parallel seat type, iron body, bronze mounted inside screw, non-rising stem, flanged or screw fitting standard hub nut.
PART 3 EXECUTION

3.1 INSTALLATION OF ON-SITE PIPELINES

A. General Requirements: These requirements shall apply to all pipeline installation except where specific exception is made in the “Special Requirements...” paragraphs hereunder.

1. Pipe Laying and Jointing: Pipe, fittings, and accessories will be carefully inspected before and after installation and those found defective will be rejected. Remove fins and burns from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other waterline material into trenches. Cut pipe accurately to measurements established at the site and work into place without springing or forcing. Lay bell-end spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines, taking care to avoid the formation of any dips or low points. Support pipe at its proper elevation and grade, taking care to secure firm and uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports (where indicated and) where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each day’s work, close open ends of pipe temporarily with water tight plugs. Do not lay pipe when conditions of trench or weather are unsuitable.

B. Special Requirements for installation of PVC Plastic Water Main Pipe and Associated Fittings:

1. Installation, General: Install pipe and fittings in accordance with the general requirements for installation of pipelines and with the requirements of UNIB-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings, except as otherwise specified in the other subparagraphs hereunder.

2. Jointing: Make push-on joints with the elastomeric gaskets previously specified for this type joint, using either elastomeric gasket bellend pipe. Use push-on joint having factory-made bevel on pipe ends for pipe-to-pipe joint connections only. Use an approved lubrication recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of UNIB-3 for laying the pipe. Make mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type joint; assemble these joints in accordance with the requirements of UNIB-3 for joining PVC pipe to fittings and accessories, with the applicable requirements of AWWA C600 for joint assembly, and with the recommendations of Appendix A to AWWA C111. Cut off spigot end of pipe for mechanical-joint connections and do not re-bevel.

C. Special Requirements for installation of Polyethylene Water Main Pipe and Associated Fittings: Pipe shall be installed in conformance with AWWA C901, Section A.4.

3.2 DISINFECTION

A. Pipe shall be disinfected in accordance with the requirements of AWWA C651.

3.3 PRESSURE AND LEAKAGE TESTING

A. Field Tests and Inspections, General: The Owner will conduct field inspections and witness all field tests specified in this section. The contractor shall perform all field tests, and provide all labor, equipment, and incidentals required for testing. Do not begin testing on any section of a pipeline until compaction is completed and until at least 7 days after placing of the concrete blocks.
B. Testing Procedure: Test water mains and water service lines in accordance with the applicable standard specified in this paragraph. Test PVC water mains in accordance with the requirements of UNIB-3 for pressure and leakage tests. The amount of leakage of PVC pipelines shall not exceed the amount given in UNIB-3. The pressure test shall be run at 150 psi and the leakage test at 100 psi. Compaction of the backfill must be completed before testing can occur.

END OF SECTION
PART 1 GENERAL

1.1 SUMMARY

A. Work includes storm drainage lines and branches, catch basins, curb inlets, and manholes.

1. Lines and Branches: Provide lines and branches of polyvinyl chloride (PVC) plastic pipe or Reinforced Concrete Pipe (RCP).

2. Catch Basins: Standard Catch Basins: Provide catch basins at the locations indicated, constructed as indicated.

3. Manholes: Standard Manholes: Provide manholes at the locations indicated, constructed as indicated.

1.2 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designations only.

1. American Concrete Pipe Association (ACPA) Publications:
   - Concrete Pipe Handbook

B. American Society for Testing and Materials (ASTM) Publications:
   1. C 478-85a Precast Reinforced Concrete Manhole Sections
   2. D 3034 Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

C. State of California Department of Transportation Standard Specifications.

1.3 GENERAL REQUIREMENTS

A. Manufacturer’s Data: Submit manufacturer’s standard drawings or catalog cuts of the following items:
   1. Fittings
   2. Joints and couplings

B. Manufacturer’s Certificates of Conformance: Submit manufacturer’s certificates of conformance of compliance for each of the following materials which are specified to conform to publications referenced under paragraph, “MATERIALS,” in this section:
   1. Pipe and fittings
   2. Pipe joint materials
   3. Cast-Iron frames, covers, and gratings
   4. Precast concrete manhole sections

   a) All tests required by each applicable referenced publications shall have been performed, whether specified in that publication to be mandatory or otherwise. For tests which are not specified in the referenced publications to be performed at definite intervals during manufacture, the tests shall have been performed within 3 years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.
1.4 DELIVERY, STORAGE, AND HANDLING OF MATERIALS

A. Delivery and Storage:

1. Piping: Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store [plastic piping and] rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

2. Precast Concrete: Handle precast sections with care to avoid chipping and breakage; store as directed. Protect precast concrete from contact with the earth and exposure to weather; keep dry until used. Use or precast concrete containing frost will not be permitted.

