Notice is hereby given to all prospective bidders that plans and specifications on the subject project are modified as hereinafter set forth. This Addendum shall be attached to and form a part of the plans and specifications. All bidders must acknowledge receipt of this addendum on the Bid Form. In case of difference with previous addenda or communications, this addendum takes precedence.

It is the responsibility of all bidders to notify all subcontractors from whom they request bids and from whom they accept bids of all changes contained in this addendum.

**PART A – RESPONSES TO BIDDER QUESTIONS**

**Item A1. Product Substitution:**

Product substitution will not be reviewed during bid. It can be reviewed after contract has been awarded.

**Item A2. Question:**

New Shade Structure is not included on the specifications, can you please add it?

**Response:**

Specifications for the New Shade Structure are included in the Shade Structure drawings.

**Item A3. Question:**

Can you please advise the location of the bird control systems on the roof plans?

**Response:**

Bird control systems shall be installed on all existing and new roof copings, and on the edges of the 2’-0” metal plate of Main Entrance Gate.

**Item A4. Question:**

Please clarify the use of 4 X 12 and 6 X 12 wood blocking details.

**Response:**

The use of various blocking sizes and materials shown on drawing details are applicable to different site conditions. Please bid per drawings.

**PART B – DRAWINGS**

**Item B1. G0.08 – Project Phasing Plan:**

Revised plan adding laydown and construction locations, and Phasing schedule.

**Item B2. A4.11 - Key Note:**

B.44 – Remove existing light weight concrete floor, epoxy flooring, scrape grout to smooth surface. Prepare for new construction.
PART C – PROJECT MANUAL

Volume 1 of 4

Item C1. 00 73 00 – Special Conditions
1. Revised 1.2 Contract Time/Milestone Schedule and Description of Phases.
2. Revised Phasing Plan

Item C2. 01 91 13 – General Commissioning Requirement
1. Added new section. Add this section to Table of Contents Matrix.

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Item C3. 26 05 00 – Electrical General Requirement:
1. Delete 3.5A

Item C4. 26 51 00 – Lighting:
1. Add 2.3E:
   E. Provide 10% spare drivers of each size and type.

Item C5. 27 05 00 – Voice and Data Communications:
1. Revise 2.12A as follows:
   A. The District provides the following WAP devices. Contractor shall provide all rough-in, outlets (jacks) and cables. Devices by the District.
2. Revise 2.13A as follows:
   A. The following is a list of hardware required by the District to be provided:
      1. See rack elevations, Reference Drawings E4.16 and E4.17.
      2. Patch cables as required

Item C6. 28 23 00 – Digital Video Surveillance System:
1. Replace existing spec section with this revised Digital Video Surveillance System section. This section will supersede the section dated August 2018.

ATTACHMENTS

Project Manual: 00 73 00 – Special Conditions
01 91 13 – General Commissioning Requirements
28 23 00 – Digital Video Surveillance System

Drawings: G0.08 – Project Phasing Plan

END OF ADDENDUM ITEMS
.1 Application of Special Conditions. These Special Conditions are a part of the Contract Documents for the Work generally described as: **Charles Drew Elementary School Modernization Project**

1.2 Contract Time/Milestone Schedule and Description of Phases

All Phase times indicated are from start of Contractor’s access to work area to Beneficial Occupancy for each Phase. All punch list work shall be completed within 30 days of Beneficial Occupancy for each phase.

**Contract Time and Milestone Schedule:**

- **Notice To Proceed (NTP):** April 10, 2019
- **Phase 1: Mobilization and Submittals** – April 10, 2019 – June 4, 2019
- **Phase 2A: Preparations for Delivery of Interim Housing** – May 20, 2019 – June 21, 2019
- **Phase 2B: Installation of Interim Housing Units** – June 24, 2019 – July 26, 2019
- **Phase 2C: MDF and Boiler Room Upgrades** – June 5, 2019 – August 2, 2019
- **Phase 3: Modernization of North Pod** – June 5, 2019 – December 20, 2019
- **Phase 4: Modernization of South Pod** – December 23, 2019 – May 29, 2020
- **Phase 5: Modernization MPR/Kitchen/Library/Administration Building, Courtyard, Building Exterior and Site work** - June 1, 2020 – July 31, 2020

Final Completion: August 31, 2020. 509 calendar days from Notice to Proceed. Thirty (30 calendar days from the end of the last phase)

**Description of Phase 1** (April 10, 2019 – June 4, 2019)

The work includes, but is not limited to:

- Project submittals including any long lead items, mobilization and setup for trailers and lay down.
- Coordination with Mobile Modular for delivery of interim housing portables

**Description of Phase 2** (May 20, 2019 – August 2, 2019)

The work includes, but is not limited to:

- **Phase 2A (May 20, 2019 – June 21, 2019) Preparations for Interim Housing:**
  - Expansion to existing chain link gate, removal of tetherball poles, and basketball hoop posts to allow for delivery of interim housing units. Work must be complete prior to delivery of units.
  - Demo of existing trees along Pomona Ave (upper play yard) to prevent further storm drain obstructions. Also includes replacement of existing storm drain lines and asphalt at upper yard as shown on Civil Drawings.
  - Perform asphalt alterations as described on Civil Drawings to allow for placement of Interim Housing Units.
Temporary power shall be ran from existing MSB along roof of existing buildings with use of temporary pole to reach interim housing units as shown on E1.01 on Interim Housing drawings.

Any underground electrical which cannot be performed after delivery of Interim Housing units.

Installation of plumbing utilities including domestic water, sewer and vent piping at upper yard to allow for interim housing installation. Stub outs may be required prior to delivery of interim housing and all asphalt patching must be completed at utility trenches to allow for delivery.

- Phase 2B (June 24, 2019 – July 26, 2019) Installation of Interim Housing:
  - Installation of electrical utilities including new pull box for low voltage, phone, data, fire alarm and security as shown on Interim Housing Electrical Drawing E1.01.
  - Complete connections for electrical and plumbing services at Interim Housing Units
  - Preparation of existing yard to receive interim housing units including asphalt build up for leveling units.
  - Installation of new chain link fencing and gate(s) around new Interim Housing for EED program and asphalt transitions for ramps shall be completed after delivery and prior to August.

- Phase 2C (June 5, 2019 – August 2, 2019) MDF and Boiler Room Upgrades
  - Any related Hazardous Material work associated with upgrades at Boiler Room, MDF Room and Storage 136.
  - Contractor responsible for maintaining existing heat at occupied areas.
  - Contractor responsible for making all electrical connections necessary to maintain power and systems for occupied portions of the campus. Refer to E4.00 for single line diagram.
  - Electrical work at Boiler Room to facilitate new construction including but not limited to:
    - Installation of new distribution panels (Panel DP and Panel MSL) and reconnect existing power as needed to maintain electrical services at occupied areas
    - Installation of transformers TC1 and T1 including secondary breakers and reconnect existing panels as needed to maintain power in occupied areas.
  - All work associated with MDF Room 112 at South Pod. Work will include but not limited to:
    - Demolition of (E) wall, installation of new racks, equipment, electrical power panels, new security panel, new FACP and new PA/Clock panel.
    - Contractor shall reconnect and maintain all electrical systems and devices in occupied areas including South Pod, Administration Building and IDF 210/219.
    - Any interior conduit from MDF to North Pod is to be temporary as existing ceiling in Admin Building shall be removed in Phase 5.
o Remove and replace drywall at Storage 136 to allow for installation of new HVAC controller, TCP-A and future electrical panels.

Description of Phase 3: (June 5, 2019 – December 20, 2019)
The work includes, but is not limited to:

- Modernization of North Pod as identified in contract documents. Work includes hazardous material abatement, demolition, framing, new windows (if Alternate #2 is selected), doors, hardware, installation of new finishes including gypsum wall board, ceramic tile, paint, marker/tack boards, ceilings, floors, and mechanical/HVAC, plumbing and electrical upgrades.
  - Maintain existing heat at South Pod (occupied)
- Install isolation valve at North Pod as necessary to facilitate new construction.
- New roof system at North Pod including flashing, drains, scuppers and downspouts.
  - Work on roof of North Pod includes replacement of HVAC units and all related systems as shown on contract documents.
- Installation of new fire sprinkler system.
  - Existing system shall be maintained in non-construction areas.
  - Upon completion of phase, sprinkler system shall be tied back into existing system.

Description of Phase 4: (December 23, 2019 – May 29, 2020)
The work includes, but is not limited to:

- Modernization of South Pod as identified in contract documents. Work includes hazardous material abatement, demolition, framing, new windows (if Alternate #2 is selected), doors, hardware, installation of new finishes including gypsum wall board, ceramic tile, paint, marker/tack boards, ceilings, floors, and mechanical/HVAC, plumbing and electrical upgrades.
  - Maintain existing heat at Administration Building (occupied)
- Install isolation valve at South Pod as necessary to facilitate new construction.
- New roof system at South Pod including flashing, drains, scuppers and downspouts.
  - Work on roof of South Pod includes replacement of HVAC units and all related systems.
- Installation of new fire sprinkler system.
  - Existing system shall be maintained in non-construction areas.
  - Upon completion of phase, sprinkler system shall be tied back into existing system.

Description of Phase 5: (June 1, 2020 – July 31, 2020)
The work includes, but is not limited to:

- Modernization of MPR/Kitchen/Library/Administration Building as identified in contract documents. Work areas also include but are not limited to: Courtyard, exterior building, trash enclosure and new entry.
  - Work includes hazardous material abatement, demolition, framing, doors, hardware, storefront, finishes, ceilings, floors, and mechanical/HVAC,
plumbing and electrical upgrades.
  o Installation of all Kitchen Equipment and associated utilities.
  o Install new fire sprinkler system and connect back to completed system at North and South Pods.
  o Modernization at the courtyard includes new pavers, operable window system to allow for indoor/outdoor seating, drainage, downspouts and scuppers.
  o All related site work at upper and lower play yards including striping, play structure installation, trash enclosure, new entry gate, new fencing, planter and storm drain work.
  o Exterior Painting
    - New roof system at MPR including flashing, drains, scuppers and downspouts.
    - MPR Roof HVAC units and all related systems.
    - Removal of existing heating system including boilers and associated equipment
  - Removal of Interim Housing and associated scope prior to off-haul by Mobil Modular, including:
    o All contractor installed items from Phase 2: signage, accessories, FA, Security, and data
    o Removal of asphalt build up installed in Phase 2 per C4.0 on Interim Housing drawings
    o Removal of utilities poles, utility stub outs, chain link fence enclosure and gates installed during Phase 2 Interim Housing drawings
    o Removal of panel DPIH, transformer and grounding rods per E2.10 Interim Housing drawings
      - If Alternate 1 selected, work shall be completed at this time.

