Alameda - Contra Costa Transit District
Project Specifications for Construction of

Richmond Parkway Transit Center
& Operator Restroom Project

Contract No. 2020-1486

Issued for Bid
2020-1486

PREPARED BY
CHOW ENGINEERING INC.

TABLE OF CONTENTS

END - TABLE OF CONTENTS

SECTION 01 10 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Construction Schedule Constraint
4. Work under separate contracts.
5. Owner-furnished products.
6. Access to site.
7. Coordination with occupants.
8. Work restrictions.
9. Specification and drawing conventions.
10. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures for provision of temporary source for water and electrical power.

2. Section 01 32 00 “Construction Progress Documentation”

3. Section 01 31 00 “Project Management and Coordination”

1.3 PROJECT INFORMATION

A. Project Identification: AC Transit Richmond Parkway Transit Center #2020- 1461

1. Project Location: The Park-and-ride lot near the intersection of Blume Drive and Richmond Parkway in the City of Richmond Avenue in Richmond, CA

B. Owner: (referred to as “District”): AC Transit, 1600 Franklin street, Oakland, CA 94612

1. Owner's Representative: Michael Hass, PE.

C. Architect: Chow Engineering Inc. 7770 Pardee Ln #100, Oakland, CA 94621

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The RICHMOND PARKWAY TRANSIT CENTER PROJECT includes:
   a. The provision and installation of a secure, fully furnished, pre-fabricated full-service double occupancy restroom for the use of AC Transit employees with hot and cold water, and three card reader secure doors. The project includes the preparation of the site and pouring of concrete slabs and footings for the pre-fabricated restroom structure, secure fence enclosure with card-activated locking gate, trenching, underground construction of all pipes, fittings, connections, connections to existing utilities in the public right-of -way, all conduits, pull-boxes, and conductors for all new utilities, including sewer, water, electrical and communications.
   b. Replacement and upgrades to ADA ramps, signage and striping.
   c. Full-depth Patching of Asphalt Concrete Paving (AC Paving) in the parking lot and drive lanes.
   d. AC Pavement grinding and 2” AC Pavement overlay with geotextile fabric
   e. Repainting and restriping of parking lot including lines, arrows, parking stall numbers.
   f. Coordination and temporary controls for the re-routing of on-site bus service and parking services.

   The PROJECT requires that the contractor obtain and pay for all permits to complete the work. This includes permits for all new utility connections, connection fees, and inspection fees by the utility providers, CALTRANS (if required) and the City of Richmond. The District will reimburse the contractor for permit fees only. All time, materials, labor and measures to comply with all permit conditions, including temporary facilities, dewatering (if required), traffic control and traffic control plans will be the responsibility of the contractor. The PROJECT requires that the contractor engage a pre-fabricated building manufacturer to design, build, ship and place a fully pre-fabricated restroom structure at the site and connect to and a full functionality test of all utilities. The contractor shall be responsible for submittal of all of the pre-fabricated building plans, specifications and calculations as required by the City of Richmond. The contractor shall also be responsible for obtaining all permits from the City of Richmond that will permit the installation of the restroom structure, utilities and connections to all utilities. The contractor must vacate the site of all materials and equipment at the end of each work day.

B. Type of Contract:

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

1.5 CONSTRUCTION SCHEDULE CONSTRAINTS

A. This AC Transit Richmond Parkway Transit Center project must be completed within 180 days.

1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Work under other contracts, including but not limited to those listed in this section, may be underway during the time of performance of this Contract. The Contractor must coordinate its work with other Contracts as required by Project Management and Coordination, Section 01 31 00.

C. Information regarding work under other contracts may be obtained by inspection of documents at the District's Office, and copies may be obtained at the cost of reproduction and handling upon Bidder's request and payment. These documents are not part of the Contract Documents.

D. In the event that the performance of Work on contracts other than those listed herein shall occur and the performance of Work on such other contracts materially increases or decreases the Contractor's costs, the work and the amount to be paid therefore will be appropriately adjusted as determined by the Project Manager.

1.7 OWNER FURNISHED PRODUCTS

A. Not Applicable. All work called for is to be provided by the contractor

1.8 ACCESS TO SITE

A. General: Contractor shall have use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

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

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

2. The project site is a layover bus stop for CAC Transit and is also serviced by Golden Gate Transit. These bus routes arrive and depart on a regular basis all days of the week. This bus service will continue to service this site during construction. The contractor shall schedule work on site to minimize impact to bus service

    a. Schedule deliveries to minimize use of driveways and impacts to bus service by construction operations.
    b. Schedule deliveries to minimize space and time requirements for uninstalled materials and equipment on-site.

C. Condition of Existing Site: Maintain and protect portions of existing site affected by construction operations, and appropriately barricade and cordon off work areas not in use throughout the construction period. Repair damage caused by construction operations.

1.9 COORDINATION WITH OCCUPANTS

A. Not Applicable.

1.10 COORDINATION WITH OCCUPANTS

A. Not Applicable.

1.11 WORK RESTRICTIONS

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

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

B. On-Site Work Hours: 7:00 a.m. to 7:00 p.m., Monday through Friday, unless otherwise indicated.

C. Comply with any and all permit requirements.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

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

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

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

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

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

1.13 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00 ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances could include the following:

1. Design, provision and placement of pre-fabricated restroom structure allowance
2. Utility or permit fee allowances
3. Contingency allowances
4. Testing and inspecting allowances

1.3 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for District’s purposes and, when applicable, only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by District under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.

C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.

D. At Project closeout, credit unused amounts remaining in the contingency allowance to District by Change Order.

1.4 TESTING AND INSPECTING ALLOWANCES

A. Testing and inspecting allowances include the cost, not otherwise included in the Contract, of engaging testing agencies, actual tests and inspections, and reporting results.

B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

C. Costs of services not required by the Contract Documents are not included in the allowance.

D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to District by Change Order.

1.5 ADJUSTMENT OF ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. District reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

A. See Section 00 41 13 Bid Form – Stipulated Sum

END OF SECTION 01 21 00

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012300 "Allowances" for products selected under an alternate.
2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

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

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

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

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

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

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

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

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers District a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities District must assume. District’s additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by District, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.

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

2. Review Costs: Contractor shall pay for costs of Architect to review substitution request at the Architect's normal hourly rate for others services on this project.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation, cutting and patching
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from District, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: See Section 002113 – Instructions To Bidders.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

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

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

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

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

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

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

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

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Conservation provisions in “Conservation” Paragraph below may be difficult to enforce. Penalties for wasteful practices, if necessary, are more enforceable if made a condition of the Contract and added by the Supplementary Conditions. Insert specific conservation requirements in appropriate Sections.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as District's property.

1.6 REQUESTS FOR INFORMATION (RFIs)

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

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

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

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

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

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

1. The following Contractor-generated RFIs will be returned without action:

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

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

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

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of Project Web site**.**

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

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

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

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

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

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

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Preparation of record documents.
    l. Use of the premises and existing building.
    m. Work restrictions.
    n. Working hours.
    o. District's occupancy requirements.
    p. Responsibility for temporary facilities and controls.
    q. Procedures for moisture and mold control.
    r. Procedures for disruptions and shutdowns.
    s. Construction waste management and recycling.
    t. Parking availability.
    u. Office, work, and storage areas.
    v. Equipment deliveries and priorities.
    w. First aid.
    x. Security.
    y. Progress cleaning.

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

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.

c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. Review of mockups.
i. Possible conflicts.
j. Compatibility requirements.
k. Time schedules.
l. Weather limitations.
m. Manufacturer's written instructions.
n. Warranty requirements.
o. Compatibility of materials.
p. Acceptability of substrates.
q. Temporary facilities and controls.
r. Space and access limitations.
s. Regulations of authorities having jurisdiction.
t. Testing and inspecting requirements.
u. Installation procedures.
v. Coordination with other work.
w. Required performance results.
x. Protection of adjacent work.
y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to District and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of District, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for delivery of material samples, attic stock, and spare parts.
f. Requirements for demonstration and training.

g. Preparation of Contractor's punch list.
h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
i. Submittal procedures.
j. Coordination of separate contracts.
k. District's partial occupancy requirements.
l. Installation of District's furniture, fixtures, and equipment.
m. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at weekly intervals.

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

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

1) Review schedule for next period.

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

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

19) Documentation of information for payment requests.

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

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

F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

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

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.
2) Sequence of operations.
3) Resolution of BIM component conflicts.
4) Status of submittals.
5) Deliveries.
6) Off-site fabrication.
7) Access.
8) Site utilization.
9) Temporary facilities and controls.
10) Work hours.
11) Hazards and risks.
12) Progress cleaning.
13) Quality and work standards.
14) Change Orders.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Special reports.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either District or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.
3. Two paper copies.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

E. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.

4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

F. Construction Schedule Updating Reports: Submit with Applications for Payment.

G. Daily Construction Reports: Submit at weekly intervals.

H. Material Location Reports: Submit at weekly intervals.

I. Site Condition Reports: Submit at time of discovery of differing conditions.

J. Special Reports: Submit at time of unusual event.

K. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing work stages area separations interim milestones and partial District occupancy.
4. Review delivery dates for District-furnished products.
5. Review schedule for work of District's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and District startup procedures.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts**,** submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work by District: Include a separate activity for each portion of the Work performed by District.
4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
5. District-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
6. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Limitations of continued occupancies.
c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use of premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.

h. Environmental control.

7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion**.**

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

1. See Section 007200 "General Conditions" for cost reporting and payment procedures.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours,

working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for commencement of the Work

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.4 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. General: Prepare network diagrams using AON (activity-on-node) format.

B. Startup Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Main events of activity.

4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the schedule of values).

E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.

F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

    a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
    b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.5 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.

11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.6 SPECIAL REPORTS

A. General: Submit special reports directly to District within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise District in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

1. In-House Option: District may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

C. Distribution: Distribute copies of approved schedule to Architect District, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Requirements:

1. Section 007200 "General Conditions" for submitting Applications for Payment and the schedule of values.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

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

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

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

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

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

1. Initial Review: Allow **15** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. **Architect** will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, District, or other parties is indicated, allow 21 days for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

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

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

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

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

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

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.

    a. Transmittal Form for Paper Submittals: Use AIA Document G810.
    b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

        1) Project name.
        2) Date.
        3) Submittal Number (Owner to provide numbered list of submittals)
        4) Destination (To:).
        5) Source (From:).
        6) Name and address of Architect.
        7) Name of Construction Manager.
        8) Name of Contractor.
        9) Name of firm or entity that prepared submittal.
        10) Names of subcontractor, manufacturer, and supplier.
        11) Category and type of submittal.
        12) Submittal purpose and description.
        13) Specification Section number and title.
        14) Specification paragraph number or drawing designation and generic name for each of multiple items.
        15) Drawing number and detail references, as appropriate.
        16) Indication of full or partial submittal.
        17) Transmittal number, numbered consecutively.
        18) Submittal and transmittal distribution record.
        19) Remarks.
        20) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to District**,** containing the following information:

    a. Project name.
    b. Date.
    c. Submittal Number (Owner to provide numbered list of submittals)
    d. Name and address of Architect.
    e. Name of Construction Manager.
    f. Name of Contractor.
    g. Name of firm or entity that prepared submittal.
    h. Names of subcontractor, manufacturer, and supplier.
    i. Category and type of submittal.
    j. Submittal purpose and description.
    k. Specification Section number and title.
    l. Specification paragraph number or drawing designation and generic name for each of multiple items.
    m. Drawing number and detail references, as appropriate.
    n. Location(s) where product is to be installed, as appropriate.
    o. Related physical samples submitted directly.
    p. Indication of full or partial submittal.
    q. Transmittal number, numbered consecutively.
    r. Submittal and transmittal distribution record.
    s. Other necessary identification.
    t. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

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

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

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

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.

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

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

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

3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

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

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

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

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

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

    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

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

    a. PDF electronic file.
    b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

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

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

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

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.
    b. Two opaque (bond) copies of each submittal. Architect will return one copy.

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

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

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as District's property, are the property of Contractor.

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

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

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

    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

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

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

b. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 007200 "General Conditions."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

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

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

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

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

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

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

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

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

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

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

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

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

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

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

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

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

3.2 ARCHITECT'S ACTION

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

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

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

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

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, District or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section and are listed in the Technical Sections.

1.3 DEFINITIONS

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

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

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to

show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

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

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

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

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

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

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

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

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

1.4 CONFLICTING REQUIREMENTS

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

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

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

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

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. District-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

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

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

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

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.

7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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

1.8 QUALITY ASSURANCE

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

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

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

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

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

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

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

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according

to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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

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

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

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

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
    a. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

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

1. District will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor**,** and the Contract Sum will be adjusted by Change Order.

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

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

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

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

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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

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

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

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

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

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

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

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to District, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

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

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

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation, provision and removal of, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Provide water, pumps, connections and extensions of water source as required for construction operations.

C. Electric Power Service from Existing System: Provide electrical power, connections and extensions of electrical source as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Fire Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.

2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before District's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails. Provide concrete bases for supporting posts.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

2.3 SWING STAGE

A. Provide swing stage(s) and obtain certification for use of existing swing stage davits during project execution.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 SUPPORT FACILITIES INSTALLATION

A. Parking: Use designated areas of District's existing parking areas for construction personnel. Parking is limited to three personal cars and ne pickup size truck.

B. Provide recycling and refuse disposal facilities on-site and remove unused, surplus and waste materials on a weekly basis.

C. Comply with the City of Richmond construction, demolition, recycling, waste removal and debris waste reduction and recycling/reuse requirements.

D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

3.4 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. District reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012100 "Allowances" for products selected under an allowance.
2. Section 012300 "Alternates" for products selected under an alternate.
3. Section 012500 "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by District's construction forces. Coordinate location with District.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to District.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for District.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. District reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and Districts, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Installation of the Work, including utilities and pre-fabricated structures.
3. Cutting and patching, including exterior ceramic tile and stone paving.
4. Progress cleaning.
5. Starting and adjusting.
6. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 024113 "Selective Demolition" for demolition and removal of selected portions of the existing improvements.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.

3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings and on approved submittals. Verify that there is sufficient room to install materials using the selected method of installation.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Architect promptly.

3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. MAINTAIN REQUIED CLEARANCES TO OVERHEAD HIGH-VOLTAGE ELECTRICAL LINES.

C. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.5 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials

specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 “Temporary Facilities and Controls”and with City of Richmond Permit instructions

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:
1. Section 017300 "Execution" for progress cleaning of Project site.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting District unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.