3. Metal Items: Check upon arrival; identify and segregate as to types, functions, and sizes. Store in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

B. Handling: Handle pipe, fittings, and other accessories in such manners as to ensure delivery to the trench in sound undamaged condition. Carry pipe to trench; do not drag it. When rubber gaskets and plastic piping are not to be installed immediately, do not leave them exposed to sunlight, but store under cover out of direct sunlight.

PART 2 PRODUCTS

2.1 MATERIALS

A. Polyvinyl Chloride (PVC) Plastic Pipe:

1. Pipe diameter less than 18 inches:
   a) Pipe and Fittings: Pipe and fittings shall conform to ASTM D3034, shall be Series 46, with ends suitable for elastomeric gasket joints.
   b) Joints and Jointing Material: Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F477.

2. Pipe diameter 18 inches and greater:
   a) Pipe and Fittings: Pipe and fittings shall conform to ASTM F679, shall be Series 46, with ends suitable for elastomeric gasket joints.
   b) Joints and Jointing Material: Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F477.

B. Reinforced Concrete (RCP) Pipe

1. Reinforced Concrete Pipe shall conform to Section 65, "Reinforced Concrete Pipe", of the State of California Department of Transportation Standard Specifications. The reinforced concrete pipe shall be Class III with rubber gasketed joints.

C. Concrete Materials


2. Precast Concrete Manhole Sections: Precast concrete manhole risers, base sections, and tops shall conform to ASTM C478.

D. Metal Items:

1. Frames, covers, and gratings shall be as shown on the plans, and shall be of cast iron.

2. Frames, covers, and gratings shall be equipped with security bolts.
PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENNANT CONSTRUCTION

A. General Requirements for Installation of Pipelines: These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements ..." paragraphs hereunder.

1. Location: The work covered by this section shall terminate at a point approximately 5 feet from the building, unless otherwise indicated on the drawings.

2. Installation of PVC Pipe shall conform to ASTM D 2321.

3. Pipe Laying and Jointing: Each pipe and fitting will be inspected before and after installation and those found defective will be rejected. Provide proper facilities for lowering sections of pipe into trenches. Lay pipe with the bell ends in the upgrade direction. Adjust spigots in bell to give a uniform space all around. Blocking or wedging between bells and spigots will not be permitted. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint material. At the end of each day's work, close open ends of pipe temporarily with wood blocks or bulkheads.

B. Concrete Work:


C. Manhole Construction: Construct base slab of cast-in-place concrete. Make inverts in cast-in-place concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent pipe sections. For changes in direction of the pipe and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. Pour bottom slabs and walls integrally or key and bond walls to bottom slab. Give a smooth finish to inside joints of concrete manholes, curb inlets, and catch basins. Cast-in-place concrete work shall be in accordance with Section 51. "Concrete Structures", of State of California Department of Standard Specifications.

D. Metal Work:

1. Workmanship and Finish: Perform metalwork to that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron and steel to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blowholes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well defined lines and arises. Provide necessary rabbets, lugs, and brackets where necessary.

FIELD TESTS AND INSPECTIONS

A. Field Tests and Inspections, General: The Owner will conduct field inspections and witness all field tests specified in this section. The Contractor shall perform all field tests and provide all labor, equipment, and incidentals required for testing. The Contractor shall be able to produce evidence, when required, that any item of work has been constructed properly in accordance with the drawings and specifications.
B. Pipeline Testing: Check each straight run of pipeline for visible deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.

1. Warranty Period Test: Pipe found to have a deflection of greater than 5 percent when deflection test is performed just prior to end of one-year warranty period shall be replaced and tested as previously specified for leakage and deflection.

END OF SECTION
PART 1  GENERAL

1.1  SUMMARY

A. Section includes cast-in-place exterior reinforced cement concrete pavement for walkways.

B. Related Sections:

1. Section 03300: Cast-in-Place Concrete.

1.2  SUBMITTALS

A. Product Data: For each type of manufactured material and product specified.

B. Design Mixes: For each concrete pavement mix.

1.3  QUALITY ASSURANCE

A. Installer: Engage an experienced installer who is familiar with requirements and methods needed for proper performance of Work of this Section.

B. Ready-Mix Concrete Manufacturer: Comply with ASTM C 94 requirements for production facilities and equipment.

C. Source Limitations: Provide each type or class of cementitious material of the same brand from the same manufacturer's plant, and each aggregate from one source.

D. Comply with ACI 301, "Specifications for Structural Concrete," unless modified by the requirements of the Contract Documents.

E. Comply with requirements in CRSI's "Manual of Standard Practice" for fabricating reinforcement.

PART 2  PRODUCTS

2.1  FORMS

A. Form Material: APA grade "B" or better plywood, metal, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

B. Form Release Agent: Commercially formulated agent that will not bond with, stain, or adversely affect concrete surfaces or subsequent treatments of concrete surfaces.