1.3 Description of General Phasing Requirements:

A. These descriptions of the phases are general in nature and in no way offer the complete and concise description of all the work required by the Contract Documents.
B. The start dates represented in the milestone schedule are preliminary and the District reserves the right to modify these dates based on when the Notice to Proceed is issued.
C. The Contractor is responsible for providing the manpower and scheduling the shifts necessary to complete the work in accordance with the Contract Time and Milestone Schedule.
D. The School will remain open during the academic year. The Work of this project must take into account that the site will be occupied by students and staff and will be phased as generally described above and in other contract documents.
E. Non-School hours are defined as hours before <7:00 AM, and after 3:30 PM> on days when school is in session.
F. Hazmat work prohibited between 7:00 AM and 6:00 PM. Haz-Mat Abatement cannot be performed while students or school staff is on site.
G. Follow City of San Francisco Noise Ordinance.
H. Work that is hazardous, noisy, or that causes vibration may not be performed in the buildings or on the site during school hours, without written approval from the District Representative. This includes but is not limited to the following work activities:
PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents:

1. Drawings and general provisions of the Contract Documents apply to this Section.

2. Review these documents for coordination with additional requirements and information that apply to work under this Section.

B. It is of primary concern to the District that all systems and assemblies in the project perform in accordance with the design intent and the District's operational needs. The process of assuring that such performance is achieved is referred to as "commissioning."

C. Commissioning requires cooperation and direct involvement by all parties throughout construction and warranty phases. Successful commissioning requires that the installation of all building systems and assemblies not only comply with requirements but also that it is achieved early enough during construction to provide full operational check-out, testing and adjustments prior to beneficial occupancy. In addition to fulfilling scheduling and planning requirements the Contractor is responsible for documenting the equipment and system installation and operational verification for all systems and assemblies.

D. Commissioning Process Overview: The Contractor shall implement all the requirements found in the Commissioning Plan provided by the Commissioning Agent. The following overview is used to provide guidance to the Contractor as to the requirements of the Commissioning process.

1. The Commissioning Process during construction begins immediately upon contract award.

2. Within 60 days of Notice to Proceed the Contractor shall designate a Commissioning Coordinator in accordance with the OM equipment manual /system design that they install as part of the project. The District must approve the Commissioning Coordinator via review of resume and references review. The approved Coordinator shall execute and document the construction checklists and perform start-up and initial checkout. At any point during the project if the District finds the Commissioning Coordinators work not in compliance with this specification the Contractor shall replace them at their own expense.

3. At no time shall the Commissioning Agency be responsible for the direct start-up activities of the systems to be commissioned. As indicated in the Commissioning Plan the Contractor shall execute start-up checklists and schedule the Commissioning Agent to witness selected start-up as indicated in the Commissioning Plan. The District shall be invited to all start-up activities and witness all work.

4. Multiple Meetings will be required throughout the project's construction to appropriately plan, scope, coordinate, schedule future activities and resolve problems. The District will coordinate and schedule all necessary meetings to ensure
successful commissioning is completed. See meetings section 3.1 for further meeting details.

5. Equipment and assembly documentation is submitted to the District and Commissioning Agent during normal submittals. Documentation shall include detailed start-up procedures and early copies of Operation and Maintenance (O&M) data, upon receipt of equipment to be installed on the project.

6. The Contractor develops start-up plans for commissioned equipment with review by the Commissioning Agent and the District. The Commissioning Agent reviews the Contractor developed construction checklists during the start-up process. The Contractor shall ensure that the District reviews all start-up plans and documentation in conjunction with the Commissioning Agent.

7. The Commissioning Agent documents that the checklists and start-ups were completed through spot witnessing and by reviewing the completed checklists and startup reports. The Contractor, or their designated Commissioning Coordinator will provide written/photo copy commissioning status updates to the Commissioning Agent and the District. All commissioning status documents shall be signed by the representative installing Trade Sub-Contractor (equipment start-up (OEM) and or Controls contractor (program point to point checklist) and submitted to the Commissioning Agent and District prior to functional performance testing.

8. The Contractor and/or their designated Commissioning Coordinator will report in the commissioning meetings per the schedule of all commissioning steps for all identified commissioned systems as part of the project. The Contractor and/or their designated Commissioning Coordinator will provide for in advance of the meetings direction to their Sub-Contractors for solutions and resolutions to late material deliveries, service vendor coordination, equipment replacement/repairs for non-compliance and/or failures, etc. to maintain schedule of commissioning and the overall construction schedule.

9. The Commissioning Agent shall review the Project Schedule and provide comment to the District on scheduling concerns that may impact the Commissioning Plan. The Contractor shall address and rectify all identified concerns per the District’s instruction to ensure successful commissioning.

10. The Commissioning Agent performs periodic construction observation. All items of concern will be issued as part of a site report and added to the commissioning issues log for tracking purposes. The Contractor shall comment on all issues identified and take the necessary steps to resolve each issue per the District’s instruction.

11. The test procedures are executed by the Contractor in accordance with and documented by the Commissioning Agent. The testing will be witnessed by the Commissioning Agent and District. The testing will be documented by the Commissioning Agent and results will be shared with the District. Please see below for additional discussion of the rigor the functional test procedures will encompass.

12. Items of non-compliance in material, installation or setup shall be corrected by the Contractor per the District’s instruction and the system shall be re-tested. The Commissioning Agent’s time and expense for the witnessing of a system re-test shall be the responsibility of the Contractor.
13. The Commissioning Agent reviews the O&M manuals for clarity, accessibility and completeness that are specific to the equipment installed as part of the project.

14. Commissioning shall be fully completed before Beneficial Occupancy including the performance period (2 weeks minimum); except for seasonal testing, near-warranty end activities and other activities approved by the Commissioning Agent and District.

15. The Commissioning Agent reviews training agendas, assists in the training coordination, and verifies complete training was provided by the Contractor. Please see Division 01, Section 017700 regarding Training.

16. Near warranty end reviews of the building operation will be conducted by the Commissioning Agent and the Contractor shall provide field technicians available as necessary to assist in review and troubleshooting. The Contractor will resolve/repair Warranty issues identified during this Warranty review.

E. The following equipment, systems, assemblies and features may be commissioned during the project utilizing the process described herein. All general references to equipment in this document refer only to equipment that is to be commissioned. The responsibility for developing and reviewing forms, overseeing, documenting and witnessing execution and reviewing reports of checks and tests is distributed among Contractors, the Design Team, and the District. These responsibilities will differ based on equipment types.

1. HVAC and mechanical system and all integral equipment controls. All HVAC systems shall be commissioned, including, but not limited to:
   a. Variable Refrigerant Flow/Heat Pump Systems
   b. Air Handling Unit Equipment
   c. Hydronic piping (including air separators and expansion tanks)
   d. Ductwork
   e. Thermal comfort, temperature and humidity control
   f. Variable speed drives
   g. Air terminal boxes
   h. Fan coil units
   i. Exhaust systems
   j. Facilities Monitoring and Control System
   k. TAB work
   l. Differential pressure relationships

2. Electrical Systems:
   a. Lighting Manual Switches
b. Lighting Dimmer Switches  
c. Scheduled lighting controls  
d. Lighting occupancy sensors  
e. Lighting Daylight Harvesting control  
f. Lighting (interior and exterior) Astronomical Time Clock  

3. Plumbing Systems:  
a. Domestic Hot Water Systems  

F. Related Sections  
1. The General and Supplementary Conditions, applicable requirements of all Divisions of the Contract Specifications and all Contract Drawings apply to the work of this Section. In the event of conflict between specific requirements of the various documents, the more restrictive or extensive requirement shall govern.  
2. Specific commissioning requirements and related issues are given in the following Sections of the Specifications.  
a. Division 01, Section 01 33 00, General Requirements: Submittal Procedures  
b. Division 01, Section 01 77 00, General Requirements: Cleaning and Closeout Procedures.  
c. Division 22, Section 22 08 00, Commissioning of Plumbing Systems; Supplements this section for items pertaining to Plumbing System commissioning  
d. Division 23, Section 23 08 00, Commissioning of HVAC Systems; Supplements this section for items pertaining to HVAC system commissioning  
e. Division 25, Section 25 50 00 Direct Digital Controls Systems; Supplements this section for items pertaining to HVAC and Plumbing system commissioning.  
f. Division 26, Section 26 08 00, Commissioning of Electrical Systems; Supplements this section for items pertaining to Electrical system commissioning.  

1.2 Definitions  
A. Active 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”).  
B. Design Team: The prime consultant (Architect) and sub-consultants who comprise the design team, generally the HVAC mechanical design engineer and the electrical designer/engineer.
C. Basis of Design: The basis and assumptions for calculations, decisions, schemes and product selections to meet the District’s Project requirements and objectives and to satisfy applicable regulatory requirements, standards and guidelines.

D. Certified Testing Company: An industry certified company utilizing industry certified technicians on this project who will perform inspections and testing for equipment and systems. This company is not affiliated or owned by the equipment manufacturer.

E. Commissioning: Commissioning is a systematic process of ensuring that all building systems and assemblies perform interactively according to the District’s objectives and requirements. This is achieved by beginning in the design phase and documenting the District’s Project requirements and continuing through construction, acceptance and the warranty period with actual verification of function and performance. The commissioning process encompasses and coordinates the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, testing and training. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractor to provide a finished and fully functioning product. Commissioning merely validates the performance of the product.

F. Commissioning Agent (CxA): An independent party, not associated with the Design Team, or Contractor. The Commissioning Agent provides assurance to the District of the Contractor’s responsibility for compliance with the commissioning requirements per the contract documents and ensures the Contractor and/or their designated Commissioning coordinator coordinates the day-to-day commissioning activities in concert with the Contractor’s schedule. The Commissioning Agent can provide recommendations as needed and or in accordance with the Project Manager in execution of the commissioning phase of the project.

