SECTION 01 79 00 DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 Demonstration, Training, and Instructions

A. This section includes administrative and procedural requirements for instructing LAWA and tenant personnel, in the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Development of training programs that will identify skills and knowledge necessary to safely and efficiently operate, adjust, and maintain equipment, controls and systems.
3. Training in operation, adjustment, and maintenance of products, equipment and systems.

B. All demonstration, training, and instructional sessions will be monitored and approved by LAWA. Any session or portion thereof deemed unsatisfactory, based on evaluation of LAWA project manager, shall be repeated by the manufacturer or manufacturer's representative at no additional cost to LAWA.

C. When approved by LAWA, field instruction to LAWA and/or tenant personnel designated to receive training will be acceptable as a training session. The instruction shall be provided by a service personnel, qualified to perform corrective or preventive maintenance, troubleshooting, or related field services.

D. Training shall be conducted so that home study will not be required. Training shall include courses, operational and maintenance, combining classroom and field hands-on training, structured and scheduled to facilitate trainee comprehension of the subject material. Courses shall be continuous, and the field training shall immediately follow the classroom instruction. Duration of the training varies, depending on the equipment and system’s levels of complexity. Duration of the training is listed in the corresponding Sections of the Technical Specification.

E. LAWA reserves the rights to videotape any or all training materials and presentations, except for the proprietary information, and retain all rights to use such recorded material for the future training.

F. Refer to Technical Specifications for specific requirements for demonstration and training instruction.

G. In addition to the requirements specified in other Sections, the Contractor must, at the minimum, perform the following tasks:

1.2 Development of Program

A. With the exception of safety and overview training, other trainings shall be divided into separate categories for operations training and maintenance training, with maintenance training further tailored to the specific crafts.

B. No actual operations training of equipment will be permitted until the equipment is properly installed and commissioned.

C. Operations training shall be a prerequisite to the beneficial use of the facility or any portion thereof and be completed a minimum of thirty (30) days prior to the beneficial use.

D. Maintenance training shall occur after the operational training and within thirty (30) days prior to the beneficial use.

E. Operational and Maintenance training may occur on the same day, if approved by LAWA, otherwise they shall be conducted on a different days.

1.3 Training Program Submittals

A. The Contractor shall provide the training submittals in the following order for review and approval by LAWA.

1. First Draft sixty (60) days prior to proposed instructions date.
2. Final Draft thirty (30) days prior to proposed instructions date.

B. The "First Draft" of the training material shall, as a minimum, contain the following:

1. Instructional text, detailing specific topics of training. These topics are detailed below in Section 1.4. All instructional text must be complete. Incomplete instructions are not acceptable.
2. Power Point, Media Player, and any other type of visual training aid that will be used in conjunction with the training plan.
3. Reference materials as detailed in the lesson plan (e.g. handout, manufacturer catalogues, brochures, and pamphlets). All material shall be reviewed by LAWA to determine applicability and functionality. Reference materials that do not pass this review shall be modified and resubmitted within two weeks for LAWA approval.
4. No actual classroom or field training shall be scheduled unless this material is approved.
5. The Contractor shall not proceed to the "Final Draft" stage of training material until LAWA has approved the "First Draft".

C. With the " Final Draft" of the training material, the Contractor shall submit a Training Agenda that provides the following information:

1. Specific and detailed training and hand out materials.
2. Vendor's company name, address, and telephone number(s).
3. Name and telephone number(s) of the vendor's training representative.
4. Duration of class (total hours).
5. Breakdown of class and duration in hours of each training activity.
6. Target audience (e.g. operators, maintenance personnel, etc).
7. Audiovisual requirements.
8. Classroom and field training requirements.

D. After the Contractor has received approval of the "Final Draft" of the training material and the training agenda from LAWA, only then the actual training can be scheduled. Contractor shall submit his proposed training schedule to LAWA for approval. The proposed training schedule shall be submitted a minimum of sixty (60) calendar days prior to the start of the training. If the proposed training schedule is approved, then it becomes the final training schedule.

E. Any compensation that is paid to LAWA personnel because of cancellation classes, that begin more than thirty (30) minutes after the scheduled start time, shall be reimbursed to LAWA by the Contractor. An exception is when a class is canceled or delayed due to actions by LAWA. LAWA will monitor the starting times of scheduled classes.

F. The review of the training material does not constitute its approval unless specifically stated so. The training material submittal shall contain, but not be limited to, the following:

1. Sufficient background information on each instructor for various sessions shall be provided to allow evaluation of the proposed instructor's qualifications and his capability of training the specific discipline.

2. At the completion of the training, the Contractor shall forward to LAWA one complete electronic set of training materials and support material for each defined training category.

1.4 Demonstration

A. Four (4) weeks prior to date of occupancy, submit for LAWA's approval, a proposed outline of demonstration program including a schedule of proposed dates, times, length. Demonstration shall include, but not limited to, the following procedures:

1. Start-up
2. Shutdown
3. Emergency Operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments
7. Effective energy utilization

B. Demonstrate products, systems, and equipment to LAWA-specified personnel two (2) weeks prior to date of occupancy.

C. For each demonstration, submit list of participants in attendance.

D. Provide two copies of video of each demonstration and instructions session to LAWA upon completion of training.

E. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

F. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

G. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each equipment item at agreed-upon times, at equipment location.

H. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

1.5 Operational Training

A. Manufacturer's (vendor's) supplied equipment training for all major equipment and subsystems shall be provided.

B. The vendor's training shall be provided by qualified instructors of the equipment manufacturers, (i.e., equipment field startup technician or their representative), as approved by LAWA and may include both on and off-site training venues. Training by the manufacturer sales representatives is not acceptable.

C. Classroom training shall be structured to develop a basic understanding of the design, function and capabilities of the equipment and the interrelationship with the process. In addition, routine operational and preventive maintenance, safety considerations, responses to abnormalities, startup, shutdown and troubleshooting will be covered.

D. Field training shall be scheduled to commence immediately following the classroom training and shall stress hands-on, performance based application of the classroom training.

E. Provide two copies of professionally recorded videos of vendor's training to LAWA for future training.

F. Equipment shall be started, operation and maintenance of systems and components shall be demonstrated.

G. Training schedule: The Contractor shall provide an operation and maintenance training schedule. Training shall be scheduled as close as possible following equipment startup and functional performance testing.

1.6 Maintenance Training

A. The maintenance training shall include detailed explanations of the functions, adjustments, repairs, and replacement of all the components related to the trainee's trade. Safety aspects shall also be stressed.

B. The training shall include, but not be limited to, the following:

1. Preventive and corrective maintenance procedures, including replacement of parts; lubrication quantities, types, frequencies, and application points; and an estimate of time to perform such procedures.

2. Training on special tools, techniques, or procedures, required for either preventive or corrective maintenance of equipment, or its auxiliary or support systems.

3. Procedures to perform adjustments required for alignment and calibration for all preventive and corrective maintenance. Training shall include estimates of the time required to perform such procedures.

4. Assembly and disassembly procedures, including parts list, required for appropriate preventive and/or corrective maintenance.

5. Maintenance, overhauls, troubleshooting of equipment, and auxiliary or support systems.

C. Models, "exploded" views, and/or audiovisual materials shall be used for this training. These materials shall be turned over to LAWA upon completion of training.

D. Hands-on field training shall be provided, subject to the approval of LAWA.

PART 2 - (NOT USED)

PART 3 - (NOT USED)

END OF SECTION 01 79 00

SECTION 01 91 00 GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1. Section 22 08 00 – Commissioning of Plumbing Systems
2. Section 23 08 00 – Commissioning of HVAC Systems
3. Section 25 20 20 – Facilities Monitoring and Controls System (FMCS) integration.
4. Section 26 08 00 – Commissioning of Electrical Systems
5. Section 27 08 00 – Commissioning of Communication Systems
6. Section 28 08 00 – Commissioning of Electronic Safety & Security Systems

1.2 SUMMARY

A. This section includes:

1. Commissioning: Commissioning is a systematic process of ensuring that all building systems perform interactively according to the design intent or Basis of Design (BOD) and the Owner's Project Requirements (OPR). This is achieved by beginning in the pre- design phase and documenting design intent and continuing through construction, acceptance, and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.
2. The commissioning process, as indicated in the LAWA Commissioning and Activation Goal Statement, consists of five (5) phases: Predesign, Design, Construction, Testing and Acceptance, Occupancy and Operation. However, the first two (2) phases, Predesign and Design, are not described in this document.
3. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
    a. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry standards and that, they receive adequate operational checkout by installing Contractors.
    b. Verify and document proper performance of equipment and systems.
    c. Verify that O&M documentation left on site is complete.
    d. Verify that the Owner's operating personnel are adequately trained.
4. The commissioning process does not take away from or reduce the responsibility of the Contractor to meet the Contract Documents.

B. Related Sections include the following:

1. Contract drawings and specifications, general provisions of the contract, including general and supplementary conditions, architectural, electrical, and mechanical provisions, and Division 1 Specification Sections apply to work of this Section.

1.3 ABBREVIATIONS

A. Abbreviations: The following are common abbreviations used in this *Specification* and in the *Commissioning Plan.*

A/E	Architect and design engineers
CxA	Commissioning authority
CC	Construction checklist.
CxT	Commissioning Team.
Cx	Commissioning
CxP	Commissioning Plan
CxR	Commissioning Report
EC	Electrical Contractor
FT	Functional performance test
GC	General Contractor
IC	Instrumentation Contractor
MC	Mechanical Contractor (including controls contractor)
IC	Instrumentation Contractor
RTF	Resolution Tracking Form
Subs	Subs. to Prime Contractors
TAB	Test and balance Contractor (if independent)

1.4 COORDINATION

A. Commissioning Team The members of the commissioning team consist of the CxA, the GC, the Architect and Design Engineers (particularly the Mechanical Engineer, as applicable depending on the project scope of work), the MC, the EC, the TAB representative, the TCC, and any other installing subs or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.

B. Management: The CxA directs and coordinates the commissioning activities and reports to the Owner. All members work together to fulfill their contractual responsibilities and meet the objectives of the Contract Documents. The CxA's responsibilities are the same regardless of who hired the CxA.

C. Scheduling: The CxA will work with the GC according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice (generally two weeks' notice) to the GC for scheduling commissioning activities. The GC will integrate all commissioning activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

D. The CxA will provide the initial schedule of primary commissioning events, and commissioning milestones at the initial commissioning meeting. The Commissioning Plan provides a format for this schedule. As construction progresses and more detailed schedules are available from the GC, the CxA will adjust the commissioning schedule accordingly.

1.5 COMMISSIONING PROCESS

A. Commissioning Plan: The Commissioning Plan, provided as part of the bid documents, is binding on the Contractor. The commissioning plan provides guidance in the execution of the commissioning process. The Specifications will take precedence over the Commissioning Plan.

B. Commissioning Process: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning during construction begins with an initial commissioning meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, coordinate, schedule future activities and resolve problems.
3. Equipment documentation is distributed by the A/E to the CxA during the normal submittal process, including detailed start- up procedures.
4. The CxA works with the Contractor of each discipline in developing startup plans and startup documentation formats, including providing the Contractors with construction checklists to be completed during the installation and startup process.
5. In general, the checkout and performance verification proceeds from simple to complex, from component level to equipment, from equipment to the systems and intersystem levels, with construction checklists being completed before functional testing occurs.
6. The Contractors, under their own direction, will execute and document the completion of construction checklists and perform startup and initial checkout. The CxA documents that the checklists and startup were completed according to the approved plans. This may include the CxA witnessing start-up of selected equipment.
7. The CxA develops specific equipment and system functional performance test procedures.
8. The functional test procedures are reviewed with the A/E, CxA, and Contractors.
9. The functional testing and procedures are executed by the Contractors under the direction of, and documented by, the CxA.
10. During initial functional tests and for critical equipment, the Engineer will witness the testing.
11. Items of non-compliance in material, installation, or setup are to be corrected at the Contractor’s expense, and the system to be retested.
12. The CxA reviews the O&M documentation for completeness.
13. The project will not be considered substantially complete until Commissioning functional testing, as it defined in the Commissioning Plan, is completed and accepted by the CxA.
14. The CxA reviews and coordinates the training provided by the Contractor and the Subs. The CxA verifies it completion.
15. Deferred testing to be conducted as specified or required.

1.6 PROJECT COMMISSIONING REQUIREMENTS AND PROJECT'S COST

Construction cost of the Commissioned Systems	Commissioning Requirements	Commissioning Documents	Commissioning Specifications (As Applicable)
< $1M	List of the MEP Systems, as shown in the contract documents to be commissioned and a detailed description of how each system is commissioned.	Commissioning Specifications	DCH Specifications sections 01 91 00
≤ $10M	List of the MEP Systems, as shown in the contract documents to be commissioned and a detailed description of how each system is commissioned.	Owner Project Requirements (OPR), Commissioning Plan (CxPlan) and Design Checklist.	DCH Specifications sections 01 91 00, 22 08 00, 23 08 00 26 08 00, 27 08 00 and 28 31 00.
> $10M	List of the MEP Systems, as shown in the contract documents to be commissioned and a detailed description of how each system is commissioned.	Owner Project Requirements (OPR), Commissioning Plan (Cx Plan), Commissioning Checklist (Cx Checklist), Design Checklist, Functional Testing Procedures, Basis of Design (BOD), Design Review and Cx Specifications.	DCH Specifications sections 01 91 00, 22 08 00, 23 08 00 26 08 00, 27 08 00 and 28 31 00.

Commissioning Requirements are in addition to the Commissioning Requirements by the Authorities Having Jurisdiction.

1.7 RESPONSIBILITIES

A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the MC, TAB and TCC are in Divisions 22 and 23, those of the EC in Division 26, and those of the GC related to the building envelope and LEED-related credits and prerequisites in Division 1. Responsibilities of various parties are listed in the Commissioning Plan.