5. Submit test/adjust/balance records.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
2. Complete final cleaning requirements, including touchup painting.
3. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after

inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 007200 General Conditions, Part 9 "Payments and Completion."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect and Construction Manager.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect will return annotated file.
b. PDF electronic file. Architect will return annotated file.
c. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit District's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by District during construction period by separate agreement with Contractor.

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

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

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

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

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

a. Clean areas disturbed by construction activities of rubbish, waste material, litter, and other foreign substances.
b. Remove tools, construction equipment, machinery, and surplus material from Project site.
c. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
d. Clean transparent materials, including glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish glass, taking care not to scratch surfaces.
e. Remove labels that are not permanent.
f. Leave Project clean and ready for occupancy.

C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

END OF SECTION

SECTION 01 78 23

SECTION 01 78 00

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

2.2 REQUIREMENTS, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of District.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by District's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by District's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for general closeout procedures.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

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

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one of file prints.
3) Submit record digital data files and one set(s) of plots.
4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit three paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and three set(s) of prints.
3) Print each drawing, whether or not changes and additional information were recorded.

c. Final Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit record digital data files and three set(s) of record digital data file plots.
3) Plot each drawing file, whether or not changes and additional information were recorded.

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

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

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

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

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

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

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

a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
b. Architect will provide data file layer information. Record markups in separate layers.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

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

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

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

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders**,** record Product Data**,** and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders**,** record Specifications**,** and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as PDF electronic file or scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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

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

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 02 41 20

SELECTIVE SITE DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes specifications for the demolition and removal of structures and foundations, including backfilling of resultant excavations and depressions, as indicated.

B. Extent of demolition work shall be as follows:
   1. Removal of concrete slabs, curbs, gutters, sidewalks, and concrete and asphalt pavements as indicated on the Contract Drawings.
   2. Removal and salvage of porta potty as indicated on the Contract Drawings.
   3. Removal and reconstruction of portions of irrigation sprinklers, valve boxes and piping.

C. The work includes restoration of existing structures and facilities to remain in place that are damaged by demolition and removal operations.

1.02 REFERENCE STANDARDS

A. American National Standards Institute (ANSI): ANSI A10.6 Safety Requirements for Demolition

B. "Greenbook" Standard Specifications for Public Works Construction, current Edition.

1.03 REGULATORY REQUIREMENTS

A. California Code of Regulations, Title 8, Chapter 4, Subchapter 4 - Construction Safety Orders.

1.04 PERMITS

A. The Contractor shall obtain all special permits including recycling permit and licenses and give all notices required for performance and completion of the demolition and removal work, hauling, and disposal of debris.

1.05 SUBMITTALS

A. Permits: Submit copies of demolition, recycling, hauling, and debris disposal permits and notices for record purposes. Include description of proposed haul routes.

1.06 SITE CONDITIONS

A. Protection of Persons and Property:
   1. Install temporary barriers around the area of work.
   2. Contractor shall coordinate construction staging, lay-down areas, and bus impacts with AC Transit prior to the beginning of construction.
   3. Erect and maintain temporary lights, barricades, signs, and other measures as necessary to protect the public, workers, buses and adjoining structures from damage from demolition work, all in accordance with applicable codes and regulations.
   4. Open depressions and excavations occurring as part of this work shall be barricaded and posted with warning lights when accessible through adjacent areas or through public access. Operate warning lights during hours from dusk to dawn each evening and as otherwise required.
   5. Protect utilities, pavements, and facilities from damage caused by settlement, lateral

movement, undermining, washout, and other hazards created by demolition operations.

6. Do not obstruct travel ways or bus stop loading areas unless otherwise directed or approved. Contractor shall coordinate with the AC Transit Project Manager.

B. Protection of Utilities:
   1. Protect in place active sewer, water, gas, electric, and other utilities, and drainage and irrigation lines indicated or, when not indicated, found or otherwise made known to the Contractor before or during demolition work. If utility is damaged, immediately notify the Owner's Representative and utility owner for corrective action.

C. Noise and Dust Abatement:
   1. Provide continuous noise and dust abatement as required to prevent disturbance and nuisance to the public and workers and to the occupants of adjacent premises and surrounding areas. Dampen or cover areas affected by demolition operations as necessary to prevent dust nuisance.

D. Unknown Conditions:
   1. The Contract Drawings and related documents may not represent all surface or subsurface conditions at the site and adjoining areas. The known surface and subsurface conditions are as indicated and shall be compared with actual conditions before commencement of work.
   2. Existing utilities and drainage systems below grade are located from existing documents.
   3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under construction, notify the Owner's Representative in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the work until written instructions are received from the Owner's Representative.
   4. Thickness and size of existing pavements, slab and other elements are from previous construction documents, and do not imply the actual depth or thickness of the element where it occurs. Remove 6" to 10" thickness of the element as required.
   5. If existing conditions encountered are different than those indicated, and interfere with the work, notify the Owner's Representative or AC Transit Project Manager in writing prior to proceeding with the work.

PART 2 – PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FACILITIES

A. The Contractor shall furnish all materials, tools, equipment, devices, appurtenances, facilities, and services as required for performing the demolition and removal work.

PART 3 – EXECUTION

3.01 DEMOLITION

A. Perform demolition work in accordance with ANSI A10.6 and the California Code of Regulations, Title 8 and Title 24, as applicable.

B. Blasting will not be permitted. Saw cut concrete and asphalt where indicated on plans to full depth unless otherwise approved by the Engineer, with saw designed for cutting pavements. Cuts shall be straight and free of ragged edges

3.02 DISPOSAL OF DEBRIS

A. Dispose of removed materials, waste, trash, and debris in a safe, acceptable manner, in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction.

B. Burying of trash and debris on the site will not be permitted. Burning of trash and debris at the site will not be permitted.

C. Remove trash and debris from the site at frequent intervals so that their presence will not delay the progress of the work.

D. Removed materials, trash, and debris shall become the property of the Contractor and shall be removed from the Owner's property and disposed of in a legal manner. Location of disposal site and length of haul shall be the Contractor's responsibility.

3.03 SALVAGE AND RECYCLING

A. Salvage existing parking bumpers and ADA signs as indicated on the Contract Drawings.

B. Repair, or replace with new material, salvaged material damaged or destroyed by Contractor’s activities.

C. Salvaged items which are not re-installed and not recycled in the Work shall remain the property of the Contractor.

D. The Contractor shall secure all permits, and make required arrangements prior to hauling salvaged or recycled material.

E. The Contractor shall provide proof of disposal or recycling.

3.04 RECONSTRUCTION

A. Existing structures or facilities that are to be reconstructed, re-laid, relocated, reset, or installed at existing or new locations shall conform to the design of the existing structures or facilities and shall be equal in all respects to the existing structures or facilities. The work or reconstruction shall be performed in accordance with the requirements of these specifications for new work of similar character, which apply to the type of facility to be reconstructed, adjusted, modified, remodeled, relaid, relocated, or reset.

B. Materials to be reused shall not be removed until their use is no longer required as determined by the Owner’s Representative.

C. Materials to be reused in the work shall be cleaned of all earth and other foreign materials. All adhering concrete shall be removed from materials to be reused in the work.

D. Materials shown on the Contract Drawings to be reused in the work that are damaged as a result of the Contractor’s operations shall be repaired by the Contractor, at the Contractor’s expense, to the satisfaction of the Owner’s Representative. Materials that are damaged beyond repair as a result of the Contractor’s operations shall be disposed of and replaced at the Contractor’s expense.

E. Materials from existing structures or facilities to be reused in the work that, in the opinion of the Owner’s Representative, are unsuitable for use in the work shall become the property of the Contractor and shall be disposed of. The unsuitable material shall be replaced with material of a kind and quality equal to the best material in the existing facility. Furnishing of material to replace unsuitable materials as ordered by the Owner’s Representative or AC Transit Project Manager will be paid for as extra work.

3.05 RESTORATION OF EXISTING STRUCTURES AND FACILITIES:

A. All damage to existing structures and facilities that are to remain in place shall be repaired to

a condition equal to that existing prior to the beginning of demolition and removal operations. The cost of repairing existing structures and facilities damaged by the Contractor's operations shall be at the Contractor's expense.

END OF SECTION 02 41 20

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes specifications for conveying and placing cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, curing, and finishes, as indicated on the Contract Drawings.

1.02 REFERENCE STANDARDS

A. American Concrete Institute (ACI):

ACI 116R	Cement and Concrete Terminology
ACI 117	Standard Tolerances for Concrete Construction and Materials
ACI 212.1R	Admixtures for Concrete & Guide Use of Admixtures
ACI 212.2R	Admixtures for Concrete & Guide Use of Admixtures
ACI 212.3R	Chemical Admixtures for Concrete
ACI 301	Specifications for Structural Concrete
ACI 302.1R	Guide for Concrete Floor and Slab Construction
ACI 304R	Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 304.2R	Placing Concrete by Pumping Methods
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 306.1	Standard Specification for Cold Weather Concreting
ACI 308	Standard Practice for Curing Concrete
ACI 308.1	Standard Specification for Curing Concrete
ACI 309R	Guide for Consolidation of Concrete
ACI 318	Building Code Requirements for Structural Concrete
ACI 347	Guide to Formwork for Concrete
ACI 503.2	Specification for Bonding Plastic Concrete to Hardened Concrete with a Multi-Component Epoxy Adhesive

B. American Society for Testing and Materials (ASTM):

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C42/42M	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C94/94M	Standard Specification for Ready-Mixed Concrete
ASTM C143	Standard Test Method for Slump for Hydraulic-Cement Concrete
ASTM C143M	Standard Test Method for Slump for Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete

ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881	Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C881	Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1059	Standard Specification for Latex Agents for Bonding Fresh To Hardened Concrete
ASTM C1064	Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM E329	Standard Specification for Agencies Engaged in Construction Inspection and/or Testing
ASTM E548	Standard Guide for General Criteria Used for Evaluating Laboratory Competence
ASTM E1155	Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers

C. "Greenbook" Standard Specifications for Public Works Construction, 2015 Edition

D. American Association of State Highway and Transportation Officials (AASHTO): AASHTO M182 Burlap Cloth made from Jute or Kenaf

1.03 DEFINITIONS:

A. The words and terms used in these Specifications conform to the definitions given in ACI 116R.

B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 SUBMITTALS

A. General: Refer to the General Conditions for submittal requirements.

B. Product Data: For each type of product indicated.

C. Qualification Data for testing agency.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates.
   2. Cementitious materials.
   3. Admixtures.
   4. Form materials and form-release agents.

5. Steel reinforcement and accessories.
6. Curing compounds.

E. Field quality-control test and inspection reports.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

A. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend a pre-construction meeting, including the following:
   a. Contractor's superintendent.
   b. Independent testing agency responsible for concrete design mixtures.
   c. Ready-mix concrete manufacturer.
   d. Concrete subcontractor.
2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, curing procedures, forms and form removal limitations, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Delivering and placing of concrete in hot weather and cold weather shall conform to the applicable requirements of ACI 305R and ACI 306R, respectively.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. High-density overlay, Class 1 or better.
   b. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2.02 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

A. Cementitious Material: ASTM C150, Type II, low alkali, of the same type, brand, and source, throughout Project:

B. Normal-Weight Aggregates: ASTM C 33, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
1. Coarse-Aggregate: Uniformly graded from No. 4 to ¾-inch maximum size.
2. Fine Aggregate: Uniformly graded from ¼-inch to fines, washed clean.

C. Water: ASTM C 94/C 94M, clean and potable, free of impurities detrimental to concrete.

2.05 ADMIXTURES

A. Contractor may include accepted concrete admixtures in the mix to improve the water-cement ratio or workability of the concrete, providing the strengths specified and other desirable characteristics of the concrete can be achieved and maintained. Admixtures require the Engineer's acceptance before they may be used, and shall be included in the design mix, introduced in solution form. Comply with ACI 212.1R, ACI 212.2R, and ACI 212.3R as applicable.
   1. Air-Entraining Admixture: ASTM C 260.
   2. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
      a. Water-Reducing Admixture: ASTM C 494.
      b. Plasticizing Admixture: ASTM C 1017.
   3. Pozzolanic Admixtures: ASTM C618
   4. Fly Ash: ASTM C 618, Class F, with weight loss on ignition limited to 3 percent.

2.06 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.07 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.08 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

D. Admixtures: Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability. Use admixtures according to manufacturer's written instructions.

2.09 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 REMOVING AND REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

B. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Engineer.

3.03 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.04 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groove tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.05 CONCRETE PLACEMENT

A. Notify the Owner's Representative at least 24 hours in advance of placing concrete.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.06 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.07 FINISHING SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power- driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
   3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.

3.08 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure all unformed surfaces.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Continuous water-fog spray.
      b. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surface and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cures or use moisture retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.09 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
   7. Strength of each concrete mixture will be satisfactory if every average of any three

consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive- strength test value falls below specified compressive strength by more than 500 psi.

8. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

C. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 03 30 00

SECTION 13 42 13

SPECIAL EQUIPMENT- PREMANUFACTURED RESTROOM BUILDING UNIT

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes information about furnishing and installing the premanufactured restroom building unit.

1.02 REFERENCES

A. Public Restroom Engineer/ Inspector. manuals, website and references.
Contact address: 2587 Business Parkway, Minden, NV 89423 ; Phone: 775-783-1200

1.03 PERFORMANCE REQUIREMENTS

A. Architectural Design/Engineering and Insurance Responsibility: The Supplier shall be responsible for architectural, engineering, and all applicable building, safety, health, fire, and accessibility code compliance. Final drawings of the restroom building unit shall be stamped by the supplier as required for local permitting (e.g., Professional Engineers in the State of California).

B. The prefabricated public restroom building requires coordination between the Contractor, who prepares the site pad and delivery access for the restroom building, and the Supplier, who completed the architectural design, engineering, off-site building construction, delivery and installation on site.

C. The premanufactured restroom building unit shall be as shown on the drawings and specified in this section. The drawings show a Public Restroom Engineer/ Inspector (Minden, NV) restroom building unit. If an "or equal" premanufactured restroom building unit is proposed, it must meet all the criteria and standards and be approved by the District.

D. Installation and maintenance shall be performed in accordance with this section and per the Manufacturer's requirements.