G. Commissioning Coordinator: A person appointed by the Contractor and approved by the District tasked with leading, organizing and implementing the Commissioning Plan as provided by the Commissioning Agent. The commissioning meetings in acquiring information from the Contractor and/or their designated Commissioning Coordinator regarding commissioning issues resolution, scheduling report status updates, status/completed checklists, status/completed test procedures etc.

H. Commissioning Plan: The overall plan that provides the structure, schedule and coordination planning for the commissioning process. The commissioning plan includes details of the commissioning scope; systems to be commissioned; rigor of commissioning; team contact information; roles and responsibilities of all players; communication and reporting protocols; commissioning process overview as well as details of submittal activities; construction observation, construction checklist and start-up activities; the process for dealing with deficiencies; test procedure development and execution; O&M manual review and training issues; warranty period activities; description of summary report, description of progress and reporting logs and initial schedule including phasing, if applicable. The Commissioning Agent updates the plan as construction progresses.

I. Contract (also referred to as Agreement): The legally binding agreement between the District and the Contractor, wherein the Contractor agrees to furnish the labor, materials, equipment, plant and appurtenances required to perform the work described in the Contract Documents, and the District agrees to pay the Contractor for such work.

J. Facilities Monitoring and Control System (FMCS): The central building energy management control system or BMS, Building Management System.
K. Pre-Functional Checklist: A list of items to include in the installation, start-up and initial checkout of a piece of equipment or assembly. Pre-Functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels, labels affixed, gauges in place, sensors calibrated, etc.). Some 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). Pre-Functional checklists augment and are combined with the manufacturer’s start-up checklist.

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

M. Deferred Tests: Tests that are performed, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.

N. Documenting Tests: The recording of what actions were taken to perform each individual test procedure, along with the results or system response of the procedure, with any deficiencies noted.

O. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with the District present.

P. Issues Log: Ongoing record of the issues identified during the commissioning process that require or did require correction. For each entry the log includes a unique identification number, identification date, identification party, a short description of the issue, the equipment or assembly it is associated with, a long description of the issue, including cause, implications of the issue, recommendations for correction, assignment of responsibility for correction, an issue closed date and the name of the party verifying the correction. The Commissioning Agent is responsible to maintain the log.

Q. Manufacturer’s Service Representative (MSR): A company that is certified and trained by a manufacturer to provide startup, testing, and troubleshooting service for equipment.

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


T. Non-Compliance: See Defective Work.

U. Non-Conformance: See Defective Work.

V. 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 degrees F to 75 degrees F to verify economizer operation). See also “Simulated Signal.”

W. District/Owner Project Requirements: Documentation of the functional requirements of the facility and the expectations of how it will be used and operated. This includes Project and design goals, measurable performance criteria, budgets and schedules and supporting information. This document is analogous to what has traditionally been referred to as the District Program or District Objectives.
X. 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.

Y. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

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

AA. 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).

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

CC. Start-up: The initial starting or activating of dynamic equipment, including executing construction checklists.

DD. Subcontractor: A person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term “Subcontractor” is referred to throughout the Contract Documents as if singular in number and neuter in gender and means a Subcontractor or an authorized representative of the Subcontractor. The term “Subcontractor” does not include a separate Contractor or subcontractors of a separate Contractor.

EE. Systems Manual: A manual provided to the immediate and future operating staff the information needed to understand and optimally operate each system. The manual is in addition to the O&M Manuals submitted by the Contractor. The systems manual focuses on operating, rather than maintaining the equipment, particularly the interactions between equipment. Some components of the manual may reside in the Contractor submitted O&M Manuals.

FF. Test: Assessments that verify specific components, assemblies, systems, and interfaces among systems function and perform in accordance with the District’s objectives and the Contract Documents. Testing may include using manual (direct observation) or monitoring methods. Testing is the dynamic testing of specific and interacting equipment and systems in full operation. Tests are generally performed after construction checklists and start-up are complete. Some procedures in construction checklists test components, but reference to "testing" generally refers to those equipment and system tests conducted after Trade Sub-Contractor startup and initial checkout.

GG. Test Procedures (FTP): The written procedures and documentation forms of tests used to guide and record testing. For mechanical systems, FTPs are composed of repeatable, step-by-step procedures and include the test prerequisites, the test process, the expected outcomes and acceptance criteria. Forms or space for recording the results of tests may be included integrally in the written procedures or attached on separate sheets. For electrical component testing, the procedures may be less step-by-step-like than for dynamic mechanical equipment. For each piece of equipment, checks and test procedures and their documentation record forms may be different documents or combined in the same document, but checks and tests should be grouped. Responsibility for test procedure development is shared between the Commissioning Agent and the Trade Subcontractor.
HH. Test Requirements: Requirements specifying what modes and functions, etc., shall be tested. The test requirements are not the detailed test procedures.

II. Trending: Monitoring using the building management system.

JJ. Vendor: Supplier of equipment.

KK. Warranty Period: Refer to Division 0, Section 00 72 00 3.04, Warranty and Guarantee; Warranties, for a technical definition relative to equipment.

LL. Warranty Phase Testing: An onsite testing of identified equipment under warranty with the CxA at least two months prior to the end of the Warranty Period

1.3 RESPONSIBILITIES

A. Overview: The responsibilities of the Commissioning parties in the commissioning process are summarized in the following articles. Additional details will be incorporated into the Commissioning Plan.

B. This section focuses on Roles and Responsibilities of the Commissioning Team in the Construction/Warranty Phase of the Project. The Commissioning Process commenced in the Pre-Design Phase and will not be completed until Warranty Phase is completed. The Contractor may have additional responsibilities in other phases of Work.

C. Contractor (GC):

1. The Contractor is fully responsible to the District for all Trade Subcontractors and Contractor listed responsibilities in the specifications.

2. Refer to the individual Division 22, 23 and 26 Commissioning specifications for additional sub-contractor responsibilities.

3. Construction Phase:

   a. Coordinate with the CxA to facilitate the commissioning work.

   b. Provide or designate a Commissioning Coordinator to organize, schedule, coordinate and direct the execution of the project Commissioning Plan. The Commissioning Coordinator shall have experience in project management, scheduling and in the technical aspects of mechanical and electrical systems including commissioning of applicable equipment and systems. The Contractor will submit resume(s) with applicable experience and references of their potential/selected Commissioning Coordinator to the District for approval. The Commissioning Coordinator will be responsible for the commissioning process throughout the contracted project and shall retain the position of coordinator at the discretion of the Contractor and/or District.

   c. If the Contractor refuses to provide the required documentation for Commissioning Coordinator selection or if the designated Commissioning Coordinator does not demonstrate acceptable performance, the District shall provide a Commissioning Coordinator for project at the Contractor’s expense.
d. Attend all meetings necessary to complete commissioning during the project including: the commissioning planning, commissioning kick off meetings, and other necessary meetings scheduled by the Commissioning Agent.

e. Work with the Commissioning Agent and District to ensure that all required commissioning activities are being scheduled into overall Project Schedule. The Contractor and/or their designated Commissioning Coordinator will provide a detailed schedule within Project schedule that includes all systems, required tasks/activities inclusive of necessary permits, work tasks, safety compliance steps, etc. at the Commissioning Kick Off Meeting.

f. Include Trade Subcontractor's cost associated with commissioning in the total contract price.

g. The Contractor shall provide requested documentation, prior to normal O&M manual submittals, to the Commissioning Agent for development of functional and performance testing procedures. Typically, this will include detailed manufacturer installation start-up, operating, troubleshooting and maintenance procedures, full details of any District-contracted tests, fan and pump curves, full factory testing reports, if any, and full warranty information, including all responsibilities of the District to keep the warranty in force clearly identified. In addition, the installation, start-up, and checkout materials that are shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent and District for review.

h. The Contractor shall provide the CxA with the documentation necessary for the commissioning process, as requested. This will include prior to the functional testing, a complete list of all equipment and/or materials necessary in completing the construction phase and/or installation of all equipment and systems, noting what inventory is on site, installed, and what may need to be ordered, and received to complete construction. Any outstanding items that may need to be expedited will be done by the respective sub-contractor under the Contractor's responsibility and expense in order to stay within the construction schedule.

i. Assist in clarifying the operation and control of commissioned equipment or assemblies in areas where the Specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

j. Notify the CxA of when the installation will begin for static assemblies being commissioned and provide dates of associated testing. Testing shall include but not be limited to pipe and duct system testing, flushing, cleaning, start-up of each piece of equipment and starting of testing adjusting and balancing per the project requirements.

k. Notify the CxA when yet to be performed or yet to be scheduled commissioning activities may delay construction. Contractor shall also provide solutions to resolve the delay prior to and/or with the notification.

l. During the installation, start-up and initial checkout process document the execution of installation, start-up and initial checkout with parties having direct knowledge of each item being checked off and provide a copy to the Commissioning Agent.
m. Complete pre-functional checklists and provide to Commissioning Agent.

n. Maintain red-line documents for coordination drawings. Update after completion of functional testing. Submit to Commissioning Agent for review and inclusion into the Final Commissioning Report.

o. Record all issues that arise during the testing, adjusting and balancing work, such as damaged or missing duct or insulation, sensors, wiring, valves, dampers, controls, programming, equipment, components, etc. or missing items that will reduce the effectiveness of the installation and/or prevent accurate air and water balancing results or impact building control. During balancing, provide the Commissioning Agent this list of issues once a week within 3 day of the end of the reported week.

p. Provide TAB procedure details to Commissioning Agent should deficiencies be detected to aid in troubleshooting. Review test procedures developed by the Commissioning Agent to ensure feasibility, safety and equipment protection and provide necessary alarm limits to be used during the tests.

q. Execute testing of selected systems and assemblies under the direction of the Contractor and their Commissioning Coordinator and documented by the Commissioning Agent.

r. Assist and cooperate with the Commissioning Agent by putting all commissioned equipment and systems into operation and continuing the operation during each working day of testing, as required.

s. Prior to testing of equipment, resolve all outstanding Design Team “punch list” items that may affect equipment operation. Air and water testing adjusting and balancing shall be completed with discrepancies and problems resolved before testing of the respective air- or water-related systems.

t. Provide all tools or the use of tools to start, check-out and functionally test equipment and systems.

u. Provide skilled technicians that are qualified to perform testing under the direction of the Commissioning Agent for specified equipment and assemblies. In particular, the person tasked with operating the controls system during testing shall be familiar with the building and control program of the site. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete necessary tests, adjustments and problem-solving. For larger mechanical equipment, provide the services of the start-up technician for the beginning of the testing of the equipment.

v. Provide assistance to the Commissioning Agent in interpreting system performance problems from monitored and test data.

w. Respond in writing to each issue. Correct deficiencies (differences between the design and observed performance) as interpreted by the Commissioning Agent, District and Design Team Retest the equipment until the defective work has been corrected to the approval of the District.

x. Train District personnel using qualified personnel according to the Contract Documents.
y. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions, and submit a copy to the CxA for review.

z. Provide necessary documentation for the Systems Manual as described in this Section.

aa. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty during occupancy. Provide this information to the District and CxA.