B. All Parties:

1. Follow the Commissioning Plan.

2. Attend an initial commissioning meeting and additional meetings, as necessary.

C. General Contractor (GC)

1. Construction and Acceptance Phase:

a. Facilitate coordination of the commissioning work by the CxA to ensure that commissioning activities are incorporated into the master schedule.
b. Include cost of the commissioning into the total contract price.
c. Furnish a copy of all construction documents, addenda, change orders, and approved submittals and shop drawings related to commissioned equipment to the CxA.
d. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks, and training.
e. Ensure that all Contractors execute their commissioning responsibilities according to the Contract Documents and schedule.
f. A representative shall attend the initial commissioning meeting and other necessary meetings scheduled by the CxA to facilitate the Cx process.
g. Coordinate and schedule training of the owner personnel.
(1) Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
h. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
i. Assist in equipment testing per agreements with sub- Contractors.
j. Include all special tools and instruments (ladders, lifts, etc.) available from vendor, specific to a piece of equipment, required for testing equipment according to these Contract Documents in the base bid price to the Contractor, except for stand-alone data logging equipment that may be used by the CxA.
k. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
(1) Review test procedures for equipment installed by factory representatives.

2. Warranty Period:

a. Ensure that Subcontractors execute seasonal or deferred functional performance testing, witnessed by the CxA, according to the specifications.

D. Ensure that Subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

1.8 DEFINITIONS

A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review, and training occur.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.

C. Architect / Engineer (A/E): The prime consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.

D. Owner's Project Requirements (OPR): The Owner's Project Requirements is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The Owner's Project Requirements describes the systems, components, conditions, and methods chosen to meet the intent. Some reiterating of the design intent may be included.

E. Commissioning Authority (CxA): An independent authority, not otherwise associated with the A/E team members or the Contractor, though may be hired as a subcontractor to them. The CA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role.Refer for requirements regarding eligibility of CxA if LEED certification is to be pursued (fundamental commissioning or enhanced commissioning).

F. Commissioning Plan (CxP): An overall plan, developed before or after bidding that provides the structure, schedule, and coordination planning for the commissioning process.

G. Construction Checklist (CC): A list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the Sub. Construction checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension correct, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some construction checklist items entail simple testing of the function of a component, a piece of equipment, or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word construction refers to before functional testing. Construction checklists augment and are combined with the manufacturer's start-up checklist. Even without a commissioning process, Contractors typically perform some, if not many, of the construction checklist items a commissioning authority will recommend. However, few Contractors document in writing the execution of these checklist items. Therefore, for most equipment, the Contractors execute the checklists on their own. The Commissioning Authority only requires that the procedures be documented in writing and does not witness much of the completion of construction checklists, except for larger or more critical pieces of equipment.

H. Contract Documents: The documents binding on parties involved in the construction of this Project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).

I. Contractor: The general Contractor or authorized representative.

1. Control system: The Building Automation System (BAS) and Facilities Management Controls System (FMCS).

J. Data Logging: Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.

K. Deferred Functional Tests: FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design, or other site conditions that prevent the test from being performed.

L. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.

M. Design Intent or Basis of Design (BOD): A dynamic document that provides the explanation of the ideas, concepts, and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.

N. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with a Project Manager present.

O. Functional Performance Test (FT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure set-point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied,

varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation, and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The Commissioning Authority develops the functional test procedures in a sequential written form, coordinates, oversees, and documents the actual testing, which is usually performed by the installing Contractor or vendor. FTs are performed after construction checklists and startups are complete.

P. General Contractor (GC): The Contractor for this project. Generally refers to all the GC's subs as well. Also referred to as the Contractor, in some contexts.

Q. Indirect Indicators: Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

R. Installing Contractor: Contractor who installs specific equipment and/or systems.

S. Manual Test: Using hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

T. Monitoring: The recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.

U. Non-Compliance: See Deficiency.

V. Non-Conformance: See Deficiency.

W. Over-written Value: Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation). See also "Simulated Signal."

X. Owner-Contracted Tests: Tests paid for by the Owner outside the GC's contract and for which the CA does not oversee. These tests will not be repeated during functional tests if properly documented.

Y. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.

Z. Sampling: Functionally testing only a fraction of the total number of identical or near-identical pieces of equipment. Refer to Part 3.4 F for details.

AA. Seasonal Performance Tests: FTs that are deferred until the system(s) will experience conditions closer to their design conditions.

BB. Simulated Condition: Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

CC. Simulated Signal: Disconnecting a sensor and using a signal generator to send an amperage, resistance, or pressure to the transducer and DDC system to simulate a sensor value.

DD. Specifications: The construction specifications of the Contract Documents.

EE. Startup: The initial starting or activating of dynamic equipment, including executing construction checklists.

FF. Subs: The subcontractors to the Prime Contractor who provide and install building components and systems.

GG. Test Procedures: The step-by-step process that must be executed to fulfill the test requirements. The CxA develops the test procedures.

HH. Test Requirements: Requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements for each system are specified in the respective section of the Contract Documents.

II. Trending: Monitoring using the building control system.

JJ. Vendor: Supplier of equipment.

KK. Warranty Period: Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.

1.9 SYSTEMS TO BE COMMISSIONED

A. Commissioning is required for the following:

1. Plumbing Equipment and Systems
2. HVAC Equipment and Systems
3. Building Automation and Facility Management Controls Systems
4. Electrical Equipment and Systems
5. Communication Systems
6. Electronic Safety and Security Systems
7. Passengers Boarding Bridge Systems
    a. Potable Water Cabinets
    b. Fixed Ground Power
    c. Rapid Recharge Systems (RRS)
    d. Visual Boarding Systems (VDG)
    e. Pre-Conditioned Air (PCA)
8. Fuel Distribution Systems
9. Fire Life Safety System
10. Elevators, escalators and moving sidewalks.
11. Ramp Service Management Systems.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the ICI for the equipment being tested. For example, the MC of Division 23 shall ultimately be responsible for all testing equipment for the HVAC system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing

equipment, according to these Contract Documents, shall be included in the base bid price to the Contractor and left on site, except for stand-alone data logging equipment that may be used by the CxA.

B. Temporary Data logging equipment and software required to test equipment will be provided by the CA but shall not become the property of the Owner.

C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration to accuracy of 0.5ºF and a resolution of + or - 0.1ºF. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) All equipment shall be calibrated according to the manufacturer's recommended intervals or within 12 month from the commissioning date, whatever comes first. Calibration tags shall be affixed and certificates readily available.

D. Refer to Part 3 for details regarding equipment that may be required to simulate required test conditions.

PART 3 - EXECUTION

3.1 MEETINGS

A. Commissioning Meeting: Within 60 days of commencement of construction, the CA will schedule, plan and conduct a commissioning meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Commissioning Plan, which will be distributed to all parties.

B. Miscellaneous Meetings: Other meetings will be planned and conducted by the CA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Contractors. The CxA will plan these meetings and will minimize unnecessary time being spent by Contractors. For large projects, these meetings may be held monthly, until the final 3 months of construction when they may be held as frequently as one per week.

3.2 STARTUP, CONSTRUCTION CHECKLISTS, AND INITIAL CHECKOUT

A. The following procedures apply to all equipment to be commissioned. Some systems that are may have very simplified CCs and startup.

B. General: Construction checklists are important to ensure that the equipment and systems are hooked up correctly and operational. Checklists also ensure that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full construction checkout. No sampling strategies are used. The construction testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system.

C. Startup and Initial Checkout Plan: The CxA will assist the commissioning team members responsible for startup of any equipment in developing detailed startup plans for all equipment. The primary role of the CxA in this process is to ensure that there is written documentation that each of the manufacturer-recommended procedures has been completed. Parties responsible for construction checklists and startup are identified in the initial commissioning meeting and in the checklist forms.

1. The CxA adapts, if necessary, the representative construction checklists and procedures from the related sections. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.
2. The CxA provides these checklists and tests to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form will have more than one trade responsible for its execution.
3. The CxA together with the Contractor responsible for the purchase of the equipment develops full startup plan. . The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
    a. The full startup plan could consist of something as simple as:
        (1) The CxA's construction checklists
        (2) The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end
        (3) The manufacturer's normally used field checkout sheets
4. The Contractor submits the full startup plan to the CxA for review and approval.
5. The CxA reviews and approves the procedures and the format for documenting them, noting any procedures that need to be further developed.

D. Sensor and Actuator Calibration

1. All field-installed instrumentation, including but not limited to temperature, relative humidity, CO, CO_2 and pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used if approved by the CA beforehand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field-calibrated.
2. All procedures used shall be fully documented on the construction checklists or other approved forms, clearly referencing the procedures followed and written documentation of initial, intermediate, and final results.
3. Sensor Calibration Methods
    a. All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading of each other for pressure. Tolerances for critical applications may be tighter.
    b. Sensors without Transmitters--Standard Application: Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage, (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, calibrate or replace sensor.
    c. Sensors with Transmitters--Standard Application: Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between

transmitter and BAS control panel. Using manufacturer's resistance-temperature data simulate minimum desired temperature. Adjust transmitter potentiometer zero until the ammeter reads 4 mA. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform to specified control ramps, reset schedules, proportional relationship, reset relationship, and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage, [BAS]) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.

d. Critical Applications: For critical applications (process, manufacturing, etc.) more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

4. Tolerances, Standard Application

Sensor	Required Tolerance (+/-)	Sensor	Required Tolerance (+/-)
Cooling coil, chilled and condenser water temps	0.4ºF	Flow rates, water Relative humidity	4% of design 4% of design
AHU wet bulb or dew point	2.0ºF	Combustion flue temps	5.0F
Hot water coil and boiler water temp	1.5ºF	Oxygen or CO_2 monitor	0.1% pts
Outside air, space air, duct air temps	0.4ºF	CO monitor	0.01% pts
Watt hour, voltage and amperage	1% of design	Natural gas and oil flow rate	1% of design
Pressures, air, water and gas	3% of design	Steam flow rate	3% of design
Flow rates, air	10% of design	Barometric pressure	0.1 in. of Hg

5. Valve and Damper Stroke Setup and Check

a. EMS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS readout.

b. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot position indicator (for pneumatics).

c. Closure for heating coil valves (NO): Set heating set-point 20°F above room temperature. Observe valve open. Remove control air or power from the valve

and verify that the valve stem and actuator position do not change. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. For pneumatics, by override in the BAS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.

d. Closure for cooling coil valves (NC): Set cooling set-point 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling set- point to 20°F below room temperature. Observe valve open. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Restore to normal.

E. Execution of Construction Checklists and Startup

1. Four weeks prior to startup, the Contractors and vendors schedule startup and checkout with the GC and CxA. The performance of the construction checklists, startup and checkout are directed and executed by the Contractor or vendor. When checking off construction checklists, signatures may be required of other Contractors for verification of completion of their work.

2. The CxA will, at their own discretion, observe, at minimum, the procedures for each piece of primary equipment unless there are multiple units. In no case will the number of units witnessed be less than four on any one building, nor less than 20% of the total number of identical or very similar units.

3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the construction and startup procedures. The sampling procedures are identified in the Commissioning Plan.

4. The Contractors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and construction tests and checklists.

5. Only installing individuals who have direct knowledge that a line item task on the construction checklist was actually performed shall initial or check off that item.

F. Deficiencies, Non-Conformance and Approval in Checklists and Startup

1. The Contractors shall clearly list any outstanding items of the initial startup and construction procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.

2. The CxA reviews the report and submits either a non- compliance report or an approval form to the Contractors. The CxA shall work with the GC to correct and retest deficiencies or uncompleted items. The CxA will involve the Contractors and others as necessary. The installing Contractors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system to the A/E using a standard form.

3. Items left incomplete, which later cause deficiencies or delays during functional testing, may result in back charges to the responsible party.

3.3 PHASED COMMISSIONING

A. The project will require startup and initial checkout to be executed in phases. This phasing will be planned and scheduled in a coordination meeting of the CxA, MC, TAB, TCC and the GC. Results will be added to the master and commissioning schedule.

3.4 FUNCTIONAL PERFORMANCE TESTING

A. This subsection applies to all commissioning functional testing for all divisions.

B. The general list of equipment to be commissioned is found in this Section. The specific equipment and modes to be tested for each system are found in the respective sections.

C. The parties responsible to execute each test are listed with each test in the respective sections.

D. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the Owner Project Requirements (OPR), Basis of Design and Contract Documents. Functional testing facilitates bringing the systems from a state of substantial completion to full dynamic operation. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems.

1. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool- down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this project are given in Divisions 22, 23, and 26, and other parts of the specification.

E. Development of Test Procedures: Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements in Divisions 22, 23, 26, and elsewhere, the CA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Contractor or vendor responsible to execute a test shall provide appropriate assistance to the CA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CA shall provide a copy of the test procedures to the Contractors, who shall review the tests for feasibility, safety, equipment, and warranty protection.

1. The CA shall review Owner-contracted factory testing or required Owner acceptance tests which the CA is not responsible to oversee, including documentation format, and shall determine what further testing or format changes may be required to comply with the Specifications. Redundancy of testing shall be minimized.

2. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

3. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:

    a. System and equipment or component name(s)
    b. Equipment location and ID number
    c. Unique test ID number, and reference to unique construction checklist and start-up documentation ID numbers for the piece of equipment

d. Date
e. Project name
f. Participating parties
g. A copy of the specification section describing the test requirements
h. A copy of the specific sequence of operations or other specified parameters being verified
i. Formulas used in any calculations
j. Required pre-test field measurements
k. Instructions for setting up the test
l. Special cautions, alarm limits, etc.
m. Specific step-by-step procedures to execute the test, in a clear, sequential, and repeatable format
n. Acceptance criteria of proper performance with a Yes / No checkbox to allow for clearly marking whether or not proper performance of each part of the test was achieved
o. A section for comments
p. Signatures and date block for the CxA

F. Test Methods

1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring their performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. Division 23 Sections and other Sections specify which methods shall be used for each test. The CxA may substitute specified methods or require an additional method to be executed other than what was specified. The CxA will determine which method is most appropriate for tests that do not have a method specified.

2. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.

3. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable, e.g., for the above case, by heating the outside air sensor with a hair dryer rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers, and devices shall be calibrated.

4. Simulated Signals: Using a signal generator, which creates a simulated signal to test and calibrate transducers and DDC constants, is generally recommended not over using the sensor to act as the signal generator via simulated conditions or overwritten values.

5. Altering Set-points: Rather than overwriting sensor values, and when simulating conditions is difficult, altering set-points to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout setpoint to be 2°F above the current outside air temperature.

6. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification is completed during construction testing.

7. Setup: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Contractor executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test operation condition.

