

REQUEST FOR PROPOSALS 7-2138

**INSTALLATION OF A VIDEO
SURVEILLANCE SYSTEM AT
SANTA ANA AND GARDEN GROVE
BUS BASES**



**ORANGE COUNTY TRANSPORTATION AUTHORITY
550 South Main Street
P.O. Box 14184
Orange, CA 92863-1584
(714) 560-6282**

Key RFP Dates

Issue Date:	January 22, 2018
Pre-Proposal Conference Date:	January 31, 2018
Question Submittal Date:	February 5, 2018
Proposal Submittal Date:	February 21, 2018
Interview Date:	March 26, 2018

FEDERAL TRANSIT ADMINISTRATION FUNDED PROJECT

DRAFT

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NOTICE OF REQUEST FOR PROPOSALS

RFP 7-2138: "INSTALLATION OF A VIDEO SURVEILLANCE SYSTEM AT SANTA ANA AND GARDEN GROVE BUS BASES"

TO: ALL OFFERORS

FROM: ORANGE COUNTY TRANSPORTATION AUTHORITY

The Orange County Transportation Authority (Authority) invites proposals from qualified contractors to furnish and install a video surveillance system at the Garden Grove and Santa Ana bus bases.

The Authority has set a **4%** Disadvantaged Business Enterprise (DBE) participation goal for this project.

Proposals must be received in the Authority's office at or before 2:00 p.m. on February 21, 2018.

Proposals delivered in person or by a means other than the U.S. Postal Service shall be submitted to the following:

**Orange County Transportation Authority
Contracts Administration and Materials Management
600 South Main Street, (Lobby Receptionist)
Orange, California 92868
Attention: Sonja Gettel, Senior Contract Administrator**

Proposals delivered using the U.S. Postal Service shall be addressed as follows:

**Orange County Transportation Authority
Contracts Administration and Materials Management
P.O. Box 14184
Orange, California 92863-1584
Attention: Sonja Gettel, Senior Contract Administrator**

Proposals and amendments to proposals received after the date and time specified above will be returned to the Offerors unopened.

Firms interested in obtaining a copy of this Request for Proposals (RFP) may do so by downloading the RFP from CAMM NET at <https://cammnet.octa.net>.

All firms interested in doing business with the Authority are required to register their business on-line at CAMM NET. The website can be found at <https://cammnet.octa.net>. From the site menu click on CAMM NET to register.

To receive all further information regarding this RFP 7-2138, firms and subconsultants must be registered on CAMM NET with at least one of the following commodity codes for this solicitation selected as part of the vendor's on-line registration profile:

<u>Category:</u>	<u>Commodity:</u>
Security, Safety and Health Services	Surveillance Services
Security, Safety & Health Equipment	Surveillance Systems
Maintenance Services - Facility Construction	Electrical Services Electrical Contractor Construction - Electrical Installation
Computer: Hardware & Software	Operating Systems and Network Software Hardware Components & Accessories

A pre-proposal conference will be held on January 31, 2018, at 1:30 p.m. at the Authority's Administrative Office, 550 South Main Street, Orange, California, in Conference Room 08. All prospective Offerors are encouraged to attend the pre-proposal conference.

The Authority has established March 26, 2018, as the date to conduct interviews. All prospective Offerors will be asked to keep this date available.

Offerors are encouraged to subcontract with small businesses to the maximum extent possible.

All Offerors will be required to comply with all applicable equal opportunity laws and regulations.

The award of this contract is subject to receipt of federal, state and/or local funds adequate to carry out the provisions of the proposed agreement including the identified Scope of Work.

SECTION I: INSTRUCTIONS TO OFFERORS

SECTION I. INSTRUCTIONS TO OFFERORS**A. PRE-PROPOSAL CONFERENCE**

A pre-proposal conference will be held on January 31, 2018, at 1:30 p.m. at the Authority's Administrative Office, 550 South Main Street, Orange, California, in Conference Room 08. All prospective Offerors are encouraged to attend the pre-proposal conference.

B. EXAMINATION OF PROPOSAL DOCUMENTS

By submitting a proposal, Offeror represents that it has thoroughly examined and become familiar with the work required under this RFP and that it is capable of performing quality work to achieve the Authority's objectives.

C. ADDENDA

Any Authority changes to the requirements will be made by written addendum to this RFP. Any written addenda issued pertaining to this RFP shall be incorporated into the terms and conditions of any resulting Agreement. The Authority will not be bound to any modifications to or deviations from the requirements set forth in this RFP as the result of oral instructions. Offerors shall acknowledge receipt of addenda in their proposals. Failure to acknowledge receipt of Addenda may cause the proposal to be deemed non-responsive to this RFP and be rejected.

D. AUTHORITY CONTACT

All communication and/or contacts with Authority staff regarding this RFP are to be directed to the following Contract Administrator:

Sonja Gettel, Senior Contract Administrator
Contracts Administration and Materials Management Department
550 South Main Street
P.O. Box 14184
Orange, CA 92863-1584
Phone: 714.560.5562, Fax: 714.560.5792
Email: sgettel@octa.net

Commencing on the date of the issuance of this RFP and continuing until award of the contract or cancellation of this RFP, no proposer, subcontractor, lobbyist or agent hired by the proposer shall have any contact or communications regarding this RFP with any Authority's staff; member of the evaluation committee for this RFP; or any contractor or consultant involved with the procurement, other than the Contract Administrator named above or unless expressly permitted by this RFP. Contact includes face-to-face, telephone, electronic mail (e-mail) or formal written communication. Any proposer, subcontractor, lobbyist or agent hired by the

proposer that engages in such prohibited communications may result in disqualification of the proposer at the sole discretion of the Authority.

E. CLARIFICATIONS

1. Examination of Documents

Should an Offeror require clarifications of this RFP, the Offeror shall notify the Authority in writing in accordance with Section E.2. below. Should it be found that the point in question is not clearly and fully set forth, the Authority will issue a written addendum clarifying the matter which will be sent to all firms registered on CAMM NET under the commodity codes specified in this RFP.

2. Submitting Requests

- a. All questions, including questions that could not be specifically answered at the pre-proposal conference must be put in writing and must be received by the Authority no later than 5:00 p.m., on February 5, 2018.
- b. Requests for clarifications, questions and comments must be clearly labeled, "Written Questions". The Authority is not responsible for failure to respond to a request that has not been labeled as such.
- c. Any of the following methods of delivering written questions are acceptable as long as the questions are received no later than the date and time specified above:
 - (1) U.S. Mail: Orange County Transportation Authority, 550 South Main Street, P.O. Box 14184, Orange, California 92863-1584.
 - (2) Personal Delivery: Contracts Administration and Materials Management Department, 600 South Main Street, Lobby Receptionist, Orange, California 92868.
 - (3) Facsimile: (714) 560-5792.
 - (4) Email: sgettel@octa.net

3. Authority Responses

Responses from the Authority will be posted on CAMM NET, no later than February 12, 2018. Offerors may download responses from CAMM NET at <https://cammnet.octa.net>, or request responses be sent via U.S. Mail by emailing or faxing the request to Sonja Gettel, Senior Contract Administrator.