2.2  FIBER REINFORCEMENT

A. Multifilament synthetic nylon fiber manufactured as a secondary reinforcing material for concrete.

B. Manufacturer: Nycon, Inc.; Nycon Synthetic Fiber.

2.3  CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type 1.

B. Aggregate: ASTM C 33, Natural, clean gravel, uniformly graded.

C. Water: ASTM C 94, Clean, free of oils, acids, organic material.
D. Admixtures:
2. Water Reducing Admixture: ASTM C 494, Type A.
3. Water Reducing and Retarding Admixture: ASTM C 494, Type D.
4. Water Reducing and Accelerating Admixture: ASTM C 494, Type E.

2.4 CURING MATERIALS
A. Waterborne Membrane Forming Curing Compound: ASTM C 309, Type 1 (clear or translucent).
B. Moisture Retaining Cover: ASTM C 171, polyethylene sheet.

2.5 RELATED MATERIALS
A. Expansion and Isolation Joint Material: 3/8 inch nominal thickness.
   1. ASTM D 1751, asphalt-saturated cellulosic fiber.
   2. ASTM D 1752, cork or self-expanding cork.
B. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, of class to suit requirements:
   1. Class II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
   2. Class V, load bearing, for bonding freshly mixed concrete to hardened concrete.
C. Concrete Surface Cleaner: Heavy Duty Concrete Cleaner, by ProSo Co., or approved.

2.6 CONCRETE MIXES
B. Ready-Mixed Concrete: Certified by materials supplier to meet compressive strengths specified and conforming to ASTM C 94.
   1. Minimum of 5-1/2 sacks of cement per cubic yard of concrete.
   3. Proportion cement, sand, aggregate and water in a workable mix to provide a minimum compressive strength of 3,000 psi at 28 days, in conformance with ACI 318-771.
   4. Concrete Slump: Between 2 inches and 4 inches at time of placement.
   5. Air Entrainment Admixture: Include 5 percent (A one percent) of Admixture.
   6. Water Cement Ratio: 0.45 maximum.
   7. Synthetic Fiber: Not less than 1.0 lb./cu. yd.

PART 3 EXECUTION
3.1 PREPARATION
A. Verify substrates are set to proper lines and grade, and proof-roll prepared subbase surface to verify subbase is firm and stable.
   1. Provide additional compaction to nonconforming areas.
   2. Proceed with pavement only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.
B. Remove loose material from compacted subbase surface immediately before placing concrete.

LRS Architects, Inc.
C. Remove standing water.

3.2 EDGE FORMS

A. Set, brace, and secure edge forms and intermediate screed guides for pavement to required lines, grades, and elevations.

B. Treat forms with approved and nonstaining form oil or wax immediately before placing concrete. Do not use materials that will adhere to or discolor concrete.

3.3 JOINTS

A. Construction Joints: Set construction joints at temporary terminations of pavement, unless pavement terminates at expansion or isolation joints.

1. Continue reinforcement across construction joints, unless otherwise indicated.
2. Use epoxy bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

B. Expansion or Isolation Joints: Form expansion and isolation joints of preformed joint filler strips as follows:

1. Provide transverse expansion joints at right angles to alignment, vertical to surface, unless otherwise indicated.
2. Provide complete separation of new concrete to existing pavements.
3. Width of Joint: 1/2 inch, unless otherwise indicated.
   a. 3/4 inch where new concrete surfacing abuts other surfacing.
4. Extend joint fillers to full depth of pavement.
   a. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

5. Locations:
   a. Between driveways and other pavements.
   b. Transversely in walks at a distance of six to eight feet in from curbs which occur at walk-ends.
   c. Transversely in walks opposite expansion joints in adjoining curbs.
   d. Elsewhere at such locations that distance between transverse expansion joints does not exceed 25 feet.
   e. Around poles, posts, driveways, boxes and other fixtures which protrude through, into or against structures.
   f. Adjacent to other new or existing pavements.
6. Install dowel bars and support assemblies at joints where indicated.
   a. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Contraction Joints:

1. Form contraction joints of weakened plane, sectioning concrete into areas indicated.
2. Space at a maximum of 5 feet, or as otherwise indicated.
3. Form joints to a depth of 1/3 of thickness of concrete and to a width of approximately 1/8 inch.
4. Tool joint edges smooth.
5. Provide sawed joints only with approval of Architect.

3.4 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.
B. Comply with requirements and recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.

C. Do not use concrete which does not reach its final position in forms within one and one-half hours after introduction of water to mix at batch plant.