E. The Supplier shall furnish a 20-year structure warranty and a 5-year component warranty.

F. Mat Engineered Concrete Building Slab/Foundation:
1. The mat engineered 8" thick slab/foundation shall be engineered and constructed to withstand the transportation weight of the building without cracking and to resist absorption from any liquids deposited on the surface. The concrete slab shall be constructed inside a steel angle curb, reinforced with dual mats (tension and compression,) and poured with a custom concrete formula with special admixtures to create a finished slab that is water proof for life.
2. Perimeter Steel Curb: 5/16" 50,000 kip steel 6" X 6" welded continuous angle.
3. Rebar Steel Mat: Two layers of 40,000 tensile steel rebar in varying sizes per engineers requirements, including a perimeter structural continuous grade beam design inside the exterior steel angle and at any other location deemed by the engineer of record as required for the use intended. In coastal locations or when required for corrosion resistance rebar shall be epoxy coated or fiberglass to resist permanent corrosion. Rebar mats shall be wire tied to code with a minimum of three turns of the wire and overlaps shall be minimum of 15 diameters for any connection.
4. All slab openings shall be surrounded with two layers of steel collars as required by the engineer of record to stop corner cracking and to reinforce the openings for lifting.
5. 1" thick by 3" minimum length threaded nuts shall be welded to the steel perimeter frame

with continuous ¼" fillet welds. Nuts shall be welded to common steel plates per the engineer of records design and attached to the interior steel rebar structural mats.

6. The engineer of record shall provide lifting locations with sufficient reinforcement to allow the safe lifting of the entire designed weight of the structure with dual 1" steel bolts and washers at each lifting location. The number of lifting locations with each location fitted with removable ¾" 8" X 8" 50,000 tensile strength steel angles shall be determined by the engineer of record.
7. The slab shall be poured over a 1" thick steel plate table. The concrete mix design shall not exceed a 3" slump and shall be stinger vibrated for maximum consolidation. All floors shall slope to any floor drains within each room and if no floor drain is present the floor should not slope. The surface shall be a very light broom that should meet a coefficient of friction on the surface of .06. Birdbaths shall be cause for rejection.
8. The steel perimeter angle will remain below the concrete surface by nominal two inches to prevent corrosion. After the site concrete sidewalks are poured, the joint shall be full flow sealed with self-leveling grey urethane caulk to prevent penetration of water into the joint.
9. The building shall be designed for future relocation and shall provide protection for the lifting openings in the mat slab so that the threaded openings will be available for future use if needed.
10. The building system shall be designed for placement on a general contractor site prepared class 2 building pad/and or footings as required by code, per the bid drawings, suitable for 1500 pounds soil bearing capacity minimum. Any soils survey (if necessary) shall be by owner or engineer of record.

G. Exterior & Interior Masonry Block Walls

1. The block walls shall be nominal 8" x 16" CMU. The building corners shall have special corner return block that matches the exterior finish and creates a uniform appearance. All CMU shall be custom fabricated with an enlarged interior hole for placement of the grout and vertical rebar. The exterior walls shall be 4" thickness per State of California codes or engineering for wind and seismic. The interior walls shall be 4" block to nominally 7'-4" above finished floor and framed with applicable required finishes above for pony and gable walls. A structural steel tubular .188 wall cap beam shall be welded to 5/16" 40,000 kip steel plate embeds, at intervals per the engineer of record, within the masonry wall. Cap beam shall be ZRC primed and painted, color to be selected by owner wall.
2. The 8" mat engineered concrete slab shall be cured a minimum of 7 days. Holes for vertical dowels shall be drilled into the mat engineered slab avoiding any grade beams or other structural reinforcement. Once the holes are drilled, blow out the remaining material and using two part structural epoxy, wet set the #3 or #4 vertical rebar (as specified on the engineering calculations into holes drilled to the depth per the engineer of record requirements. Each rebar shall be held vertical to allow equal epoxy support to each dowel during the drying period. Engineering calculations require that rebar shall be installed in each concrete block center void or every block hole. The engineered uplift on each rebar shall be sufficient to restrain any load imposed on the masonry block wall for vertical rebar pull out from the concrete mat engineered slab.

H. Roof System

1. The roof structure shall be 2" x 6" wood rafters at 24" on center with 5/8" OSB sheathing, and ice and water shield membrane with 26 gauge standing seam metal roof panels, color selected by owner. The rake and fascia shall be 14 gauge formed steel painted in a color selected by owner.
2. Roof shall be designed per plans to reduce vandals climbing on roof and to obtain proper ventilation. Custom size openings for the gable vents to provide fan-free ventilation.
3. The restroom ventilation screens (described in a following section) shall be attached to

the truss frames and non-removable by vandals.

I. Exterior Wall Finish, Masonry and Gable
   1. The building exterior finish shall be precision 8" x 16" CMU to wall height with three sides stucco per the exterior elevations in the bid plans. The block shall be coated with 2-4 mil layers of special 7-day curing block fillers and painted with two additional layers of industrial high solids, gloss enamel to a 4 mil thickness. Color to be selected by Owner. The gable ends above the cap beam shall be surfaced with fiber-cement siding stucco in pattern, painted with industrial enamel, color to be selected by owner.

J. Interior Wall Finish:
   1. Interior precision CMU block masonry walls (Restroom) shall be smoothed to a pebble grain finish with 2-4 mil layers of 7-day curing block fillers and painted with two additional 4 mil layers of industrial high solids (white) industrial grade enamel.

K. Gable Ventilation System (Restroom)
   1. Shall be woven 1/4" X 1" X 1", 316T,stainless steel wire mesh set in welded stainless steel angles attached to the wall framing with vandal resistant stainless steel screws.

L. Doors:
   1. The restroom entry doors shall be 7'-0" high, custom fabricated, 14 gauge steel; reinforced with 14 gauge steel ribs welded at 6" intervals on each face, concealed; reinforced with a welded plate for door closer mounting; hung on a single continuous, 1 million cycle, aluminum gear hinge with stainless steel vandal resistant screws at nominal 4" on center. The doors shall weigh nominally 176 lbs each for a 36" X 84" door. Custom fabricated 14-gauge steel door jambs with 4" steel heads shall be welded to the steel cap beam and be solid filled with 3000 psi masonry grout mix.
   2. All exterior entry doors shall have a ¼" thick stainless steel "Z-shaped" anti-microbial pull handles and Schlage B-600 series commercial series dead bolts. Each exterior door shall have a Schlage Activated Lock Set and conductive (transfer) hinge.
   3. The door closer (restroom entry doors only) shall be "LCN" heavy duty #4210 Series, fastened to a structural reinforced door plate per door manufacturer design.
   4. Stainless steel vandal resistant fasteners shall be used on all hardware.

M. Specialties
   1. All specialty washroom equipment shall be commercial grade stainless steel fastened securely to walls with vandal resistant stainless steel screws to avoid removal by vandals as follows:
   2. Toilet paper holder shall be a covered three-roll, 18-gauge stainless steel. Toilet paper holders shall be attached to block walls with 4 epoxy bedded vandal resistant stainless steel fasteners.
   3. Stainless steel grab bars to code shall be 1 ¼" minimum exposed fastener vandal resistant design and installed at each accessible water closet.
   4. Hand dryer shall be a wall mounted Dyson "V-blade", adjacent to lavatory in the restroom.
   5. Soap Dispensers shall be vandal resistant ASI #353 through the wall dispenser over lavatory with a behind the wall stainless steel tank located inside the utility chase for easy maintenance.
   6. A 24"x36" sheet of plywood shall be installed on the interior wall in the utility chase.
   7. Junction boxes and minimum ¾" conduit capable of accommodating Cat 6 cable shall be installed at each exterior door leading to the plywood sheet in the utility chase.

N. Plumbing:
   1. Building shall be fully compliant with the following codes:
      a. All applicable State of California Commercial Building Codes. Latest edition

applicable.

2. GENERAL: All components and fabrications shall be designed to reduce life cycle maintenance, be compatible with current maintenance spare parts, and shall be listed in a spare parts/maintenance manual (two copies) delivered in utility chase of building.
3. WATER PIPING: shall be type L copper soldered per code above grade and type K with silver solder below grade. All water piping shall be designed and constructed with high and low point drain fittings. All piping shall be mounted on Uni-strut wall brackets with neoprene isolators, to code.
4. WATER PRESSURE GAUGE/VALVE COMBO: install three commercial grade industrial water pressure gauges, isolation ball valves, 150 PSI pressure regulator with wye strainer, check valve, and Keystone SR 40 240 water filter.
5. PLUMBING FAUCETS, ISOLATION VALVES AND ACTUATORS: All fixtures except those with flush valves shall be isolated with ball valves for each fixture, concealed antimicrobial impregnated flush handle valves, and metered push-button lavatory faucets.
6. DWV PIPING: DWV piping shall be concealed behind the wall. DWV piping shall be PVC DWV, solvent welded, for all concealed piping. A cast iron no hub DWV vent pipe with a cast iron roof mounted vandal cap vent shall be required, through the roof.
7. REMOVABLE PIPE TRAPS: all floor drain, sink drain, and waste traps shall be removable for maintenance. Floor drains shall be trapped behind the wall in the utility chase using a combination waste and vent system. Floor drains shall be increased two pipe sizes over standard to allow code use. Trap primers shall not be used as preferred method of cleaning shall be by hose down maintenance. All surface mounted utility chase piping shall be mounted on Uni-strut with plastic isolators to code. Sink drain traps shall be concealed behind the utility chase walls where maintenance staff can access all plumbing.
8. PLUMBING FIXTURES: Plumbing fixtures shall be 14-gauge 316 stainless steel manufactured by Acorn. Toilet shall be wall hung, rear discharge, with concealed anti-microbial lever flush valves. Toilet seat shall be black solid core plastic, non-flammable construction with continuous stainless steel concealed self-checking hinges. Lavatory shall have concealed remote traps behind the mechanical wall. Schedule of fixtures:
   a. Water Closets: Acorn Penal-Ware,1675-W-1-HET-1-FVBO-ADA-PFS
   b. Water Closet Flush Valve: Zurn Z6143AV-HET-BG-7L
   c. Lavatories: Acorn Penal-ware 1652LRB-1-DMS-03-M
   d. Urinal: Acorn Penal-Ware: 1709HEU-W-1-0.125-FVBO
   e. Urinal Flush Valve: Z-6195AV-ULF-BG-7L
9. FLOOR GRATES: Removable 350 lbs per square foot pultruded fiberglass non-skid floor grates shall be installed over every opening in the utility chase for OSHA protection/compliance.
10. HOSE BIB: There shall be one hose bib provided in the utility chase.

O. Electrical:
   1. GENERAL: Electrical system and components shall be commercial grade or better and piping conduits shall be installed on commercial Uni-strut wall hangers. Interior and exterior electrical lighting fixtures in public areas shall provide lifetime manufacturer's warranty.
   2. PANEL/WIRING: One 100 amp, 120/240v, Single-phase, industrial grade Panel Board, Square "D" QO series with 100 amp main circuit breaker, shall be mounted in the utility chase in the restroom building. All breakers shall be snap-on type, minimum 10,000 A.I.C. RMS (Sym). Wiring shall be copper wire #12 min in EMT piping with compression fittings.
   3. PIPING: All piping shall be surface mounted to the masonry block walls with minimum of 2" fastener penetration. EMT conduit shall be compression type. Main panel shall

maintain a 30" X 36" safety code required clear space, floor to 6' above finished floor.

4. EXTERIOR LIGHTING: Luminaire YWP610 LED, vandal resistant, high-impact polycarbonate lens fixtures shall be installed per plans.
5. INTERIOR LIGHTING: Luminaire SWP1212 LED vandal resistant high-impact polycarbonate lens fixtures shall be installed in the restrooms per plans. The utility chase shall have one (1), 4' single-tube LED fixture, suitable for wet locations, with a single switch at door entry.
6. LIGHTING CONTROL: All interior restroom lighting shall be controlled by a motion sensor integral to the light fixture. The utility chase shall have 2 bypass switches (one for interior lighting and one for exterior lighting), so maintenance staff can check operation during daylight hours. A single photo cell, roof mounted, shall control all exterior lighting.
7. ELECTRICAL OUTLETS: One (1) commercial spec grade duplex outlet shall be located in the utility chase adjacent to the panel. One (1) single phase, 20 amp plug shall be located on the interior wall of the utility room.
8. HAND DRYER: Shall be Dyson "V-blade" through the wall, one adjacent to each lavatory in the restroom.
9. WATER HEATER: Shall be tankless, Stiebel DHC-E 8/10 to service the restroom lavatories.

1.04 SUBMITTALS

A. General: Refer to General Conditions for submittal requirements.

1.05 DELIVERY, UNLOADING, LIFTING AND HANDLING

A. The restroom manufacturer shall deliver the unit to the site in coordination with the Contractor.

B. The Contractor may require a gradall-type lift or crane (if applicable) to place the unit.

C. The Contractor shall coordinate the delivery and placement of the restroom unit with AC Transit and the City of Richmond and provide a traffic safety plan for approval prior to placement.

PART 2 – PRODUCTS

2.01 MATERIALS

A. The restroom unit is a premanufactured single occupancy, uni-sex restroom with a utility closet. It shall be ADA accessible. It shall be an engineered block wall system with a metal roof and commercial grade, wall mounted plumbing fixtures. Interior and exterior lighting is required.

B. The Supplier shall provide final building design architectural drawings and engineering calculations under the responsibility of a licensed structural engineer, in compliance with all local, state, and federal codes. The Supplier shall construct the building offsite as a permanently relocatable building, transport it to the final required destination, and install the building turnkey, on the pad prepared by the Contractor per the drawings provided by the Supplier.

PART 3 – EXECUTION

3.01 SITE PREPARATION

A. The Contractor shall prepare the building subbase per details on the project plans. The Contractor shall furnish and install all utilities per bid site plans up to the specified points of connection (POC) nominally 6' from the building lines. Coordinate locations and elevations of

sewer, water, and electric utilities coming into the building with the Supplier.

B. The Contractor shall stub-out electrical, water, and sewer at the point of connection and at the proper elevation below grade for the project. The Contractor shall provide final hook up of the water from the building to the point of connection; sewer hook up to the point of connection; and electrical sleeve from building panels to the point of connection. Final utility connections shall be by the Contractor.

C. The Contractor shall flush the water lines thoroughly (a minimum of 30 minutes) before making the final water connection to the building.

3.02 INSPECTION

A. Inspection of the restroom unit and all parts contained in or shipped outside of the unit shall be inspected at time of delivery by the site Engineer/Inspector and the Contractor. Any non-conformance to approved drawings or damage to any part of the system shall be documented on the shipping ticket. Damage to the unit during and after unloading shall be corrected at the expense of the Contractor. Any necessary repairs to the restroom unit shall be made to the acceptance of the Engineer/Inspector.

3.03 INSTALLATION

A. The Contractor is responsible for unloading the restroom unit (lifting with equipment or a crane) and placing it on the prepared subbase or concrete pad.