8. Sampling: Multiple identical pieces of non-life-safety, or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. No sampling is allowed for the major Plumbing, Mechanical and Electrical equipment.

    a. A common sampling strategy referenced in the Specifications as the "xx% Sampling—yy% Failure Rule" is defined by the following example.
        (1) xx = the percent of the group of identical equipment to be included in each sample.
        (2) yy = the percent of the sample that if failing, will require another sample to be tested.
    b. The example below describes a 20% Sampling—10% Failure Rule.
        (1) Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the "first sample."
        (2) If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
        (3) If 10% of the units in the second sample fail, test all remaining units in the whole group.
        (4) If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.

G. Coordination and Scheduling: The Contractors shall provide sufficient notice to the CxA regarding their completion schedule for the construction checklists and startup of all equipment and systems. The CxA will schedule functional tests through the A/E, GC and other Contractors. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Contractors shall execute the tests.

1. In general, functional testing is conducted after construction testing and startup has been satisfactorily completed. The controls system is sufficiently tested and approved by the CxA before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of

all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.

H. Problem Solving: The CxA will recommend solutions to problems found; however, the burden of responsibility to solve, correct, and retest problems is with the GC.

3.5 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS

A. Documentation: The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the Contractors for review. The CxA will include the filled- out forms in the O&M manuals.

B. Non-Conformance

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the A/E on a standard non-compliance form.

2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.

3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.

4. As tests progress and a deficiencies are identified, the CxA discusses the issue with the Contractor.

   a. When there is no dispute on the deficiency and the Contractor accepts responsibility to correct it:
      (1) The CxA documents the deficiency and the Contractor's response and intentions, and Contractor continue with the next test or sequence. After all the test are completed, the CxA submits the non-compliance reports to the A/E for signature. A copy is provided to the Contractor and CxA. The Contractor corrects the deficiency, signs the statement of correction at the bottom of the non- compliance form, certifying that the equipment is ready to be retested, and sends it back to the CxA.
      (2) The Contractor reschedules the test and coordinates with CxA to establish a time and date that the test is to be repeated.
   b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
      (1) The deficiency shall be documented on the non- compliance form with the Contractor's response and a copy given to the A/E and to the Contractor representative assumed to be responsible.
      (2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the A/E.
      (3) The CxA documents the resolution process.
      (4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The Contractor reschedules

the test and notifies the CxA of the date and time the test is to be repeated. This will occur until satisfactory performance is achieved.

5. Cost of Retesting

   a. The cost for the Contractor to retest a construction or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the responsible parties.
   b. For a deficiency identified, not related to any construction checklist or startup fault, the following shall apply: The CxA will direct the retesting of the equipment once at no "charge" to the Contractor for their time. However, the CxA's time for a second retest will be charged to the Contractor, who may choose to recover costs from the responsible Sub.
   c. The time for the CxA to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the Contractor, who may choose to recover costs from the party responsible for executing the faulty construction test.
   d. Refer to the sampling section of Section 01 8 10, for requirements for testing and retesting identical equipment.
   e. The CxA shall only conduct testing (initial test or retest) after confirming with the Contractor regarding the readiness of equuipment. If the CxA arrives at the site as scheduled but the equipment turns out to be not ready for testing despite of the aforementioned confirmation, the contractor shall be liable for the costs incurred.

6. The Contractor shall respond in writing to the CxA at least as often as commissioning meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

7. The CxA retains the original non-conformance forms until the end of the project.

8. Any required retesting by any Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

C. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the Owner. In such case, the Contractor shall provide the Owner with the following:

1. Within one week of notification from the A/E, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the A/E within two weeks of the original notice.

2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions, which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.

3. The A/E will determine whether a replacement of all identical units or a repair is acceptable.

4. Two examples of the proposed solution will be installed by the Contractor and the CxA will be allowed to test the installations for up to one week, upon which the CxA will decide whether to accept the solution.

5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

D. Approval: The CA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA. The CxA recommends acceptance of each test to the Owner and A/E using a standard form. The A/E gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

3.6 SUBMITTALS

A. Standard O&M Manuals.

1. Special requirements for the TCC and TAB Contractor are found in Sections 22 08 00 and 23 08 00.

B. General Contractor (GC) shall submit final TAB report, final Commissioning report and Final Deficiencies report,as part of the close out documents upon the project's completion.

3.7 TRAINING OF OWNER PERSONNEL

A. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.

B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.

1. The CxA shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable. The Owner and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The CxA shall communicate the results to the Contractor and vendors who have training responsibilities.

2. In addition to these general requirements, the specific training requirements of Owner personnel by Contractor and vendors are specified in Divisions 22, 23, and 26.

3. Each Contractor and vendor responsible for training will submit a written training plan to the CA for review and approval prior to training. The plan will cover the following elements:

a. Equipment (included in training)
b. Intended audience
c. Location of training
d. Objectives
e. Subjects covered (description, duration of discussion, special methods, etc.)
f. Duration of training on each subject
g. Instructor for each subject
h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
i. Instructor and qualifications

4. For the primary HVAC equipment, the TCC shall provide a short discussion of the control of the equipment during the mechanical or electrical training conducted by others.

5. The CxA develops an overall Training Plan, coordinates and schedules it, with the Owner and the Contractor. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the A/E using a standard form. The A/E also signs the approval form.

6. At one of the training sessions, the CxA presents a presentation discussing the use of the blank functional test forms for re-commissioning equipment.

7. The GC will provide electronic recording of the training sessions, with the recording media cataloged by the GC, and added to the O&M manuals.

8. As applicable depending on the project scope of work, the mechanical design engineer shall at the first training session present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, heat rejection systems, heating systems, fuel oil and gas supply systems, supply air systems, exhaust system, and outside air strategies.

3.8 DEFERRED TESTING

A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition, or other deficiency, execution of checklists and functional testing may be delayed upon approval of the A/E.

B. Architect: These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.

C. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) specified in Division 23 shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed and documented, and any deficiencies corrected by the appropriate Contractor, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and as-builts due to the testing will be made.

3.9 WRITTEN WORK PRODUCTS

A. The commissioning process generates a number of written work products described in various parts of the Specifications. The Commissioning Plan lists all the formal written work products, describes briefly their contents, who is responsible to create them, their due dates, who receives and approves them, and the location of the specification to create them. In summary, the written products are:

Product	**Developed By**
Commissioning plan	CxA
Commissioning meeting minutes	CxA
Commissioning schedules	GC and CxA with other Contractors
Equipment documentation submittals	GC with review by CxA
Sequence clarifications	GC and A/E
Construction checklists (verification of equipment installation)	CxA

Startup and initial checkout plan	GC and CxA (Compilation of Existing documents)
Startup and initial checkout forms filled out	GC
Final TAB report	TAB
Issues log (deficiencies)	CxA with responses provided by the GC
Commissioning Progress Record	CxA
Deficiency reports	CxA,GC
Functional test forms	CxA
Filled-out functional tests	CxA,GC
O&M manuals	GC with review by CA
Commissioning record books and CD's	CxA
Overall training plan	CxA, GC, and training personnel
Specific training agendas	GC
Final commissioning report	CxA
Miscellaneous approvals and Systems Manuals	CxA, GC

END OF SECTION 01 91 00

01 00 00 GENERAL REQUIREMENTS

01 10 00 SUMMARY

01 12 00 MULTIPLE CONTRACT SUMMARY

01 14 00 WORK RESTRICTIONS

The Applicant shall complete and dated plans and specifications (including traffic or noise control plans if applicable) of sufficient clarity to indicate the location, nature and extent of the work proposed and with sufficient detail to indicate that the proposed work conforms to the provisions of LAWA's Design & Construction Handbook, and other applicable laws, statutes, orders, and regulations.

Plans and specifications shall be prepared by an architect, engineer, or other design professional licensed in the State of California to practice as such and shall bear the seal of the design professional responsible for preparation of the plans and specifications. Submit eight (8) sets of construction documents along with two electronic copies. Designer shall provide full size prints if needed, otherwise 11 X 17 size will suffice.

Project Phasing Documents

A. That the Applicant/Contractor shall coordinate, phase, sequence, and organize his or her work so as to minimize the inconvenience and disruption to the public, airport stakeholders, and other contractors. The Applicant/Contractor shall submit a Project Phasing Document, in AutoCAD DWG (vector format only), defining each specific work area (Phase) into which the overall project is divided as defined in the Graphics Standards. A Project Phasing Document is required for any project with one or more phases of work. An approved Project Phasing Document must be in place prior to issuance of a Notice to Proceed. The document shall be developed in accordance with the following criteria.

    1. Written description of the work to be accomplished within each phase.
    2. Breakdown the physical elements of the project in maximum thirty (30)-day increments, or less if required to accurately reflect the progression of work, sequenced in accordance with the project schedule.
    3. Include dates for proposed work, daily work hours, and a written work plan for each phase.
    4. The document shall be flexible in its ability to describe real-time updates and shall be updated as required to fully ensure stakeholders are fully informed of revisions as they occur.
    5. The document shall be consistent with the overall Project Schedule.

B. The description of each Phase shall address the following as a minimum.

    1. Location of barricades, partitions, covered walkways, stairs, scaffolding, work platforms, etc. which are designed to separate construction activities from ongoing operational areas and mitigate disruptions to passenger and other stakeholder traffic flows. Approval must be obtained for Barricade and Enclosure Plans, temporary signage, and Scaffold and Messaging Concept. Please see "Additional Design Standards and Criteria" for a sample presentation. Full-size mock-ups of these systems may be required and agreed to prior to installation.

2. Security provisions
3. Emergency personnel provisions
4. Emergency evacuation routes
5. Egress analysis and Occupancy Load calculations for each phase of the construction
6. Public and worker health and safety protection
7. Relocation and definition of temporary facilities required to maintain ongoing operations
8. Maintenance of fire/life safety systems
9. Construction restrictions during special events and holidays
10. Material stockpiling and staging
11. Locations and related work zones for worker/material handling equipment
12. Plan for rubbish removal, including location of trash bins
13. Modification and maintenance of existing systems during construction
14. Temporary signage/way-finding devices
15. Stakeholder relocations
16. Routes of temporary utilities, lines, and points of tie-in
17. Temporary facilities
18. Dust/dirt/debris mitigation
19. Construction Noise mitigation

C. **Graphics Standards:** The **Site Logistics Plan** and the Project Phasing Document shall be submitted in AutoCAD DWG (vector format only) per LAWA CAD Standards. The Site Logistics file submittals are based upon location. For example, areas between terminals (alleyways) and up to the first perpendicular taxiway must be submitted in AutoCAD DWG (vector format only). Areas between the first perpendicular taxiway and entrance AOA gates/posts can be submitted in pdf format. The Site Logistics Plan and Project Phasing Document shall each be a separate deliverable and not incorporated into the Design Documents. Graphically denote changes by clouding "Labels" only.

D. The **Site Logistics Plan** and the Project Phasing Document shall be submitted in AutoCAD DWG or shape file ("dwg" or shp") format per LAWA CAD Standards. Graphically denote changes by clouding "Labels" only. Reference attached drawing titled "Design and Construction Guidelines Graphics Example" for a graphic representation of these standards.

E. **Updates:** The **Site Logistics Plan**, the Project Phasing Document and the Project Schedule shall be updated periodically as changes are identified and LAWA shall be notified immediately.

01 20 00 PRICE AND PAYMENT PROCEDURES

01 25 00 SUBSTITUTION PROCEDURES

Contractor Product, Material, and Equipment Substitutions

When requested by LAWA, submit request for substitution at least twenty (20) days prior to submitting product or system information for Airport Contact/Project Manager's approval.

Substitution request form shall be in CSI Form 13.1A or a different form as approved by LAWA. The form shall be accompanied by a statement, explaining why substitution is needed. The substitution should benefit LAWA and either require no extra cost or provide better product at the same cost. The statement should include at a minimum:

A. 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.

B. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

C. Samples, where applicable or requested.

D. Certificates and qualification data, where applicable or requested.

E. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

F. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

G. Research reports evidencing compliance with building code in effect for Project, from LADBS.

H. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

I. Cost information, including a proposal of change, if any, in the Contract price.

J. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

K. Contractor's certification that all additional costs and impacts are included in the substitution request and that Contractor assumes full liability for all additional costs and impacts that may arise in the future as a result of the proposed substitution.

L. 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.

Submittal Procedures

A. This section includes administrative and procedural requirements of the Contractor for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals. Prepare and submit Submittals for MEP, Communications, Security, etc.

Deviations: The Submittals shall clearly identify all deviations from the standards by either highlight, encircle, and/or itemize deviations on submittals.

01 30 00 ADMINISTRATIVE REQUIREMENTS

01 31 00 PROJECT MANAGEMENT AND COORDINATION

Coordination and Logistical Management. (CALM) The CALM Team's mission statement is to minimize construction-related impacts to passenger service and tenants. To facilitate this, CALM utilizes a GIS data base to capture project specific time and space particulars for all projects undertaken at Los Angeles International Airport. The Project particulars, which are referenced as the Logistical Work Plan, will include, but are not limited to; proposed schedule, estimated construction costs, site logistics plans and project phasing documents (graphical representation of the schedule). Each project is tracked from its inception at Concept Review through completion, to insure efficient sequencing of multiple projects competing for the same time and space resources. In accordance with the Design and Construction Handbook, the applicant is responsible for submitting all necessary documentation in a timely manner to allow for a thorough review by the CALM Management Team. A "Notice to Proceed" for the project will not be granted until the Applicant's submittals have been approved.

Below is an outline of the Process and required Submittals the Applicant must follow.