To receive email notification of Authority responses when they are posted on CAMM NET, firms and subconsultants must be registered on CAMM NET with at least one of the following commodity codes for this solicitation selected as part of the vendor's on-line registration profile:

<u>Category:</u>	<u>Commodity:</u>
Security, Safety and Health Services	Surveillance Services
Security, Safety & Health Equipment	Surveillance Systems
Maintenance Services - Facility Construction	Electrical Services
	Electrical Contractor Construction - Electrical Installation
Computer: Hardware & Software	Operating Systems and Network Software
	Hardware Components & Accessories

Inquiries received after 5:00 p.m. on February 5, 2018, will not be responded to.

F. SUBMISSION OF PROPOSALS

1. Date and Time

Proposals must be received in the Authority's office at or before 2:00 p.m. on February 21, 2018.

Proposals received after the above-specified date and time will be returned to Offerors unopened.

2. Address

Proposals delivered in person or by a means other than the U.S. Postal Service shall be submitted to the following:

**Orange County Transportation Authority
Contracts Administration and Materials Management (CAMM)
600 South Main Street, (Lobby Receptionist)
Orange, California 92868
Attention: Sonja Gettel, Senior Contract Administrator**

Or proposals delivered using the U.S. Postal Services shall be addressed as follows:

**Orange County Transportation Authority
Contracts Administration and Materials Management (Camm)
550 South Main Street
P.O. Box 14184
Orange, California 92863-1584
Attention: Sonja Gettel, Senior Contract Administrator**

3. Identification of Proposals

Offeror shall submit an **original and 6 copies** of its proposal in a sealed package, addressed as shown above in F.2. The outer envelope must show the Offeror's name and address and clearly marked with RFP number. In addition to the above, Proposers shall also include one (1) electronic copy of their entire RFP submittal package in "PDF" format, on a CD or DVD, or flash drive.

4. Acceptance of Proposals

- a. The Authority reserves the right to accept or reject any and all proposals, or any item or part thereof, or to waive any informalities or irregularities in proposals.
- b. The Authority reserves the right to withdraw or cancel this RFP at any time without prior notice and the Authority makes no representations that any contract will be awarded to any Offeror responding to this RFP.
- c. The Authority reserves the right to postpone proposal openings for its own convenience.
- d. Submitted proposals are not to be copyrighted.

G. PRE-CONTRACTUAL EXPENSES

The Authority shall not, in any event, be liable for any pre-contractual expenses incurred by Offeror in the preparation of its proposal. Offeror shall not include any such expenses as part of its proposal.

Pre-contractual expenses are defined as expenses incurred by Offeror in:

1. Preparing its proposal in response to this RFP;
2. Submitting that proposal to the Authority;
3. Negotiating with the Authority any matter related to this proposal; or
4. Any other expenses incurred by Offeror prior to date of award, if any, of the Agreement.

H. JOINT OFFERS

Where two or more firms desire to submit a single proposal in response to this RFP, they should do so on a prime-subcontractor basis rather than as a joint venture. The Authority intends to contract with a single firm and not with multiple firms doing business as a joint venture.

I. TAXES

Offerors' proposals are subject to State and Local sales taxes. However, the Authority is exempt from the payment of Federal Excise and Transportation Taxes.

J. PROTEST PROCEDURES

The Authority has on file a set of written protest procedures applicable to this solicitation that may be obtained by contacting the Contract Administrator responsible for this procurement. Any protests filed by an Offeror in connection with this RFP must be submitted in accordance with the Authority's written procedures.

K. CONTRACT TYPE

It is anticipated that the Agreement resulting from this solicitation, if awarded, will be a firm-fixed price contract specifying firm-fixed prices for individual tasks specified in the Scope of Work, included in this RFP as Exhibit A.

L. SAFETY SPECIFICATIONS

Offerors shall comply with Safety Specifications Level 3 as included in this RFP as Exhibit D, during the term of the awarded Agreement.

M. CONFLICT OF INTEREST

All Offerors responding to this RFP must avoid organizational conflicts of interest which would restrict full and open competition in this procurement. An organizational conflict of interest means that due to other activities, relationships or contracts, an Offeror is unable, or potentially unable to render impartial assistance or advice to the Authority; an Offeror's objectivity in performing the work identified in the Scope of Work is or might be otherwise impaired; or an Offeror has an unfair competitive advantage. Conflict of Interest issues must be fully disclosed in the Offeror's proposal.

All Offerors must disclose in their proposal and immediately throughout the course of the evaluation process if they have hired or retained an advocate to lobby Authority staff or the Board of Directors on their behalf.

Offerors hired to perform services for the Authority are prohibited from concurrently acting as an advocate for another firm who is competing for a contract with the Authority, either as a prime or subcontractor.

N. PREVAILING WAGES

This project is funded under a financial assistance contract by the U.S. Department of Transportation and is subject to all conditions of the Davis-Bacon Act (40 U.S.C. 276a) and the Labor Code of the State of California commencing in Section 1770 et. seq. It is required that all mechanics and laborers employed or working at the site be paid not less than the current basic hourly rates of pay and fringe benefits. Wage schedules are available at the Authority's Offices or on the internet At:

www.dir.ca.gov/DLSR/statistics_research.html
www.access.gpo.gov/davisbacon/.

Offerors shall utilize the relevant prevailing wage determinations in effect on the first advertisement date of the Notice of Request for Proposals. In the event there are any differences between the minimum wage rates as determined by the United States Secretary of Labor and those determined by the State of California, the highest rate must be paid.

O. CODE OF CONDUCT

All Offerors agree to comply with the Authority's Code of Conduct as it relates to Third-Party contracts which is hereby referenced and by this reference is incorporated herein. All Offerors agree to include these requirements in all of its subcontracts.

P. PRIME AND LOWER TIER DEBARMENT

Offerors are advised that by signing their proposal, they are certifying that they and their subcontractors are not debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any federal department or agency.

Q. DISADVANTAGED BUSINESS ENTERPRISE

The Authority has established a four percent (4%) Disadvantaged Business Enterprise (DBE) participation goal for the services required in this solicitation.

R. "BUY AMERICA" REQUIREMENTS

If the proposed price is greater than one hundred and fifty thousand dollars (\$150,000), Offeror is required to complete the form titled "Bidder's Certificate Regarding 'Buy America' Requirements for Steel, Iron, or Manufactured Products." This form requires Offeror to certify that it will meet the requirements of 49 U.S.C. 5323(j) and the applicable regulations in 49 C.F.R. Part 661.

S. PERMITS AND INSPECTION COSTS

Successful bidder shall procure all permits and licenses; pay all charges, assessments and fees, as may be required by the ordinances and regulations of the public agencies having jurisdiction over the areas in which the work is located, and shall comply with all the terms and conditions thereof and with all lawful orders and regulations of each such public agency relating to construction operations under the jurisdiction of such agency.