B. The Contractor is responsible for utility connections and will make final connections to sewer, water and power.

3.04 MAINTENANCE

A. The Supplier shall provide maintenance manuals for the building and components.

END OF SECTION 13 42 13

SECTION 22 04 13

PIPING, GENERAL

PART 1 – GENERAL

1.01 THE REQUIREMENT

A. Pipe materials and installation procedures shall be in accordance with the pipe manufacturer's recommendations unless otherwise specified in this Section, or in the specific Section of these Specifications for the particular pipeline material being used.

B. Contractor shall use piping, fittings and joint materials approved by the local jurisdiction (West County Wastewater District)

C. Pipe sizes cited in these Specifications refer to the nominal diameter of the pipe in whole inches.

D. For a particular sewer installation, pipe and manufactured fittings connecting pipe between structures shall be of one and only one manufacturer's brand and of the same type, quality, class and size.

E. Joining of pipe dissimilar size should be joined using an eccentric sheer band coupler and matching the inverts of the pipes to be connected.

F. Where field cuts are required, the Contractor shall use tools and/or equipment recommended by the pipe manufacturer. No hammer and chisel cuts will be permitted.

G. All pipe and fittings delivered to the jobsite shall be marked by the manufacturer with such inventory and identification (Brand Name, Pipe Type, Strength Class, Batch Lot, Lengths, etc.) as to be properly identified in the field as meeting the requirements of these Specifications.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 22 13 13 – Construction of Sanitary Sewer Lines

B. Section 31 23 33- Trenching and Backfilling

C. Section 33 05 19 – Ductile Iron Pipe (DIP)

D. Section 33 05 31.11- Polyvinyl Chloride (PVC) Pipe

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards and Codes:
   1. ANSI/ASME B1.20. Pipe Threads, General Purpose (inch)
   2. ANSI/AWS D1.1 Structural Welding Code
   3. Cal/OSHA Construction Safety Orders

1.04 QUALITY ASSURANCE

A. Pipe shall be subject to inspection at the place of manufacture. During the manufacture of the pipe, local jurisdiction/agent shall be given access to all areas where manufacturing is in progress and shall be permitted to make all inspections necessary to confirm compliance with these Specifications.

B. Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable specifications and standards. The manufacturer shall perform all tests at its own cost.

1.05 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Where the assistance of a manufacturer's service representative is required, in order to obtain compliance for pipe joints, supports, or special connections, the Contractor shall arrange for such assistance.

1.06 MATERIAL DELIVERY, STORAGE AND PROTECTION

A. All piping materials, fittings, valves, and accessories shall be delivered in a clean and undamaged condition and stored off the ground. All pipe and appurtenances shall be protected from damage by sunlight, moisture, corrosive materials, equipment and other sources. All defective or damaged pipe or appurtenances shall be removed from the jobsite and replaced with new materials.

PART 2 PRODUCTS

2.01 GENERAL

A. Pipes, fittings, and appurtenances shall be furnished in accordance with the requirements of the applicable Section of these Specifications for the particular pipeline material being used.

B. Application of pipe coatings shall be in accordance with the requirements of the local jurisdiction.

2.02 BANDED COUPLINGS

A. Where banded couplings are used for joining of new pipe or repair of existing pipelines, only couplings listed in the Approved Materials List shall be allowed.

PART 3 EXECUTION

3.01 GENERAL

A. Sewer pipelines shall be constructed to the alignment and grade shown on the plans, and in compliance with the specified requirements of this Section and of the specific Section of these Specifications for the particular pipeline material being used.

3.02 SEWER INSTALLATION

A. Sewer pipelines shall have a minimum wall-to-wall horizontal clearance of three (3) feet and a minimum vertical clearance of twelve (12) inches from all other improvements and utilities unless otherwise shown on the plans as being allowed by the local jurisdiction under Special Approval.

B. Where sewer pipelines are to be installed in the vicinity of potable water pipelines, wall-to-wall sewer-to-water pipeline separation shall be in conformance with the minimum requirements provided by the local jurisdiction. Sewer pipeline installation in the area labeled "Special Permission," will not be allowed unless specifically approved in writing by the water utility.

C. Pipe cover for sewer pipelines shall be in conformance with the requirements showed in the Standard Drawings, unless otherwise shown on the plans as being allowed by WCWD under a Special Approval.

D. For main sewers and trunk sewers, and for side sewers with less than a min slope of 2% (if approved by the wastewater district) the grade line shall be established by setting cut stakes and obtaining local jurisdiction approval for cut sheets. During pipe installation, the Contractor shall continuously utilize an industrial-standard laser grade control system to confirm that the pipe is installed to the design grade, subject to the following requirements:
   1. The Contractor shall provide a properly calibrated laser instrument and an operator who is qualified and trained in the operation of the particular laser instrument being used. The operator shall adhere to the provisions of the CalOSHA Construction Safety Orders regarding the use of laser equipment.
   2. Laser control points shall be established benchmarks or construction cut stakes identified on the approved cut sheets.
   3. Laser must contain a direct grade reading screen, which will allow the Inspector to verify the grade at all times.

E. Pipe shall not be laid when the Inspector determines that the condition of the trench is unsuitable.

F. If the sewer is to be laid in an area that is to be filled, and the cover prior to filling is less than the required minimum cover specified pipe material and type, the pipe shall not be laid until the area has been properly filled and compacted to a level at least equal to required minimum cover above the proposed pipe, unless otherwise authorized by the Inspector.

G. If field conditions in areas that are potentially unstable or subject to settlement warrant, the Inspector may require that the Contractor substitute a different pipe material/type for the pipe shown on the plans.

H. Pipe, fittings and appurtenances shall be carefully handled and protected against damage, impact shocks, and free fall. Pipe shall be stored in a manner which will protect it from damage at the trench site or elsewhere. The Contractor shall inspect each pipe and fitting prior to installation to determine that only undamaged material is installed.

I. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance and shall be kept clean at all times thereafter.

J. Sewer pipelines shall be laid upgrade from the point of connection to the existing sewer with the bell end at the upgrade end of each pipe length.

K. Layout of curves should not be allowed except by special variance from WCWD.

L. Non-marring slings shall be used for lowering each length of pipe into the trench (chains shall not be used). The pipe shall be laid on properly compacted bedding material as specified in WCWD standard details. No blocking will be permitted and the pipe shall have full bearing

for its entire length between bell holes excavated in said bedding material to prevent point loading at the bells or couplings and to allow for unobstructed assembly of all joints. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints. After jointing is completed, bell holes shall be backfilled with properly compacted bedding material, taking care not to damage, move, or lift the pipe from its bedding support.

M. Where it becomes necessary to modify the design pipe alignment to resolve conflicts with unforeseen obstructions or other causes, the Contractor shall propose a revised alignment to the Inspector who may allow installation per the revised alignment or may require that the revision be submitted to the Engineer for consideration. Such revision may be made by the deflection of joints, by the use of fittings or by forced bending of the pipe if permitted, however, in no case shall the deflection in the pipe or at any joint exceed the maximum deflection recommended by the pipe manufacturer.

N. Sewer pipes, branches, stubs, or other open ends which are not to be immediately connected, shall be plugged or capped.

O. The Contractor shall take all necessary precautions to prevent excavated or other foreign material from getting into the pipe during the laying operations. At all times when laying operations are not in progress and at the close of the day's work, the openings of all pipe and specials, whether in the trench or in storage, shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance.

P. The Contractor shall prevent the pipe from floating during and after its installation.

3.03 CONNECTIONS TO EXISTING SEWERS

A. Existing sewers are shown on the plans at the locations where new sewers are to be connected. It is the responsibility of the Contractor to determine the exact location and depth of the existing sewers prior to the installation of any sewer pipe. New pipe shall be plugged with mechanical plugs until further connection is necessary.

B. Connection of new main and/or trunk sewers to existing lines up to and including forty eight (48) inches in diameter shall be made at existing manholes or by constructing a new manhole over the point of connection, or by removing an existing rodding inlet or plug and extending new pipe of the same diameter, material and class from the point of connection.

1. Where the connection is to be made into an existing manhole, the Contractor shall make the connection by core-drilling through the manhole shelf to the existing channel, installing the new pipe, finishing a new channel within the manhole and repairing any damage to the structure.
2. Where the connection is to be made by constructing a new manhole on an existing sewer, the manhole and new connection shall conform to the standard details. The existing sewer shall be kept intact until immediately before the cleaning and flushing operation for the new sewer is to begin.
3. Where the connection is to be made at a removed rodding inlet or plug, the existing piping shall be cut square and ends properly prepared for the connection shown and an air test fitting shall be installed at the connection of new and existing pipelines.
4. All new pipe shall be plugged with an approved mechanical plug or brick/mortar until the line is completed and ready for testing.

C. Side Sewer Connections to Main Sewers:

1. Side sewer connections shall be made with fittings or adapters recommended by the manufacturer for use with the particular pipe and as approved by the local jurisdiction.
2. Side sewers connecting to 6" or 8" inch main sewer lines shall be connected by installing a wye branch fitting.
3. Connection and side sewer details shall conform to the requirements shown on G-5 of the WCWD Standard Drawings.
4. Side sewer or lateral connections to public sewer shall be as detailed on P-9 and P-10 of the Standard Drawings.
5. Side sewer connections where wyes, tees or laterals were not installed during main sewer construction, shall be made by installing a tap listed in the Approved Materials List, installing a main sewer repair spool (replacement pipe section) as specified in Subsection 3.05 below including a new wye branch or tee fitting, or by core drilling through the barrel of an existing manhole at the top of the shelf or crown of mainline pipe. Installation of taps shall comply with the following requirements:
    a. Only pre-qualified Contractors shall be permitted to install tap and saddle connections on VCP, CIP, DIP, or RCP.
    b. Before commencing excavation for tap installation, the Contractor shall have sufficient Type I bedding and backfill material at the site to properly re-bed the main and lateral sewers, and backfill the excavation.
    c. The excavation for the tapping work shall be a minimum of two (2) feet in width, give enough length for work space, without under-cut sides and shall be properly shored in conformance with all state and local regulations. A minimum clearance of three (3) inches below, six (6) inches on each side and twelve (12) inches each way along the main from the point of connection shall be provided for tap installation.
6. If the main sewer is damaged during excavation for or during installation of the tap, the Contractor shall install a main sewer repair spool (replacement pipe section) as specified in Subsection 3.05 below including a new wye branch or tee fitting.
7. The outer surface of the main in this exposed area shall be thoroughly cleaned prior to tapping.

3.04 REPAIRS TO EXISTING SIDE SEWERS AND MAINS

A. Repairs to main sewers and trunk sewers sixteen (16) inches or less in diameter shall be made using pipe and fittings specified in Section 33 05 19 - Ductile Iron Pipe (DIP), or Section 33 05 31.11 - Polyvinyl Chloride (PVC) Pipe.

B. Repairs to side sewers shall conform to the requirements shown in WCWD Standard Drawings, and shall be made using pipe and fittings specified in Ductile Iron Pipe (DIP); Polyvinyl Chloride (PVC) Pipe; High-Density Polyethylene (HDPE) Pipe; or Cast Iron Soil Pipe (CIP).

C. When repair of a damaged section of pipe is required within eighteen (18) inches of a pipe joint, the replacement section shall extend to and include the joint.

D. Where repair couplings are permitted, only couplings listed in the Approved Materials List shall be used.

E. The Inspector may require replacement of broken, damaged or improper pipe or fittings discovered during sewer repair or replacement work.

3.05 REPAIRS TO NEW SEWER MAINS

A. If damage to the new main sewer pipe is identified during inspection, testing or televising, the Contractor shall repair the damage or replace the pipe as instructed by the Inspector. When repair of a damaged section of pipe is required within eighteen (18) inches of a pipe joint, the replacement section shall be extended to include the joint. Repair procedures shall comply with the following:

1. VCP and DIP SEWER MAINS – Manufacturer's recommended couplings shall be used. The damaged pipe shall be removed by squarely cutting out the damaged section. The replacement pipe shall be squarely cut approximately one-half (1/2) inch shorter than the missing section. The repair couplings shall be placed onto the pipe ends, the replacement assembly inserted into the gap, the repair couplings moved to be centered over each new joint, and the fasteners or bands tightened as required. The Contractor shall re-bed the pipe and backfill the excavation with properly compacted bedding and backfill material in accordance with Section 31 23 33 -Trenching and Backfill.
2. PVC SEWER MAINS - PVC double bell repair couplings shall be used. The damaged pipe shall be removed by squarely cutting out the damaged section, and the remaining ends shall be beveled. The replacement pipe shall be a minimum of three (3) feet in length and shall be squarely cut approximately one-half (1/2) inch shorter than the missing section, and its ends shall be beveled. Reference lines indicating the spigot stab distance required for centering the repair coupling shall be clearly marked on all cut ends. The repair couplings shall be placed onto the pipe ends, the replacement assembly inserted into the gap, the repair couplings moved to be centered over each new joint. The Contractor shall re-bed the pipe and backfill the excavation with properly compacted bedding and backfill material in accordance with Section 31 23 33 - Trenching and Backfill.

3.06 WARNING TAPE INSTALLATION

A. See Section 31 0 5 13 - Earthwork for warning tape requirements.

END OF SECTION 22 04 13

SECTION 22 13 13

CONSTRUCTION OF SANITARY SEWER LINES

PART 1 – GENERAL

1.1 SCOPE

A. The Contractor shall furnish all labor, supervision, materials, and equipment required for installation of a new gravity sewer line as shown on the drawings.

1.2 GENERAL REQUIREMENTS

A. Construction of sanitary sewer lines shall be defined as the excavation, placing bedding and/or foundation, laying of new pipe, backfill, modifications to utilities at points of connections, and cleanup as required by the contract documents. Excavation, backfill and compaction shall be performed in accordance with Section 31 23 33.

1.3 REFERENCES

A. The following standards form a part of this specification.
   1. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
   2. AWWA C-900, ASTM D 1784, cell class 12454, , Class 200 DR-14 PVC Pipe and Fittings, ASTM F 477 and ASTM D 3139
   3. ASTM D2665 – PVC Drain, Waste and Vent Pipe & Fittings
   4. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
   5. ASTM D2564 – Solvent Cements for PVC Pipe and Fittings
   6. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
   7. ASTM D3034 – Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
   8. ASTM F714 - Standard Specification for Polyethylene Plastic Pipe Based on Outside Diameter.
   9. ASTM F794 – Standard Specification for Poly vinyl Chloride (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter.
   10. California Plumbing Code

PART 2 PRODUCTS

2.01 MATERIALS

A. PVC pipe and fittings for gravity sewer lines shall conform to the requirements of AWWA C-900, ASTM D 1784, cell class 12454, , Class 200 DR-14 PVC Pipe and Fittings, ASTM F 477 and ASTM D 3139.