- **Concept Review:** As Identified on the Stage 1- Concept Review Form, the Applicant must submit an Estimated Project Cost, an Estimated Milestone Start Date, and Completion Date for the proposed construction project, physical location, and scope of the project. With this information, the CALM Team will be able to identify any conflicts, or impacts with time and space coordination. If the Applicants request conflicts, or impacts other proposed projects, the Applicant may be required to alter/or resubmit their Project Concept.
- **Schedule Changes:** Due to the large number of construction projects taking place, appropriate project sequencing is of critical importance to LAWA. Therefore, in accordance with the Concept Approval Letter, the Applicant shall notify the LAWA Project Manager of any cost/schedule changes, from what was provided on the Concept Review Form. Failure to notify the LAWA Project Manager of any schedule change, may adversely affect the Applicants ability to commence/complete the project.
- **Deliverables Pre-NTP:** Prior to the Applicant receiving a Notice to Proceed, (NTP), the Applicant shall have an approved Logistical Work Plan consisting of, but not limited to the following: Updated Construction Schedule, Site Logistics Plan, Temporary Barricade Plan (Section 01 56 23), Temporary Signage Plan (Section 01 58 00), Project Phasing Documents, Haul Routes (Section 01 35 43) and Construction Material Stock Piles (Section 01 35 43). To facilitate the submittal process of the required documents, See "Construction" section of the Design and Construction Handbook for the Site Logistics & Project Phasing Checklist, which is required to be completed and submitted with the Logistical Work Plan.
- **Deliverables After-NTP (Construction):** After NTP, and during all phases of construction, the Applicant, and the Applicant's Contractor shall not deviate from the approved Logistical Work Plan. The Applicant must resubmit any changes to the Logistical Plan for approval, to the LAWA Project Manager. If the Applicant deviates from the approved plan, it will be considered "Unauthorized Work" (Section 01 43 00), and subject to remediation at the Applicant's expense. *Please keep in mind that if the deviation from the approved plans causes an unsafe condition, impacts other Tenants, Customers, or other construction Projects, the Applicant and the Applicants Contractor are subject to a "Stop Work Notice" until the condition has been remedied.*

Site Logistics Plan:

As part of the Logistics Work Plan, the Applicant shall submit a proposed Site Logistics Plan, in AutoCAD DWG (vector format only), as defined by the Graphics Standards Section (01 14 00 C). A Site

Logistics Plan, and a fully documented Logistical Work Plan Checklist, shall be approved by LAWA prior to issuance of a Notice to Proceed. At a minimum, the plan shall address the following information:

A. Identify point of entrance locations and traffic routes for movement of the contractor's equipment, materials and workers to the work.

B. Incorporate Escort provisions including conformance with LAWA and TSA regulations regarding allowable number and handling of un-badged personnel.

C. Define alterations to existing facilities/infrastructure

D. Locate on plans, construction zone accommodation of vehicular and aircraft traffic including signage, traffic stripping, flagging, temporary closures, barricades, and detours

E. Locate on plans, provisions and plans for worker parking.

F. Locate on plans, the staging/laydown areas for construction equipment, trash/debris receptacles, and material storage and protection

G. Locate on plans, temporary facilities including trailers, and dumpsters.

H. Identify locations and related work zones for worker/material handling equipment such as cranes, and lifts.

I. Provide emergency vehicle access provisions

J. Provide emergency evacuation routes

K. Provisions for protection of private and public properties, including leased properties on site, if applicable

L. Identify security provisions

M. Locate on plans, fencing and enclosure provisions

N. Identify location of off-site, project-related facilities

O. Identify on-site parking provisions if applicable.

P. Emergency contacts posted on plan

Q. Define work shifts and corresponding working hours

R. Show routing of temporary utility lines and points of tie-ins

S. Show provisions for reclamation of areas disturbed by the contractor

T. Provide plans and actions taken to comply with environmental requirements and permits

U. Identify the means for dust/dirt/debris mitigation

V. Identify the means for construction noise mitigation

W. Incorporate coordination and accommodation of stakeholders impacted by the work.

X. Incorporate coordination with other contractors impacted by or impacting the work.

Project Phasing Documents:

A. As part of the Logistics Work Plan, the Applicant shall coordinate, phase, sequence, and organize his or her work so as to minimize the inconvenience and disruption to the public, airport stakeholders, and other contractors. The Applicant shall submit a Project Phasing Document, in AutoCAD DWG (vector format only), defining each specific work area (Phase) into which the overall project is divided, as defined the graphics Standards section (01 14 00 C). A Project Phasing

Document is required for any project with one or more phases of work. A Project Phasing Document and a fully documented Logistical Work Plan Checklist shall be approved by LAWA prior to issuance of a Notice to Proceed. The document shall be developed in accordance with the following criteria.

1. Written description of the work to be accomplished within each phase.
2. Breakdown the physical elements of the project in maximum thirty (30)-day increments, or less if required to accurately reflect the progression of work, sequenced in accordance with the project schedule. .
3. Include dates for proposed work, daily work hours, and Emergency 24 hour contact information for each phase.
4. The document shall be flexible in its ability to describe real-time updates and shall be updated as required to fully ensure stakeholders are fully informed of revisions as they occur.
5. The document shall be consistent with the overall Project Schedule.

B. The description of each Phase shall address the following as a minimum.

1. Location of barricades, partitions, covered walkways, stairs, scaffolding, work platforms, etc. which are designed to separate construction activities from ongoing operational areas and mitigate disruptions to passenger and other stakeholder traffic flows. Please see “Additional Design Standards and Criteria” for a sample presentation. Full-size mock-ups of these systems may be required and agreed to prior to installation.
2. Identify security provisions
3. Identify emergency personnel provisions
4. Emergency evacuation routes
5. Identify egress analysis and Occupancy Load calculations for each phase of the construction
6. identify the means for public and worker health and safety protection
7. Identify any relocation and definition of temporary facilities required to maintain ongoing operations
8. State the means for maintenance of fire/life safety systems
9. State applicable construction restrictions during special events and holidays
10. identify locations for material stockpiling and staging
11. Identify Locations and related work zones for worker/material handling equipment
12. Identify the plan for rubbish removal, including location of trash bins
13. identify modification and maintenance of existing systems during construction
14. Identify temporary signage/way-finding needs and depict on drawings.
15. Identify Stakeholder relocations
16. Show routing of temporary utilities, lines, and points of tie-in
17. Identify temporary facilities
18. Identify means for dust/dirt/debris mitigation
19. Identify means for construction noise mitigation

01 31 09 OBSTRUCTIONS TO NAVIGATION (ADDED)

A. Penetrations of the imaginary surfaces defined in Federal Aviation Regulation (FAR) Part 77 shall not be permitted without advance notification of, and approval by, the Engineer. It will be necessary for the Contractor to file FAA Form 7460-1 with the FAA to obtain approval prior for operation of equipment 15 feet or more in height, including but not limited to vehicles, cranes, or other construction equipment, structures, stockpiled materials, excavated earth, etc. It shall be the Contractor's sole responsibility to file this document. In accordance with Federal Regulation Title 14, Part 77 (14 CFR Part 77), notice must be provided at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest.

B. When penetrations more than 15 feet above ground level (AGL) are unavoidable, they shall be brought to the attention of the Engineer, as far in advance as possible. Contractor shall comply with the provisions of FAA's Advisory Circular (AC) 70/7460-1, latest edition, in the marking and lighting of obstacles. In accordance with 14 CFR Part 77, notice must be provided at least 45 days before the start date of the proposed construction or alteration or the date an application for a construction permit is filed, whichever is earliest. No delays will be granted the Contractor for his failure to submit the necessary documents in a timely manner.

01 31 13.5 PROJECT COORDINATION – UTILITIES (ADDED)

Utilities

A. Pursuant to Section 4216 of the Government Code, at least 2 working days prior to commencing any excavation, the Contractor will be required to contact the regional notification center (Underground Service Alert of Southern California) and obtain an inquiry identification number.

B. The following includes a list, but is not limited to, of utility companies and representatives whose facilities may be impacted by this Project:

Agency/Company	Phone Number
City of L.A., Dept. of Water and Power -Water	(213) 481-5411
City of L.A., Dept. of Water and Power - Power	(213) 367-4215
Southern California Gas Company	(310) 605-4181
SBC Regional Engineer Office (Los Angeles County)	(310) 847-1121

C. The contractor shall employ ground penetrating radar, x-ray, or other non-destructive methods to identify utilities at proposed excavations, coring, and or selective demolition wherever that may occur in addition to utility company notification requirements. LAWA inspection (424) 646-6010 shall be notified prior to this activity occurring and shall review markings prior to coring. Employ all necessary safety precautions for the method used.

01 31 19.13 PRECONSTRUCTION MEETINGS

Pre-Construction – Upon approval of the project, the applicant, his design agents, and his contractor shall meet with LAWA staff for a pre-construction conference. At such time, principal aspects of coordination will be established: project schedule, coordination, inspections, as well as any other items of a timely nature to the project.

Preconstruction Conference – The Applicant must contact LAWA for the purpose of scheduling a pre-construction conference. The conference should include the Applicant, the Applicant's Contractor and the Contractor's major Subcontractors. The Contractor will be briefed on rules, regulations and procedures to be followed for construction projects on the Airport. The Contractor must submit an emergency phone list, any required submittals including safety submittals and a construction schedule. After posting the Construction Permit and placing approved construction documents at the project site, the Contractor may

begin construction. Clarification shall be made between LAWA inspection and B&S inspection. LAWA inspection is required before covering or concealing any electrical, plumbing, utility, mechanical, fire sprinkler, fire alarm or structural systems. Work may not progress beyond any point for which an inspection is required until the Contractor receives an approved inspection report for the inspected work.

Also included will be the required submittals of a project-specific safety plan, the Contractor's Illness and Injury Prevention Program (IIPP), Code of Safe Practices and any other applicable safety documentation requested. The project-specific, IIPP and Code of Safe Practices MUST be submitted at the pre-construction and other documentation as requested for acceptance.

01 31 19.23 PROGRESS MEETINGS

Weekly Progress Meetings

The Tenant's authorized representative will schedule and administer weekly progress meetings. This meeting shall be open to all affected stakeholders as determined by LAWA. Progress meetings shall be at the job Site in office space provided by the Contractor. Minutes of each meeting are to be prepared by the Tenant's authorized representative on the project and shall be distributed to those in attendance. At a minimum, each meeting shall address the following items:

- Safety and security issues
- Quality Control issues and testing schedule
- Contractor activities – 3 week look ahead
- Schedule
- Submittals
- RFI's
- Change Orders

Issues shall be carried forward in the meeting minutes for one week following closeout before removing from the minutes. Attachments to the meeting minutes shall include the following:

- 3-week look-ahead schedule
- Full schedule update, if presented in the meeting
- Master Submittal Log
- Master RFI Log
- Master Change Order Proposal Log

Airport Contact will schedule and administer weekly progress meetings. Progress meetings shall be at the job Site in office space provided by the Contractor. Minutes of each meeting are to be prepared by the Construction Manager on the project and shall be distributed to those in attendance.

01 33 00 SUBMITTAL PROCEDURES

01 33 16 DESIGN DATA

Basis of Design Manual – Basis of Design (BOD)—The BOD is a narrative and analytical documentation prepared by the design team AE along with design submissions to explain how the owner's project requirements are met by the proposed design. It describes the technical approach used for systems selections, integration, and sequence of operations, focusing on design features critical to overall building performance. Most design projects require that various engineering calculations be performed and/or

design criteria/material cut sheets be assembled that provide the basis for information on the construction plans and specifications. These values and calculations shall be assembled in a "Basis of Design Manual" for each project.

These written and graphic information documentation requirements will vary for each specific design discipline, 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. The BOD should be approved in the design review phases before advancing the design effort to the next step.

01 33 29 SUSTAINABLE DESIGN REPORTING

LAWA Sustainable Requirements (See "Planning" section of the Design and Construction Handbook for the Sustainability, CALGreen, and LEED requirements).

01 35 00 SPECIAL PROCEDURES

01 35 13 SPECIAL PROJECT PROCEDURES

01 35 13.13 SPECIAL PROJECT PROCEDURES FOR AIRPORT FACILITIES

Damage to Existing Utilities and Improvements

A. Any utility or improvement that is damaged by the Contractor shall be immediately reported to LAWA and immediately repaired to a condition equal to, or better than, the condition they were in prior to such damage. Repair Work shall be continuous until the utility or improvement is placed back in service.

B. All repairs to a damaged utility or shall be inspected and approved by an authorized representative of the utility or improvement LAWA before being concealed by backfill or other Work.

C. In case of damage, which in the opinion of the Airport Contact threatens the safety of persons or property, the Contractor shall immediately make all repairs necessary for removal of the hazard. Should the Contractor fail to take prompt action to this end, the LAWA has the option to remove any hazard resulting from damages caused by the Contractor without waiving any other rights the LAWA may have, and costs shall be charged to the Contractor.

01 35 23 OWNER SAFETY REQUIREMENTS

Prior to commencing field construction, contractors will be required to submit a construction safety plan, for LAWA's review and approval, The LAWA approved safety plan shall be enforced strictly for the project to maintain a safe work environment. The safety plan shall include as a minimum the following items:

A. Policy statement clearly stating the objective of the safety plan and the scope of the project

B. Organization chart indicating the duties and responsibilities for the safety staff and the designated safety representative.

C. Safety program shall describe the services and facilities to be available for non-recordable illnesses or injuries as well as recordable illnesses or injuries.

D. The safety plan shall also set the procedures for all work site injury records and reports.

E. The safety plan shall set the procedures for compliance with all applicable laws and contract requirements.

Any activities or condition found to be hazardous by LAWA shall be corrected "on the spot" and delay in the correction of a hazard to the life safety of any person may result in the closure by LAWA of the involved work site until the activity and/or condition is corrected. Should such condition cause an immediate safety threat, LAWA may close the work site immediately until the condition is corrected.

01 35 43 ENVIRONMENTAL PROCEDURES

Environmental Mitigation Requirements

A. This section covers construction related mitigation requirements that include, but is not limited to, traffic mitigation measures, air quality construction related measures, restrictions on construction material stockpiles, and other miscellaneous items, as included hereafter.

B. The Applicant/Contractor shall implement and comply with these requirements in the performance of the work.

C. Compliance with this section does not exempt the Contractor from compliance with other applicable permits, approvals, requirements, rules and regulations of other agencies with jurisdiction over the work of this contract.

D. The Applicant/Contractor may be required to designate a person or persons to ensure the implementation of all components of the construction- related Environmental Mitigation Requirements through direct inspections, records review, and investigations of complaints

E. All construction deliveries requiring lane closures shall receive prior approval from the Project Manager. Construction Notification of deliveries requiring lane closures shall be made in writing to the Project Manager (a minimum of 72 hours in advance) in order to allow for any modifications to approved traffic detour plans. The Contractor shall obtain delivery permits from all applicable local agencies 30 days prior to any delivery requiring a lane closure.