T. EXECUTION OF CONTRACT

The successful Offeror shall submit to the Authority the required performance and payments bonds, and acceptable insurance certificates, as required by the proposed Agreement and as shown as forms **L and M**, within (10) calendar days after notification of contract award from the Authority. Failure to sign the contract and submit applicable bonds, and acceptable insurance certificates within the specified time shall be cause to cancel the award. Transfers of contract, or of interest in contracts, are prohibited.

Additionally, at Authority's sole discretion, a letter of Guaranty may be requested from Offerors if deemed necessary.

U. LIQUIDATED DAMAGES

The Authority reserves the right to assess liquidated damages related to CONTRACTOR's performance, time and schedule and delay against the CONTRACTOR, as detailed in the Proposed Agreement included in this RFP as Exhibit C.

V. PUBLIC RECORDS AND INFORMATION

Proposals received by Authority are considered public information and will be made available to the public if requested to do so. In no event shall the Authority or any of its agents, representatives, consultants, directors, officers, or employees be liable to an Offeror for the disclosure of any materials or information submitted in response to the RFP.

SECTION II: PROPOSAL CONTENT

SECTION II. PROPOSAL CONTENT

A. PROPOSAL FORMAT AND CONTENT

1. Format

Proposals should be typed with a standard 12-point font, double-spaced and submitted on 8 1/2" x 11" size paper, using a single method of fastening. Charts and schedules may be included in 11"x17" format. Proposals should not include any unnecessarily elaborate or promotional materials. Proposals should not exceed fifty (50) pages in length, excluding any appendices, cover letters, resumes, or forms.

2. Letter of Transmittal

The Letter of Transmittal shall be addressed to Sonja Gettel, Senior Contract Administrator and must, at a minimum, contain the following:

- a. Identification of Offeror that will have contractual responsibility with the Authority. Identification shall include legal name of company, corporate address, telephone and fax number, and email address. Include name, title, address, email address, and telephone number of the contact person identified during period of proposal evaluation.
- b. Identification of all proposed subcontractors/subconsultants including legal name of company, whether the firm is a Disadvantaged Business Enterprise (DBE), contact person's name and address, phone number and fax number, and email address; relationship between Offeror and subcontractors, if applicable.
- c. Acknowledgement of receipt of all RFP addenda, if any.
- d. A statement to the effect that the proposal shall remain valid for a period of not less than 120 days from the date of submittal.
- e. Signature of a person authorized to bind Offeror to the terms of the proposal.
- f. Signed statement attesting that all information submitted with the proposal is true and correct.

3. Technical Proposal

- a. Qualifications, Related Experience and References of Offeror

This section of the proposal should establish the ability of Offeror to satisfactorily perform the required work by reasons of: experience in

performing work of a similar nature; demonstrated competence in the services to be provided; strength and stability of the firm; staffing capability; work load; record of meeting schedules on similar projects; and supportive client references.

Offeror to:

- (1) Provide a brief profile of the firm, including the types of services offered; the year founded; form of the organization (corporation, partnership, sole proprietorship); number, size and location of offices; and number of employees.
- (2) Provide a general description of the firm's financial condition and identify any conditions (e.g., bankruptcy, pending litigation, planned office closures, impending merger) that may impede Offeror's ability to complete the project.
- (3) Describe the firm's experience in performing work of a similar nature to that solicited in this RFP, and highlight the participation in such work by the key personnel proposed for assignment to this project.
- (4) Identify subcontractors by company name, address, contact person, telephone number, email, and project function. Describe Offeror's experience working with each subcontractor.
- (5) Identify all firms hired or retained to provide lobbying or advocating services on behalf of the Offeror by company name, address, contact person, telephone number and email address. This information is required to be provided by the Offeror immediately during the evaluation process, if a lobbyist or advocate is hired or retained.
- (6) Provide as a minimum three (3) references for the projects cited as related experience, and furnish the name, title, address, telephone number, and email address of the person(s) at the client organization who is most knowledgeable about the work performed. Offeror may also supply references from other work not cited in this section as related experience.

b. Proposed Staffing and Project Organization

This section of the proposal should establish the method, which will be used by the Offeror to manage the project as well as identify key personnel assigned.

Offeror to:

- (1) Identify key personnel proposed to perform the work in the specified tasks and include major areas of subcontract work. Include the person's name, current location, proposed position for this project, current assignment, level of commitment to that assignment, availability for this assignment and how long each person has been with the firm.
- (2) Furnish brief resumes (not more than two [2] pages each) for the proposed Project Manager and other key personnel that includes education, experience, and applicable professional credentials.
- (3) Indicate adequacy of labor resources utilizing a table projecting the labor-hour allocation to the project by individual task.
- (4) Include a project organization chart, which clearly delineates communication/reporting relationships among the project staff.
- (5) Include a statement that key personnel will be available to the extent proposed for the duration of the project acknowledging that no person designated as "key" to the project shall be removed or replaced without the prior written concurrence of the Authority.

c. Work Plan

Offeror should provide a narrative, which addresses the Scope of Work, and shows Offeror's understanding of Authority's needs and requirements.

Offeror to:

- (1) Describe the approach to completing the tasks specified in the Scope of Work. The approach to the work plan shall be of such detail to demonstrate the Offeror's ability to accomplish the project objectives and overall schedule.
- (2) Outline sequentially the activities that would be undertaken in completing the tasks and specify who would perform them.
- (3) Furnish a project schedule for completing the tasks in terms of elapsed weeks.
- (4) Identify methods that Offeror will use to ensure quality control as well as budget and schedule control for the project.

- (5) Identify any special issues or problems that are likely to be encountered in this project and how the Offeror would propose to address them.
- (6) Offeror is encouraged to propose enhancements or procedural or technical innovations to the Scope of Work that do not materially deviate from the objectives or required content of the project.

d. Exceptions/Deviations

State any technical and/or contractual exceptions and/or deviations from the requirements of this RFP, including the Authority's technical requirements and contractual terms and conditions set forth in the Scope of Work (Exhibit A) and Proposed Agreement (Exhibit C), using the form entitled "Proposal Exceptions and/or Deviations" included in this RFP. This Proposal Exceptions and/or Deviations form must be included in the original proposal submitted by the Offeror. If no technical or contractual exceptions and/or deviations are submitted as part of the original proposal, Offerors are deemed to have accepted the Authority's technical requirements and contractual terms and conditions set forth in the Scope of Work (Exhibit A) and Proposed Agreement (Exhibit C). Offerors will not be allowed to submit the Proposal Exceptions and/or Deviations form or any technical and/or contractual exceptions after the proposal submittal date identified in the RFP. Exceptions and/or deviations submitted after the proposal submittal date will not be reviewed by Authority.

All exceptions and/or deviations will be reviewed by the Authority and will be assigned a "pass" or "fail" status. Exceptions and deviations that "pass" do not mean that the Authority has accepted the change but that it is a potential negotiable issue. Exceptions and deviations that receive a "fail" status means that the requested change is not something that the Authority would consider a potential negotiable issue. Offerors that receive a "fail" status on their exceptions and/or deviations will be notified by the Authority and will be allowed to retract the exception and/or deviation and continue in the evaluation process. Any exceptions and/or deviation that receive a "fail" status and the Offeror cannot or does not retract the requested change may result in the firm being eliminated from further evaluation.