B. Bedding material shall conform to Section 02200 shall be laid in accordance with the contract drawings.

C. Printed 4.5 mil minimum, 6” width minimum detectable underground warning tape.

D. Manholes – Watertight precast concrete manholes conforming to ASTM C478 complete with cast iron cover

PART 3 – EXECUTION

3.01 PREPARATION

A. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.02 INSTALLATION

A. Installation of sewer lines shall be in accordance with the requirements of the California Plumbing Code and ASTM D2321 and the requirements of the West County Wastewater District.

B. Sequence - Construction of a sewer line or manhole shall follow the sequential order as listed below:
   1. Any existing sewer line or manhole involved in the new construction shall be isolated (normal flow rerouted if necessary, by by-pass pumping or other means).
   2. The existing sewer line or manhole shall be excavated and completely uncovered at tie-in points. If wellpointing is required, then applicable methods for well-pointing shall be carried out.
   3. For pipe placement, the trench shall be shaped to conform to required slope and grade. As required by soil conditions, the trench shall be undercut as necessary for placement of pipe bedding as noted on the plans and as specified. The new sewer pipe shall then be laid in the trench.
   4. Manholes and pipe shall be tied in and the trench or excavation shall be backfilled.

C. General Laying Conditions for Pipe and Fittings
   1. Pipes and fittings shall be carefully inspected after delivery on the site of the work and will be rejected if in the opinion of the Engineer/Inspector they are defective in such a way as to endanger the strength of the sewer or the tightness of the joint. The installation of all pipe shall be in conformance with the respective manufacturer's guidelines except where specific procedures outlined therein are contrary to the specifications for this contract. Prior to beginning work, the Contractor shall verify the elevations of all existing inverts involved in the construction.
   2. No pipe shall be set in place and no joint shall be made with water standing in the trench or the bell hole. Whenever pipe laying is topped, either for the night or for any other cause, the end of the pipe shall be securely closed to prevent the entrance of water, mud, or other matter, and shall be secured in such a manner as to prevent the end pipe from being dislodged by sliding or other movement of the backfilling.
   3. The pipes and fittings shall be so laid in the trench that after the sewer is completed, the invert thereof, shall conform accurately to the grades and alignment required. At any stage of construction of a straight stretch between two consecutive manholes, the zero, or starting end of the pipe shall be clearly visible on looking through the pipe from the other end, with the full cross-section of the interior of the pipe in clear view. Pipe sections shall be laid such that flow enters the bell end of the pipe.

D. Backfilling
   1. Backfilling of sewer trenches shall begin as soon as the Engineer/Inspector is satisfied that the joints have been made properly and after any required inspection by representatives of the wastewater district. Pipe bedding material shall be placed in the trench in such a manner as not to disturb the pipe and thoroughly, but carefully, compacted under and around the pipe as shown on the contract drawings. The backfill material placed above the bedding material shall be as specified in Section 31 23 33 and as shown in the contract plans.
   2. Backfilling around manholes shall be done after installation of the manhole, connection

of pipes and inspection by the Engineer/Inspector. Selected backfill material shall be structural fill and shall be placed and compacted as specified in Section 31 23 33.

E. By-Pass Pumping - For any existing sewer lines and manholes involved in the construction work under this contract (to be tied-in, etc.). The Contractor shall provide adequate pumping capacity, back-up pumps so as to avoid sewer overflows, suction/discharge hoses, roll-over ramps at all intersections where hoses may be traversed by vehicular traffic or construction equipment and a sewer overflow protection plan conforming to the requirements of the local jurisdiction.

3.03 INFILTRATION TESTING

A. The sewers shall be true and to line and grade and shall not have any infiltration of ground water. An infiltration measurement will be made by the Contractor to determine acceptability. The Contractor will be responsible for paying for any subsequent re-testing due to failure of the system to pass the initial test.

B. Infiltration rate shall be 0 (zero) gallons per inch per mile per 24 hours; any detectable leaks shall be repaired by the Contractor. The infiltration test is the responsibility of the Contractor and shall be witnessed by the Engineer/Inspector and a representative of the local Sewerage Department.

C. Provide a 60 degree V-notch sharp crested weir suitable for insertion in the collection lines for each pipe diameter used in the ‘project, and shall provide such labor, plugs and pumps that are necessary for conducting such tests. The weirs shall be set vertical and in proper alignment and shall provide that no leakage occur between the periphery of the pipe and the outer edge of the weir. The depth of the V-notch shall be a minimum of 2 inches, and the lowest point of the notch shall be 2 inches above the invert of the pipe. For short lengths of pipe, 2,000 feet or less, provide a spout adaptable to the weir, and a one-gallon measuring pan.

END OF SECTION 22 13 13

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by UL, a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 – PRODUCTS

2.01 CONDUCTORS AND CABLES

A. Copper Conductors: Comply with NEMA WC 70.

B. Conductor Insulation: Comply with NEMA WC 70 for Types THW, THHN-THWN and XHHW.

2.02 CONNECTORS AND SPLICES

A. Connect and splice wire No. 8 AWG and smaller with self-insulating, wire nut connectors.

B. Joints, taps, and splices of wire above grade shall be made by means of “Ideal-Nut” connectors or “3M Scothlok” spring connectors which are resistant to vibration.

C. Taps and splices of wire within in-grade handholes shall be made by means of Burndy Type YC-C compression connectors. Each joint, tap and splice in conductor of #8 and larger shall have the connector voids filled with electrical insulation putty and be taped with rubber covered with plastic tape providing insulation not less than one and a half times the thickness of the original insulation with two half-lapped layers each, Scotch #33.

PART 3 – EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND

WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

C. Feeders Concealed in Concrete: Type THHN-THWN, single conductors in raceway.

D. Exposed Branch Circuits: Type THHN-THWN, single conductors in raceway.

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in structural steel supporting exterior canopies, Type UF, Type MC or Type THHN-THWN, single conductors in raceway. Conceal wiring systems within exterior canopy structure. Where concealment is not possible run wiring system in exposed painted conduit.

G. Branch Circuits Concealed in lighting poles, Type UF, Type MC or Type THHN-THWN, single conductors in raceway. Where concealment is not possible run wiring system in exposed painted conduit.

H. Branch Circuits Concealed in Concrete: Type THHN-THWN, single conductors in raceway.

I. Class 1 Control Circuits: Type THHN-THWN, in raceway.

J. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable, concealed in building finishes.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

G. Use no wire smaller than No. 12 AWG for power and lighting circuits, and no smaller than No. 14 AWG for control wiring unless otherwise indicated. Provide minimum of No. 12 AWG for all switch legs. Provide neutral conductor of the same size as the phase conductors to which it is associated.

H. Provide homerun conductors of continuous length without joint or splice from overcurrent device to first outlet.

I. Provide feeder conductors of continuous length without joint or splice for their entire length.

J. Neatly train and lace wiring inside boxes, panelboards, switchgear, motor control centers, wiring gutters, and other equipment using Thomas & Betts “Ty-Wraps” or similar.

K. Provide equal conductor lengths for all parallel circuits.

L. Provide individual neutral for branch circuits unless indicated otherwise.

M. Drawings indicate proposed circuiting only, and do not indicate every conductor unless intent is unclear and further clarification is required. Provide the necessary travelers for all three-way and four-way switches.

N. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant. Do not exceed manufacturer's recommended tension.

O. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

P. Completely and thoroughly swab raceway system before installing conductors.

Q. Remove and discard conductors cut too short or installed in wrong raceway. Do not install conductors which have been removed from a raceway.

R. Do not install conductors in conduit which contains wires already in place.

3.04 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

D. Connectors shall be large enough to enclose and securely fasten all strands of the conductor.

E. Thoroughly clean wires before installing lugs and connectors.

F. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Provide joints in branch circuits only where such circuits divide. Where circuits divide, provide one through circuit to which the branch is spliced from the circuit. Do not leave joints in branch circuits for fixture hanger to make. Make all taps and splices with approved type compression connector.

H. Terminate spare conductors with electrical tape.

I. Identify and label all conductor terminations as specified in electrical identification.

J. Properly terminate indicated conductors in equipment furnished and provide properly sized lugs.

3.05 SITE EQUIPMENT CONNECTIONS

A. Branch Circuits connections concealed in structural steel supporting exterior canopies, shall only be made in junction boxes concealed within the structural steel and shall be accessible behind access covers.

B. Make taps and splices for connections to exterior equipment mounted remote from building structures within in-grade handholes serving lighting poles, lighting, signage or security equipment mounted on Canopies and grade mounted equipment. Use waterproof fuseholder with fuses for taps.

3.06 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Test insulation resistance of each main feeder and service after the installation is complete but before the connection is made to its source and point of termination.
2. Test insulation resistance using Biddle Megger or equivalent test instrument at a voltage not less than 1,000 volts DC. Measure resistance from phase-to-phase and phase-to-ground. In circuits where insulation test value is lower than 1 megohm, remove and replace conductor and retest.
3. Visually inspect connections of every branch circuit for tightness.
4. Ensure that grounding conductor is electrically continuous.
5. Test branch circuits against grounds, shorts or other faults.
6. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
7. Perform each visual and mechanical inspection and electrical test as indicated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 31 05 13

EARTHWORK

PART 1 GENERAL

1.01 SCOPE

A. Work included under this section shall include site grading and fill, excavation, backfill and compaction for foundations, slabs on grade and utility trenches.

1.02 REFERENCES

A. Standard Specifications - The latest edition of the publications listed below form a part of this specification to the extent referenced. References within the body of text refer to the basic specification designation only.
   1. ASTM D442 – Test Method for Particle-Size Analysis of Soils
   2. ASTM D1140 – Test Method for Amount of Material in soils Finer than the No. 200 (75-micrometer) Sieve
   3. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3 (2,700 kN-m/m3))
   4. ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil In-place by the Sand Cone Method
   5. ASTM D2922 – Standard Test Methods for Density of Soil and Soil-Aggregate In-place by Nuclear Methods (Shallow Depth).

1.03 SUBMITTALS:

A. The CONTRACTOR shall provide the following submittals:
   1. Results of laboratory gradation testing on off-site borrow materials. Gradation testing to be performed in accordance with ASTM D442 and D1140 at the rate of one test per 1000 cubic yards of material.
   2. Results of field density tests.
   3. Dust Control Plan.

PART 2 PRODUCTS

2.01 IMPORTED FILL MATERIALS

A. Materials imported and utilized for general fill shall be select non-expansive engineered fill. Engineered fill material shall be chemically inert, free of organic materials and conform to the following minimum criteria:
   1. Plasticity Index 15 or less
   2. Liquid Limit 35 or less
   3. Gradation per ASTM D442 and ASTM D1140:
   4. Sieve Size Percentage Passing
   5. 4-inch 100%
   6. ¾-inch 75%
   7. No. 200 8 to 40%

2.02 FOUNDATION BACKFILL MATERIALS

A. Backfill materials for foundations shall be suitable select fill or processed clean, fine earth, rock or sand, free from grass, roots, brush, or other vegetation. Backfill material to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.

B. Suitable Materials - Existing on-site materials are suitable for backfill so long as they free of organic materials, deleterious matter or rocks larger than 3 inches in diameter. Supplemental imported material conforming to Section 2.01 is suitable for backfill.

C. Unsuitable fill materials are materials not meeting the engineering requirements specified above or any material that cannot be compacted sufficiently to meet the requirements specified herein.

2.03 PIPE BEDDING MATERIALS

A. Pipe bedding shall be defined as all material within 6 inches of the perimeter of the pipe. Backfill shall be classified as all material within the remainder of the trench. Material for bedding shall be as required by the Utility providing service or as required on the drawings. Unless otherwise specified, material for use as bedding shall consist of clean granular materials having a sand equivalent of not less than 30.

B. Backfill in areas outside of the bedding zone shall conform to the requirements specified in Section 2.02.

C. A colored detectable metallic foil core plastic tape, at least three (3) inches in width, shall be placed on top of the pipe zone backfill wherever sewers are installed. The tape shall have printed on it the words “Caution: Sewer Buried Below.” The warning tape shall be utilized for all pipes (mains and laterals).

PART 3 EXECUTION

3.01 GENERAL

A. Conform excavation to the limits shown on drawings. Do not excavate beyond or below the specified grade except as directed. Where determined necessary by the DISTRICT’S representative, the CONTRACTOR shall extend the depth of excavation until such time as suitable supporting soils are encountered as determined by the DISTRICT’S representative

B. The CONTRACTOR shall be responsible for development and implementation of dust control measures during execution of the work. CONTRACTOR shall submit dust control plan for approval prior to commencing work. Apply water at such times and places as to minimize dust nuisance as directed. This is in addition to water required for compaction.

C. CONTRACTOR shall be responsible for locating all below ground utilities on or adjacent to the zone of construction. CONTRACTOR shall take necessary precautions to prevent damage to underground utilities, vaults, fire hydrants, overhead power lines or any other existing permanent installations.

D. Excavations remaining after installation of structures shall be refilled to the grading plane with structural backfill as shown on the drawings or as directed. The excavation to be backfilled shall be dry and cleaned of all forming or shoring materials, trash, spoil, or debris of any nature.

E. Backfill structural excavation fourteen days after structure installation, and trenches within three days after pipe has been installed, unless otherwise directed by the Inspector.

3.02 SITE PREPARATION

A. Strip site of vegetation and scarify exposed subgrade to a depth of 12 inches. Remove any existing obstructions exposed.

B. Moisture condition scarified areas to a level 2 to 4 percent over optimum moisture content and re-compact as specified in Section 3.3.3.

C. Excavate and re-compact subgrade supporting footings and slabs on grades where indicated on the plans to the depths specified.

3.03 STRUCTURAL FOUNDATION BACKFILL AND COMPACTION

A. Place structural backfill in uniform layers not exceeding 8 inches in loose thickness, at a moisture content within 2 percent of the optimum determined by ASTM D 1557.

B. Backfill shall not be dropped directly upon any structure or pipe. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed. Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall be placed after all water is removed from the excavation.

C. Compaction Requirements: Compact each layer to not less than the percent relative compaction specified below as determined by ASTM D 1557, when tested in accordance with ASTM D 1556, or as otherwise shown on the drawings.
- Areas beneath paved roads, parking areas and grade supported foundations – 95%
- Areas beneath pile supported foundations – 90%
- Areas beneath graveled areas – 90%
- Vegetated areas – 85%

D. Flooding, ponding, or jetting shall not be used for compaction. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the depth of the fill at that time. Hand operated power compaction equipment shall be used where use of heavier equipment is impractical or restricted due to weight limitations. Do not place backfill against concrete before concrete has attained sufficient strength to withstand the pressure of the compacted material (minimum 14 days) or as directed. Raise backfill uniformly around structures, columns, footings, or pipes.