D. Do not retemper or remix concrete that has hardened, or has attained an initial set.

E. Place concrete in a continuous operation between transverse joints.

F. Consolidate concrete, during and immediately after placing.
   1. Comply with recommendations of ACI 309 for consolidating concrete.
   2. Consolidate by mechanical means, such as spading, or high frequency vibrators, that will ensure smooth surfaces and dense concrete along form surfaces or in corners, etc.

G. Screed pavement surfaces with a straightedge and strike off.

H. Cold Weather Precautions: Comply with ACI 306R, and as follows:
   1. Do not place concrete on frozen subgrade.
   2. Remove ice and snow from reinforcing, forms, and embedded items.
   3. Protect concrete from physical damage or reduced strength caused by air temperatures below 45 degrees F.
   4. Maintain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
   5. Use of salts or chemical admixtures to prevent concrete freezing is prohibited.

I. Warm Weather Precautions: Comply with ACI 305R, and as follows:
   1. Protect concrete from physical damage or reduced strength caused by air temperatures above 75 degrees F.
   2. Maintain a concrete temperature of not more than 75 degrees F at point of placement:
   3. Fog stray forms, reinforcing, embedded items, and subgrade with cool water immediately prior to concrete placement.
   4. Cover reinforcement steel with water soaked burlap so steel temperature will not exceed ambient air temperature immediately before concrete is placed.
   5. Protect placed concrete from shrinkage crack damage until protected by curing procedure.

3.5 REMOVAL OF FORMS

A. Give consideration to location and character of concrete, weather and other conditions influencing setting of concrete and materials used in mix in determining time for removal of forms.
   1. Comply with recommendations, precautions and requirements of ACI 347 and ACI 318.
   2. In any case, do not remove forms for a period of 4 days following placement of concrete.

3.6 CONCRETE FINISHING

A. Floated Finish:
   1. Provide floated finish for slab surfaces to receive washed and broomed finish.
   2. Comply with ACI 301, paragraph 11.7.2.
3. Begin floating when water sheen has disappeared and surface has stiffened sufficiently to permit float finishing.
4. Check surface plane with a 10 foot straightedge at two or more angles during or after first floating.
5. Cut high spots and fill low spots during floating to level to class B tolerance, 1/4 inch in 10 feet.
6. Refloat immediately to a uniform sandy texture.

B. Broom Finish: Comply with ACI 301, paragraph 11.7.4.
   1. Medium-to-Fine Texture: Draw a soft bristle broom across float finished concrete perpendicular to line of traffic to provide a uniform, fine-line texture
   2. Course-to-Medium Texture: Striate float finished concrete 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
   1. Comply with ACI recommendations for cold weather and hot weather protection during curing.

B. Cure concrete by one of the following, or a combination of methods:
   1. Moisture Curing: Keep concrete surfaces continually moist for not less than 7 days with water, continuous water-fog spray, or use of water saturated absorptive cover kept continuously wet.
   2. Moisture Retaining Cover Curing: Cover concrete with moisture retaining cover with sides and ends lapped and sealed by waterproof tape.
   3. Curing Compound: Apply uniformly in continuous operation according to manufacturer's instructions.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   3. Surface: Not to vary more than 1/4 inch when tested with a 10 foot straight edge.
   4. Joint Spacing: 3 inches.
   5. Contraction Joint Depth: Plus 1/4 inch, no minus.

3.9 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective. Reconstruct damaged pavement for entire length between regularly scheduled joints.

B. Protect concrete pavement from damage and discoloration. Exclude traffic from pavement for at least 14 days after placement.

C. Clean discolored concrete. Apply concrete cleaner, in conformance with manufacturer's recommendations, to remove oil residues, scum, excess mortar, and the like.

END OF SECTION
SECTION 02813 - IRRIGATION SYSTEMS

PART 1 - GENERAL

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

1.2 SUMMARY
A. This Section includes piping, valves, irrigation heads, controls, and wiring.

1.3 DEFINITIONS
A. Lateral Line Piping: Downstream from control valves to irrigation heads, specialties, and drain valves. Piping is under pressure during flow only.
B. Mainline Piping: Downstream from point of connection to water distribution piping to and including control valves. Piping is under water distribution system pressure.
C. The following are industry abbreviations for plastic materials:
   2. NP: Nylon plastic.
   3. PE: Polyethylene plastic.
   4. PP: Polypropylene plastic.
   5. PTFE: Polytetrafluoroethylene plastic.
   6. PVC: Polyvinyl chloride plastic.

1.4 SYSTEM PERFORMANCE REQUIREMENTS
A. Minimum Water Coverage: 100 percent of turf areas.
B. Location of Irrigation heads: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards.
C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and Irrigation Heads, unless otherwise indicated:
   1. Pressure Piping: 200 psig.
   2. Circuit Piping: 150 psig.
1.5 SUBMITTALS

A. Product Data: Include pressure rating, rated capacity, settings, and electrical data of selected models for the following:
   1. Valves. Include aboveground and underground; general-duty, manual and automatic control, and quick-coupler types.
   2. Valve boxes.
   3. Irrigation heads.