4. Cost and Price Proposal- Exhibit B

As part of the cost and price proposal, the Offeror shall submit proposed pricing to provide the services for each work task described in Exhibit A, Scope of Work.

The Offeror shall complete the "Price Summary Sheet" form included with this RFP (Exhibit B), and furnish any narrative required to explain the prices quoted in the schedules. It is anticipated that the Authority will issue a firm-fixed-price contract specifying firm-fixed-prices for individual tasks.

5. Appendices

Information considered by Offeror to be pertinent to this project and which has not been specifically solicited in any of the aforementioned sections may be placed in a separate appendix section. Offerors are cautioned, however, that this does not constitute an invitation to submit large amounts of extraneous materials. Appendices should be relevant and brief.

B. FORMS

1. Campaign Contribution Disclosure Form – Exhibit E

In conformance with the statutory requirements of the State of California Government Code Section 84308, part of the Political Reform Act and Title 2, California Code of Regulations 18438 through 18438.8, regarding campaign contributions to members of appointed Boards of Directors, Offeror is required to complete and sign the Campaign Contribution Disclosure Form provided in this RFP and submit as part of the proposal. Offeror is required to submit only one copy of the completed form(s) as part of its proposal and it should be included in only the original proposal. The prime consultant, subcontractors, lobbyists and agents are required to report all campaign contributions from the proposal submittal date up and until the Board of Directors makes a selection, which is currently scheduled for May 25, 2018.

2. Status of Past and Present Contracts Form – Exhibit F

Offeror shall complete and sign the form entitled "Status of Past and Present Contracts" provided in this RFP and submit as part of its proposal. Offeror shall identify the status of past and present contracts where the firm has either provided services as a prime vendor or a subcontractor during the past five (5) years in which the contract has been the subject of or may be involved in litigation with the contracting authority. This includes, but is not limited to, claims, settlement agreements, arbitrations, administrative proceedings, and investigations arising out of the contract. Offeror shall have an ongoing obligation to update the Authority with any changes to the

identified contracts and any new litigation, claims, settlement agreements, arbitrations, administrative proceedings, or investigations that arise subsequent to the submission of Offeror's proposal.

A separate form must be completed for each identified contract. Each form must be signed by the Offeror confirming that the information provided is true and accurate. Offeror is required to submit one copy of the completed form(s) as part of its proposals and it should be included in only the original proposal.

3. Disadvantaged Business Enterprise Program and Forms – Exhibit G

Bidders shall complete the following forms set forth in “DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROVISIONS FOR DOT-ASSISTED CONTRACTS”:

- DBE Participation Commitment(s) Form
- Bidders List
- DBE Information – Good Faith Efforts

4. Restrictions on Lobbying Form – Exhibit H

As a recipient of federal funds, the Authority is required to certify compliance with the influencing restrictions and efforts of Offeror to influence federal officials regarding specific procurements in excess of \$100,000 that must be disclosed pursuant to section 1352, Title 31, U.S. Code.

This RFP includes, under Exhibit H, the following: a certification form entitled “Certification of Restrictions on Lobbying,” the office of Management and Budget (OMB) Standard Form LLL entitled “Disclosure of Lobbying Activities,” and a document entitled “Limitation on Payments to Influence Certain Federal Transactions.”

The Offeror to this solicitation will be required to complete and submit to the Authority in their proposal, the certification form entitled “Certification of Restrictions on Lobbying” whether or not any lobbying efforts took place. If the Offeror did engage in lobbying activities, then OMB Standard Form LLL “Disclosure of Lobbying Activities” must also be completed and submitted to the Authority.

5. Bidders Certificate Regarding “Buy America” Form – Exhibit I

If the proposed price is greater than one hundred and fifty thousand dollars (\$150,000), Offeror is required to complete the form titled “Bidder’s Certificate Regarding ‘Buy America’ Requirements for Steel, Iron, or Manufactured Products.” This form requires Offeror to certify that it will

meet the requirements of 49 U.S.C. 5323(j) and the applicable regulations in 49 C.F.R. Part 661.

6. Certification of Consultant Commission and Fees – Exhibit J

In receiving federal funds, Offerors are required to complete the Certification of Consultants, Commissions and Fees form. This form is to be included with the Offeror's proposal.

7. Proposal Exceptions and/or Deviation Form – Exhibit K

Offerors shall complete the form entitled "Proposal Exceptions and/or Deviations" provided in this RFP and submit it as part of the original proposal. For each exception and/or deviation, a new form should be used, identifying the exception and/or deviation and the rationale for requesting the change. Exceptions and/or deviations submitted after the proposal submittal date will not be reviewed nor considered by the Authority.

8. Contractual Exhibits/ Post Award Submittals

8.1 Performance Bond – Exhibit L

The successful bidder shall furnish at its own expense a Performance Bond (Exhibit E) satisfactory to the Authority in the amount of one hundred percent (100%) of the full amount of the contract as a guarantee of good faith on behalf of the Contractor that the terms of the contract, including all warranty provisions, shall be complied with in every particular. The bond shall be issued by a corporation surety (not an individual surety) required in the state of California and registered to do business in the county of Orange. The bond shall not be issued from a corporation surety that requires a funds control, funds disbursement, or funds administration company for the issuance of the performance bond.

The bond shall specifically provide that if the Contractor, or its subcontractor, fails to fully perform that the surety or sureties will pay for the same in an amount not exceeding the amount specified in the bond and in case suit is brought against the Authority, that the surety will undertake the defense of same.

8.2 Payment Bond – Exhibit M

The successful bidder shall furnish a Payment Bond (Exhibit F) satisfactory to the Authority in the amount of one hundred percent (100%) of the full amount of the contract. Such bonds shall be in effect during the entire term of the contract and warranty and shall be issued directly by a corporate surety (not an individual surety) registered in the state of California and registered to do business in the county of Orange. The bond shall not be issued from a corporation surety that requires a funds control, funds disbursement, or funds administration company for

the issuance of the performance bond.

The bond shall specifically provide that if the Contractor fails to pay for amounts due under the Employment Insurance Act that the surety or sureties will pay for the same in an amount not exceeding the amount specified in the bond and in case suit is brought against the Authority, that the surety will undertake the defense of same.

Pursuant to California Civil Code sections 9550 through 9554, in conjunction with the Bond and Undertaking Law (Code of Civil Procedure sections 995.010, et. seq.), Bidders must provide the following information as part of their payment bond; a certificate of Authority from the Orange County Clerks Office indicating that the insurer has not been surrendered, revoked, canceled, annulled, or suspended or, in the event that it has, that renewed Authority has been granted.