3.04 UTILITY TRENCH BEDDING AND BACKFILL

A. Pipe bedding shall be placed in thin layers not exceeding 6 inches in loose thickness, conditioned to the proper moisture content for compaction and compacted to at least 90% relative compaction as defined in ASTM D1557.

B. Backfill materials outside of the bedding zone shall be compacted in 8 inch layers to a relative compaction as follows:
- Beneath paved roads and parking areas – 95%
- Beneath unpaved roads and parking areas – 90%
- Open areas – 85%

3.05 TESTS AND INSPECTIONS

A. Field density tests shall be performed in accordance with ASTM D2922 and the frequencies specified below or when requested by the Engineer:
- Structural Foundations and Backfill – At the excavated and compacted subgrade supporting structural foundations at the depths specified. The more frequent of once for every 250 cubic yards of material, or once per every 1600 square feet of lift, or once per lift, or once per work shift.
- Roads, Shoulders and Parking Lots – Once for every 650 cubic yards of material.
- General backfill – Once for every 1800 cubic yards of material.

B. In the event the tested area fails to meet the specified compaction requirements, two additional tests shall be performed for the area. If either of the two additional tests fails to meet the compaction requirements, the area shall undergo additional compaction and testing until the test

results meet the minimum compaction requirements.

C. Gradation testing shall be performed for borrowed fill materials in accordance with ASTM D442 and D1140 at the rate of one test per 1000 cubic yards of material.

END OF SECTION 31 05 13

SECTION 31 05 16

AGGREGATE

PART 1 - GENERAL

1.01 SUMMARY

A. Aggregate materials for Aggregate base and sand for earthwork, excavation and fill, and backfill purposes.
B. Aggregate base is designated as Class 2.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM):
ASTM D2922 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D3017 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
B. State of California, Department of Transportation (Caltrans), Standard Specifications:
Section 17 Watering
Section 26 Aggregate Bases
C. State of California, Department of Transportation (Caltrans), Standard Test Methods:
Calif. Test 201 Method of Soil and Aggregate Sample Preparation
Calif. Test 202 Method of Tests for Sieve Analysis of Fine and Coarse Aggregates
Calif. Test 205 Method of Determining Percentage of Crushed Particles
Calif. Test 216 Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates
Calif. Test 217 Method of Method of Test for Sand Equivalent
Calif. Test 229 Method of Test for Durability Index
Calif. Test 301 Method of Test for Resistance "R" Value of Treated and Untreated Bases, Subbases and Basement Soils by the Stabilometer
D. “Greenbook” Standard Specifications for Public Works Construction, 2015 Edition

1.03 SUBMITTALS

A. Refer to the General Conditions for submittal requirements.
B. Samples: Submit, in air-tight containers, 10-pound sample of each type of Aggregate with certificate of compliance to CalTrans or ASTM standard listed.
1. In addition to the above, submit samples of both gradations for Aggregate base.
C. Materials Source: Submit name of imported materials suppliers and physical location of material.
D. Submit independent laboratory test results that verify material properties of aggregate base to be used.
E. Test Reports: Submit certified test reports of all tests specified to be performed by the Contractor. Test reports shall be sealed and signed by a California registered civil engineer.

PART 2 - PRODUCTS

2.01 COARSE AGGREGATE MATERIAL

A. **Class 2 Aggregate Base**: Conforming to State of California’s Standard Specification Section 26 for Class 2 Aggregate Base. Aggregate for the aggregate base at the time it is deposited on the prepared subgrade or subbase shall conform to the following requirements:

1. Aggregate for Class 2 Aggregate base shall be 100% virgin material and consist of gravel and crushed rock, free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.
2. Aggregate shall conform to the grading and quality requirements shown in the following tables. At the option of the Contracting Officer's Technical Representative, the grading for either the 37.5-mm {1½ -inch} maximum or 19-mm {¾-inch} maximum shall be used, except that once a gradation is selected, the grading shall not be changed without the Contracting Officer's Technical Representative's written approval.

CLASS 2 AGGREGATE BASE GRADING REQUIREMENTS				
	Percentage Passing			
	37.5-mm {11/2"} Maximum		19-mm {3/4"} Maximum	
Sieve Sizes	Operating Range	Contract Compliance	Operating Range	Contract Compliance
50-mm {2"}	100	100	—	—
37.5-mm {11/2"}	90-100	87-100	—	—
25-mm {1"}	—	—	100	100
19-mm {3/4"}	50-85	45-90	90-100	87-100
4.75-mm {No. 4}	25-45	20-50	35-60	30-65
600-µm {No. 30}	10-25	6-29	10-30	5-35
75-µm {No. 200}	2-9	0-12	2-9	0-12

QUALITY REQUIREMENTS		
Test	Operating Range	Contract Compliance
Resistance (R-value)	—	78 Min.
Sand Equivalent	25 Min.	22 Min.
Durability Index	—	35 Min.

3. The Aggregate shall not be treated with lime, cement or other chemical material before the Durability Index test is performed. Untreated reclaimed asphalt concrete and Portland cement concrete will not be considered to be treated with lime, cement or other chemical material for purposes of performing the Durability Index test.
4. If the results of either or both the Aggregate grading and Sand Equivalent tests do not meet the requirements specified for "Operating Range" but meet the "Contract Compliance" requirements, placement of the Aggregate base may be continued for the remainder of that day. However, another day's work may not be started until tests, or other information, indicate to the satisfaction of the Engineer that the next material to be used in the work will comply with the requirements specified for "Operating Range."
5. If the results of either or both the Aggregate grading and Sand Equivalent tests do not meet the requirements specified, the Aggregate base which is represented by

these tests shall be removed.

6. No single aggregate grading or Sand Equivalent test shall represent more than 400 m3 {500 cubic yards} or one day's production, whichever is smaller.

2.02 FINE AGGREGATE MATERIALS

A. **Sand:** Natural river or bank sand conforming to AASHTO M-6 or ASTM C-33; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded within the following limits:

SAND	
Sieve Sizes	Percent Passing
No. 4	90-100
No. 200	<5

2.02 SOURCE QUALITY CONTROL:

A. The Contractor shall perform sampling and tests of the aggregate base material in accordance with the California Test methods herein specified, to determine compliance with specified requirements. Samples shall be taken from material as delivered to the site, and shall be prepared in accordance with California Test Method No. 201.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Stockpile in sufficient quantities to meet Project schedule and requirements.

B. Separate differing materials with dividers or stockpile apart to prevent mixing.

C. Direct surface water away from stockpile site so as to prevent erosion or deterioration of materials.

D. Materials shall be stockpiled on impervious material and covered over with same material, until disposed of.

3.2 STOCKPILE CLEANUP

A. Leave unused materials in a neat, compact stockpile.

B. If a borrow area is indicated, leave area in a clean and neat condition.

C. Grade surrounding site surface to prevent free-standing surface water.

END OF SECTION 31 05 16

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavating trenches for utilities; compacted fill from top of utility bedding to subgrade elevations; and backfilling and compaction.

1.02 RELATED SECTIONS

A. Section 31 05 13 – Soils for Earthwork

B. Section 31 05 16 - Aggregate

1.03 REFERENCES

A. ASTM D 1557 - Moisture-Density Relations of Soils for Earthwork and Soil-Aggregate Mixtures Using 10 pound (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

B. ASTM D 4253 - Maximum Index Density and Unit Weight of Soils for Earthwork Using a Vibratory Table.

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

D. ASTM D 3017 - Moisture Content of Soil and Soil-Aggregate Mixtures.

1.04 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, wire, or cable.

1.05 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction.

B. Testing and Inspection Service: Contractor shall employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow Soils for Earthwork to verify that Soils for Earthwork comply with specified requirements and to perform required field and laboratory testing. C. Pre-installation Conference:

1. Before commencing earthwork, meet with representatives of the governing authorities, AC Transit Representative, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.06 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.07 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 - PRODUCTS

2.01 FILL MATERIALS

A. Native Soil Fill: As specified in Section 31 05 13.

B. Engineered Soil Fill: As specified in Section 31 05 13.

C. Aggregate Base Fill: As specified in Section 31 05 16

PART 3 - EXECUTION

3.01 LINES AND GRADES

A. Grades:
1. Lay pipes true to lines and grades indicated.
2. Maintain grade alignment of pipe by use of string line parallel with grade line and vertically above centerline of pipe. Establish line on level batter boards at intervals of not more than 25 feet. Batter boards shall span trench and be rigidly anchored to substantial posts driven into ground on each side of trench. Set three adjacent batter boards before laying pipe to provide check on grades and line. Determine elevation and position of string line from elevation and position of offset points or stakes located along pipe route. Pipe shall not be laid using side lines for line or grade.
3. As alternative means of establishing alignment and grade, utilize "LaserBeam" instrument with competent operator.

B. Location of Pipe Lines and Utility Trench:
1. Location and approximate depths of proposed pipe lines and utility trench shall be as shown on Drawings.
2. Contracting Officer's Technical Representative reserves right to make changes in lines, grades, and depths of pipe lines and trenches.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Protect features remaining as a portion of final landscaping.

C. Protect bench marks, existing structures, fences, and paving from excavating equipment and vehicular traffic.

D. Maintain and protect above and below grade utilities which are to remain.

E. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Aggregate base and compact to the density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATING

A. Excavate subsoil required for utilities to municipal utilities.

B. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

C. Hand trim excavation. Hand trim for bell and spigot, and coupler pipe joints. Remove loose matter.

D. Remove lumped subsoil, boulders, and rock up to 1/3-cubic yard, measured by volume.

E. Correct areas over excavated areas with backfill and compact replacement as specified for authorized excavation or replace with fill concrete as directed.

F. Stockpile excavated material in area designated on site.

3.04 TRENCHING

A. Excavations:

1. Excavate so that pipe can be laid and jointed properly. Make trench so that pipe can be laid to alignment and depth as shown on Drawings; excavate only so far in advance of pipe laying as permitted by Contracting Officer's Technical Representative. Excavation shall not be more than 2 feet wider at bottom than outside diameter of pipe or structure. If there is no interference with construction or adjacent property, and if soil permits, side walls of excavation may be sloped starting at a point 2 feet above top of pipe.
2. Excavate trench to depth required to provide uniform and continuous bearing and support for pipe on bedding material at every point between joints, except where pipe slings or other lifting tackle are withdrawn.
3. Excavation Below Grade:
    a. Where excavation indicates that the subsurface materials at the bottom of the trench are in a loose or soft state, the Contractor shall be advised to excavate to a depth where suitable material is encountered, as directed by the AC Transit Representative.

    b. Where the bottom of the trench has been excavated by mistake to a greater depth than required, the Contractor shall refill this area using approved material. No additional compensation shall be given to the Contractor. Refilling with earth to bring the bottom of the trench to the proper grade will not be permitted.

    c. Excavation within 24 inches of existing utilities shall be governed by the respective utility.
4. Trenching in Advance of Pipe Laying: Trench for pipe lines shall not be opened for distance of more than 200 feet at any one time, unless authorized by the AC Transit Representative. At no time will more than 50 feet of trench be left open at end of a working day. Provide protection of open trench, as reviewed by the AC Transit Representative.

B. Trenching for Pipe: Approval of site trenching and site trenching cover will be by the AC Transit Representative.

1. General: At all times the Contractor shall follow the applicable Trench Safety Plan for the locale and all applicable OSHA requirements. Before pipe is laid, the trench alignment, grade, bottom, and bedding shall be properly established, and shall be inspected by the AC Transit Representative.

2. Grade, Alignment, and Dimension: The alignment and grade for the bottom of the trench shall be properly established before the trench is excavated. Trenches shall be dug true to line and grade, and the bottom of the trench shall be smooth and free from all objectionable material. The sides of the pipe trench shall be excavated vertically to the top of the pipe where the Trench Safety Plan and the stability of the soil will permit. The trench shall be sufficiently wide to properly perform the necessary laying, handling and joining operation. There shall be a minimum clearance of not less than six inches (6") nor more than twelve inches (12") on each side of the pipe. The trench width shall be sufficient to accommodate hand-held backfill tampers or vibrating equipment on both sides of the pipe, but shall not be more than twenty four inches (24") greater than the external diameter of the pipe barrel, except at bell holes.

3. Trench excavation which, in the judgment of the AC Transit Representative, is excessively wide or non-uniform will not be permitted.

4. Trench in Soft or Unstable Material: Where the bottom of the trench is soft and unstable, it shall be excavated a minimum of one foot (1') below grade for the full width of the trench to firm material. When the bottom of the trench is excavated below grade, the over excavation shall be refilled and consolidated with rock of one and one half inches (1½") maximum size, with a gradation approved by the AC Transit Representative.

5. Trench in Rock or Boulders: If the trench is excavated in rock, boulders or other hard material that cannot be excavated by the normal trenching methods, the bottom of the trench shall be excavated six inches (6") below the required grade for the full width of the trench, refilled with select material approved by the AC Transit Representative, and compacted in accordance with the applicable provisions of subsection 3.4.C, below.

6. Trench Condition Before Laying Pipe: All surfaces against which pipe is to be placed shall be free of standing water, loose earth, mud and debris. Should water get into the trench before the pipe is laid, the laying of the pipe shall be postponed until the trench has been drained or pumped, and dried sufficiently to provide a firm foundation for the pipe, or the mud or soft material shall be removed and the grade reestablished by refilling as specified above.

7. Pipe Bedding: Immediately before placing each section of the pipe, the pipe bedding shall be prepared to provide uniform bearing along the full length of the pipe except at bell holes. Depth of bedding shall be as shown in the details. A bell hole shall be excavated under and immediately in front of the last section of pipe which has been laid. The bell hole shall provide a minimum clearance between the pipe barrel and bottom of the bell hole of three inches (3") but in no case shall the bell holes be smaller than required to facilitate joining or laying the pipe.

C. Backfill of Pipe

1. General: Unless otherwise directed or approved, the Contractor shall backfill the trench prior to field testing and within 48 hours after the time the pipe has been installed. Thrust blocks and concrete-joined bends shall not be backfilled prior to twenty-four (24) hours after the concrete is placed. Regardless of the method and

materials used in backfilling the pipe trench, the Contractor shall be responsible for avoiding damage to the pipe, and coatings if any. The pipe shall not be displaced from alignment during the backfilling operation. The Contractor shall take all precautions necessary to prevent water flooding the trench before the backfill is complete.