B. Shop Drawings: Show location by dimensioning from two determinable points mainline piping, water meters, backflow preventers, valves, accessories, controllers, and wiring. Shop drawing information may be included in the submitted irrigation plans. All required information must be easily legible. Drawings may be reduced but must be to a scale that is marked on each sheet.

C. Test Reports: As specified in "Field Quality Control" Article in Part 3.

D. Maintenance Data: To include in maintenance manuals specified in Division 1. Include data for the following:
   1. Automatic control valves.
   2. Irrigation heads.
   3. Controllers.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of irrigation systems components and are based on specific types and models indicated on the drawings. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

C. Comply with requirements of utility supplying water and authorities having jurisdiction for preventing backflow and back siphonage.

D. Comply with ASTM F 645, "Guide for Selection, Design, and Installation of Thermoplastic Water Pressure Piping Systems."


1.7 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flange faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.
B. During Storage: Use precautions for valves according to the following:

1. Do not remove end protectors unless necessary for inspection; then, reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

D. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

E. Protect flanges, fittings, and specialties from moisture and dirt.

F. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Call USA at 800-642-2444 prior to trenching or any other underground activity.

B. Investigate and determine available water supply water pressure and flow characteristics. If pressure is different than shown on plans notify Landscape Architect immediately.

1.9 SEQUENCING AND SCHEDULING

A. Maintain uninterrupted water service to building during normal working hours. Arrange for temporary water shutoff with Owner.

B. Coordinate irrigation systems with work specified in Division 2 Section "Landscaping."

C. Coordinate irrigation systems with utility work.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Deliver extra materials to Owner.

1. Valve Keys: Furnish quantity of tee-handle units equal to 25 percent of amount of each type of key-operated, control valve installed.

2. Quick-Coupler Hose Swivels: Furnish quantity of units equal to 25 percent of amount of each type of quick coupler installed.

3. Quick-Coupler Operating Keys: Furnish quantity of units equal to 25 percent of amount of each type of quick coupler installed.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Product manufacturers shall be in accordance with those shown on the drawings. Substitutions may be accepted if submitted in accordance with specifications.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Plastic, Automatic Control Valves: See Drawings

2. Control-Valve Boxes:
   a. AMETEK; Plymouth Products Div.
   b. Carson-Brooks Plastics, Inc.
   c. NDS, Inc.
   d. Normandy Products Co.

3. Quick Couplers: - See Drawings

4. Irrigation heads: - See Drawings

5. Water Regulators:
   a. Bermad, Inc.
   b. Cla-Val Co.
   c. FLOMATIC Corp.
   d. GA Industries, Inc.
   e. Honeywell Braukmann.
   g. Zurn Industries, Inc.; Wilkins Div.

6. Emitter and Drip-Tube Specialties: - See Drawings for specific components. If manufacturer is not specified use from the following:
   a. Agrifim Irrigation Products, Inc.
   b. Buckner, Inc.
   c. Netafim Irrigation, Inc.
   e. Olson Irrigation Systems.
   f. Rain Bird Sprinkler Mfg. Corp.
   g. Raindrip, Inc.
   h. Salco Products, Inc.
   i. Toro Co.; Irrigation Div.

7. Controllers: - See Drawings

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" and "Valve Applications" articles for application of pipe and tube materials, joining methods, and valve applications.
2.3 PIPES AND TUBES

A. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedules 40 and 80.

2.4 PIPE AND TUBE FITTINGS

A. Cast-Copper Fittings: ASME B16.18, solder-joint, pressure fittings.

B. Copper Unions: ASME B16.18, cast-copper-alloy body, hexagonal stock, with ball-and-socket joint, metal-to-metal seating surfaces, and solder joint, and threaded or solder-joint ends. Include threads complying with ASME B1.20.1.


D. PVC Socket Fittings, Schedule 80: ASTM D 2467.

E. PVC Threaded Fittings: ASTM D 2464.

F. Transition Fittings: Manufactured assembly or fitting, with pressure rating at least equal to that of system and with ends compatible to piping where fitting is to be installed.

2.5 JOINING MATERIALS

A. Refer to Division 2 Section "Utility Materials" for commonly used joining materials.

2.6 VALVES AND VALVE SPECIALTIES

A. Bronze, Rising-Stem Gate Valves: MSS SP-80, Type 2, solid wedge; rising, copper-silicon-alloy stem; Class 125, body and screw bonnet of ASTM B 62 cast bronze, with threaded or solder-joint ends. Include PTFE-impregnated packing, brass packing gland, and malleable-iron hand-wheel.