SECTION III: EVALUATION AND AWARD

SECTION III. EVALUATION AND AWARD

A. EVALUATION CRITERIA

The Authority will evaluate the offers received based on the following criteria:

- 1. Qualifications of the Firm 20%**

Technical experience in performing work of a closely similar nature; experience working with public agencies; strength and stability of the firm; strength, stability, experience and technical competence of subcontractors; assessment by client references.
- 2. Staffing and Project Organization 30%**

Qualifications of project staff, particularly key personnel and especially the Project Manager; key personnel's level of involvement in performing related work cited in "Qualifications of the Firm" section; logic of project organization; adequacy of labor commitment; concurrence in the restrictions on changes in key personnel.
- 3. Work Plan 30%**

Depth of Offeror's understanding of Authority's requirements and overall quality of work plan; logic, clarity and specificity of work plan; appropriateness of resource allocation among the tasks; reasonableness of proposed schedule; utility of suggested technical or procedural innovations.
- 4. Cost and Price 20%**

Reasonableness of the total price as well as the individual tasks; competitiveness with other offers received; adequacy of data in support of figures quoted.

B. EVALUATION PROCEDURE

An evaluation committee will be appointed to review all proposals received for this RFP. The committee is comprised of Authority staff and may include outside personnel. The committee members will evaluate the written proposals using criteria identified in Section III A. A list of top ranked proposals, firms within a competitive range, will be developed based upon the totals of each committee members' score for each proposal.

During the evaluation period, the Authority may interview some or all of the proposing firms. The Authority has established March 26, 2018, as the date to conduct interviews. All prospective Offerors are asked to keep this date available. No other interview dates will be provided, therefore, if an Offeror is unable to attend

the interview on this date, its proposal may be eliminated from further discussion. The interview may consist of a short presentation by the Offeror after which the evaluation committee will ask questions related to the firm's proposal and qualifications.

At the conclusion of the proposal evaluations, Offerors remaining within the competitive range may be asked to submit a Best and Final Offer (BAFO). In the BAFO request, the firms may be asked to provide additional information, confirm or clarify issues and submit a final cost/price offer. A deadline for submission will be stipulated.

At the conclusion of the evaluation process, the evaluation committee will recommend to the Transit Committee, the Offeror with the highest final ranking or a short list of top ranked firms within the competitive range whose proposal(s) is most advantageous to the Authority. The Transit Committee will review the evaluation committee's recommendation and forward its decision to the full Board of Directors for final action.

C. AWARD

The Authority will evaluate the proposals received and will submit, with approval of the Transit Committee, the proposal considered to be the most competitive to the Authority's Board of Directors, for consideration and selection. The Authority may also negotiate contract terms with the selected Offeror prior to award, and expressly reserves the right to negotiate with several Offerors simultaneously and, thereafter, to award a contract to the Offeror offering the most favorable terms to the Authority.

The Authority reserves the right to award its total requirements to one Offeror or to apportion those requirements among several Offerors as the Authority may deem to be in its best interest. In addition, negotiations may or may not be conducted with Offerors; therefore, the proposal submitted should contain Offeror's most favorable terms and conditions, since the selection and award may be made without discussion with any Offeror.

The selected offeror will be required to submit to the Authority's Accounting department a current IRS W-9 form prior to commencing work.

D. NOTIFICATION OF AWARD AND DEBRIEFING

Offerors who submit a proposal in response to this RFP shall be notified via CAMM NET of the contract award. Such notification shall be made within three (3) business days of the date the contract is awarded.

Offerors who were not awarded the contract may obtain a debriefing concerning the strengths and weaknesses of their proposal. Unsuccessful Offerors, who wish to be debriefed, must request the debriefing in writing or electronic mail and the

Authority must receive it within three (3) business days of notification of the contract award.

EXHIBIT A: SCOPE OF WORK



ORANGE COUNTY TRANSPORTATION AUTHORITY

**INSTALLATION OF
VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE
BUS BASES**

**STATEMENT OF WORK, REQUIREMENTS
AND PROJECT SPECIFICATIONS**

RFP 7-2138

January 2018

ORANGE COUNTY TRANSPORTATION AUTHORITY
INSTALLATION OF VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE BUS BASES

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**SECTION 01 11 00
SUMMARY OF WORK**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Contract documents: The Contractor shall obtain all copies of the RFP documents including all addenda through the OCTA CAMMNET website, as required to perform the work. The cost for obtaining any additional documents required for the contractor shall be included in the proposal and no additional compensation will be allowed.
- B. All drawings, specifications, and other contract documents, and copies furnished by the Authority are its property. They are not to be used on other work and with the exception of signed contract sets are to be returned to the Authority upon request at the completion of the work. The location of the work, its general nature and extent, and the form and general dimensions of the project and appurtenant works are shown on the contract drawings which are hereby made a part of these specifications as listed herein.
- C. The general intent of the contract, specifications, drawings, and other contract documents is that the Contractor shall:
 - 1. Furnish tools, qualified labor, material, equipment, qualified superintendence, and services, assurances and guarantees, and assumptions of risk and responsibility, necessary for the performance of the Work as set forth in the contract documents unless otherwise specifically provided.
 - 2. Begin work promptly and proceed expeditiously and continuously without cessation or shutdown of Work unless otherwise specifically approved in writing by the OCTA Engineer, or directed by the contract documents.
 - 3. Perform, complete, and make ready for its intended purpose, within the times specified, including additional times provided for certain conditions, the work or parts thereof covered by the contract, all in accordance with drawings, specifications, and modifications thereto and directions or instructions the OCTA Engineer may give to supplement the drawings and specifications. The Contractor shall retain sole responsibility and expense for quality control of the work.
- D. Words and abbreviations which have well-known technical or trade meanings are used in the contract documents in accordance with such recognized meanings.
- E. The organization of the specifications into divisions, sections, parts, and paragraphs, and the arrangement of the drawings, shall not control the Contractor in dividing the work among subcontractors or in establishing the extent of work to be performed by any trade. Study and compare the contract documents and immediately report to the OCTA Engineer any error, inconsistency, or omission that may be discovered.

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- Contractor shall be liable to OCTA for damage resulting from unreported errors, inconsistencies, or omissions in the contract documents.
- F. It will be the responsibility of the Contractor to stage the construction activities at the project site, using the Site Specific Work Plan process (SSWP)
- G. Ownership of Materials:
1. Materials furnished by the Contractor under this contract shall become the property of the OCTA.
- H. General Summary of Work:
1. The project work consists of installation of labor, materials, equipment, supplies, testing and accessories required to complete installation of video surveillance system at OCTA Santa Ana bus base located at 4301 West MacArthur Boulevard, Santa Ana, CA 92704 and Garden Grove bus base located at 11790 Cardinal Circle, Garden Grove, CA 92843 as shown on drawings and detailed in the specifications.
 2. The descriptions provided in this section are general in nature and are not meant to detail all work required by the contract documents.
- I. Other features of the work include, but are not limited to, the following:
1. Complete mobilization and demobilization.
 2. Obtaining of necessary construction and related permits from various jurisdictional agencies. Contractor shall be responsible for all related fees from various jurisdictional agencies.
 3. Obtain and pay for all licenses required by all jurisdictions associated with the approval and requirements of the project.