F. No staging of construction traffic in residential areas will be allowed. Should traffic staging areas be required, the Contractor shall locate these areas away from residential development and shall comply with all local regulations.

G. All construction deliveries of bulk materials such as aggregate, bulk cement, dirt, etc. to the project site, and hauling of materials from the project site, shall be scheduled during off peak hours to avoid the peak commuter traffic periods. The Contractor may be required to submit haul routes for all construction traffic, deliveries, and employee travel within 30 days from Notice to Proceed for approval by LAWA. Haul routes shall be located away from residential areas. Further, at LAX, construction trucks will not be allowed on:

   1. 104th Street between Hawthorne Boulevard and Inglewood Avenue;
   2. Inglewood Avenue between Century Boulevard and Imperial Highway; and
   3. Lennox Boulevard between Hawthorne Boulevard and Inglewood Ave.

   Peak commuter traffic periods are between 7:00 a.m. to 9:00 a.m. and 4:30 p.m. to 6:30 p.m. Any and all deviations to this requirement shall be approved in writing by LAWA prior to actual site deliveries.

H. To the extent possible, Contractor shall establish work hours that avoid peak commuter traffic periods as defined herein. Avoidance with peak commuter traffic shall be extended to include weekend and, when applicable, multiple work shifts.

I. When requested by LAWA, the Applicant/Contractor shall ensure that all construction personnel attend a pre-construction orientation meeting to be conducted by the Contractor wherein personnel are advised on topics including the following: where to park, where staging areas are located, construction policies, and the environmental mitigation requirements herein. A copy of the Orientation Meeting Agenda and personnel sign-in sheet shall be submitted to LAWA after each orientation meeting.

Construction Material Stockpiles Locations and Maintenance

Stockpile locations will be off airport property unless otherwise approved by LAWA.

Environmental Regulations.

That you shall fulfill, as applicable, all requirements of environmental regulatory agencies, including but not limited to the federal and state Environmental Protection Agencies; the Certified Unified Program Agency (CUPA); the Air Quality Management District (AQMD); and the local ordinances as cited in the City's Municipal Code. Those requirements may include:

A. Obtaining the proper permits for any construction, demolition, and/or remediation activities.

B. Developing and providing, if required based on hazardous materials stored quantities, a business emergency/contingency plan.

C. Filing a California Accidental Release Prevention Program form, and preparing and providing a risk management plan (RMP).

D. Submitting the proper application and obtaining the proper permits for installation, operation or removal of aboveground storage tanks (AST's) and underground storage tanks (USTs).

E. Filing a petroleum storage statement with the CUPA and developing and implementing a Spill Prevention Control and Countermeasures plan (SPCC) required of facilities which store over 1,320 gallons of petroleum products above.

Copies of the required permits, plans, reports and surveys shall be provided to Los Angeles World Airports, Airport Development Group prior to construction.

Air Pollution Control

The Applicant/Contractor shall not discharge smoke, dust equipment exhaust, or any other air contaminants into the atmosphere in such quantity as will violate any Federal, State or local regulations. The Applicant/Contractor shall also abate dust nuisance by cleaning, sweeping and spraying with water or other means as deemed necessary.
Obtain the proper permits or registrations from the governing agencies for construction, demolition, and/or renovation activities. These activities may include but are not limited to asbestos abatement, and the installation, testing, operation, or removal of mobile and/or stationary equipment.

Dust Control

A. The Contractor will be responsible for removing from the Site and other public areas, excavated materials and debris resulting from the Work. Vehicles exiting the Site shall have all dirt clods and mud removed from their tires.

B. The Contractor will contain dust and remove it from the Site at intervals sufficient to prevent contamination outside work limits and as directed by the Engineer. The Contractor shall use adequate watering techniques to alleviate accumulation of construction-generated dust.

1. The Contractor will be responsible for containment of dust emission from all construction, transport, storage or handling activities, in accordance with South Coast Air Quality Management District (SCAQMD) Rule 403: Fugitive Dust.
2. The Contractor will be responsible for the continuous clean-up of all construction-related dirt on approach routes to the Site. Location of Trash Bins shall be included on laydown plans. These trash bins shall not impede normal operations of other tenants and airlines.
3. The Contractor shall furnish trash bins for all debris resulting from Construction. All debris shall be placed in trash bins daily. Forms or false work that is to be reused shall be stacked neatly as they are being removed. Forms and falsework that are not to be reused shall be disposed of immediately upon their removal.
4. The Contractor shall comply with California Vehicle Code 23114 which states in part that "A vehicle may not be driven or moved on any highway unless the vehicle is so constructed, covered, or loaded so as to prevent any of its contents or load other than clear water from dropping, sifting, leaking, blowing, spilling, or otherwise escaping from the vehicle."
5. The Contractor shall comply with vehicle speed limits of 15 miles per hour while traveling on unpaved construction sites and maintain at least six (6) inches of freeboard on haul vehicles.

C. When requested by LAWA, the Contractor shall furnish and operate a self-loading motor sweeper with spray nozzles at least once each Working Day for the purpose of keeping paved areas acceptably clean wherever construction, including restoration, is incomplete.

Air Quality

A. Contractor shall make every effort to reduce air pollutant emissions from construction traffic and equipment both on and off the airport. This includes, but is not limited to, use of construction equipment with "cleaner burning diesel" fuel and exhaust emission controls. The Contractor shall use alternative fuel or low emission vehicles to the maximum extent practicable.

Non-Road Mobile Source Controls

A. The Contractor shall prohibit staging or parking of construction vehicles (including workers' vehicles) on streets adjacent to schools, daycare centers, and hospitals.

B. The Contractor shall prohibit construction diesel vehicles or equipment from idling in excess of the idling restrictions as defined in CARB Vehicle Idling Rule. The Contractor shall advise drivers and operators of these requirements at the pre-construction orientation meeting, remind them on a daily basis, and post signs in appropriate places indicating the CARB Vehicle Idling Rule. Exemptions may be granted for safety-related and operational reasons, as defined in CARB or as approved by the Engineer. The Contractor and subcontractors shall have policies and procedures in place for compliance with the Vehicle Idling Rule.

Stationary Point Source Controls

A. The Contractor shall specify a combination of electricity from power poles and electricity from portable diesel- or gasoline-fueled generators using "cleaner burning diesel" fuel and exhaust emission controls for his electrical energy requirements.

B. The Contractor shall obtain approval of the Engineer for the use of internal combustion engine water pumps, power generators, air compressors and other related construction equipment when an option exists to utilize grid power or electric powered equipment.

Noise Control

A. Noise generated form the Contractor's operations shall be controlled as required by LAWA.

B. The Contractor shall comply with local sound control and noise level rules, regulations and ordinances which apply to the Work.

Spill Prevention and Emergency Response Plan.

A. The Contractor shall prepare and submit a spill prevention and emergency response plan. The plan shall address implementation of measures to prevent sewage spills; procedures for spill control and containment, notifications, emergency response, cleanup, and spill and damage reporting.

B. The plan shall account for all storm drain systems and water courses within the vicinity of the Work which could be affected by a sewage spill. Catch basins that could receive spilled sewage shall be identified. Unless otherwise specified in the Specifications, these catch basins shall be sealed prior to operating the bypass and pumping system. The Contractor shall remove all material used to seal the catch basins when the bypass and pumping system operations are complete.

C. The Contractor shall be fully responsible for containing any sewage spillage, preventing any sewage from reaching a watercourse, recovery and legal disposal of any spilled sewage, any fines or penalties associated with the sewage spill imposed upon by LAWA and/or the Contractor by jurisdictional regulatory agencies, and any other expenses or liabilities related to the sewage spill.

01 40 00 QUALITY REQUIREMENTS

Adjustments

A. Adjust operating products, systems, subsystems, and equipment to ensure smooth and unhindered operation.

The Contractor shall make all repairs and replacements promptly upon receipt of written order from LAWA.

01 41 00 REGULATORY REQUIREMENTS (CODES, LAWS, RULES, FEES, AND PERMIT REQUIREMENTS)

Federal, State, Local Statutes, Codes, and Regulations

This section provides an overview of the regulatory requirements and procedures for development work at LAX. Mentioned in this section are the codes and guidelines that the Designer is encouraged to become familiar with. This list is neither exhaustive nor all inclusive. The Designer is responsible to be aware of these and any other code regulations that apply to their specific project.

LAWA is not a self-permitting agency. The City of Los Angeles, Department of Building and Safety (LADBS) is the lead agency for plan check approvals for most building projects at LAX and VNY. The exceptions include, but are not limited to, airfield or special structures that are reviewed and approved through the FAA and roadway projects that fall under the City of Los Angeles Department of Transportation.

LADBS will determine other City or County agencies with jurisdiction over the project where review and sign-off is necessary to obtain final plan check approval and permit for construction. Examples include the City of Los Angeles Fire Department, the Disabled Access Division and for projects that involve food service facilities, the Los Angeles County Department of Public Health. In addition, depending on the scope of the project, review and approval may be required by Federal agencies such as the Department of Homeland Security Transportation Security Administration, Customs and Border Protection and the Federal Aviation Administration.

01 43 00 QUALITY ASSURANCE

QUALITY ASSURANCE

General

A. LAWA will inspect the work in accordance with the Tenant's LAWA approved Construction Documents and any other pertinent LAWA agreements.

B. The Work is subject to inspection and approval by LAWA.

C. The LAWA Engineer and Inspector shall be permitted access to all parts of the Work, including plants where materials or items are manufactured or fabricated. The presence of the Engineer or the Inspector shall not relieve the Contractor of the responsibility for the proper execution of the Work.

D. The Contractor shall notify the Inspector before noon of the working day before inspection is required. Work shall be done only in the presence of the Inspector, unless otherwise authorized. Any work done without proper inspection will be subject to rejection. The Inspector and any authorized representatives shall at all times have access to the Work during its construction at shops and yards and while in storage, as well as to the Work site. The Contractor shall provide every reasonable facility for ascertaining that the materials and workmanship are in accordance with these Specifications. Inspection of the Work shall not relieve the Contractor of the obligation to fulfill all requirements of the Contract.

E. The Inspector is authorized to determine the acceptability of materials and the quality of Work. The Inspector is authorized to sample and test all materials to be incorporated into the Work. The Inspector may delegate this authority to sample materials for construction to an approved public or private testing laboratory to perform any necessary tests.

F. No Work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected by the Inspector and other Agencies for which a permit is required. The Contractor shall notify the Inspector before noon of the working day before inspection is required. Tenant Inspection (424) 646-6010. The Contractor shall provide project title, inspector name, time inspection desired, work location, and description of work to be inspected. Should the Contractor attempt to cover or conceal any item of Work prior to its approval and acceptance, the Inspector may cause the activity to be stopped and require said Work to be exposed, if determined necessary by the Inspector, so that proper inspection may take place. All costs for exposing such Work, including premium costs resulting from alternate means of inspection, time delays, and impacts resulting on other portions of the Work, shall be borne by the Contractor. All costs of such delays, including its effect upon other portions of the Work, shall be borne by the Contractor. Where Work that was done without inspection cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal, and reconstruction under proper inspection at the expense of the Contractor.

Faulty and Unauthorized Work

A. Unauthorized work shall be remedied or removed and replaced by the Contractor in an acceptable manner, and no added compensation will be allowed for such removal, replacement, or remedial work. If the contractor chooses to propose repair of non-conforming work, a repair procedure is required for non-conforming work and shall be submitted to the Engineer for review and approval prior to any corrective action taking place. Work done beyond the areas indicated or established by LAWA's approved set of documents may be considered as unauthorized work. Work shall be remedied, removed or replaced at the Contractor's expense.

B. Except as set forth in this Subsection or elsewhere in Project Specifications, all non-conforming Work and materials, in place or not, shall be removed immediately from the Site or corrected to conform to all requirements of the Contract Documents, by the Contractor, at the sole expense of the Contractor. If the contractor chooses to propose repair of non-conforming work, a repair procedure is required for non-conforming work and shall be submitted to the Engineer for review and approval prior to any corrective action taking place. If the Contractor fails to remove, replace, or correct any non-conforming Work or materials within seventy-two (72) hours of discovery, the Engineer may cause such Work or materials to be removed and replaced. Such removal and replacement shall be at the sole expense of the Contractor.

C. If the Contractor shall join Work with any Work in place, and if such joint is not made in a skillful manner, then such joint or Work shall be deemed and construed to be faulty workmanship and such materials shall be deemed and construed to be defective materials.

D. In case of a dispute between the Contractor and the Inspector, the latter is authorized to reject materials or suspend the Work until any questions at issue can be referred to and decided by the Engineer

Materials and Workmanship

A. Workers and installers shall be skilled, trained and experienced in the necessary crafts and shall be completely familiar with the specific requirements and methods needed for proper performance and completion of the Work.

B. Fabricators shall be licensed by the City of Los Angeles. All structural welding shall be performed by welders certified and licensed by the City of Los Angeles, Department of Building and Safety.

C. No product containing asbestos shall be used for any purpose. When removing asbestos products, the Contractor shall comply with the requirements of Title 8, California Code of Regulations (CCR), General Industry Safety Orders and Construction Safety Orders.

D. All references to specifications of national organizations and trade associations related to building industry such as, but not limited to, American Society for Testing and Materials, American Institute of Steel Construction, American Concrete Institute, Prestressed Concrete Institute, Post-Tensioning Institute, and the National Board of Fire Underwriters refer to the latest revision of such specifications except as otherwise noted at time of bid opening.

E. All materials, parts, and equipment furnished by the Contractor in the Work shall be new, high grade, and free from defects. Used or secondhand materials, parts, and equipment may be used only if so specified in the contract documents.

F. The quality of materials and workmanship shall be subject to approval by the Inspector. Materials and workmanship of quality not conforming to the requirements of the Specifications shall be considered defective and will be subject to rejection. Defective work or material, whether in place or not, shall be removed immediately form the Work site by the Contractor, at its expenses, when so directed by the Inspector.

G. If the Contractor fails to replace any defective or damaged work or material after reasonable notice, the Engineer may cause such work or materials to be replaced. The replacement expense will be deducted from the amount to be paid to the Contractor.

Protection of Work and Materials

A. The Contractor shall provide and maintain storage facilities and employ such measures as will preserve the specified quality of materials to be used in the Work. Stored materials shall be reasonably accessible for inspection. The Contractor shall also adequately protect new and existing work and all items of equipment for the duration of the Contract.