B. Plastic Valves: PVC with 150-psig minimum pressure rating, ends compatible with piping, and tee handle.

C. Plastic Diaphragm Valves: Molded-plastic body, normally closed, with manual flow adjustment, and operated by 24-V, ac solenoid.

D. Quick-Couplers: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

1. Locking Top Option: Include vandal-resistant, locking feature with two matching keys.

E. Control-Valve Boxes: PE, ABS, fiberglass, polymer concrete, or precast concrete box and cover, with open bottom, openings for piping, and designed for installing flush with grade. Include size as required for valves and service.
1. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3 inches maximum to 3/4-inch minimum.

2.7 IRRIGATION HEADS

A. Description: Manufacturer's standard irrigation heads designed for uniform coverage over entire spray area indicated, at available water pressure.

B. Components: Brass or plastic housing and corrosion-resistant interior parts.

C. Pop-up, Spray Irrigation heads: Fixed pattern, with screw-type flow adjustment and stainless steel retraction spring.

D. Pop-up, Rotary, Spray Irrigation heads: Gear drive, full-circle and adjustable part-circle types.

E. Pop-up, Rotary, Impact Irrigation heads: Impact drive, full-circle and part-circle types.

2.8 AUTOMATIC CONTROL SYSTEM

A. Controller as specified on the drawings

B. Transformer: Internal; and suitable for converting 120-V, ac building power to 24-V, ac power.

C. Controller Stations for Automatic Control Valves: Each station is variable from approximately five to 90 minutes. Include switch for manual or automatic operation of each station.

D. Timing Device: Adjustable, 24-hour, 14-day clock with automatic operations to skip operation any day in timer period; to operate every other day; or to operate two or more times daily.

E. Wiring: UL 493, Type UF, solid-copper-conductor, insulated cable, suitable for direct burial.

   1. Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
   2. Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves and color-coded different than feeder-circuit-cable jacket color and with jackets of different colors for multiple-cable installation in same trench.
   3. Splicing Materials: Pressure-sensitive, thermoplastic tape; waterproof sealing packets; or other waterproof connectors.

PART 3 - EXECUTION

3.1 TRENCHING AND BACKFILLING

A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

B. Install piping and wiring in sleeves under sidewalks, roadways, parking lots, and railroads see drawings for size.

   1. Sleeves may not be installed under existing paving by hydroboring.
C. Provide minimum cover over top of underground piping according to the following:

1. Pressure Piping: Greater depth of minimum of 36 inches below finished grade, or not less than 18 inches below average local frost depth.
2. Circuit Piping: 12 inches.
3. Sleeves: 12 inches.

3.2 PIPING APPLICATIONS

A. Install components having pressure rating equal to or greater than system operating pressure.

B. Piping in control-valve boxes and aboveground may be joined with flanges instead of joints indicated.

C. Underground, Pressure Piping: Use the following:
   1. 3-Inch NPS (DN100) and Smaller: Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.
   2. 4-Inch NPS (DN100) and Larger: Class 315 PVC pipe, Class 315 PVC socket fittings, and solvent-cemented joints.

D. Circuit Piping: Use the following:
   1. 2-Inch NPS (DN50) and Smaller: Class 200 PVC pipe, Class 200 PVC socket fittings, and solvent-cemented joints.
   2. 2-1/2- to 4-Inch NPS (DN65 to DN100): Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

E. Underground Branches and Offsets at Irrigation heads and Devices: Schedule 80 PVC pipe, PVC threaded fittings, and threaded joints.
   1. Option: Plastic piping made for this application may be used instead of pipe and fittings specified.

F. Risers to Aboveground Irrigation heads and Specialties: Schedule 80 PVC pipe, Schedule 80 PVC socket fittings, and solvent-cemented joints.

G. Sleeves: Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.

3.3 VALVE APPLICATIONS

A. Underground, Manual Control Valves: Bronze globe valve with control-valve service box and valve key.

B. Control Valves: Per the drawing

3.4 JOINT CONSTRUCTION

A. Refer to Division 2 Section "Utility Materials" for pipe joint construction requirements.
B. PVC Piping Gasketed Joints: Construct underground joints between cast-iron valves and PVC pipe with elastomeric seals that fit pipe and valve ends. Use lubricant according to ASTM D 3139.

C. Dissimilar Piping Material Joints: Construct joints using adapters or couplings that are compatible with both piping materials, outside diameters, and system working pressure.

3.5 PIPING INSTALLATION

A. Locations and Arrangements: Drawings indicate location and arrangement of piping systems, which were used to size pipe and calculate friction loss, and other design considerations. Install piping as indicated, unless deviations are approved on Coordination Drawings.