1.02 INTENT OF DRAWINGS AND SPECIFICATIONS

- A. The intent of the drawings and specifications is to prescribe the details for construction and completion of the work that the Contractor undertakes to perform in accordance with the terms of the Contract. Camera locations shown on plans are subject to final approval by OCTA prior to installation. Where the drawings or specifications describe portions of the work in general terms, but not complete detail, it is understood that only the best industry practice is to prevail and that only materials and workmanship of the first quality are to be used. Unless otherwise specified, the Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and perform all the work involved in executing the contract in a satisfactory and workmanlike manner.

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- B. Drawings and specifications are essential parts of the Contract, and a requirement indicated in one is binding as though indicated in all. They are intended to be complementary and to describe and provide for the complete work.
- C. Summaries or introductory descriptions of the work of individual sections do not limit requirements. The Contractor's responsibilities include all requirements for proper execution of the work.
- D. Division 01 of the specifications governs all divisions. Comply with Division 01 requirements whether or not referenced in individual sections in Divisions 26-28.
- E. References to the singular include the plural and do not imply that only one unit of a product is required.
- F. Unless an object or activity is specified to be less than the total, the quantity or amount is all of the object or activity.
- G. Unless a requirement is specified to apply for a limited time, it applies for the duration of the work.
- H. "Including," "such as," "as follows," and similar terms do not limit the meaning to only items listed. The phrase "but not limited to" is understood to follow these expressions.
- I. All items in a list apply unless the items are specified as choices.

1.03 REFERENCE MATERIAL

- A. Reference specifications or standards referred to in the plans or specifications shall be the most recent version developed as of Contract award. Where referenced standards refer to the "specifications" or the "special conditions," this shall be understood by Contractor to mean the drawings and specifications of this contract. Contractor is responsible to obtain all reference material at its own expense and to make itself familiar with the requirements therein.

1.04 PROJECT ACCESS AND CONTRACT LIMITS

- A. Contractor shall submit a Traffic Management Plan as required on Section 01 14 43 Environmental Resource Protection, outlining access to the job site and maintaining the facility operational at all times.
- B. Construction activity shall be within the normal work hours between 7:00 am to 3:30 pm Monday through Friday. Construction area shall be cordoned off using temporary barriers and chain link fencing unless otherwise noted on Contract Drawings. See project plans for additional information on phasing and work windows.

PART 2 – PRODUCTS

Not Used

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PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

**SECTION 01 14 22
RULES AND HOURS OF OPERATION**

PART 1 – GENERAL

1.01 SUMMARY

- A. This section outlines rules and hours of operation to which Contractor shall conform during the execution of the work under this contract. It is Contractor's responsibility to ensure that these rules are acceptable to OCTA.

1.02 REFERENCE STANDARDS

- A. Comply with the provisions of applicable local, State, and Federal codes, standard plans and specifications, and recommended practices, and with OCTA policy, including:
 - 1. SSPWC: Public Works Standards, Inc., Standard Specifications for Public Works Construction.
 - 2. Caltrans: California Department of Transportation, Trenching and Shoring Manual.
 - 3. Cal/OSHA: California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) regulations.
 - 4. OSHA: Federal Occupational Safety and Health Administration regulations.

1.03 SUBMITTALS

- A. Site Specific Work Plan (SSWP) containing the information specified herein.

1.04 PROJECT COORDINATION

- A. Cooperate with the OCTA Project Manager in all matters requiring coordination.
- B. Coordinate execution of the work with the OCTA Project Manager to eliminate or minimize to the greatest extent possible interference with bus operations.
- C. Keep OCTA Project Manager fully informed regarding all work.

1.05 CONTRACTOR'S RESPONSIBILITY

- A. Perform work in accordance with the contract and all applicable codes, ordinances, rules, regulations, orders, and other legal requirements of governmental bodies and public agencies having jurisdiction, including the OCTA.
- B. Damage caused by Contractor to third-party property, signal and communications equipment, or other facilities shall be repaired at Contractor's expense to a condition equal or better than the condition prior to Contractor entry and as accepted by the OCTA Project Manager. At the sole discretion of the OCTA Project Manager, the OCTA Project Manager may direct repairs to be performed by other contractors. Charges for those repairs shall be deducted from Contractor's payment due under this Contract.
- C. Items shown on the drawings to be protected in place, or not identified as part of demolitions, removals, or modifications, shall be protected in place in accordance with SSPWC Section 7-9, Protection and Restoration of Existing Improvements, at no additional cost to the OCTA.
- D. Perform work within the operating envelope or which affects the operating system only after submitting a Site Specific Work Plan (SSWP) and receiving written approval of the SSWP from the OCTA Project Manager.
- E. Furnish all labor, materials, and equipment as required to perform and complete the work within the work windows in accordance with the approved schedule in the SSWP.

1.06 SSWP – GENERAL CONTRACTOR REQUIREMENTS

- A. SSWPs with potential to impact normal functioning of any part of the operating system shall include a detailed schedule of events indicating the expected hourly progress of each activity that has duration of one hour or longer. The schedule shall include a time at which each activity planned under the SSWP and the requested work window will be completed. The total duration of the construction activities shall be less than the approved work window. Contractor's failure to complete scheduled activities by the planned time or to put in place an approved contingency plan may adversely impact the operations of the bus base.
- B. The SSWP shall be prepared by the Contractor and shall include the following information:
 - 1. All activities necessary to perform construction activities.
 - 2. Conformance with all other requirements applicable under the contract documents.
 - 3. A schedule for the work showing each activity and where and how it affects normal operation. Each activity in the plan shall include all labor, materials, and equipment required to complete the activity within the OCTA allotted time period.

4. List of approved proposed work plans to be performed under the SSWP, with names and phone numbers of Contractor's supervisors in charge of SSWP tasks.
- C. SSWPs must be of sufficient details, clarity, and organization to permit easy review and approval by the OCTA Project Manager before the proposed work is performed. SSWPs shall be submitted to the OCTA Project Manager as follows:
 1. At least 14 calendar days prior to start of work.
- D. The OCTA Project Manager may request explanations and changes to the SSWP to conform the SSWP to the requirements of the contract documents. If the SSWP is not acceptable, Contractor shall revise the SSWP to make it acceptable. Contractor is responsible for submitting a revised SSWP that can be reviewed and approved by the OCTA at least seven days in advance of any work.
- E. Contractor will be informed if the SSWP is acceptable not less than seven calendar days prior to the scheduled start of work within the operating envelope. Once the SSWP is accepted, Contractor shall assemble the resources necessary to perform the work represented by the SSWP, so that necessary resources are available one day before the work is to be accomplished. At that time, the OCTA Project Manager will make a final decision as to whether or not the work is to proceed as planned or will be canceled. The prime consideration will be the stage of readiness of Contractor, which Contractor shall demonstrate to the OCTA Project Manager.

1.07 SSWP – SPECIAL CONTRACTOR REQUIREMENTS

- A. Contractor shall provide sufficient personnel, equipment, materials, and all other resources necessary to return impacted facilities to full service upon the conclusion of the approved work window.
- B. Contractor shall perform the work expeditiously and continuously with no gaps or breaks in work activities or substantive reductions in the labor force, equipment, and materials necessary to construct, reconstruct, or repair the impacted facility to full service upon conclusion of the approved work window.
- C. In general, open excavation areas shall be protected per OSHA regulations.