4. Warranty Period:

a. Correct deficiencies and make necessary adjustments to O&M manuals and red-line documents for applicable issues identified in any seasonal or warranty period testing.

b. Provide qualified technicians to assist in Warranty Phase Testing, and resolve issues uncovered in that process.

5. Equipment Suppliers:

a. Provide requested submittal data, including detailed start-up and checkout procedures and specific responsibilities of the District to keep warranties in force for all commissioned equipment or assemblies.

b. Assist in equipment or assembly testing per agreements with Contractor.

c. Include all special tools and instruments, when only 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.

d. Review test procedures for equipment installed by factory representatives.

e. Provide expert qualified staff for equipment training.

f. Provide expert qualified staff for equipment troubleshooting should issues arise during functional testing.

D. District:

1. Construction Phase:

a. Furnish a copy of all Construction Documents, addenda, requests for information, change orders, approved submittals and Shop Drawings related to commissioned equipment to the CxA for their permanent retention.

b. Facilitate the coordination of the commissioning work by the CxA.

c. Ensure that commissioning activities are being scheduled into the master Project schedule.
d. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan.

e. Participate in issue resolution as necessary.

f. Provide final approval for the completion of the commissioning work.

2. Warranty Period:

   a. Ensure that any seasonal testing, deferred testing and warranty phase testing issues are addressed.

   b. Attend the Project site for warranty phase testing.

   c. Facilitate warranty review work with the Contractor.

E. Commissioning Agent:

1. The primary role of the Commissioning Agent is to develop and coordinate a process of approved equipment installation, checkout and functional field verification of identified systems in accordance with District’s objectives defined in the Construction Drawings and Contract Documents.

2. Construction Phase Commissioning Agent Tasks:

   a. Review the Project schedule to ensure that all commissioning activities are appropriately scheduled.

   b. Provide and revise, as necessary throughout construction, the Commissioning Plans as construction progresses, the Project Schedule changes, and project scope is modified.

   c. Plan and conduct commissioning meetings including the kick-off meeting and planning meetings as needed, take minute notes and distribute notes to the project team.

   d. Regularly communicate with all members of the commissioning team, keeping them up to date of the commissioning progress and scheduling changes through memos, progress, reports, etc.

   e. Request and review additional information required to perform commissioning tasks, including O&M materials, Contractor start-up and checkout procedures.

   f. Prior to equipment start-up, gather and review the current control sequences and interlocks and work with the contractor and engineers of record until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.

   g. Track the installation status of each piece of equipment identified in the Commissioning Plan in the equipment list matrix for: receipt of documentation, submittal reviewed, construction checklist development and execution progress, startup, test form development and execution, trend log completion,
O&M manual submission, training agenda development or receipt and training completion, red-line document submission and seasonal testing.

h. In parallel with the Design Team review submittals applicable to the Commissioned equipment for compliance with commissioning goals, including O&M manuals and coordination issues. Comments will be provided and reviewed by the District and forwarded to the Design Team for resolution.

i. Review RFI’s responses for impact on the commissioned equipment and the District’s objectives.

j. Controls Integration Meetings: Coordinate the approval process for the control system database and programming (point names, alarm limits, access levels, graphic details and layout, specific control strategies and sequences, etc.) via a series of meetings attended by the Contractor, District, and Mechanical Engineer of Record. The meetings shall occur after the software and database drawings are issued for initial review, but prior to the development of the database and code for any piece of equipment.

k. Review the Contractor’s developed start-up and initial systems checkout plans in conjunction with the Design Team for all commissioned equipment.

l. Perform site visits to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolution of any identified discrepancies.

m. Document pre-functional checklist completion by reviewing completed checklists and by selected site observation.

n. Document systems start-up by reviewing start-up reports and by selected site observation.

o. Write step-by-step test procedures and documentation formats for commissioned equipment and assemblies. Functional Test procedures will at minimum include active testing, and energy management control system trending. As needed stand-alone data-logger monitoring may be included and will be outlined in the Functional Test Procedures.

p. Witness HVAC piping pressure test and flushing, sufficient to be confident that proper procedures were followed. Include documentation of all testing in the Commissioning Final Report.

q. Witness any ductwork testing and cleaning sufficient to be confident that proper procedures were followed. Include documentation of all testing in the Commissioning Final Report.

r. Approve air and water systems balancing by selected site observation, by reviewing completed reports and by spot testing.

s. Work with the Contractor, District and Design Team to coordinate testing for all commissioned systems and assemblies. Witness and document active tests performed by the Contractors for all commissioned systems and assemblies.
Testing shall include operating the system and components through each of the written sequences of operation, and other significant modes and sequences, including start-up, shutdown, unoccupied mode, manual mode, staging, miscellaneous alarms and power failure, when impacted and interlocks with other systems or equipment. Sensors and actuators shall be calibrated during construction pre-functional checklists by the installing Sub-Contractor, and confirmed by the commissioning agent during testing. Analyze functional performance trend logs and monitoring data to verify performance. Coordinate retesting as necessary until satisfactory performance is achieved. Testing shall occur on all commissioned equipment except for:

i. Identified smaller equipment that may be tested and documented by the Contractor, at the Commissioning Agent's and District's discretion.

ii. Electrical equipment testing and regulated testing that may be directed and documented by the Trade Sub-Contractor with only spot witnessing and report review by the Commissioning Agent.

t. After active testing and initial troubleshooting is complete, monitor system operation and performance for selected data points for up to 2 weeks by requesting trend logs from the Contractor. Analyze monitored data to verify operation, performance and issue a written report with comments to the District and Contractor for resolution.

u. Maintain an electronic master Issues Log. Where possible; integrate commissioning issues log into the master project punch list record (to be coordinated at the construction kick off meeting).

v. Review equipment warranties to ensure that the District responsibilities are clearly defined.

w. Oversee and approve the training of the District’s operating personnel. Provide at least one offsite training session to the District’s personnel to communicate commissioning results and issues.

x. Review and approve the preparation of the O&M manuals for commissioned equipment.

y. Compile a Commissioning Final report.

z. Compile a Systems Manual according to the definition and description in this Section for all commissioned systems.

3. Warranty Period

a. Complete Warranty Phase Testing 2 months prior to Warranty end. Provide a list of deficiencies to the District for resolution by the Contractor. Update Final Report with amendment regarding Warranty period results and work.

b. Coordinate and supervise required seasonal testing, deferred testing and defective work corrections and provide the final testing and sequence of operation update documentation for the Commissioning Final Report and O&M manuals.

F. Design Team (i.e. Architect, Construction Management Team, Engineers of Record):
1. Construction Phase:
   a. Review the Commissioning Plan.
   b. Attend the commissioning planning and kick-off meetings and selected commissioning team meetings.
   c. The mechanical and electrical engineer attend the controls integration meetings.
   d. Perform normal submittal review, construction observation, O&M manual review.
   e. Review the coordination Drawings.
   f. Assist in clarifying the operation and control of commissioned equipment in areas where the Specifications, control Drawings or equipment documentation is not sufficient for writing detailed testing procedures.
   g. Witness selected testing as necessary per direction of the Commissioning Agent and District.
   h. Coordinate resolution of system deficiencies and warranty issues identified during commissioning.
   i. Provide an overview of system design and function during selected operator trainings. The design team shall attend training sessions organized by the Commissioning Agent to provide technical design feedback to the operators.
   j. Provide updated/record design basis and design narratives documentation for the Systems Manual.

2. Warranty Period
   a. Coordinate resolution of design non-conformance and design deficiencies identified during the Warranty Phase Testing.

1.4 DOCUMENTATION REQUIREMENTS

A. The Contractor shall provide the Commissioning Agent with information required to facilitate the commissioning process.

B. When not included with the standard submittals, the Contractor shall provide to the Commissioning Agent requested shop drawings, the manufacturer’s printed installation and detailed start-up procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of District contracted tests. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Commissioning Agent. This documentation will be required prior to the normal O&M manual submittals.
C. All equipment and assembly documentation requested by the Commissioning Agent shall be included by the Contractor later in the O&M manuals.

D. The Contractor shall submit all company and required staff qualifications that will participate in the Commissioning Process.

E. The Contractor shall submit checklists, startup and test plans, forms and procedures for use by the Commissioning Agent in developing the pre-functional checklists and functional test procedures.

1.5 TEST EQUIPMENT

A. Test Equipment:

1. The Contractor shall provide all the necessary testing equipment required for the testing of equipment.

B. Test Equipment Calibration Verification:

1. 30 days prior to any testing being performed, the Contractor shall provide documentation proving that all test equipment meet the following calibration requirements.

2. Electrical equipment testing instruments must be calibrated in accordance with the following frequency:
   a. Field Instruments: Analog, 6 months maximum, digital, 12 months maximum.
   b. Laboratory Instruments: 12 months.
   c. Leased specialty equipment: 12 months where accuracy is guaranteed by lessor.

3. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications.

1.6 COORDINATION

A. General: The Contractor will coordinate with the Commissioning Agent in a number of areas as described in this Section in order to facilitate the successful completion of the commissioning plan.

B. Commissioning Team: The members of the commissioning team consist of the Commissioning Agent, the District, the Contractor, the Design Team and the District’s Building & Grounds team.

C. Management: The Commissioning Agent is hired by the District directly. The Commissioning Agent directs and coordinates the commissioning activities and reports to the District. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.

D. Scheduling: The Contractor shall provide sufficient notice to the Commissioning Agent regarding the installation of static assemblies being commissioned and the schedule for the
construction checklists, start-up and initial checkout of all commissioned dynamic equipment and systems. Refer to Schedule under Part 3, EXECUTION, for additional scheduling details.