B. The Contractor shall not, without LAWA's consent, assign, sell, mortgage, hypothecate, or remove equipment or materials which have been installed or delivered and which may be necessary for the completion of the Work.

C. Access to Work and Materials. The Contractor shall provide access at any time to the Work and materials wherever same are stored, being fabricated, erected or installed, when requested to do so by a representative of the LAWA or other regulatory subdivisions having jurisdiction.

D. Facilities and Labor. The Contractor shall provide sufficient, safe, and proper facilities and labor necessary to move, take and prepare samples for testing of materials, and shall move same for purposes of additional testing when ordered to do so by any of the LAWA's representatives.

SHOP Inspection Requirements

An LADBS approved fabricator designation does not relieve the tenant/contractor from any of the following requirements.

A. Coordinator

All items identified in the technical specifications requiring shop inspection require shop inspection. At the 90% LAWA Project Approval Team plan review, the designer will provide a list of items to be fabricated. At the 90% review, LAWA inspection and or engineering will determine the need for shop inspection. All shop inspection will be performed by LAWA staff, regardless of location. No additional cost by the contractor will be incurred for this service unless otherwise noted in the contract. When shop inspection is required by the Engineer, a Notification of Fabrication form shall be submitted by the General Contractor or the Quality Control Manager to the Materials Control Coordinator.

B. The General Contractor or the Quality Control Manager shall fax the Notification of Fabrication to the Materials Control Coordinator at (424) 646-9327 at least 48 hours in advance when the fabrication will take place within 50 miles of the project.

C. The General Contractor or the Quality Control Manager shall fax the Notification of Fabrication to the Materials Control Coordinator at (424) 646-9327 at least 10 working days in advance when the fabrication will take place more than 50 miles from the project.

D. The General Contractor or the Quality Control Manager shall fax the Notification of Fabrication to the Materials Control Coordinator at (424) 646-9327 at least 30 days in advance when the fabrication will take place outside of the continental United States.

E. David Jackson is the Material Control Coordinator for all LAWA projects and can be reached at (424) 646-5755 or at djackson@lawa.org.

F. Notification of Fabrication form can be obtained by contacting David Jackson.

G. Unless otherwise specified, inspection is required at the sources for asphalt concrete pavement mixtures, structural concrete, metal fabrication, metal casting, welding, concrete pipe manufacture, protective coating application, and similar shop or plant operations. Additional materials and fabricated items which require inspection at the source shall be as specified.

H. Steel pipe in sizes less than 8 inches and vitrified clay and cast iron pipe in all sizes are acceptable upon certification as to compliance with the Specifications, subject to sampling and testing by LAWA. Shelf items mass produced unless noted otherwise in this contract are subject to inspection at the Work site only. Special items of equipment such as designed electrical panel boards, large pumps, sewage plant equipment, etc. are subject to inspection at the source including performance testing. Inspection at the source for other items shall be as specified.

I. All materials and fabricated articles furnished by the Contractor are subject to inspection at their source, and no materials or fabricated articles shall be used in the Work until they have been inspected and accepted by the Materials Control Inspector. The Materials Control Inspector shall be permitted access to all parts of the Work, including shops where materials and fabricated articles are manufactured or fabricated.

J. All materials and fabricated items shall be manufactured or fabricated from Shop Drawings that have been approved by the Engineer of Record. The Contractor shall ensure that legible copies of the approved submittals, shop drawings, approved mix designs, and the corresponding Contract Specifications are provided to its fabricators or suppliers, and that said documents are available to the Materials Control Inspector or Independent Inspection and/or Testing Laboratory (IITL) during the inspection. Shop inspection cannot and will not take place without noted documents.

K. Any material or fabricated item that requires shop inspection and arrives at the Site without inspection by the Materials Control Inspector is subject to rejection by the Inspector and may be required to be removed from the Site by the Contractor at the Contractor's sole expense.

L. Prior to shipment of any material or fabricated item, final inspection shall be performed by the Materials Control Inspector or IITL. Said inspection shall consist of a final visual inspection, identification, and tagging and/or stamping for release to the Project Site. Items received at the Site without the proper identification may be rejected and required to be removed from the Site.

Test of Materials

A. Before incorporation into the Work, the Contractor shall submit samples of materials, as the Engineer may require, at no cost to LAWA. The Contractor, at its expense, shall deliver the materials for testing to the place and at the time designated by the Engineer. For Tenant Projects, the testing expense shall be borne by the Applicant.

B. The Contractor shall notify the Engineer in writing, at least 15 days in advance, of its intention to use materials for which tests are specified, to allow sufficient time to perform the tests. The notice shall name the proposed supplier and source of material.

C. If the notice of intent to use is sent before the materials are available for testing or inspection, or is sent so far in advance that the materials on hand at the time will not last but will be replaced by a new lot prior to use on the Work, it will be the Contractor’s responsibility to re-notify the Engineer when samples which are representative may be obtained.

D. Testing by the LAWA. In addition to any other inspection or Quality Assurance provisions that may be specified, the Engineer shall have the right to independently select, test, and analyze, at the expense of the LAWA, additional test specimens of any or all of the materials to be used. Whenever any portion of the Work fails to meet the requirements of the Contract Documents as shown by the results of independent testing or investigation by the Engineer, all costs of such independent inspection and investigation, and all costs of removal, correction, and reconstruction or repair of any such Work shall be borne by the Contractor.

E. Testing by Approved Testing Laboratory. When the manufacturer, fabricator, or supplier provides the results of tests from samples taken at the mill, factory, or warehouse, the Engineer will accept the test reports provided the following conditions are met:

1. The Testing Laboratory was approved by the Engineer prior to performing the tests, and that all necessary certifications were valid at the time the tests were performed.

2. The tests were performed in conformance with the Contract Documents for the specified material or item.

3. The reports are made in the form of an affidavit, as specified below.

4. Tests performed by an approved Testing Laboratory are subject to be monitored by LAWA Inspectors.

F. Whenever the approved Testing Laboratory takes samples of materials other than at the Site, the deliveries to the Site of materials represented by such samples shall be identified as specified for the specific material. The results of such tests shall be reported to the Materials Control Inspector in the form of affidavits attested to by the Testing Laboratory. Such affidavits shall furnish the following information with respect to the material sampled:

1. Manufacturer's name and brand.
2. Place of sampling.
3. Sufficient information to identify the lot, group, bin, or silo from which the samples were taken.
4. Amount of material in the lot sampled.
5. Statement that the material has passed the requirements.
6. Signature and title of the person creating the affidavit and the date of execution of the affidavit.

Certification

A. The Engineer may waive the materials testing requirements and accept the manufacturer's written certificate of compliance that the materials to be supplied meet those requirements. Materials test data may be required by the Engineer to be included with the submittal.

B. A Certificate of Compliance in triplicate shall be furnished prior to the use of materials for which the Contract Documents require that such a certificate be furnished. The Engineer may permit the use of certain materials or assemblies prior to the sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and the Contractor, and shall state that the materials involved comply in all respects with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of materials delivered to the work, and the lot so certified shall be clearly identified on the certificate. The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

C. Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the Work which conforms to the requirements of the Contract Documents and such material not conforming to such requirements will be subject to rejection whether in place or not.

D. The Engineer reserves the right to refuse to permit the use of material notwithstanding the submittal of a Certificate of Compliance.

Trade Names or Equals

A. The Contractor may supply any of the materials specified or offer an equivalent. The Engineer will determine whether the material offered is equivalent to that specified. Adequate time shall be allowed for the Engineer to make this determination.

B. A listing of materials is not intended to be comprehensive, or in order of preference. The Contractor may offer any material, process, or equipment considered to be equivalent to that indicated. The substantiation of offers shall be submitted as provided in the Contract Documents.

C. The Contractor shall, at its expense, furnish data concerning items offered by it as equivalent to those specified. The Contractor shall have the material tested as required by the Engineer to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the item will fulfill its intended function.

D. Test methods shall be subject to the approval of the Engineer. Test results shall be reported promptly to the Engineer, who will evaluate the results and determine if the substitute item is equivalent. The Engineer's findings shall be final. Installation and use of a substitute item shall not be made until approved by the Engineer.

E. If a substitute offered by the Contractor is not found to be equal to the specified material, the Contractor shall furnish and install the specified material.

F. The specified Contract completion time shall not be affected by any circumstance developing from the provisions of this subsection.

Weighing and Metering Equipment

A. Scales and metering equipment used for proportioning materials shall be inspected for accuracy and certified within the past 12 months by the State of California Bureau of Weights and Measures, by the County Director or Sealer of Weights and Measures, or by a scale mechanic registered with or licensed by the County

B. The accuracy of the work of a scale service agency, except as stated herein, shall meet the standards of the Business and Professions Code and the Code of Regulations pertaining to weighing devices. A Certificate of Compliance shall be presented, prior to operation, to the Engineer for approval and shall be renewed whenever required.

C. Scales shall be arranged so they may be read easily from the operator's platform or area. They shall indicate the true net weight without the application of any factor. The figures of the scales shall be clearly legible. Scales shall be accurate to within 1 percent when tested with the plant shut down. Weighing equipment shall be so insulated against vibration or moving of other operating equipment in the plant area that the error in weighing with the entire plant running will not exceed 2 percent for any setting or 1.5 percent for any batch.

Final Inspection

At the completion of Work, after completion of all corrections, the Inspector, Engineer, Designer, Architect, Construction & Maintenance, and Contractor may make a final inspection, as applicable. The Inspector will provide a Final Inspection Correction List itemizing all Work necessary to complete the Project as initially approved by LAWA.

01 45 16.13 CONTRACTOR QUALITY CONTROL

Prior to issuance of an NTP, contractors may be required to submit a Quality Control plan, for LAWA's review and approval. The quality plan shall include as a minimum the following:

A. Statement of purpose and the policy for the quality control plan
B. Organization chart designating the quality staff for the project
C. All quality control process for the project including but not limited to:
    1. All meetings associated with quality control including preparatory, mobilization and any other quality related meeting
    2. All inspection processes and sign-off procedures including punch lists
    3. Specialty inspections
    4. Supplemental procedures to the quality plan

D. All testing required for the project including any independent testing agencies and their processes
E. Documentation for the process including but not limited to:
    1. Quality control reports and project logs
    2. Action item logs
    3. All forms required for the quality plan
    4. Agenda and meeting minutes for all quality related meetings.

01 50 00 TEMPORARY FACILITIES AND CONTROLS

01 52 00 CONSTRUCTION FACILITIES

Contractor's Equipment and Facility

A. Contractors will be required to furnish and maintain all equipment and facilities as required for the proper execution of the work.

B. Contractors will be required to restore the Operations and Storage Yard, if any is provided, and adjacent areas to their original condition prior to final acceptance of the Project, or at the discretion/option of LAWA, left in place at completion of the Project and Ownership shall thereupon be vested to the City.

C. Equipment and materials shall be stored off the Project Site until they are to be used on the Work. All other operations of the Contractor shall be confined to the areas authorized or approved by the Airport Contact.

01 56 00 TEMPORARY BARRIERS AND ENCLOSURES

TEMPORARY BARRICADE AND ENCLOSURE STANDARDS

01 56 33 TEMPORARY SECURITY BARRIERS

01 56 36 TEMPORARY SECURITY ENCLOSURES

01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL

Water Pollution Control

A. The Contractor shall conform to all applicable local, state and Federal regulations and laws pertaining to water pollution control. The Contractor shall conduct and schedule its operations in such a manner as to prevent water pollution.

    1. "Water Pollution" shall mean an alteration of the quality of waters by fuels, oils, and other harmful materials. The alteration shall be to a degree that adversely affects such waters for beneficial uses, or facilities that serve such beneficial uses.

    2. "Beneficial Uses" shall include, but not necessarily be limited to, domestic, municipal, agricultural, and industrial supply; power generation; recreation; esthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

B. When required, the Contractor shall obtain permits for erosion and water pollution control from the appropriate jurisdictional agency before the start of construction.

C. Wet Weather Erosion Control Plan (WWECP) shall be prepared pursuant to Section 61.02 of the LAMC, whenever it appears that the construction Site will have grading during the rainy season (from October 15 to April 15). The Contractor shall submit a WWECP to the Engineer for approval within thirty (30) Days after the Notice to Proceed or get approval thirty (30) Days prior to the beginning of the rainy season, whichever is longer.

D. Work shall be in compliance with the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for the City of Los Angeles (NPDES Permit No. CAS004001), including the Los Angeles Standard Urban Stormwater Mitigation Plan (SUSMP). Guidance on NPDES, SUSMP, and WWECP can be found on the City of Los Angeles' Stormwater website at http://www.lastormwater.org.

E. The Contractor shall conform to the following requirements:

1. Sediments or other surface water quality pollutants shall not be discharged to a storm drain system or receiving waters.
2. Sediments and other surface water quality pollutants generated on the Work site shall be contained on the Work site using appropriate Best Management Practices (BMPs).
3. No construction-related materials, waste, spill, or residue shall be discharged from the Work site to streets, drainage facilities, receiving waters, or adjacent property by wind or runoff.
4. Non-storm water runoff form equipment, vehicle washing, or any other activity shall be contained within the Work site using appropriate BMPs.
5. Erosion shall be prevented. Erosion susceptible slopes, shall be covered, planted or otherwise protected in a way that prevents discharge from the Work site.

Stormwater Discharges Associated with Construction Activity

A. The Contractor shall implement and maintain such BMPs as are relevant to the Work.

B. The Contractor shall be responsible throughout the duration of the Contract for installing, constructing, inspecting, maintaining, removing and disposing of BMPs. Unless otherwise directed by LAWA, the Contractor shall be responsible for BMP implementation and maintenance throughout any temporary suspension of the Work.