1.08 WORK WINDOWS - GENERAL

- A. Site-specific available work windows shall be as approved by the OCTA Project Manager under established procedures.
- B. Construction hours shall be limited to 7:00 am to 3:30 pm Monday through Friday unless approved in writing in advance by OCTA and appropriate regulatory agencies.

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PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

No payment will be made to Contractor for work of this section.

END OF SECTION

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SECTION 01 14 23

COORDINATION WITH OCTA AND LOCAL AGENCIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements for coordination with OCTA and Local Agencies.

1.02 REGULATIONS

- A. If additional work is being performed by others, on or adjacent to the work site for this Contract, coordinate work with other activities in order to avoid conflicts.

1.03 COORDINATION

- A. Coordination: Contractor shall coordinate the Work as stated in the Conditions of the Contract.
- B. Relationship of Contract Documents: Drawings, Specifications and other Contract Documents are intended to be complementary. What is required by one shall be as if required by all. What is shown or required, or may be reasonably inferred to be required, or which is usually and customarily provided for similar work, shall be included in the Work.
- C. Discrepancies in Contract Documents: In the event of error, omission, ambiguity or conflict in the Drawings or Specifications, Contractor shall bring the matter to the OCTA's attention in timely manner, for the OCTA's determination and direction in accordance with provisions of the Conditions of the Contract.
- D. Construction Interfacing and Coordination: Layout, Phasing, and Sequencing of Work shall be solely the Contractor's responsibility. Contractor shall bring together the various parts, components, systems and assemblies as required for the correct interfacing and integration of all elements of Work. Contractor shall coordinate Work to correctly and accurately connect abutting, adjoining, overlapping and related elements, including utilities, for a complete operational system to the satisfaction of the OCTA, agencies, and companies. Provide adequate access for OCTA buses to pass through all areas at all times. Do not block non-construction areas.
- E. Contractor shall notify OCTA a minimum of three (3) working days before excavation begin. The work shall be construction in phases where indicated on the contract drawings or specifications. A phase shall be completed and operational before proceeding to the next phase.
- F. The Contractor shall cooperate fully with all forces of the Authority. Contractor should note that additional work is being conducted on site with other construction contracts

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and work of this contract must be coordinated amounts the trades and not additional compensation will be allowed for this coordination work.

- G. Unless otherwise directed, provide five (5) days notice of all utility outages and shutdowns. Duration of outages and shutdowns shall not hinder normal operations and maintenance of the facility. In case of accidental damage to power or utility lines, repair power or utility line immediately, provide alternate source of power to keep facility operation during the repair period.

1.04 GENERAL REQUIREMENTS

- A. Adhere to work window rules detailed in the approved SSWP under Section 01 14 22, Rules and Hours of Operation and the specifications.
- B. See Section 01 14 22, Rules and Hours of Operation

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

SECTION 01 14 25

PROCEDURES IN CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Procedures used in performance of work of a general nature, including work by Contractor, Contractor use of work site, work zone limitations of site, and pollution controls.

B. Related Sections:

1. Section 01 14 23, Rules and Hour of Operation.
2. Section 01 14 27, Legal Relations and Responsibility.

1.02 WORK BY CONTRACTOR

- A. Provide work reasonably inferred from the drawings and specifications as being required to produce the intended result whether or not specifically called for.
- B. Work, materials, or equipment described in words which have known technical or trade meaning shall be deemed to carry the accepted meaning of recognized standards.
- C. Complete all work enumerated under the contract including but not limited to the following:
 1. Perform work set forth in the contract documents, including the drawings and specifications.
 2. Obtain required permits, inspections, and certifications for material compliance.

1.03 SUBMITTALS

- A. All required submittals per OCTA Level 3 Health, Safety and Environmental Specification.
- B. Material Safety Data Sheets (MSDSs).

1.04 STORM WATER MANAGEMENT

- A. Contractor is responsible for preventing and/or mitigating potential chemical releases, erosion and sedimentation impacts associated with storm water runoff. Contractor shall comply with OCTA's bus base industrial SWPPP and comply with the Statewide General Permit for Storm Water Discharges Associated with Industrial Activities (IGP) order number 2014-0057-DWQ or the latest order (See link below). Contractor shall prepare and submit a best management practices (BMP) plan for OCTA's review and acceptance; and shall implement BMP plan and maintain the BMPs for the duration of the project. See Section 01 57 13, Temporary Erosion and Sedimentation Control, for additional requirements.
http://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2014/wqo2014_0057_dwq_rev_mar2015.pdf.
- B. Use best management practices (BMPs) Contractor proposes in connection with the execution of construction activity at the project site. Use BMPs included in the Construction Site Best Management Practices (BMP) Manual prepared by the California Stormwater Quality Association, www.cabmphandbooks.com.
- C. Provide copies of the contractor's BMP plan to subcontractors and keep a copy available onsite at the project office. Provide amendments to the BMP plan when there is a change in construction or operations, or where storm water runoff conditions may affect the discharge of significant quantities of pollutants to surface waters, groundwater, or separate municipal storm sewer systems. Submit the amended BMP plan to the OCTA for review and acceptance as soon as practicable, and retain the amended plan on site.
- D. Preparation and implementation of an OCTA-accepted BMP plan does not relieve the Contractor or subcontractors of their responsibilities to comply with state, county, and local governmental requirements, including those for storm water management and non-point source runoff controls.

1.05 MATERIAL SAFETY DATA SHEETS (MSDS)

- A. Material Safety Data Sheets (MSDSs) are prepared by manufacturers and suppliers of products that contain hazardous materials. Hazardous material is defined as any substance which is a physical or health hazard, or is included in the Cal/OSHA Director's List of Hazardous Substances, or is listed by the California EPA Office of Environmental Health Hazard Assessment under Title 27 of the California Code of Regulations, Section 27001, Chemicals Known to the State to Cause Cancer or Reproductive Toxicity.
- B. No hazardous materials shall be delivered, stored, or used at any work site or facility unless they are properly labeled, tagged, or marked and a copy of the MSDS has been provided to the OCTA. Provide a copy of any updated MSDS to the Engineer immediately.

- C. Maintain a file of MSDSs at the work site. Keep MSDS files current; add new or updated MSDSs immediately and provide a copy to the OCTA.
- D. See Contract Documents for OCTA Level 3 Health, Safety, and Environmental Specifications for additional requirements.