E. Meetings: Refer to Part 3, EXECUTION, for a description of meetings required as part of the commissioning process.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 MEETINGS

A. Kick-off Meeting: Within 60 days of NTP, or prior to the start of submittal review, the Commissioning Agent will schedule, plan and conduct a commissioning kick-off meeting with the entire commissioning team in attendance, including the controls, sheet metal, electrical, mechanical, test, adjusting and balancing and other appropriate Contractor and the District representatives (including PM and Building & Grounds personnel). The commissioning plan, the overall commissioning process, the general responsibilities of each team member, reporting and communication protocols and next steps will be discussed. Meeting minutes will be distributed to all parties by the Commissioning Agent.

B. Temporary or Early Startup of Equipment (prior to commissioning functional testing and/or substantial completion of the project.) . When equipment will be used in a temporary mode prior to operating the equipment permanently, a meeting shall be held that discusses the issues surrounding indoor environmental quality, moisture intrusion, building pressurization, duct and equipment cleanliness, safety concerns, warranty impacts, etc. The Commissioning Agent shall provide the District with any documented concerns of the early start-up, provide potential solutions, and make adjustments to the Commissioning Plan as needed for the specific project.

C. Commissioning Meetings: Deficiencies in compliance with the contract documents identified through the commissioning process or other means shall be discussed, as needed, in portions of regular construction meetings. Meetings dedicated to deficiencies or commissioning: status, coordination and planning shall also be conducted. The Commissioning Agent will plan, conduct and take minutes at commissioning meetings. When practical, commissioning meetings will be an appendage to regular construction meetings. All commissioning meetings shall be attended by the Contractor along with representatives from the District. Select meetings shall require the attendance of the electrical, sheet metal, fire alarm, TAB or other trades of commissioned systems or assemblies. The number of specific meetings dedicated to commissioning, besides those specifically listed in this Section are expected to consist of:

1. From 30 days prior to setting ductwork or mechanical equipment until the startup of the first piece of major mechanical equipment: 1 hour meeting every 6 weeks.

2. From the startup of the first piece of major mechanical equipment until the beginning of functional testing of mechanical equipment: 1 hour meeting every two weeks.

3. From the beginning of functional testing of mechanical equipment until all mechanical equipment has had the first round of testing conducted: 1 hour meeting once a week.
4. From the end of the first round of testing until all deficiencies are corrected: 1 hour meetings once a week or as determined appropriate by the Commissioning Agent.

5. If the number of deficiencies is abnormal or coordination or cooperation is insufficient, additional meetings or meeting durations shall be required.

D. Controls Integration Meetings: The Commissioning Agent shall coordinate a series of meetings to go over the control drawings, sequences of operation, points list and database and controls submittal requirements. These meetings are held prior to a formal control drawing submittal and any programming. The intent is to clarify control related issues for the controls contractor, mechanical, fire alarm and electrical contractor, District facility staff and Commissioning Agent prior to final point database development, programming and the formal control drawing submittal.

1. The controls contractor shall attend all meetings. The mechanical, electrical and contractor shall attend when issues regarding equipment they are responsible for are discussed. The mechanical and electrical designers attend.

2. Preliminary control drawing submittals and sequences by system are provided by the Controls Contractor, reviewed beforehand and discussed at these meetings. The controls contractor shall provide this draft controls submittal at least 21 days prior to the controls integration meeting.

3. Primary issues discussed and clarified are:
   a. Control drawing content and format
   b. Point database (monitored points, software points, naming conventions, alarms, report format)
   c. Sequences of operation and setpoints (clarity, completeness, design intent, functionality, and enhancements for control, energy and O&M)
   d. Interlocks to packaged controls and other systems, including filling in the fire alarm and emergency power response matrices
   e. Operator workstation graphics
   f. Field sensor and panel locations

4. Prior to the approval of Controls Submittal the Controls Contractor, Commissioning Agent, Mechanical Engineer of Record and the District shall conduct a site walkthrough where precise locations of panels, sensors, thermometers, flow meters and stations and valve taps will be identified.

5. The Commissioning Agent takes minutes at these meetings, which may include marked up database forms and sequences of operation.

3.2 PRE-FUNCTIONAL CHECKLISTS, START-UP, AND INITIAL CHECKOUT

A. The following procedures apply to all equipment and assemblies to be commissioned:
1. **Static Elements:** Systems or assemblies that are static in nature (not dynamic like mechanical or some electrical systems) may have simple pre-functional checklists for installation and do not have start-up or testing requirements. Refer to the Static Elements article later in this Section for specific requirements.

2. **Pre-Functional Checklists (PFCs):**
   
   a. The Commissioning Agent (with aid of the installing Contractor) will develop new or adapt existing representative pre-functional checklists and procedures for commissioned equipment and assemblies according to the notation in the list of commissioned systems in Part 1, GENERAL, of this Section.
   
   b. Calibrations: The construction checklists will contain requirements for calibrations when applicable. The Contractor is responsible to ensure all testing of field-installed sensors and actuators are completed using test and documentation methods approved by the Commissioning Agent.
   
   c. The Commissioning Agent will provide the Contractor with Pre-Functional Checklists that clearly identify which trade or contractor is responsible for executing and documenting each of the line item tasks.
   
   d. PFCs Checklists may leverage start-up procedure forms; however, they shall be reviewed and deemed acceptable by the Commissioning Agent and the District.

3. **Manufacturer Installation and Startup Procedures:**
   
   a. In addition to the PFCs, the Contractor shall require that all installations and startups utilize manufacturer installation and startup procedures, check sheets and reports.
   
   b. The completed manufacturer startup reports shall be submitted to the Commissioning Agent within 5 days of startup. The Contractor shall clearly note any items that have not been completed and properly plan for their completion.

4. **Execution of Pre-Functional Checklists and Startup Procedures:**
   
   a. Each piece of equipment shall receive full construction checkout by the Contractor following the approved plan and forms. No sampling strategies are used. Only individuals that have direct knowledge and witnessed that a line item task on the PFC was actually performed shall initial or check that item off. It is not acceptable for non-witnessing supervisors to fill out the forms.
   
   b. The Contractor shall complete the pre-start procedures in the PFC prior to starting equipment, including but not limited to verification of completion of wiring, safeties, lubrication, drive rotation and proper electrical test readings. Startup shall be conducted under supervision of responsible manufacturer representatives for major pieces of equipment. The Contractor shall notify the Commissioning Agent at least 5 days in advance of any equipment start-up, providing the Commissioning Agent a copy of the pre-start sections of the Pre-Functional Checklist.
c. The Commissioning Agent shall observe installation, start-up and checkout of selected systems. Procedures on the plans and checklists will be spot-checked by the Commissioning Agent prior to functional testing.

d. The Contractor and vendors shall execute start-up and provide the Commissioning Agent with a signed and dated copy of the completed construction PFCs and other start-up documentation. The Contractor shall clearly note any items that have not been completed and the plan for their completion.

e. The Contractor shall operate each commissioned device or assembly to the full extent of its capability, from minimum to maximum, under automatic and manual control and verify that the equipment, system and assembly is functioning according to the specifications, manufacturer's recommendations and good operating practice.

f. The PFCs and associated startup sheets and procedures for a given system shall be successfully completed and submitted prior to formal testing by the Commissioning Agent.

g. Where final balancing of a system or particular components thereof are not specifically indicated to be performed by the District or District's consultants, the Contractor shall provide final balancing and adjustments for operation within specified tolerances prior to functional testing by the Commissioning Agent.

h. The Commissioning Agent will review PFC, startup and TAB documentation and identify incomplete areas.

i. The Contractor shall correct all areas that are identified as deficient or incomplete in the documentation in a timely manner.

3.3 FUNCTIONAL TESTING

A. This sub-section applies to all commissioning testing for all Divisions of the Project Specifications including but not limited: 22 08 00 Commissioning of Plumbing Systems, 23 08 00 Commissioning of HVAC Systems, 25 50 00 Direct Digital Controls Systems and 26 08 00 Commissioning of Electrical Systems.

B. The Contractor shall be responsible for fully testing and executing all systems and assemblies according to the Specifications. The Commissioning Agent will direct, witness, document most of the systems tests.

C. Testing for any given system or assembly shall not be conducted until the Contractor has submitted a completed construction checklist, a startup report, Test and Balance (TAB) report and the Control System has achieved fully operational status which includes: confirmation of complete reliable operation with appropriate control calibrations, and a complete control system graphics interface.

D. Testing Requirements: The testing requirements for specific systems and assemblies are found in other specification sections.

E. Objectives and Scope:
1. The objective of testing is to demonstrate that each system is operating in accordance with documented District Objectives and Contract Documents. For dynamic systems, testing requires bringing the systems from a state of initial operation to full dynamic operation. For static elements, testing verifies the performance of the assembly in its installed state under conditions specified in the testing requirements. Additionally, during the testing process, areas of deficient performance are identified and corrected.

2. In general, testing shall include verification of each sequence in the sequence of operations, and other sequences and control strategies not mentioned in the written sequences; including, but not limited to startup, shutdown, unoccupied and manual modes, modulation up and down the unit’s range of capacity, power failure, alarms, component staging and backup upon failure, interlocks with other equipment, and sensor and actuator calibrations. All interlocks and interactions between systems shall be tested (including fire alarm system). All equipment will be individually tested. Heating equipment must be tested appropriately during winter and air conditioning equipment must be tested appropriately during summer to demonstrate performance under near-design conditions. The installing sub-contractor shall allow for seasonal testing and provide resources to complete seasonal testing after occupancy.

F. General Acceptance Criteria for Commissioned Equipment

1. Please refer to Sections 220800, 230800, 260800 for additional equipment specific acceptance criteria. This section shall describe general acceptance criteria for the commissioned equipment. This list is not exhaustive.

2. All commissioned equipment shall be installed per plan, specifications, and manufacturer’s recommendations and per code. The Contractor shall resolve all noted deficiencies by the CxA.

3. Issues identified during the Functional and Performance Testing Phase, as defined below, shall be responded to and coordinated by the Contractor (i.e. through RFIs, etc.)

4. Problem Solving/Troubleshooting: The burden of problem solving/troubleshooting is on the Contractor, and the Design Team, though the Commissioning Agent may recommend solutions to problems found. The District holds full authority on how to resolve issues encountered in testing.