2. Placement of Backfill

   a. Backfill shall not be dropped directly on the pipe. Backfill shall be placed at approximately the same elevation on both sides of the pipe. The Contractor shall use extreme care in placing the backfill under the pipe haunches to assure that all spaces are filled under and about the pipe.

   b. Where the backfill is of cohesive materials the materials shall be deposited in horizontal layers of not more than eight inches (8") thick.

   c. Prior to and during compaction, the materials shall have the optimum practicable moisture content required for the purpose of compaction and the moisture shall be uniform throughout each layer. If the moisture content is less than optimum for compaction, the compaction operations shall not proceed, except with the specific approval of the Engineer and, if the moisture content is greater than optimum for compaction, the compaction operations shall be delayed until such time as the material has dried to the optimum practicable moisture content, and no adjustment in price will be made on account of any operation of the Contractor in drying the materials or on account of delays occasioned thereby.

3. Excess Material: Material excavated from the trench over and above the quantity required to fill the trench shall be heaped over the pipe except that in roadways or crossings the material shall be disposed of as directed by the Engineer in the field.

4. Compaction: When the material has been conditioned as specified in subsection 3.4.C.2.c., it shall be compacted by equipment approved by the Engineer. The Contractor shall use extreme care in compacting the backfill in the vicinity of the pipe to avoid damage to the pipeline. The compaction shall be per the requirements shown in the Drawings and per the Geotechnical Engineer's recommendations. Test methods used shall conform the requirements of this Section. Testing shall be a part of the contract. Any retesting required shall be at the Contractor's sole expense.

5. Sheeting Removal: Where the side walls of the trench are unstable or where the depth of the trench will present a safety hazard to workers and the Contractor has elected to use sheeting, it shall be withdrawn as the backfill is placed about the pipe. Any voids which result from the withdrawn sheeting shall be backfilled and compacted to the same density as the remainder of the trench.

3.05 EXCAVATION AND FOUNDATIONS FOR PIPE STRUCTURES

A. The excavation shall be sufficient to provide adequate space for the proper banding and handling of the pipe sections.

B. If the natural foundation for the structure is disturbed or loosened during the excavation process, the Contractor shall re-compact the foundation to the density specified in subsection 3.11 or specified for structure subgrade. The bottom of the excavation shall be excavated to a minimum of one foot (1') below the required neat line of the structure.

C. When water is encountered in the excavation, it shall be removed by pumping or draining. The foundation excavation shall be refilled with six inch (6") layers of 1½" crushed rock and compacted to the density specified in subsection 3.10.

3.06 SHEETING AND BRACING

A. General:
   1. Sheeting and bracing of excavations shall conform to latest statutes of U.S. Federal Government governing safety of workers in construction industry. When necessary, install sheeting and bracing to prevent ground movement that may cause damage or settlement to adjacent structures, pipelines, and utilities. Repair damage due to settlement because of failure to use sheeting or because of inadequate bracing, or through negligence or fault in any other manner.
   2. Shore, sheet, brace, or slope sides of trenches in unsuitable, loose, or soft material, 5 feet or more in depth, or otherwise support by means of sufficient strength to protect employees working within.
   3. Shoring plans shall be prepared by a registered Civil Engineer or Geotechnical Engineer.

B. Sheeting Requirements:
   1. Where excavations are made with vertical sides which require supporting, sheeting and bracing shall be of sufficient strength to sustain sides of excavations and shall prevent movement which could in any way injure Work or adjacent structures, or diminish working space sufficiently to delay Work. Take precautions where there is additional pressure due to presence of other structures.
   2. Select sheeting and bracing of sufficient dimensions and strength to adequately support sides of trenches and excavations.
   3. Timber sheeting shall conform in quality to select structural Douglas Fir lumber and shall be sound, live timber, free from sap, large checks, shakes, loose or decayed knots, worm holes, and other imperfections which may impair its strength or durability.
   4. In wet excavation, use grooved sheeting to prevent passage of soil. Fill voids between sheeting and face of excavation with suitable material rammed in place.
   5. Remove sheeting and bracing before completion of Work, unless otherwise directed in writing by AC Transit Representative. Cut off sheeting which is left in place 18 inches below original ground surface or as directed by AC Transit Representative. Untreated wood will not be allowed to be left in place.

3.07 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Drainage Fill Aggregate: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

D. Native Soil Fill: Place and compact material in equal continuous layers not exceeding 12 inches compacted depth.

E. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Remove surplus fill materials from site.

H. Leave fill material stockpile areas completely free of excess fill materials.

3.08 TOLERANCES

A. Top Surface of Backfilling Under Paved Areas: Plus or minus .5 inch from required elevations.

B. Top Surface of General Backfilling: Plus or minus .5 inch from required elevations.

3.09 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D 1557 ASTM D 2922, ASTM D 3017.

B. If tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

C. Frequency of Tests:

1. Test for every 200 LF of trenches.

3.10 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.11 SCHEDULE

A. Cover pipe and bedding with Engineered Fill (or Native Soils if approved by Geotechnical Engineer) for Earthwork, in 6-inch lifts, compacted to 90 percent relative density. Compact to 95% relative compaction in upper 12”.

END OF SECTION 31 23 33

SECTION 32 11 23

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course for miscellaneous structure pads and concrete paving.

1.02 RELATED SECTIONS

A. Section 31 05 16 - Aggregate Materials.

B. Section 31 22 13 - Rough Grading: Preparation of site for base course.

C. Section 31 23 23 - Fill: Compacted fill under base course.

D. Section 31 23 33 - Trenching and Backfilling: Compacted fill under base course.

E. Section 32 13 13 - Concrete Paving: Finish concrete surface course.

1.03 REFERENCES

A. ASTM D 1557 - Moisture-Density Relations of Soils for Earthwork and Soil-Aggregate Mixtures Using 10 pound (4.54 Kg) Rammer and an 18 inch (457 mm) Drop.

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

C. ASTM D 3017 - Moisture Content of Soil and Soil-Aggregate Mixtures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Aggregate Base for Paving: As specified in Section 31 05 16 for 1 ½" Maximum in size.

PART 3 - EXECUTION

3.01 EXAMINATION

A. The subgrade or subbase to receive aggregate base course, immediately prior to spreading, shall conform to the compaction and elevation tolerances indicated for the material involved and shall be free of standing water and loose or extraneous material.

3.02 INSTALLATION STANDARDS

A. Aggregate base course shall be applied over the prepared subgrade or subbase and compacted to 95 percent relative compaction.

B. Aggregate base course shall be minimum uniform thickness after compaction of dimensions indicated. Where not indicated otherwise, compacted thickness shall be at least 12 inches.

C. All compaction expressed in percentages in this Section refers to the maximum dry density as determined by California Test Method No. 216.

3.03 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place fill on soft, muddy, or frozen surfaces.

3.04 AGGREGATE PLACEMENT

A. Aggregate for base course shall be delivered as uniform mixture of fine and coarse aggregate and shall be spread in layers without segregation.

B. Aggregate base material shall be moisture-conditioned to near optimum moisture content in accordance with the applicable requirements of Section 17 of the Caltrans Standard Specifications.

C. Spread Aggregate over prepared substrate to a total compacted thickness of the thicknesses indicated on the Drawings.

D. Place Aggregate in maximum 6-inch layers and roller compact to specified density. For thickness greater than 6 inches, the base course aggregate shall be spread and compacted in two or more layers of uniform thickness not greater than 6 inches each. Aggregate base course 6 inches and less in thickness may be spread and compacted in one layer.

E. Level and contour surfaces to elevations and gradients indicated.

F. Add water to assist compaction. If excess water is apparent, remove Aggregate and aerate to reduce moisture content.

G. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.05 TOLERANCES

A. Flatness: Maximum variation of ¼ -inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within ¼-inch.

C. Variation From Design Elevation: Within ½-inch.

3.06 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D 1557, ASTM D 2922 and ASTM D 3017 (California Test 216 or 231).

B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest.

C. Frequency of Tests: One test for every 200 linear feet of driveway and one test for every 100 feet in a grid for open paving areas.

3.06 SCHEDULES

A. Under Concrete Pavement and Curbs: Compact placed Aggregate materials where indicated to achieve relative compaction of 95 percent.

END OF SECTION 32 11 23

SECTION 32 12 12

ASPHALT CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

B. Section 39-3.01 includes general specifications for performing work on existing asphalt concrete facilities.

C. Section 39-3.02 of the Standard Specifications includes specifications for replacing asphalt concrete surfacing.

1.02 REFERENCES

A. 2018 Standard Specifications of the State of California Transportation Agency Department of Transportation.

1.03 SUBMITTALS

A. Product Data: Mix design for asphalt concrete.

1.04 OTHER REQUIREMENTS

A. During paving operations, Contractor shall furnish and place sufficient barricades and other traffic control measures to protect new surfacing from traffic until sufficiently cooled, as well as “Detour” signs, as applicable. At least one lane of traffic for bus operations shall remain open at all times.

PART 2 - PRODUCTS

2.01 GENERAL

A. The asphalt content of the asphalt mixture will be determined in conformance with the requirements in California Test 379, or in conformance with the requirements in California Test 382.

B. Paint binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer.

C. Paint binder (tack coat) shall be, at the option of the Contractor, either slow-setting asphaltic emulsion, rapid-setting asphaltic emulsion or paving asphalt. Slow-setting asphaltic emulsion and rapid-setting asphaltic emulsion shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 94, “Asphaltic Emulsions," of the Standard Specifications. When paving asphalt is used for paint binder, the grade will be determined by the Engineer. Paving asphalt shall conform to the provisions in Section 39-4.02, "Prime Coat and Paint Binder (Tack Coat)," and the provisions in Section 92, "Asphalts," of the

Standard Specifications.

PART 3 - EXECUTION

3.01 GENERAL

A. Where trenching or other construction activity has resulted in damage to a localized area of pavement, the damaged pavement surface shall be cut back six inches beyond the damaged area.

B. Where the damaged area extends over more than fifty percent (50%) of the lane width or paved area, as determined by the Engineer, the full pavement width or area shall be saw cut, excavated, removed and repaired.

C. All structures such as valve boxes, manhole frames and covers, and monuments within the resurfaced areas shall be adjusted to the new grade, as necessary.

3.02 TACK COAT

A. Paint binder (tack coat) shall be applied in the liter per square meter range limits specified for the surfaces to receive asphalt concrete in the tables below. The exact application rate within the range will be determined by the Engineer.

Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)		
Type of surface to receive paint binder (tack coat)	Slow-Setting Asphaltic Emulsion L/m^2(Note A)	Rapid-Setting Asphaltic Emulsion L/m^2(Note B)
Dense, compact surfaces, between layers, and on PCCP	0.20 – 0.35	0.10 – 0.20
Open textured, or dry, aged surfaces	0.35 – 0.90	0.20 – 0.40

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.
Note B: Undiluted rapid-setting asphaltic emulsion.

Application Rates for Paint Binder (Tack Coat) on Asphalt Concrete (except Open Graded) and on Portland Cement Concrete Pavement (PCCP)	
Type of surface to receive paint binder (tack coat)	Paving Asphalt L/m^2
Dense, compact surfaces, between layers, and on PCCP	0.05 – 0.10
Open textured, or dry, aged surfaces	0.10 – 0.25

Application Rates for Asphaltic Emulsion Paint Binder (Tack Coat) on Open Graded Asphalt Concrete		
Type of surface to receive paint binder (tack coat)	Slow-Setting Asphaltic Emulsion L/m^2(Note A)	Rapid-setting Asphaltic Emulsion L/m^2(Note B)
Dense, compact surfaces and between layers	0.25 – 0.50	0.10 – 0.25
Open textured, or dry, aged surfaces	0.50 – 1.10	0.25 – 0.55

Note A: Slow-setting asphaltic emulsion is asphaltic emulsion diluted with additional water. Water shall be added and mixed with the asphaltic emulsion (containing up to 43 percent water) so the resulting mixture contains one part asphaltic emulsion and not more than one part added water. The water shall be added by the emulsion producer or at a facility that has the capability to mix or agitate the combined blend.
Note B: Undiluted rapid-setting asphaltic emulsion.

Application Rates for Paint Binder (Tack Coat) on Open Graded Asphalt Concrete	
Type of surface to receive paint binder (tack coat)	Paving Asphalt L/m^2
Dense, compact surfaces and between layers	0.05 – 0.15
Open textured, or dry, aged surfaces	0.15 – 0.30

When asphaltic emulsion is used as paint binder (tack coat), asphalt concrete shall not be placed until the applied asphaltic emulsion has completely changed color from brown to black.

END OF SECTION 32 12 12

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Concrete curb and gutter, crosswalks, sidewalks, and ramps.

1.02 RELATED SECTIONS

A. Section 32 11 23 - Aggregate Base Course.

B. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.

C. Section 31 23 23 - Fill: Compacted subbase for paving.

D. Section 03 30 10 Cast-In-Place Concrete-Civil Scope

1.03 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ACI 304 - Measuring, Mixing, Transporting and Placing Concrete.

C. ASTM C 33 - Concrete Aggregates.

D. ASTM C 94 - Ready Mix Concrete.

E. ASTM C 150 - Portland Cement.

F. ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete.

G. ASTM C979 - Pigments for Integrally Colored Concrete.

H. ASTM D 1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.04 SUBMITTALS

B. Product Data: Submit data on curing compounds.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and requirements of Section 03 30 00

B. Obtain cementitious materials from same source throughout.

1.06 ENVIRONMENTAL REQUIREMENTS

B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is

wet or frozen.

PART 2 - PRODUCTS

2.01 FORM MATERIALS

A. Wood or Steel form material, profiled to suit conditions.

1. Use metal or wood forms that are straight and suitable for the work involved in cross-section, depth, and strength to resist springing during depositing and consolidating the concrete.
2. Do not use forms if they vary from a straight line more than 3 mm (1/8 inch) in any 3000 mm (ten foot) long section in either a horizontal or vertical direction.
3. Wood forms should be at least 50 mm (2 inches) thick (nominal). Wood forms shall also be free from warp, twist, loose knots, splits, or other defects. Use approved flexible or curved forms for radius forming.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615; 40 ksi yield grade; deformed billet steel bars; unfinished finish.

B. Welded Steel Wire Reinforcement: Plain type, ASTM A 185; furnish in flat sheets.

C. Dowels: ASTM A 615; 40 ksi yield grade, plain steel. Paper covered one end.

2.03 CONCRETE MATERIALS

A. Concrete Materials: Concrete shall be Type C, 4000 psi as 28 Days as specified in Section 03 30 00, CAST-IN-PLACE CONCRETE, with the following exceptions:

TYPE	MAXIMUM SLUMP*
Pedestrian Pavement	3”
Vehicular Pavement	2” (Machine Finished) 4” (Hand Finished)
Utility/Equipment Pad	3” to 4”

* For concrete to be vibrated: Slump as determined by ASTM C143. Tolerances as established by ASTM C94.