B. Install piping free of sags and bends.

C. Install groups of pipes parallel to each other, spaced to permit valve servicing.

D. Install fittings for changes in direction and branch connections.

E. Install unions adjacent to valves and final connections to other components with 2-inch NPS (DN50) or smaller pipe connection.

F. Install flanges adjacent to valves and final connections to other components with 2-1/2-inch NPS (DN65) or larger pipe connection.

G. Install dielectric fittings to connect piping of dissimilar metals.

H. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.

I. Lay piping on solid subbase, uniformly sloped without humps or depressions.

J. Install PVC piping in dry weather when temperature is above 40 deg F. Allow joints to cure at least 24 hours at temperature above 40 deg F before testing, unless otherwise recommended by manufacturer.

3.6 VALVE INSTALLATION

A. Underground Gate Valves: Install in valve box with top of box flush with grade.

3.7 SPRINKLER INSTALLATION

A. Flush circuit piping with full head of water and install irrigation heads after hydrostatic test is completed.

B. Install irrigation heads per detail on the drawings.

C. Locate part-circle irrigation heads to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries, unless otherwise indicated.
3.8 AUTOMATIC CONTROL SYSTEM INSTALLATION

A. Install controllers according to manufacturer's written instructions and as indicated.

B. Install control wiring in same trench with piping. Install wiring with loops at control valves and controllers, at intervals not greater than 100 feet, and changes in direction to allow for expansion. Bundle wiring in same trench at 10-foot intervals. See detail on drawings.

3.9 CONNECTIONS

A. Connect piping to valves and irrigation heads.

B. Connect water supplies to irrigation systems with backflow preventers at connections to potable-water supplies.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

D. Ground electric-powered controllers, valves, and devices.

   1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Arrange for electric-power connections to controllers, control valves, and devices that require power. Electric power, wiring, and disconnect switches are specified in Division 16 Sections.

3.10 FIELD QUALITY CONTROL

A. Testing: Hydrostatically test piping and valves before backfilling trenches. Piping may be tested in sections.

   1. Cap and test piping with static water pressure of 50 psig above system operating pressure and without exceeding pressure rating of piping system materials. Isolate test sources and allows to stand for four hours.

   2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.

3.11 CLEANING AND ADJUSTING

A. Flush dirt and debris from piping before installing irrigation heads and other devices.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Carefully adjust lawn irrigation heads so they will be flush with, or not more than 1/2 inch above, finish grade.

D. Adjust settings of controllers and automatic control valves.
3.12 COMMISSIONING

A. Starting Procedures: Follow manufacturer’s written procedures. If no procedures are prescribed by manufacturers, proceed as follows:

1. Verify that specialty valves and their accessories are installed and operate correctly.
2. Verify that specified tests of piping are complete.
3. Verify that irrigation heads and devices are correct types.
4. Verify that damaged irrigation heads and devices are replaced with new materials.
5. Verify that potable-water supply connections have backflow preventers.
6. Energize circuits to electrical equipment and devices.
7. Adjust operating controls.

B. Operational Tests: Measure and record water flow rate and area coverage at each sprinkler. Adjust to achieve indicated values.

3.13 DEMONSTRATION

A. Demonstrate to Owner’s maintenance personnel operation of equipment, irrigation heads, specialties, and accessories. Review maintenance information.

B. Provide seven days’ advance written notice of demonstration.

END OF SECTION
PART 1  GENERAL

1.1  SUMMARY

A. Section includes security fence framework, wire fabric, non-climbable mesh, and accessories.

B. Related Sections:

1. Section 03300: Cast-In-Place Concrete, for anchorage of posts to concrete.
2. Section 08710: Door Hardware, for locks installed at gates.

1.2  SUBMITTALS

A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.

C. Samples: Submit two samples of fence fabric illustrating construction and finish.

1.3  QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

B. Provide and install products in accordance with requirements and recommendations of the following:

2. ASTM F567 Installation of Chain Link Fence.

1.4  FIELD MEASUREMENTS

A. Verify that field measurements are as indicated.

PART 2  PRODUCTS

2.1  MATERIALS AND COMPONENTS


B. Fence Fabric: Galvanized steel, Heavy Industrial service, 0.192 inch (6 gage) coated thickness, CLFMI Class 2, with zinc coating not less that 2.0 oz./sq. ft.

C. Non-climbable Mesh: Woven 3/8 inch galvanized steel mesh with manufacturer's standard clips and fasteners.

1. Manufacturer: Security Fence Manufacturing & Supply Co., Inc.'s "Secure Guard", or approved.

D. Accessories: Steel, hop-dip galvanized, as shown and as required for a complete installation.

E. Intermediate Posts: Type II, round, cold-formed steel posts, welded per ASTM F 1083, Group IC, having a minimum yield strength of 50,000 psi, and Type B zinc coating.