G. Development of Functional and Performance Test Procedures (FTP):

1. Test procedures and documentation forms are not finalized until after equipment and control system submittals and shop drawings are approved.

2. The Commissioning Agent is responsible for obtaining the needed documentation to write detailed step-by-step testing procedures that comply with the testing requirements. Necessary documentation generally includes equipment Specifications, testing requirements, O&M manuals, approved submittals and shop drawings, start-up instructions, sequences of operation, and mechanical, electrical and control drawings.

3. The Contractor, the Design team, and District shall review the testing procedures provided by the CxA to check for completeness, effectiveness, feasibility, safety, suitability, and equipment warranty protection.
4. Test procedures shall be written and submitted by the CxA to the members of the commissioning team for review and acceptance at least 6 weeks prior to tests execution.

H. Test Procedure Format: The final test procedure forms shall include (but not be limited to) the following information:

1. System and equipment or component name(s).
2. Equipment location and ID number.
3. Date of test, including re-test dates.
4. Project name.
5. Participating parties.
6. A copy of the relevant controls, equipment submittal and project drawings to describe the system being tested.
7. Special cautions, alarm limits, as necessary for the equipment being tested.
8. Verification of points to be monitored through the BMS system.
9. Calibration verification of inputs and outputs from the BMS:
   a. Binary outputs
   b. Binary inputs
   c. Analog outputs
   d. Analog inputs
10. Calibration of the standalone sensors will be verified (i.e. standalone thermostats, static pressure sensors, lighting photocell, sewage ejector floats, etc.).
11. Capacity check and verification (i.e. cooling capacity, domestic hot water production, etc.)
12. Sequence of Operations testing verifying all modes of operation of the equipment.
13. BMS Alarm testing.
14. BMS Trending set-up and performance period information.
15. A section for comments.
16. Signatures and date block for the Commissioning Agent.
1.2 ISSUES AND NON-CONFORMANCE

A. Issue Management

1. The Commissioning Agent will record the results of document reviews, field observations, tests conducted or reviewed and trend logs or monitoring. All deficiencies or non-conformance issues will be recorded on a master Issues Log kept by the Commissioning Agent. The Issues Log will be updated by the Commissioning Agent.

2. An electronic copy of the Issues Log will be constantly updated and provided to the Contractor and District on a regular basis. Issues resolutions and new issues since the last update will be explicitly identified.

3. Issues warranting a request for information (RFI) will be forwarded by the Commissioning Agent to the District.

4. Issues of noncompliance or items that are incomplete or require Design Team input will be sent to the District by the Commissioning Agent.

5. When there is an unclear responsible party for an identified issue the Commissioning Agent will notify both the Design Team, and the Contractor If does not believe it is not their initial responsibility, they shall state this in a reply to the Commissioning Agent within two days of receipt. The Commissioning Agent will forward to the designated party.

6. When completion of a task or other issue has been identified by the Commissioning Agent as holding up or is likely to delay any commissioning process, particularly functional testing, the Contractor or the Design Team, as applicable, shall be provide a corrective action and an expected date of complete to the Commissioning Agent in writing within two days of notification of the issue. Upon corrective action completion the Contractor shall notify the Commissioning Agent in writing within one day. It is not the responsibility of the Commissioning Agent to obtain this status information through meeting attendance, asking questions or field observation.

7. The Commissioning Agent documents resolutions in the Issues Log and schedules retesting and re-inspection as needed.

8. Corrections of minor issues identified may be made during the tests at the discretion of the Commissioning Agent and with the issue and resolution documented in the completed Functional Test.

9. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures.

   a. Cost of Retesting: Problems identified during testing will fall into the following five categories.

      1) Equipment or hardware not installed or not installed properly.

      2) Controls program not per the approved sequence of operation (either the specified sequence was not programmed, or the methods and subroutines used to meet the specified sequence or performance requirement does not meet the objectives).
3) Air or water balancing does not meet the design documents when the system has the capacity to do so.

4) Specified design control sequences, set points or schedules require modification to achieve proper operation or control.

5) Design balancing quantities require modification.

b. If a delay occurs because of the case of (1), (2) or (3) in the article immediately above, no additional compensation will be given to the Contractor involved in troubleshooting, making corrections or retesting.

c. The determination of the cause of the problem will be by agreement between the District, the Design Team and the Contractor.

d. For items identified as non-conforming (1), (2) or (3), the cost of re-testing by the Commissioning Agent shall be the responsibility of the Contractor through a District initiated credit.

e. The time for the Commissioning Agent to direct, document and evaluate any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during testing to be faulty, will be charged to the Contractor via a credit request by the District.

f. The Contractor shall reimburse the District and Commissioning Agent for costs when a scheduled test cannot be completed due to:

1) Failure by the Contractor to schedule the test with all parties required to perform the test or with regulatory authorities required to witness the test.

2) Failure by the Contractor to provide required notice for tests that have been cancelled or rescheduled.

3) Failure by the Contractor to have in place test equipment, support equipment, instrumentation, permits, or other ancillary equipment or systems required for successful execution of the test.

4) Failure by the Contractor to complete pre-start or start-up procedures or other work required as a prerequisite for execution of the test.

10. The Contractor shall respond in writing to the Commissioning Agent and District at least as often as commissioning meetings are being scheduled concerning the status of each outstanding issue identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.

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

B. Approval and Acceptance: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. However, formal approval of an entire test form is not normally given. Functional approval or acceptance of a system is indicated after all testing and monitoring is complete and there are no outstanding issues for that equipment.
or assembly in the Commissioning Agent’s Issues Log. The District alone will accept the equipment based upon the recommendations above by the Commissioning Agent. The District may have other issues that will bar approval and acceptance of the commissioned equipment.

1.3 DEFERRED TESTING

A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the lack of performance of existing equipment, required occupancy condition or other defective work, execution of checklists and testing may be delayed upon written approval of the District.

B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system’s design) specified in the commissioning plan shall be completed as part of this contract. The Commissioning Agent will coordinate this activity with the District and Contractor. Tests will be executed, documented and deficiencies corrected by the responsible Trade Subcontractor(s), and be witnessed by appropriate District staff and the Commissioning Agent. The Contractor shall make needed final adjustments to the O&M manuals and Record Documents due to the testing results.

C. Warranty Phase Testing: The Contractor shall provide skilled technicians (as described above) prior to warranty end to complete selected on site testing of commissioned equipment. This shall be a selected functional testing of systems that encountered issues during the initial occupancy of the building. The contractor shall provide an allowance of 32 onsite hours for testing with the Commissioning agent.

1.4 CLOSE OUT DOCUMENTATION

A. To assist in the Cleaning and Closeout Process for the project the Commissioning Agent will review the submitted O&M Manuals for completion, compile a Commissioned Systems Manual, and provide the District with a Final Commissioning Report.

B. O&M Documentation Completion and Review:

1. The Commissioning Agent will provide an O&M Manual Checklist that lists the elements of the manuals required by the specifications. The Contractor shall fill out this checklist for each manual and submit with the manual.

2. Prior to requesting Beneficial Occupancy Inspection as described in Division 01, Section 01 77 00, the Commissioning Agent shall review the O&M manuals for commissioned systems to verify compliance with the Specifications. This verification will be conducted by sampling the manuals against the O&M Manual Checklist. The Commissioning Agent will communicate deficiencies in the manuals to the District and the Architect. If systemic deficiencies are found, the Contractor shall go back through those checklist items on every manual and verify compliance.

3. Upon a successful review of the corrections, the Commissioning Agent will recommend approval and acceptance of these sections of the O&M manuals.

4. The Commissioning Agent will also review each equipment warranty and verify that all requirements to keep the warranty valid are clearly stated.

5. This work does not supersede the Design Team’s review of the O&M manuals.

6.
C. Commissioned Systems Manual: The Commissioning Agent (CxA) will compile a
Commissioned Systems Manual which will document the history of each system or
assembly that is commissioned during the project from design through project completion.
The following components of the manual are organized and indexed by system into one
compilation. The responsibility of the Contractor and other parties in the Commissioned
Systems Manual development defined above.

1. District Requirements and Objectives (see Definitions). [By Architect, District]
2. Basis of Design Narrative (see Definitions). [By Architect]
3. Submittal Reviews [Design Team]
4. PFC checklist form completed. [Contractor]
5. Startup and initial checkout forms completed. [Contractor]
6. Flow Diagrams: Include reductions of the flow or one-line diagrams from the
drawings for all commissioned systems for which flow drawings exist. [Contractor]
7. Red-Line Drawings: [Contractor]
8. Test and Balance Reports [Contractor]
9. Complete as-built Control Drawings with points list, valve schedules, schematics,
control system architecture and full sequences of operation. [By Contractor.]
10. Controls Point to Point checkout [Contractor]
11. Sequence of Operation(s) including a list of all user adjustable set points, reset
schedules and a narrative of each defining the purpose of the operation. [CxA]
12. Set point and schedule review recommendations to ensure values are current, and
operating efficiently. [CxA]
13. Recommendations for recalibration frequency of sensors and actuators by type and
use. [By CxA.]
14. Recommended frequency for recommissioning by equipment type with reference to
tests conducted during initial commissioning. [By CxA.]
15. An indexed and fully labeled trend log analysis [CxA]
16. O&M Manual Approval Recommendation [CxA]
17. Seasonal start-up and shutdown, manual and restart operation procedures. [By
Contractor.]
18. Completed test forms and record of deficiencies and incomplete items for tests they
are responsible to document [Contractor]
19. Additional documentation as required by equipment specifications and/or this
specification [Contractor]
D. Final Commissioning Report: Upon completion of a successful onsite training and the final compiling of all other reports, the Commissioning Agent is responsible to compile, organize and index a Final Commissioning Report into a labeled, indexed and tabbed PDF document by the following two sections Project Overview, and Outstanding Issues & Future Recommendations. Each section will include at minimum the following information:

1. Project Overview: This section will include copies of the following project level information:
   a. A Project Summary Report, including progress reports
   b. The Commissioning Plan
   c. The Issue Log documenting all issues identified during the entire project and the actions taken to correct the issues.
   d. Training Document including:
      1) The materials presented to B&G at the offsite
      2) Training Materials as required in 01 77 00.
      3) A list of any issues identified during the onsite trainings. Any issues identified at the onsite training will be listed as outstanding issues section.