C. All projects, regardless of size, shall implement the following good housekeeping BMPs to reduce the discharge of pollutants from construction sites to the maximum extent practicable:

1. Eroded sediments and other pollutants must be retained on Site and may not be transported from the Site via sheet flow, swales, area drains, or natural drainage.
2. Stockpiles of earth and other construction-related materials must be protected from being transported from the Site by water.
3. Fuels, oils, solvents, and other toxic substances originating from the Contractor's operations shall not be allowed to enter the ground water or be placed where they will enter a live stream, channel, drain, or other water conveyance facility. Spills may not be washed into the live streams, channels, drains, or other water conveyance facilities.
4. Such features as drainage gutters, slope protection blankets, and retention basins shall be constructed concurrently with other Work and at the earliest practical time. The Contractor shall exercise care to preserve vegetation beyond the limits of construction.
5. Excess or waste concrete may not be washed into the public way or any drainage system. Provisions shall be made to retain concrete wastes on-site until it can be appropriately disposed of or recycled.
6. Trash and construction-related solid wastes must be deposited into a covered receptacle to prevent contamination of rainwater and dispersal by wind.

7. Sediments and other materials may not be tracked from the Site by vehicle traffic. The construction entrance roadways must be stabilized so as to inhibit sediments from being deposited into the public ways. Accidental depositions must be swept up immediately and may not be washed down by rain or by any other means.

8. After the completion of the Work, the Site shall be cleared of debris and restored to a condition equal to or better than that existing before construction.

D. The Contractor shall comply with the State Water Resources Control Board Order No. 2009-0009-DWQ (Construction Activities Storm Water General Permit). Contractor is to determine the Risk Level for the Site in accordance with State Water Resources Control Board Order No. 2009-0009-DWQ and determine which requirements are applicable.

E. Compliance with State Water Resources Control Board Order No. 2009-0009-DWQ, may include, but is not limited to the following:

1. Register via the State Water Board's Storm Water Multi-Application & Reporting System (SMARTS) system, as coordinated through LAWA.

2. Prepare all Permit Registration Documents.

3. Have a credentialed preparer, as defined in State Water Resources Control Board Order No. 2009-0009-DWQ, develop a site-specific Storm Water Pollution Prevention Plan (SWPPP).

4. Submit SWPPP to LAWA Environmental Programs Group for review and approval.

5. Implement the SWPPP in accordance with State Water Resources Control Board Order No. 2009-0009-DWQ requirements, including, but not limited to necessary and appropriate site monitoring, and filing of required reports and notifications via SMARTS (in consultation with LAWA).

6. Prepare a Notice of Termination (NOT) upon completion of said construction work, fulfill all post-construction requirements under State Water Resources Control Board Order No. 2009-0009-DWQ, and coordinate with LAWA the filing of the NOT via SMARTS.

F. Failure to comply with State Water Resources Control Board Order No. 2009-0009-DWQ may subject discharges to penalties. Dischargers may become liable to pay up to $10,000 a day pursuant to California Water Code section 13385, and another penalty of a minimum of $1,000 pursuant to sections 13399.25-3399.43.

G. Should the Contractor violate any of the provisions of this Subsection, or if pollution occurs in the work area for any reason, the Contractor shall immediately notify LAWA. In addition the Contractor shall, within 10 Days, submit written confirmation to LAWA describing the incident and corrective actions taken. Contractor is to comply with all discharge reporting requirements of Water Resources Control Board Order No. 2009-0009-DWQ. If pollution, for whatever reason, is detected by the Inspector/Engineer before notification by the Contractor, the required written confirmation shall also include any explanation of why the Contractor had not notified the Inspector.

Drainage Control

The Contractor shall ensure that storm and drainage water does not pond due to the temporary blockage of exiting drainage facilities. To this end, the Contractor shall provide temporary methods that allow for the passage of storm and drainage water in a manner equivalent to the existing drainage system.

01 58 00 TEMPORARY SIGNAGE STANDARDS

01 60 00 PRODUCT REQUIREMENTS

01 64 00 OWNER-FURNISHED PRODUCTS

LAWA FURNISHED MATERIALS

Materials Furnished by LAWA

A. Upon receiving material furnished by the LAWA for storage or installation in the Work, the Contractor shall give a signed receipt to the Airport Contact for the material delivered. Thereafter the Contractor shall be responsible for the care and necessary replacement of such material if damaged.

B. If, as determined by LAWA, the material is not adequately protected by the Contractor, such material may be protected by the LAWA and the cost thereto be charged to the Contractor.

C. Upon receiving such material, the Contractor shall inspect it, and should any damage, defects, or missing equipment or parts be found, the Contractor shall immediately notify LAWA in writing. By failing to notify LAWA, it shall be deemed that the Contractor has accepted such material as being free from said damage, defects, or missing equipment or parts, except for latent defects.

01 66 00 PRODUCT STORAGE AND HANDLING REQUIREMENTS

01 66 13 PRODUCT STORAGE AND HANDLING REQUIREMENTS FOR HAZARDOUS MATERIALS

Special Hazardous Substances and Processes

A. Special Hazardous Substances and Processes. Materials that contain hazardous substances or mixtures may be required on the Work. A Material Safety Data Sheet as described in Section 5194 of the California Code of Regulations shall be requested by the Contractor from the manufacturer of any hazardous products used. All hazardous wastes shall be removed from LAWA property within 90 days by a registered hauler to a licensed treatment, storage, or disposal facility.

B. Except as otherwise permitted, the Contractor agrees to accept sole responsibility for full compliance with any and all applicable present and future rules, regulations, restrictions, ordinances, statutes, laws and/or other orders of any governmental entity regarding the use, storage, handling, distribution, processing and/or disposal of hazardous wastes, extremely hazardous wastes, hazardous substances, hazardous materials, hazardous chemicals, toxic chemicals, toxic substances, pollutants, contaminants, or other similarly regulated substances (hereinafter referred to as "hazardous substances") regardless of whether the obligation for such compliance or responsibility is placed on the owner of the land, on the owner of any improvements on the premises, on the user of the land, or on the user of the improvements. Said hazardous substances shall include, but shall not be limited to gasoline, aviation, diesel and jet fuels, lubricating oils and solvents.

C. With the exception of the City’s sole negligence, the Contractor agrees that any damages, penalties or fines levied on the City and/or the Contractor as a result of noncompliance with any of the above shall be the sole responsibility of the Contractor and, further, that the Contractor shall indemnify and pay and/or reimburse City for any damages, penalties or fines that City incurs, or pays, as a result of noncompliance with the above requirements.

D. In the case of any hazardous substance spill, leak, discharge or improper storage on the premises, or contamination of same, by any person, the Contractor agrees to make, or cause to be made, any necessary repairs or corrective actions, as well as to clean up and remove any leakage, contamination or contaminated ground. In the case of any hazardous substance spill, leak, discharge or contamination by the Contractor, or by any of its employees, agents, servants, or subcontractors which affects other property of the City, or property(ies) of the City's tenant(s), the Contractor agrees to make, or cause to be made, any necessary repairs, or take corrective actions, to clean-up and remove any such spill, leakage or contamination.

E. If the Contractor fails to repair, clean-up, properly dispose of, or take any other corrective action(s) as required, the City may (but shall not be required to) take all steps it deems reasonably necessary to properly repair, clean-up or otherwise correct the condition(s) resulting from the spill, leak or contamination. Any such repair, clean-up or corrective action(s) taken by the City shall be at Contractor's sole cost and expense, as well as shall any and all costs (including any administrative costs) which City incurs, or pays, as a result of any repair, clean-up or corrective action it takes.

F. Contractor shall promptly supply City with copies of all notices, reports, correspondence and submissions made by the Contractor to any governmental entity regarding any hazardous substance spill, leak, discharge or clean-up, including all tests results.

G. This section and the obligations herein shall survive the expiration or earlier termination of any other contractual relationship.

01 70 00 EXECUTION AND CLOSEOUT REQUIREMENTS

01 71 33 PROTECTION OF ADJACENT CONSTRUCTION

01 71 33.10 PROTECTION OF ADJACENT CONSTRUCTION – UTILITIES (ADDED)

Utility Protection:

A. All utilities encountered during the execution of the Work shall be maintained continuously in service, unless other arrangements satisfactory to the utility, LAWA, and the Engineer are made. Utilities shall include, but not be limited to, all above or below ground conduit, pipes, wet wells, ducts, cables, and appurtenances associated with oil, gas, water, steam, irrigation, sewer, storm drain, wastewater, air, electrical, power, instrumentation, communication, telephone, TV, and lighting systems, whether or not owned by the City. All valves, switches, vaults, and meters shall be maintained readily accessible for emergency shutoff.

B. Fire and police call boxes and conduits shall be protected by the Contractor. Should said facilities be damaged by the Contractor's operations, immediate notification shall be given to LAWA.

C. When placing concrete around or contiguous to any non-metallic utility installation, the Contractor will be required to do one of the following:

1. Furnish and install a 50mm (2-inch) cushion of expansion joint material or other similar resilient material; or

2. Provide a sleeve or other opening which will result in a 50mm (2-inch) minimum-clear annular space between the concrete and the utility; or

3. Provide other acceptable means to prevent embedment in or bonding to the concrete.

D. Where concrete is used for backfill or for structures which would result in embedment, or partial embedment, of a metallic utility installation; or where the coating, bedding or other cathodic protection system is exposed or damaged by the Contractor's operations, the Contractor shall notify the Airport Contact and arrange to secure the advice of the affected utility LAWA regarding the procedures required to maintain or restore the integrity of the system.

E. Upon completion of the Work, the Contractor will remove all enclosures or protective coverings and leave the work area in a finished condition.

01 74 00 CLEANING AND WASTE MANAGEMENT

01 74 23 FINAL CLEANING

Final Cleaning

A. General cleaning is required during construction.

B. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions. Do not use cleaning agents that are potentially hazardous to health or property or which might damage finish surfaces. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with California Code of Regulations maximum allowable VOC levels.

C. In addition to the requirements of the contract documents, complete the following cleaning operations before requesting LAWA Final Inspection.

1. Remove labels that are not permanent labels.
2. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
3. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
4. Vacuum carpeted and soft surfaces, removing debris and excess nap. Shampoo if visible soil or stains exist.
5. Clean equipment and plumbing fixtures to a sanitary condition.
6. Clean exposed surfaces of grilles, registers, and diffusers.
7. Replace filters of operating mechanical equipment.
8. Clean ducts, blowers, and coils if units were operated without filters during construction or display contamination with particulate matter upon inspection.
9. Clean light fixtures and replace burned out lamps and bulbs. Replace defective or noisy ballasts and starters in fluorescent fixtures.
10. Remove debris and surface dust from limited access spaces, including, but not limited to the following: roofs, attics, plenums, shafts, trenches, equipment vaults, maintenance holes, gutters, downspouts, and drainage systems.
11. Wipe surfaces of mechanical and electrical equipment, elevator, escalator, moving walk, baggage handling, and similar equipment. Remove excess lubrication, paint, mortar droppings, and other foreign substances.
12. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
13. Clean the site, including Contractor’s Operations and Storage Yard, of rubbish, litter and foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

14. Reinstall any cladding removed for the work.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on LAWA property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

F. Where extra materials of value, which have become LAWA's property, remain after completion of associated Work, arrange for the removal, relocation, and or disposal of these materials as directed by LAWA.

PEST CONTROL. When directed by LAWA, engage an experienced, licensed exterminator to make final inspection and rid Project of rodents, insects, and other pests. Submit pest-control final inspection report and warranty to LAWA.

01 76 00 PROTECTING INSTALLED CONSTRUCTION

Utility Protection:

A. All underground utility conduits shall have a minimum cover of eighteen (18) inches and shall have identifying detectable tape placed in the trench above the conduit. The detection tape shall be made of metalized foil laminated between two layers of inert plastic film, six (6) inches wide and a minimum of 4.5 mils thick, as described here:

1. Safety Red = Electric and lighting conduit and cables.
2. Safety Yellow = Gas, oil, steam, petroleum or gaseous materials.
3. Safety Orange = Telephone, alarm, or signal cables and conduit.
4. Safety Blue = Potable water or irrigation.
5. Safety Green = Sewer or drain lines.

B. The detection tape shall be placed directly above and reasonably horizontal for the full length of the conduit. For conduits with less than four (4) feet of cover, install tape four (4) to eighteen (18) inches below the subgrade surface and at least twelve (12) inches above the conduit. For conduits with more than four (4) feet of cover, install tape at least three (3) feet above the conduit.

C. Upon completion of the Work, the Contractor will remove all enclosures or protective coverings and leave the work area in a finished condition.

01 77 00 CLOSEOUT PROCEDURES

CLOSEOUT PROCEDURES

01 77 13 PRELIMINARY CLOSEOUT REVIEWS

List of Incomplete Items (Punchlist)

A. Thirty (30) days prior to the anticipated Project Completion, submit a list, in an electronic format approved by LAWA, either Microsoft Excel Spreadsheet with PDF or Microsoft Access Database with PDF. 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 limits of construction. Use CSI Form 14.1A or other form acceptable to LAWA.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor, unless otherwise acceptable to LAWA.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include following information at top of each page:
    a. Project name.
    b. Date.
    c. Name of Construction Manager and Designer/Architect.
    d. Name of Contractor.
    e. Page number.

01 77 16 FINAL CLOSEOUT REVIEW

Final Inspection

At the completion of Work, after completion of all corrections, the Inspector, Engineer, Designer, Architect, Construction & Maintenance, and Contractor may make a final inspection, as applicable. The Inspector will provide a Final Inspection Correction List itemizing all Work necessary to complete the Project satisfactorily.

Tenant/Contractor is to:

A. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

B. Submit certified copy of LAWA's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by LAWA. Certified copy of list shall state that each item has been completed or otherwise resolved for acceptance.

C. Submit documentation of performance of Closeout Submittals as outlined in Section 01 78 00.

D. In addition to submittals required in Section 01 78 00, submit final project photographs, damage or settlement surveys, property surveys, and similar final record information.

Additionally, for those portions to be maintained by LAWA, Tenant/Contractor is to:

A. Advise LAWA of pending insurance changeover requirements.

B. Obtain and submit releases permitting LAWA unrestricted use of Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

C. Advise LAWA of changeover in heat and other utilities.

D. Submit changeover information related to LAWA's occupancy, use, operation, and maintenance.

E. Submit final meter readings for utilities, measured record of stored fuel, and similar data as of date of Substantial Completion or when LAWA took possession of and assumed responsibility for corresponding elements of Work.

F. Make ready for landscape maintenance period (if applicable).

G. Submit any specific testing data, warranties, maintenance agreements, final certifications and similar documents not addressed in Section 01 78 00.