F. Terminal, Corner, Rail, and Brace Posts: Type II, round.

H. Tension Wire: ASTM A 824, Minimum 7 gage.

I. Post Anchor Plates: Galvanized steel, size as required.

J. Gates: Conform to ASTM F 900 with finish same as fence materials.

2.2 ACCESSORIES

A. Fittings: Galvanized steel; sleeves, bands, clips, rail ends, tension bars, fasteners and fittings, and the like, as required for a complete installation.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install framework, fabric, accessories in accordance with ASTM F 567.

B. Set posts plumb, with anchor plates securely attached to structure.

C. Stretch fabric between terminal posts or framework.

D. Position bottom of fabric 2 inches maximum above finished grade.

E. Fasten fabric to line posts and tension wire with tie wire at maximum 15 inches on center.

F. Attach fabric to end and corner posts with tension bars and tension bar clips.

G. Install bottom rail between terminal posts.

H. Install non-climbable mesh continuously at top half of fencing.

I. Install gates with wire fabric and non-climbable mesh to match fence.

3.2 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1/2 inch.

3.3 SCHEDULE

A. Outdoor Recreation Perimeter: 12 feet high, galvanized, with non-climbable mesh at top half.

END OF SECTION
SECTION 02900 - LANDSCAPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

   1. Lawns.
   2. Topsoil and soil amendments.
   3. Fertilizers and mulches.

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

   1. Division 2 Section "Irrigation Systems".

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.

   1. Manufacturer's certified analysis for standard products.
   2. Analysis for other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
   3. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.

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

   1. Certification of each seed mixture for sod, identifying sod source, including name and telephone number of supplier.

D. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.

   1. Analysis of existing surface soil.
2. Analysis of imported topsoil.

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

F. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1. Installer’s Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.

B. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

B. Sod: Harvest, deliver, store, and handle sod according to the requirements of the American Sod Producers Association’s (ASPA) "Specifications for Turfgrass Sod Materials and Transplanting/Installing."

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

1.6 PROJECT CONDITIONS

A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall
be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Warrant the following living planting materials for the following specified time period after date of Substantial Completion, against defects including death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, or abuse by Owner, abnormal weather conditions unusual for warranty period, or incidents that are beyond Contractor's control.
   1. Lawn – Length of maintenance period.

C. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season.

D. Replace planting materials that are in a substantially unhealthy condition (more than 25 percent of the plant dead or removed due to death of branches, etc.) at end of warranty period.

1.8 MAINTENANCE

A. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

B. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

C. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry.

   1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. of lawn area.

PART 2 - PRODUCTS

2.1 GRASS MATERIALS

A. Sod: Certified turfgrass sod complying with ASPA specifications for machine-cut thickness, size, strength, moisture content, and mowed height, and free of weeds and undesirable native grasses. Provide viable sod of uniform density, color, and texture of the following turfgrass species, strongly rooted, and capable of vigorous growth and development when planted.

   1. Species: Provide sod of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on the drawings.

1. Seed Mixture: Provide seed of grass species and varieties, proportions by weight, and minimum percentages of purity, germination, and maximum percentage of weed seed as indicated on Schedules at the end of this Section.

2.2 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch or larger in any dimension, and other extraneous materials harmful to plant growth. Any topsoil added shall be thoroughly mixed with the existing site soil to a depth of 12” minimum (unless otherwise noted on drawings).

1. Topsoil Source: Amend existing surface soil to produce topsoil. Supplement with imported topsoil when required.

2.3 SOIL AMENDMENTS

A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.

1. Provide lime in the form of dolomitic limestone.

B. Aluminum Sulfate: Commercial grade, unadulterated.

C. Sand: Clean, washed, natural or manufactured sand, free of toxic materials.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.

G. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

H. Herbicides: EPA registered and approved, of type recommended by manufacturer.

I. Water: Potable.

2.4 FERTILIZER

A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the compositions as indicated on the drawings or as recommended by the soil test (soil test recommendation to take precedence over drawings).

2.5 MULCHES

A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Wood and bark chips – refer to drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 LAWN PLANTING PREPARATION

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

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

C. Spread planting soil mixture to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.

1. Place approximately 1/2 the thickness of planting soil mixture required. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil mixture.

2. Allow for sod thickness in areas to be sodded.

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

E. Moistens prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.
3.3 MULCHING

A. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.

B. Mulch: Apply the following average thickness of mulch per plans and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

1. Thickness: 2 inches.

3.4 SODDING NEW LAWNS

A. Lay sod within 24 hours of stripping. Do not lay sod if dormant or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with biodegradable organic plastic staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within 2 hours of planting. During first week, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below the sod.

3.5 CLEANUP AND PROTECTION

A. During landscaping, keep pavements clean and work area in an orderly condition.

B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.6 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

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