2. Outstanding Issues & Future Recommendations
   a. A list of all the outstanding non-compliance items, include issues identified at onsite B&G trainings. Each non-compliance issue shall reference a specific test, inspection, trend log, etc. where the non-conformance is documented.
   b. A proposed schedule date for the Warranty Phase Testing and agenda.

1.5 DISTRICT TRAINING

A. The Contractor and Trade Subcontractors are responsible to provide training for District personnel per the Contract Documents, as described in Division 01, Section 01 77 00 Cleaning and Closeout Procedures. The Commissioning Agent shall participate in the training process in the following ways:

1. Complete an offsite training session with the District’s personnel to review the project scope, communicate the commissioning results, and review the Commissioned Systems Manual.
2. Review the proposed training agenda and provide comments to the District to ensure the agenda adequately covers the commissioned equipment and assemblies.
3. Attend the onsite training of the District by the Contractor to answer questions as they relate to commissioned systems and to note any outstanding non-compliance items discovered during training.

END OF SECTION 01 91 13
SECTION 28 23 00

DIGITAL VIDEO SURVEILLANCE SYSTEMS

PART 1 - GENERAL REQUIREMENTS

1.1 RELATED DOCUMENTS

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

1.2 SECTIONS INCLUDE

A. Related Sections
B. Scope Of Work
C. Field Verification
D. System Overview
E. System Training
F. Submittals
G. Related Documents
H. Responsibilities
I. Products
J. General Installation
K. Identification And Tagging Of Cables
L. Programming
M. Camera Setup
N. System Testing
O. Warranty And Service
P. Cleaning

1.3 RELATED SECTIONS

A. Refer to General Conditions, Supplementary General Conditions and Division 1 – General Requirements.

B. Contractor/Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 28.
1.4 SCOPE OF WORK

A. The following specification has been developed to address the installation of the video equipment for a Digital Video Surveillance System. This document is not a stand-alone specification. The installing contractor shall provide all equipment, labor, materials, and services required to install and program the system. The installation is to be accomplished in accordance with this specification, sketches, and the referenced plans.

B. The Contractor shall provide, install, program, label, and document the equipment locations and programming parameters for all devices and users, mounting hardware, connectors, patch cords, recording and storage units, UPS, and software to provide a complete and functional Digital Surveillance System.

C. This system’s software must integrate with the District’s existing surveillance systems and match the District’s surveillance standard.

D. The site video is not intended to be monitored on a constant basis. Contractor shall provide District approved signage at each entry.

E. Where lighting is inadequate for clear video, provide Infra-red lighting and cameras with Day/Night capability.

F. It is required to record based upon motion per camera. Frequency of recorded images should be based on the maximum provided by the capability of the system and meet the two week recording requirement.

G. Authorized District personnel must be able to view the video using a client based application.

H. Back-up power UPS is to be supplied at each server location.

I. District security contact is Alberto Garcia, 415-695-5535; garciaal@sfusd.edu

J. Security Integration: James Gracey, 415-810-6919/844-247-2338

1.5 FIELD VERIFICATION

A. Confirm condition of lighting and glare for clear quality video.

B. Rack space will be shared with IT based systems. Confirm there is sufficient rack space for recorders and peripheral equipment at each rack location. Note the space needed to accommodate the number of NVRs required for the storage requirements.

C. Confirm format of video configuration and naming conventions to maintain consistent nomenclature for end-user interface.

1.6 SYSTEM OVERVIEW

A. The intent of this specification is to provide overall video surveillance capability for a campus.

B. Primary Features include:

1. Remote viewing for authorized personnel.

2. A single authentication for access to District video surveillance systems of like kind.

3. A distributed NVR configuration, without a centralized storage location, to minimize the impact of network activity and failure modes.
4. 24x7 Video Coverage: Motion detection should be used to qualify activity for triggering an update in recorded images.

5. Capable of masking areas with known motion to eliminate false alarms causing excessive recording.

6. A minimum of 14 days recorded video for each camera.

7. Recorded video should be captured at full resolution and maximum frequency available for the specific camera, within the periods of activity.

8. A user-friendly method of identifying the periods of activity and retrieval from the recorded video.

9. A user-friendly method of accessing either a single camera for live viewing or an NVR for obtaining recorded video for a specific camera.

10. The intended location, field of view, and camera number is shown on Drawings provided by the District.

11. Fields of view should be confirmed with the System Administrator prior to sign-off of the system.

12. The network video recorders (NVR) are to be installed in the IT racks and connected to the District's WAN/LAN infrastructure. Coordination with the District IT representative is required.

1.7 SYSTEM TRAINING

A. Furnish personnel to execute a training plan.

B. The training plan shall include a lesson plan for each primary feature:

   1. Internet-based access to view and retrieve recorded video for end-users.
   2. Programming the NVR for Surveillance System Administrator.

C. Provide a minimum of 2 hours total end-user training. Provide training literature and outlines at the beginning of each session. Training shall include system operation and configuration management. Establish a specific schedule to meet the convenience of District.

1.8 SUBMITTALS

A. Provide submittals of all devices, O&M manuals and programming guides per general conditions.

B. Prepare as-built documentation showing:

   1. Floor plans showing all devices and cabling pathway; CAD files to be provided to Contractor by District.
   2. Single line riser diagram
   3. Camera number and name to be provided by District and incorporated into as-built documentation.
1.9 RELATED DOCUMENTS

A. In addition to this written specification, the following drawings and documents are to be reference and included in the scope of this specification:
   1. Architectural / Structural / Electrical drawings
   2. Detail Drawings & Diagrams
   3. Any addendum, hereafter release of specifications

B. Ensure that, manufacture, test, and install of the system is per manufacturer’s requirements and in accordance with NFPA-70 (National Electrical Code®), state codes, local codes, requirements of authorities having jurisdiction, and particularly the LATEST EDITION AND ADDENDUMS of the following standards:
   1. Cabling Systems:
      a. ANSI/TIA/EIA-588-C.0 – General Cabling Standards
      b. ANSI/TIA/EIA-568-C.1 -- Commercial Building Cabling Standard
      c. ANSI/TIA/EIA-568-C.2 -- Balanced Twisted Pair Cabling Standard
      d. ANSI/NECA/BICSI 568, Standard for Installing Commercial Building Telecommunications Cabling
   2. Pathways and Spaces:
      a. ANSI/TIA/EIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces
      b. ISO/IEC 18010 – Pathways and Spaces for Customer Premises Cabling
   3. Cabling Administration:
      a. ANSI/TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
      b. TIA/EIA-942 – Telecommunications Infrastructure Standard for Data Centers
   4. Grounding and Bonding:
      a. ANSI/TIA/EIA-607 Commercial Bonding Requirements Telecommunications
      b. IEEE 1100 IEEE Emerald Book
      c. TIA/EIA-942
      d. NFPA 780 Standard for the Installation of Lightning Protection
   5. Outside Plant:
      a. ANSI/TIA/EIA-758 -- Customer-Owned Outside Plant Telecommunications Cabling Standard
      b. ANSI/TIA-968 – Telecommunications Telephone Terminal Equipment Technical Requirements for Connection of Terminal Equipment to the Telephone Network
   6. Cal/OSHA-Pocket Guide for the Construction Industry

C. Contractor must install cabling in accordance with the most recent edition of BICSI® publications:
   1. BICSI – Telecommunications Distribution Methods Manual (TDMM)

D. Federal, state, and local codes, rules, regulations, and ordinances governing the work, are as fully part of the specifications as if herein repeated or hereto attached. If contractor shall note items in the drawings or the specifications, construction of which would be code violations, promptly call them to the attention of the owner's representative in writing. Where the requirements of other sections of the specifications are more stringent than applicable codes, rules, regulations, and ordinances, the specifications shall apply.

E. When the words "should", "may", "desirable", or "will" appear in specifications, standards, codes, and publications listed above replace with the word "shall" to ensure a best practice installation. All suggestions listed in a specification, standard, code, or publications listed above can be enforceable and demanded by owner at no extra cost since these best practices shall be included in the quotation/bid/proposal/estimate.

F. When there is a conflict between standards, specifications, drawings, addendums, manufacturer recommendations, and publications listed above the stricter requirement will be applied and shall be included in the base quote/bid/proposal/estimate and scope of work unless a written exception is issued. Codes will never have a written exception. If there is not a stricter requirement when addressing a conflict (Example: different colors for jacks on drawings than in specs) then what is in writing (specs, RFI, etc.), standard industry/owner practice, and approved submittals and who approved them will be used to determine which guideline shall be enforced; the policy with the most in favor wins. NOTE: Specifications and other written instructions usually take precedence over drawings and details even if drawings and details are issued at a later date, unless otherwise noted (UON).

1.9 RESPONSIBILITIES

A. Contract documents are detailed only to the extent required to show design intent. It shall be understood and agreed upon by the bidder that all work described herein shall be completed in every detail so as to provide a complete and functioning system.

B. Furnish additional items and labor not mentioned herein to meet the requirements as specified and for a complete and functional system without claim for additional payments. Ex. Adapters, nuts, bolts, etc.

C. The installing contractor shall furnish and install all hardware, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of the system so that the system shall perform the functions listed herein in compliance with all specified requirements.

D. All equipment unless otherwise specified, shall be new, free from defects, and the best craftsmanship in its class.

E. Provide system documentation and labeling as specified without claim for additional payments.

F. Guarantee all equipment and components as specified from date of acceptance.
1. 10 WARRANTY

A. Units and components offered under this section shall be covered per Division 1 by a 2-year parts and labor warranty for malfunctions resulting from defects in materials and workmanship. Warranty shall begin upon acceptance by the Owner.

PART 2 - PRODUCTS

2.1 PRODUCTS - QUANTITY PER DRAWINGS

A. The specified solution for the digital video surveillance system is Security Integration, Inc. Contact James Gracey; 415-810-6919; sales@securityintegration.net

B. Review the District provided drawing(s) and all attachments to this specification to identify any additional components required to provide a complete and operable system. The quantities of individual components shall be determined by reviewing the documentation provided.