01 78 00 CLOSEOUT SUBMITTALS

CLOSEOUT SUBMITTALS

Project Record Documents

A. General: Comply with the requirements of the Contract Documents regarding submittal requirements.

B. Summary: This subsection includes administrative and procedural requirements for Project Record Documents, including, but not limited to, the following:

1. Record Drawings
2. Record Models
3. Record Specifications
4. Record Product Data
5. Record Samples
6. Spare Parts and Tools
7. Technical Manuals
8. Permits
9. Certificate of Occupancy, where applicable
10. Equipment Summary Data Forms, Equipment Summary Maintenance Forms or Maximo® E-forms
11. Miscellaneous Record Submittals

C. Store Project Record Documents and samples in the field office, in a secure, fire-resistive location, apart from the documents used for construction. Maintain Project Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for LAWA reference during normal working hours.

Record Drawings

A. Initial Submittal: Thirty days prior to Substantial Completion, submit one paper copy set and PDF electronic files of marked-up (in contrasting color) record prints and one set of plots from corrected record digital files. LAWA will indicate whether general scope of changes, additional information, and quality of drafting are acceptable.

Additional information is to include, but not be limited to, the following:

1. Note requests for information, change orders, alternate numbers, and similar information, where applicable.

2. Measured horizontal and vertical locations of underground substructures, utilities and appurtenances, referenced to permanent surface improvements.

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

4. When substructures are encased in concrete, the outside dimensions of the encasement shall also be given.

5. Field changes of dimension and detail.

6. Details not on original Contract Drawings.

7. Revisions to electrical circuitry and locations of electrical devices and equipment.

8. Where the plans are diagrammatic or lacking precise details, the Contractor shall produce dimensioned full-sized sheets.

9. In the case of those Drawings which depict the detail requirements for equipment to be assembled and wired in the factory, the Record Drawings shall be updated by indicating those portions which are superseded by final Shop Drawings.

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

1. Format to be same digital data software program, version, and operating system as the original Contract Drawings.

2. LAWA will furnish one digital data set of the original Contract Drawings for use in recording information.

3. Annotated, indexed PDF electronic files with comment function enabled.

C. Final Submittal: Upon approval of Initial Submittal, but not less than fifteen days after substantial completion, submit one paper copy set and PDF electronic files of marked-up (in contrasting color) record prints, one set of record digital data files, and three sets of record digital data file plots. Plot each drawing file, whether or not changes and/or additional information were recorded.

D. Identify and date each record drawing; including the designation “PROJECT RECORD DRAWING” in a prominent location.

E. Organize record prints and newly prepared record drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

F. All electronic files shall include metadata describing the content in a format compatible with LAWA’s document management system.

G. Record models shall be submitted to LAWA in a pre-approved format.

H. Building Information Models (BIM) files shall be cleaned and purged prior to submission to LAWA.

Record Specifications

A. Mark Specifications in contrasting color to indicate the actual product installation, where installation varies from that indicated in Specifications.

B. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

C. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

D. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.

E. Submit one paper copy and a set of annotated, indexed PDF electronic files of Project Specifications, including addenda and contract modifications.

Record Product Data

A. LAWA will use consistent and uniform processes for managing the transition of facilities, systems, and components (F/S/C) from construction or acquisition to operations and maintenance. Maximo® E-forms will be used to validate and/or collect data regarding F/S/C constructed or acquired through LAWA and tenant projects. The Maximo® E-form serves as a template for creating new F/S/C records and it typically includes drop-down menus or LAWA predefined information. Submission of forms will be coordinated with LAWA Planning & Development Group and Facilities Management during the Close-Out phase.

B. Equipment Summary Data Forms shall be submitted to provide LAWA Facilities Maintenance and Utilities Group with sufficient information to catalogue newly purchased equipment items installed. This information is used for inventory purposes as well as for equipment performance tracking purposes. Each item of equipment installed must be documented on one of two forms provided by LAWA; either Equipment Summary Data Form or Maximo® E-forms.

   Additional requirements regarding submittal format, quantities, etc, are found elsewhere in the Contract Documents.

C. Equipment Summary Maintenance Forms shall be submitted to provide LAWA Facilities Maintenance and Utilities Group with information sufficient to properly diagnose, troubleshoot, repair, check-out, and return an item of equipment to service. In addition, Maintenance information required to troubleshoot, repair, and return electrical/electronic equipment to service (including set point, derivatives, etc.) shall be included as required. Information must be documented on one of two forms provided by LAWA; either Equipment Summary Maintenance Form or Maximo® E-forms. Additional requirements regarding submittal format, quantities, etc. are found elsewhere in the Contract Documents.

D. LAWA will provide Contractor with list of typical equipment Job Plans and Preventative Maintenance activities included in its existing Facilities Management System. Contractor shall select applicable plans. If none exist, Contractor shall work with LAWA Planning & Development Group and Facilities Management to create them.

E. When using Equipment Summary forms in lieu of Maximo® E-form, submit one paper copy and a set of annotated, indexed PDF electronic files of each Form and/or submittal.

Record Samples

Not more than 30 days prior to the date of Substantial Completion, the Contractor will meet at the Jobsite with LAWA to determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to LAWA for record purposes. Comply with delivery to a storage area designated by LAWA.

Spare Parts and Tools

A. Submit a Recommended Spare Parts List to LAWA sixty (60) days prior to date certified for substantial Completion. This is to be a list from the manufacturer of the Recommended Spare Parts adequate to ensure two (2) continuous years of normal operation after expiration of the equipment warranty.

B. The Recommended Spare Parts List shall include, but not be limited to, items requiring replacement under the following conditions:

   1. Wear, corrosion, or erosion during normal operation.

2. Failure which causes a shutdown of equipment or systems.
3. Damage or breakage during routine maintenance or inspections of equipment.
4. Custom or specially fabricated parts, and

C. Long lead items.

D. Approval of the individual equipment submittal does not constitute authorization to procure the Recommended Spare Parts.

E. The Spare Parts supplier must be the manufacturer or a factory authorized representative of the manufacturer. The manufacturer will be responsible for any default of the representative that is not corrected by the representative in a timely and efficient manner. This responsibility includes replacing incorrect or defective parts, trouble shooting, and correcting problems that are traceable to the manufacturer's parts. The supplier shall provide, along with the Spare Parts List, a formal letter of certification from the manufacturer that the supplier is an authorized representative of the manufacturer.

F. The supplier shall be a stocking facility of the manufacturer of the proposed parts, or the manufacturer must maintain a stocking facility of these parts on the West Coast, or the supplier can guarantee delivery of spare parts within seventy-two (72) hours.

G. The Spare Parts list shall be in addition to any other lists required under any other sections of these Specifications. This list shall include but is not limited to the following:

1. Current prices including delivery to the Jobsite.
2. Original Equipment Manufacturer (OEM) part numbers, which identify interchangeability.
3. Make and type of equipment as well as Model number.
4. Size.
5. Supplier's address and telephone number.
6. Address and phone number of local representative.
7. Address and phone number of servicing location.
8. Letter of certification from the manufacturer.
9. Materials.
10. Special tools, lubricants, and/or fuels.
11. Estimated delivery lead times.
12. Warranty: State terms of warranty of spare parts offered.
13. Cross-sectional, exploded view or assembly-type drawing with part numbers.
14. Manufacturer’s price list catalog.

H. Upon approval of the Spare Parts list, and no less than thirty (30) days prior to Substantial Completion, deliver tools, spare parts, extra materials, and similar items to location designated by LAWA.

I. The Contractor shall be responsible for proper storage and protection of the Spare Parts until delivered to LAWA.

J. Spare Parts should be supplied in the manufacturer's original packaging and shall be new and unused. A statement shall be included to clearly indicate that the Spare Parts are new and unused.

Technical Manuals

A. This section includes administrative and procedural requirements for preparing technical manuals, including the following:

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

B. Definitions:

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

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

C. Submit technical manuals as required in individual Technical Specification Sections and in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to LAWA.
   i. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked directory.
   ii. Enable inserted reviewer comments on draft submittals.
   iii. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. Four paper copies. Include a complete directory. Enclose title pages and directories in clear plastic sleeves. Bind in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch paper with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversized sheets.
   i. 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.
   ii. Identify each binder on front and spine with title, project title, subject matter of contents, and indicate specification section number on bottom of spine. Indicate volume number for multiple volume sets.
   iii. Dividers are to be heavy paper with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components included in the section on each divider, cross-referenced to specification section number and title of project manual.
   iv. Provide protective sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
   v. 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.

D. Timeliness of draft technical manual submittals is detailed in the other subsections. Before final payment, the Contractor shall prepare and deliver to LAWA, four (4) each printed and two (2) each electronic copies on compact discs (CDs) of the final technical manuals. The content of the manuals is detailed in the subsections below.

E. The manuals shall be approved and stamped by the respective Subcontractors.

F. Submit draft copy of each manual at least 30 days before commencing demonstration and training. LAWA will comment on whether general scope and content of manual are acceptable. Correct or modify each manual to comply with LAWA comments.

G. Include a section in the directory for each of the following:

1. List of documents
2. List of systems – list alphabetically
3. List of equipment – list alphabetically
4. Table of Contents – include for emergency, operation, and maintenance manuals

H. Where manuals contain manufacturer's 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 tabular format, identify each item using appropriate references from the Contract Documents.

I. Prepare a separate manual that provides an organized reference to all technical manuals. This is called the Documentation Directory.

J. In the Documentation Directory and in each technical manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

K. Enable bookmarking of individual documents based upon 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 upon opening file.

Emergency Instructions

A. Content: Organize manual into separate section for each of the following:

1. Type of emergency
2. Emergency instructions
3. Emergency procedures

B. Type of emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire
2. Flood
3. Gas leak
4. Water leak

5. Power failure
6. Water outage
7. System, subsystem, or equipment failure
8. Chemical release or spill

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of operating personnel for notification of installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping
2. Shutdown instructions for each type of emergency
3. Operating instructions for conditions outside normal operating limits
4. Required sequences for electric or electronic systems
5. Special operating instructions and procedures during emergency

Operational Instructions

A. Content: In addition to requirements of 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 is designated 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. Manufacturer's recommended tolerances and clearances
10. Complete internal and connection wiring diagrams. Circuit diagrams and schematics shall be down to component level
11. Complete programming procedures and ladder logic documentation for all computer controlled, programmable logic controllers and automated equipment
12. Approved isometric drawings of piping systems
13. 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. Instructions on stopping
5. Normal shutdown instructions
6. Seasonal and weekend operating instructions
7. Instructions regarding load changes
8. Recommended "turn-around" cycles
9. Required sequences for electric or electronic systems
10. All special operating instructions and procedures
11. Inspection procedures

D. Systems and Subsystems: Include exploded views and schematics of each assembly.

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

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

Maintenance Instructions

A. Product Maintenance Manuals: Include each product, material, and finish

1. Include the following as applicable:
    i. Product name and model number
    ii. Manufacturer's name
    iii. Color, pattern, and texture
    iv. Material and chemical composition
    v. Reordering information for specially manufactured products.
2. Include manufacturer's written recommendations and the following:
    i. Inspection procedures
    ii. Types of cleaning agents to be used and methods of cleaning

iii. List of cleaning agents and methods of cleaning detrimental to product

iv. Schedule for routine cleaning and maintenance

v. Repair instructions – include local sources of materials and related services

B. Systems and Equipment Maintenance Manuals: For each system, subsystem, and piece of equipment not part of a system.

1. Include manufacturer's maintenance documentation including the following for each component part or piece of equipment:

i. Standard maintenance instructions and bulletins

ii. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly

iii. Identification and nomenclature of parts and components

iv. Include service, calibration, and lubrication requirements and standard time allotments

v. Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies

vi. Include manufacturer forms for recording maintenance

vii. List the following information and any items that detail essential maintenance procedures:

(a) Test and inspection instructions

(b) Trouble-shooting guide

(c) Precautions against improper maintenance

(d) Disassembly; component removal, repair, and replacement; and reassembly instructions

(e) Aligning, adjusting, and checking instructions

C. The maintenance manual letters are to be on the front cover of the Maintenance Manuals.

Warranty Submittals

A. Submit written warranties to LAWA thirty (30) days prior to date certified for substantial Completion. If Certificate of Substantial Completion designates commencement date for warranties other than date of Substantial Completion for Work, or designated portion of Work, submit written warranties upon request of LAWA.

B. When a designated portion of Work is completed and occupied or used by City, by separate agreement with Contractor during construction period, submit properly executed warranties to LAWA within fifteen (15) days of completion of that designated portion of work.

C. When Contract Documents require Contractor, or Contractor and subcontractor, supplier or manufacturer to execute special warranty, prepare written document that contains appropriate terms and identification, ready for execution by required parties. Submit draft to LAWA, for approval prior to final execution.

D. Refer to other sections for specific content requirements and particular requirements for submitting special warranties.

E. Form of Submittal: At Final Completion compile two (2) copies of each required warranty properly executed by Contractor, or by Contractor, sub-Contractor, supplier, or manufacturer. Organize warranty documents into orderly sequence based on table of contents of Project Manual.

F. Bind warranties in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product, and name, address, and telephone number of Installer.

2. Identify each binder on front and spine with typed or printed title “WARRANTIES,” project title or name, and name of Contractor.

3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

4. 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 a table of contents at the beginning of the document.

G. Provide duplicate notarized copies of warranties in operation and maintenance manuals.

H. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

I. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on the work that incorporates the products.

J. When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

K. When work covered by warranty has failed and has been corrected, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.

L. Upon determination that Work covered by warranty has failed, replace or repair Work to an acceptable condition complying with requirements of the Contract Documents.

Keying Schedule

For those areas to be operated and maintained by LAWA, within 30 days of Substantial Completion, provide key schedule for review. Make final changeover of permanent locks and deliver keys to LAWA. Advise LAWA’s personnel of changeover in security provisions.”

01 78 39 Project Record Documents

Production and maintenance of project documentation shall comply with LAWA CADD Standards.

01 80 00 PERFORMANCE REQUIREMENTS

01 81 00 FACILITY PERFORMANCE REQUIREMENTS

01 81 13 SUSTAINABLE DESIGN REQUIREMENTS

LAWA Sustainable Requirements See "Planning" section of the Design and Construction Handbook for the Sustainability, CALGreen, and LEED requirements).

01 90 00 LIFE CYCLE ACTIVITIES

END OF SECTION