PART 3 - EXECUTION

3.01 EXAMINATION

D. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

E. Verify gradients and elevations of base are correct.

3.02 AGGREGATE BASE

A. See Section 32 11 23 for the installation of aggregate base for this section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Notify Contracting Officer's Technical Representative minimum 24 hours prior to commencement of concreting operations.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at expansion joints; use dowels for joint transfer devices.

C. Provide doweled joints 12 inch on center at interruptions of concrete reinforcement with one end of dowel set in capped sleeve to allow longitudinal movement.

3.06 BATCHING AND MIXING OF CONCRETE

A. See Section 03 30 00 – Cast in Place Concrete

3.07 PLACING CONCRETE - GENERAL

A. Place concrete in accordance with ACI 301 and as specified in Section 03 30 00.

B. Obtain approval of the AC Transit Representative before placing concrete.

C. Remove debris and other foreign material from between the forms before placing concrete. Obtain approval of the Contracting Officer's Technical Representative before placing concrete.

D. Before the concrete is placed, uniformly moisten the subgrade, base or subbase as appropriate , avoiding puddles of water.

E. Convey concrete from mixer to final place of deposit by a method which will prevent segregation or loss of ingredients. Deposit concrete so that it requires as little handling as possible.

F. While being placed, spade or vibrate and compact the concrete with suitable tools to prevent the formation of voids or honeycomb pockets. Vibrate concrete well against forms and along joints. Over-vibration or manipulation causing segregation will not be permitted. Place concrete continuously between joints without bulkheads.

G. Install a construction joint whenever the placing of concrete is suspended for more than 30 minutes and at the end of each day's work.

H. Workmen or construction equipment coated with foreign material shall not be permitted to walk or operate in the concrete during placement and finishing operations.

3.08 PLACING CONCRETE FOR CURB AND GUTTER

A. Place concrete in the forms in one layer of such thickness that, when compacted and finished, it will conform to the cross section as shown.

B. Deposit concrete as near to joints as possible without disturbing them but do not dump onto a joint assembly.

C. After the concrete has been placed in the forms, use a strike-off guided by the side forms to bring the surface to the proper section to be compacted.

D. Consolidate the concrete thoroughly by tamping and spading, or with approved mechanical finishing equipment.

E. Finish the surface to grade with a metal float.

3.09 JOINTS

A. Place expansion joints at 30-foot intervals maximum and against previously constructed curb and gutters or as shown.

B. Place joint filler between paving components and building or other fixed appurtenances.

C. Box out and isolate column footings with expansion joints.

D. Provide keyed joints as indicated.

E. Edges at concrete joints shall be edger finished to approximately 3/8-inch radius

3.10 FINISHING

A. The sequence of operations, unless otherwise indicated, shall be as follows:
   1. Consolidating, floating, straight-edging, troweling, texturing, and edging of joints.
   2. Maintain finishing equipment and tools in a clean and approved condition.
   3. No swirl or wave finishes are permitted.
   4. Remove excess concrete from perimeter of forms.
      a. When appropriate, cut away any concrete that has seeped beyond limits of forms.

B. Area Paving and Curbs: Light broom

C. Direction of Curb Texturing: Parallel to curb length.

D. Place curing compound on exposed concrete surfaces immediately after finishing. Mask adjacent surfaces subject to staining or marking.

3.11 JOINT SEALING

A. Separate pavement from vertical surfaces with ½ inch thick joint filler.

B. Place joint filler in pavement pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

3.12 TOLERANCES

A. Maximum Variation of Surface Flatness: ½ -inch in 10 feet.

B. Maximum Variation From True Position: ½-inch.

3.13 FIELD QUALITY CONTROL

A. Three concrete test cylinders will be taken for every 75 or less cubic yards of each class of concrete placed each day.

B. One additional test cylinder will be taken during cold weather and cured on site under same conditions as concrete it represents.

C. One slump test will be taken for each set of test cylinders taken.

D. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.14 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian vehicular traffic over pavement for 7 days minimum after finishing.

C. Protect surfaces from construction activities and traffic until final acceptance of project.

END OF SECTION 32 13 13

SECTION 32 17 23

PAVEMENT MARKING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Striping paint for marking on new pavement or for re-striping; brush, roller, or spray applied.

B. Concrete Parking Blocks.

1.02 RELATED SECTIONS

A. Section 32 13 13 - Concrete Paving.

1.03 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing Work of this Section with minimum three years documented experience.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Apply marking paint in dry weather when pavement and atmospheric temperatures are minimum 50 degrees F and are anticipated to remain above 50 degrees F for four hours after completing application.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Marking Paint:

1. High solids, water based acrylic latex, containing ultraviolet resistant pigments. Traffic rated.
2. Colors:
   a. Parking stalls and lane striping: White.
   b. Curbs where indicated on drawings: Red
   c. ADA Parking Stall : Blue
3. Roadway markings and reflectors: Per City of Richmond Department of Public Works requirements and Manual of Uniform Traffic Control Devices (latest edition) (MUTCD) and Caltrans Standards.

B. Parking Blocks

1. 72”L x 6”H x 9”W chamfered precast concrete blocks with two locating holes. Provide 30”L #6 Rebar Pins.

C. Traffic Control Markings and Signing

1. Conform to Manual of Uniform Traffic Control Devices (latest edition) (MUTCD).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect existing pavement surfaces for conditions and defects that will adversely affect work

and which cannot be put into an acceptable condition through normal preparatory work.

B. Do not place marking over unsound pavements. If condition exists, notify Contracting Officer's Technical Representative.

C. Starting installation constitutes acceptance of surface as suitable for installation.

D. Verify that new asphalt is complete, has been accepted by Contracting Officer's Technical Representative, and cured minimum of 14 days.

3.02 PREPARATION

A. Layout marking using guide lines, templates, and forms.

B. Thoroughly clean surfaces free of dirt, sand, gravel, oil, and other foreign matter.

C. Protect adjacent curbs, walks, fences, and other items from receiving marking paint.

D. Verify that pavement coating has been accepted by Contracting Officer's Technical Representative and has cured minimum 24 hours under drying conditions in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply marking paint in accordance with manufacturer's instructions at rate of one gallon per 150 square feet by power spray, one gallon per 450 lineal feet of 4-inch wide stripes.

B. Apply stripes straight and even, as indicated.

C. Apply stripes and other markings in widths and colors indicated.

D. Install parking blocks in locations shown with 30" long pins, 2 each block, to prevent intrusion of autos. Drive pins to ½" below top of block. Seal with mortar and grind smooth.

E. Locate and install traffic control markings and signing at public right of way in conformance with the City of Richmond requirements.

3.04 CLEANING

A. Remove overspray, spills, or drips from surfaces other than those requiring marking paint.

3.05 PROTECTION

A. Barricade marked areas until marking paint is dried and ready for traffic. Area may be opened to traffic in approximately six hours or in accordance

END OF SECTION 32 17 23

SECTION 33 05 19

DUCTILE IRON PIPE (DIP)

PART 1 – GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install ductile iron pipe (DIP) and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 22 04 13 – Piping, General.

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. Commercial Standards:

ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids

ANSI/AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings

ANSI/AWWA C115/A21.15 Flanged Ductile-Iron and Gray-Iron Pipe with Threaded Flanges

ANSI/AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe

ANSI/AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast

ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 in. through 12 in. for Water and Other Liquids

AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances

1.04 QUALITY ASSURANCE

A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.

B. Submittals and testing shall be done in compliance with Section 22 04 13 – Piping, General of these Specifications.

PART 2 – PRODUCTS

2.01 GENERAL

A. Ductile-iron pipe shall conform to the latest revision of ANSI/AWWA C150/A21.50 subject to the following supplemental requirements. The pipe shall be furnished complete with rubber gaskets, and all special fittings shall be provided as shown on the plans.

B. Bell and spigot joints are to be used for all underground applications. As an alternative to bell and spigot joints the use of mechanical and flanged joints will be permitted for above ground applications only.

2.02 PIPE

A. Ductile iron pipe shall be of the diameter indicated at a minimum class 52, and shall be manufactured with standard bell and spigot joints in accordance with the latest revision of ANSI/AWWA C151/A21.51.

2.03 LINING AND COATING

A. Pipe shall have standard asphaltic coating on the exterior and be epoxy lined on the interior with Protecto 401TM ceramic epoxy lining as manufactured by U.S. Pipe, or approved equal.

2.04 FITTINGS

A. Fittings shall be ductile iron at a minimum of class 52. Fittings shall conform to the latest revision of either ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. Fittings and accessories shall be furnished with either Push-on or Mechanical Type Joints in accordance with ANSI/AWWA C111/A21.11.

B. Ductile-iron pipe and fittings shall be furnished with mechanical joints, push-on joints, flanged joints, and/or restrained joints, as required. Bolted joints shall not be used for underground installations.
   1. Mechanical and push-on bell and spigot joints shall conform to ANSI/AWWA C111/ A21.11, and be furnished complete with all necessary accessories.
   2. Flanged joints shall conform to ANSI/AWWA C115/A21.15.
   3. Restrained joints shall be per the Approved Materials List.

PART 3 – EXECUTION

3.01 GENERAL

A. Sewer pipelines shall be constructed in compliance with the requirements of this Section and of Section 22 04 13 and Section 22 13 13.

B. Work shall meet or exceed the requirements of these Specifications unless applicable requirements of an agency having jurisdiction (including the terms and conditions of an encroachment permit issued by a city or county) are greater, in which case the greater requirements shall govern.

3.02 INSTALLATION OF PIPE

A. All pipe shall be installed in accordance with ANSI/AWWA C600.

3.03 RUBBER-GASKETED JOINTS

A. Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket, lubricated with an approved vegetable-based lubricant, shall be placed in the bell

groove. The spigot end of the pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and pushed into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

END OF SECTION 33 05 19

SECTION 33 05 31.11

POLYVINYL CHLORIDE (PVC) PIPE

PART 1 – GENERAL

1.01 SUMMARY

A. The Contractor shall furnish and install PVC pipe and all appurtenances as specified, complete and in place, as shown on the plans, as specified in this Section and of Section 22 04 13.

1.02 REFERENCE STANDARDS

A. Commercial Standards:
   1. AWWA C900-07 Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm through 300 mm), for Water Transmission and Distribution
   2. AWWA C905-08 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In. (350 mm Through 1,200 mm), for Water Transmission and Distribution
   3. ASTM D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
   4. ASTM D 2241 Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)
   5. ASTM D 2321 Practice for Underground Installation of Thermoplastic Sewer Pipe for Sewers and Other Gravity-Flow Applications
   6. ASTM D 3034 Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
   7. ASTM F 477 Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
   8. ASTM F 1674 Test Method for Joint Restraint Products

1.03 SUBMITTALS

A. General: Refer to the General Conditions, for submittal requirements.

1.04 QUALITY ASSURANCE

A. Except as modified in this Section, all materials used in the manufacture or installation of the pipe shall be tested in accordance with the requirements of the referenced standards.

B. Submittals and testing shall be done in compliance with Section 22 04 13 Piping, General of these Specifications.

PART 2 – PRODUCTS

2.01 GENERAL:

A. All PVC pipe shall be continuously and permanently marked with the manufacturer's name, pipe size and pressure rating in psi.

2.02 PIPE

A. All PVC pipe shall be joined by compression, solvent-welded, thermo-fusion welded or mechanical restrained joints as shown on the Plans.

B. Polyvinyl chloride pipe (PVC) shall conform to the requirements of ASTM D 3034, SDR 26, or AWWA C900 or C905, Class 100, 150, 165, 200, 253, or 305. Material for PVC pipe shall conform to the requirements of ASTM D 1784 for Class 12454-B or 12454-C as defined therein.

C. Flexible rubber rings for compression type joints for PVC pipe and fittings shall conform to the requirements of ASTM F 477.

D. All sun-faded pipe or pipe with noticeable surface defects will be rejected and shall be replaced by the Contractor.

2.03 COUPLINGS AND FITTINGS

A. Couplings shall be as listed in the Approved Materials List.

B. All fittings for PVC pipe shall conform to the requirements of ASTM D 2241. The ring groove and gasket ring shall be compatible with PVC pipe ends.

C. The strength class of fittings shall be no less than the strength class of any adjoining pipe.

D. PVC fittings shall, at a minimum, conform to the requirements of ASTM D 3034 as they apply to type SDR 26 PVC Sewer Pipe using an Elastomeric Gasket Joint in a bell and spigot assembly system. Rubber sealing gaskets shall meet the requirements of ASTM F 477.

E. All PVC pipe entering or leaving a concrete structure shall have a rubber sealing gasket, as supplied by the pipe manufacturer, firmly seated perpendicular to the pipe axis, around the pipe banded and cast into the structure base or near the structure wall center as a water stop. Said water stop may also consist of a manhole coupling with rubber sealing rings cast into the structure base.

2.04 RESTRAINED JOINTS FOR C900 PVC PIPE

A. All restrained joints used in sanitary sewer applications shall meet or exceed the requirements of ASTM F 1674. All restrained joints shall be per the Approved Materials List.

PART 3 – EXECUTION

3.01 GENERAL

A. Sewer pipelines shall be constructed in compliance with the requirements of this Section.

B. Work shall meet the specified requirements of these Specifications unless the requirements of the local agency having jurisdiction are greater, in which case the greater requirements shall govern.

3.02 INSTALLATION

A. PVC pipe shall be installed in accordance with the requirements of ASTM D 2321; as specified herein and shown on the plans.

3.03 HORIZONTAL CURVES

A. Horizontal curves shall be installed in straight pipe segments by special variance from the local jurisdiction, each a minimum of five feet in length and joint deflections or fittings in

accordance with the requirements or with forced bends where the radius of the curve exceeds the minimums specified in the table below:

SDR 26 PVC Pipe (Forced Bends)				
Pipe Diameter	4"	6"	8"	10"
Minimum Radius	135’	200’	260’	322’

3.04 FIELD JOINTING

A. Each pipe compression type joint shall be joined with a lock-in rubber ring and a ring groove that is designed to resist displacement during pipe insertion.

B. The ring and the ring seat inside the bell shall be wiped clean before the gasket is inserted. A thin film of lubricant shall be applied to the exposed surface of the ring and to the outside of the clean pipe end. Lubricant other than that furnished with the pipe shall not be used.

C. Joints shall not be deflected either vertically or horizontally in excess of the printed recommendations of the pipe manufacturer.

END OF SECTION 33 05 31.11