1. Digital Video Server 32-12000-SI2
2. Computer Monitor SI-CMON 19
3. Public display monitor 32”, LCD SI-MON 32
4. Security monitor mount SI-MON-MT
5. Camera signal converter hub SI-UTP-16
6. Single port UTP transmitter SI-UTP-1
7. Exterior 2.1 megapixel IR cameras SI-3895-WIR3
8. Camera Power Supplies for Fixed Cameras SI-PWR-8I
9. Integrated 2.1 megapixel PTZ cameras SI-PTZ-23M
10. PTZ mount SI-PP-SM
11. PTZ Power Supply SI-PTZ-PWR1
12. UPS 1500 VA SI-UPS-1500
13. Custom database programming SI-PRGM
14. Server install and testing SI-TEST
15. Daily remote diagnostics, service SI-2RM32SE
16. Cisco Switch WS-C2960S-24TS-L
17. Cisco Fiber Module Cisco GLC-SX-MM
18. 2 meter LC/SC fiber MM patch cable LCSC625-02M
19. patch cords SI-PATCH6
20. Signage pack SI-SIGNAGE
PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Aesthetics are an important consideration in this installation. Install all components to provide aesthetically pleasing results. Coordinate the actual locations of all visible components in advance with District.

B. Prior to delivery to the site for actual installation, ‘shop’-assemble and test all devices.

C. Locate all cameras according to floor plans. Coordinate with District for determining specific camera mount locations and angle of view.

D. During daylight hours of install check infra-red lights on all cameras to verify functionality. Ensure that the illuminated area is sufficient for the particular location to be viewed by the camera.

E. Connect quantity of cameras per NVR in the order they are indicated on the drawings.

F. Set motion detection for all cameras and block out high motion areas that are not relevant to security.

G. Determine the camera and rack mapping for each existing cable and tag with permanent labels to show camera and connection point at the NVR at both ends of the cable.

H. Confirm each camera’s field of view with District Representative. Use the varifocal feature to ensure that the field of view is appropriate to the required scene coverage.

I. Program the NVR(s) and demonstrate functional operability. None of the preparation and demonstrations associated with this task is part of training. Provide the training after the system is shown to be operable.

J. Verify that the program parameters available in both the NVR and VMS (District’s existing systems) are consistent with the requirements and between the two devices.

K. Verify designated views and names of cameras match and provide a clear video image at the Administrative Workstation. Print a copy of each view as a benchmark for future calibration.

L. Connect the surveillance equipment (NVR’s only) to the UPS and then to the power outlet that has been provided for the designated room on the drawings.

M. Set up the system with appropriate level settings currently used by District. Users are to include at a minimum, All Cameras, District User, Site Admin and Site User.

N. The Contractor shall make an inspection of all system equipment including all components, accessories, and installation hardware. The inspection shall determine that the type of equipment installed meets the intent of the specifications, that the wiring installation and connections to all equipment components follow or meets all code requirements, that the equipment has been installed in accordance with the device manufacturer’s recommendations, and that all devices have been tested to verify their proper operation.

O. Installation of all electrical equipment and signaling wire and conduit shall conform to all applicable electrical and building codes and approved practices or conventions whichever is more stringent. Installation of the video surveillance equipment will conform to manufacturer’s recommendations and approved installation practices for such systems.
P. Power for cameras is not to be run over CAT 6 cable, only the contractor supplied 18/2 for fixed lens cameras and 12/2 for PTZ cameras.

Q. Exact power locations to be located per job walk.

R. Cameras are to be wall mounted unless otherwise specified and terminations are to be made in the baseplate of fixed lens cameras.

S. Interior fixed cameras are to be wall mounted at a center height of 8’6” AFF (ceiling height permitted); exterior fixed lens cameras should be mounted at 10’ above grade and PTZ cameras should be no less than 14’ above grade to center of camera.

T. Trunk cable run between server location and IDF’s is to be unshielded CAT 6. IDF locations may also be utilized for remote power supply locations.

U. All video cable pulled directly from termination block to camera is to be CAT 6.

V. There shall be a single CAT 6 and a single RG 59, 95% copper braid, pulled from server location to the public view monitor location in the main office.

W. Monitor requires an outlet jack and cover plate; hidden behind the monitor if possible. Power is to be provided behind monitors by electrical contractor.

X. PTZ cameras require local power supply (SI-PTZ-PWR) to be mounted within 200 feet of the camera. Power supplies are cord and plug.

Y. Minimum conduit size is 3/4”.

Z. Leave and 8 foot coil of all cables on the camera end and a 20 foot coil of all cables in the head end equipment room prior to installation of the cameras and head-end equipment.

AA. Pull string is to be left in conduits and labeled to indicate destination of conduit.

BB. Pathways should ensure that a maximum pulling tension of 25 lb-ft is not exceeded and pathways should not deform cable jacket.

CC. Cables are not to be attached to ceiling grid or lighting support wires.

DD. When pulling through conduit, cable pulling lubricants shall be continuously applied to all cables and be specifically approved by cable manufacturer.

EE. Dimension of largest component of server rack is 20”W x 28”D. In addition to this area there must be space for an installation/service technician to work at the front and rear of the server rack which should be no less than 24” each.

3. 2 IDENTIFICATION AND TAGGING OF CABLES

A. Each cable must be confirmed and a permanent wrap-around or slip-on wire tag placed at both ends of each cable showing the camera number and name. This information shall also be recorded on the red-lines for placement on the as-built documentation.

B. If nylon cable ties are used they are to be black and strapped with a loose tie so as not to pinch the cable sheath and with enough slack to get snips and fingers between tie and cable. The end of the tie should be cut after strapping.

C. Each rack will need to be configured with video recorder(s), camera switch, video conditioning equipment, monitor/mouse and UPS to support the number and recording requirements for the cameras connected at that location.
D. Connect the correct RJ-45 connectors from each NVR to the District designated network switch in the same network closet.

3. 3 PROGRAMMING

   A. Program the video systems to make fully functional: home positions, scheduled tours, detection windows, recording times, rates, and resolution.
   B. Confirm access from local site administrator’s office and from the District Security System Administrator at the time of system configuration.
   C. Provide a recap of all programming parameters as part of the as-built documentation.
   D. The NVRs are to come pre-programmed with the District assigned usernames and passwords and recording software.

3. 4 CAMERA SETUP

   A. Each camera has 26 individual settings that must be checked for applicability to the primary scene.
   B. Turn on smart IR on every fixed lens camera
   C. Determine and activate if primary scene requires BLC and WDR.
   D. Adjust 2.8mm to 12mm lens to the appropriate view per District staff
   E. Configure motion detection zones appropriately based on primary scene need
   F. Focus the camera per primary scene requirement.
   G. Set PTZ camera tours not to exceed 90 seconds

3. 5 SYSTEM TESTING

   A. After the system is completely installed, conduct a full systems test. Provide a copy of the record of results to District. Use the test procedures attached to this specification section to test and evaluate the system. These tests shall be part of the overall Final System Acceptance Testing Requirements.
   B. In the test procedure for the Surveillance System, each camera and all associated video transmission devices and cables must be tested for good video signal.
   C. Final signoff must include site visit by SFUSD Security Department; Alberto Garcia; garciaal@sfusd.edu; 415-695-5535. Signoff consists of verification of each camera’s field of view and settings specific to each camera.
3. 6  WARRANTY AND SERVICE

A. All products including installation and workmanship in this section shall carry a warranty per general condition. The warranty product code is SI-2RM32SE.

B. Make available fully qualified, factory trained, repair and maintenance personnel for all warranty, normal, and emergency service.

C. Provide normal service to District during regular business hours, which are between 8:00 a.m. and 5:00 p.m., Monday through Friday, except holidays. Provide a list of normal service rates at end of installation.

3. 7  CLEANING

A. At the end of each work day the contractor should clean up waste and dispose. Excess materials should be stored in a limited access area.

B. After punch list is complete the contractor should clean/dust racks, cabinets, faceplates and cameras. As well, contractor should ensure that all excess tape and/or non-essential tags are removed.

END OF SECTION
PHASING PLAN LEGEND

NOTICE TO PROCEED (NTP) - APRIL 10, 2019

**PHASE 1** - MOBILIZATION AND SUBMITTALS
- APRIL 10, 2019 - JUNE 4, 2019

**PHASE 2A** - PREPARATIONS FOR DELIVERY OF INTERIM HOUSING
- MAY 20, 2019 - JUNE 21, 2019

**PHASE 2B** - INSTALLATION OF INTERIM HOUSING UNITS
- JUNE 24, 2019 - JULY 26, 2019

**PHASE 2C** - MDF AND BOILER ROOM UPGRADES
- JUNE 5, 2019 - AUGUST 2, 2019

**PHASE 3** - MODERNIZATION OF NORTH POD
- JUNE 5, 2019 - DECEMBER 20, 2019

**PHASE 4** - MODERNIZATION OF SOUTH POD
- DECEMBER 23, 2019 - MAY 29, 2020

**PHASE 5** - MODERNIZATION MPR / KITCHEN / ADMINISTRATION BLDG.
- COURTYARD, BUILDING EXTERIOR AND SITE WORK
- JUNE 1, 2020 - JULY 31, 2020

**NOTE:** EXISTING ACCESSIBLE ROUTES AND ACCESSIBLE PARKING SERVING FACILITIES AND BUILDINGS THAT ARE OPERATIONAL DURING CONSTRUCTION SHALL REMAIN UNOBSTRUCTED, SAFE AND USABLE BY PEOPLE WITH DISABILITIES.

**FLORA STREET**

SOUTH WING - LOWER LEVEL  FLOOR  PHASING PLAN
1" = 20'-0"

SOUTH WING - LOWER FLOOR CLASSROOMS POD (PHASE 4)

SOUTH WING - LOWER FLOOR MECHANICAL ROOMS (PHASE 2C)

SOUTH WING - UPPER FLOOR CLASSROOMS POD (PHASE 3)

NORTH WING - MAIN FLOOR CLASSROOMS POD (PHASE 1)

NORTH WING - UPPER FLOOR CLASSROOMS POD (PHASE 2)

NORTH WING - MIDDLE PLAYGROUND

NORTH WING - UPPER PLAYGROUND

SOUTH WING - LOWER PLAYGROUND (PHASE 5) ALTERNATE

PROPOSED NEW ADMIN / CORRIDORS SITE MAIN ENTRANCE (PHASE 5)

MPR - NEW ADMIN / CORRIDORS SITE MAIN ENTRANCE (PHASE 5)

1H SET UP (PHASE 2A/B)

1H REMOVAL (PHASE 5)

PROJECT ISSUE DATE: 09/10/2018 - DSA SUBMITTAL

1" = 20'-0"