1.06 CONTRACTOR USE OF WORK SITE

- A. Coordinate access, use, and preparation of facilities adjacent to project areas with owners and agencies. Coordination shall include but not be limited to the following:
 - 1. Staging and laydown areas for use under this Contract are as specified or shown on the Drawings. Staging and laydown areas not covered in the Contract Documents shall be requested in writing and approved by the OCTA. The OCTA may or may not grant approval. No equipment may be operated or materials stored or placed for any period of time in unfenced areas. Provide a fence to enclose each laydown or staging area within the right-of-way. Furnish the OCTA with photographs of all staging and laydown areas to document their condition prior to start of work.
 - 2. Contractor shall submit construction staging plan as a part of SSWP for review and approval by OCTA. The staging plan must be accepted by the OCTA prior to undertaking work in accordance with the staging plan.
 - 3. Prior to demobilization, restore to full serviceability fences, walls, signs, and gates affected by Contractor's access to the right-of-way.
- B. Confine work site operations to areas permitted by law, ordinances, permits, and the contract.
- C. Consider the safety of the work, OCTA patrons and property on and adjacent to the work site when determining amount, location, movement, and use of materials and equipment on work site.
- D. Do not load work site with excessive amounts of material, equipment, or other items which have the potential to interfere with the work or with bus base operations.
- E. Protect products, equipment, and materials stored on work site.
- F. Coordinate operations and secure from property owners at no cost to OCTA additional storage or work areas as needed for proper execution of the work. Adhere to the noise levels and work hours of local ordinances.
- G. Protect the general public from work-related activities, and do not unnecessarily inconvenience those persons by work activities.
- H. Submit proposed locations of staging areas for OCTA's approval.

- I. Preserve drainage facilities throughout the duration of the work so that there is no ponding or accumulation of water in any work site area, there is no flow of water diverted out of normal drainage channels. Maintain culvert inlets and outlets free of debris.
- J. Preserve existing right-of-way fences and walls, and replace any fences or walls damaged during the work to the satisfaction of the owner(s) of the fences or walls.
- K. Provide and maintain barriers and chain link fence around the work area as shown on the contract drawings.

1.07 WORK ZONE LIMITATIONS OF SITE

- A. In addition to site utilization limitations and requirements indicated in contract documents, divide available space equitably among subcontractors and other entities needing access and space so as to provide best overall efficiency in performance of total work of the project.
- B. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site, with minimal disruption to adjoining property owners and operations. Pick-up and delivery shall be conducted only during normal working hours and as approved by OCTA. Contractor shall give OCTA 48 hours notice prior to delivery of equipment or materials to the project site.

1.08 POLLUTION CONTROLS

- A. Conduct operations for the execution of the project in compliance with applicable Federal, State, and local regulations controlling pollution and noise levels related to construction work, in accordance with Section 01 14 27, Legal Relations and Responsibility.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

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PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

SECTION 01 14 27

LEGAL RELATIONS AND RESPONSIBILITY

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Laws to be observed, fire prevention, protection of premises, use of explosives, access roads, construction roads, waste control, public relations, and pollution controls.
2. This section complements requirements in other sections.

1.02 LAWS TO BE OBSERVED

- A. Keep fully informed of State and Federal laws; county, municipal, and other local ordinances; regulations; and orders of authorities having jurisdiction that affect those engaged in the work, materials used in the work, or conduct of the work.
- B. Observe and comply with laws, ordinances, regulations, and orders of authorities having jurisdiction over the work. Contractor's responsibilities include causing Contractor's agents, employees, subcontractors, and visitors to observe and comply with these laws, ordinances, regulations, and orders.
- C. Protect and indemnify OCTA and its officers and employees against claims and liabilities arising from or based on Contractor's violation of a law, ordinance, regulation, or order.
- D. Report to the OCTA, in writing within two days of discovery, discrepancies or inconsistencies discovered in the drawings, specifications, or contract documents in relation to laws, ordinances, regulations, or orders.

1.03 COORDINATION WITH UTILITIES

- A. Coordinate with utility companies to ensure that utility locations are clearly marked for the duration of construction activities.

1.04 FIRE PROTECTION

- A. Comply with Federal, State, county, municipal, and other laws and regulations pertaining to the prevention, control, and fighting of fire and to the conduct of welding and burning operations. Procure all related permits and licenses.

- B. Supply fire-fighting equipment, supplies, and personnel and perform work required by laws and regulations pertaining to fire protection. If loss or damage results from fire or other cause, promptly repair loss or damage at no expense to OCTA.

1.05 PROTECTION OF PREMISES

- A. Take precautions necessary and be responsible for maintaining lights, guards, signs, temporary passages, or other protection.
- B. Restore loss or damage to materials, tools, or other articles used or held for use in connection with the work at no expense to OCTA.
- C. Restore loss or damage as a result of fire or other cause attributable to Contractor or subcontractors at no expense to OCTA. Promptly repair damage and restore loss to materials, tools, or other articles used or held for use in connection with the work. Carry the work to completion without damage to or interference with other work or contiguous property.

1.06 USE OF EXPLOSIVES

- A. Use of explosives is not permitted unless specifically detailed in the specifications or approved in advance in writing by OCTA.

1.07 WORK SITES AND WASTE MATERIAL

- A. Obtain required approvals and bear costs of location, construction, maintenance, operation, removal, and transportation of sanitation facilities and waste material from work sites. Sanitation shall conform to local, State, and Federal requirements. Maintain work sites in a neat and orderly condition.
- B. Before starting work, submit to OCTA a contingency plan for cleanup of accidental spillage of toxic or detrimental materials and for restoration of soil damaged thereby to near-natural conditions. Conduct the handling, storage, and disposal of waste material so as to avoid pollution of rivers, streams, ponds, or wells, and in compliance with local, State, and Federal environmental laws and regulations
- C. OCTA shall acquire all applicable permits. These permits include, but would not be limited to, a Section 404 Wetlands Fill Permit from the USACE, or a Report of Waste Discharge from the Regional Water Quality Control Board (RWQCB), and a Section 401 Water Quality Certification from the RWCQB. Additionally, a Section 1602 Streambed Alteration Agreement from the California Department of Fish and Wildlife (CDFW) would be required for development that would cross or affect any stream course.

1.08 PUBLIC RELATIONS, CONVENIENCE, AND NOTICE OF DAMAGE

- A. Conduct operations so as to offer the least possible obstruction and inconvenience to the public. Have under construction no greater length or amount of work than can be prosecuted properly with due regard to the rights of the public. Control temporary noise from construction equipment by using work hour controls and maintenance of muffler systems on machinery as necessary.
- B. Provide, at Contractor's expense, adequate safeguards, safety devices, and protective equipment, and take other needed action, both at Contractor's own volition and as the OCTA may determine reasonably necessary, to protect property, life, health, and public safety in connection with the performance of the work covered by the contract.
- C. Notify the OCTA in writing within 24 hours after causing injury to persons or damage to public or private property, including above and below ground structures. Contractor shall be responsible and liable for all damages and injuries.

1.09 ENVIRONMENTAL AND ANTI-POLLUTION

- A. Comply with Federal, State, county, municipal, and other local laws and regulations pertaining to the environment, including noise, aesthetics, air quality, water quality, and resources of archaeological significance. Refer also to Section 01 14 43 Environmental Resource Protection for additional requirements. Expense of compliance with these laws and regulations is included in the lump sum and unit prices. Provide water used for dust control, or for pre-wetting areas to be paved, as required; no payment will be made by OCTA for this water.
- B. Carry out grading and other work in a manner which will not create a pollution problem. Temporary construction roads, haul roads, and work areas shall be maintained free from excessive dust by an approved program of sprinkling, graveling, chemical treatment, temporary asphalt pavement, or combination thereof for the duration of the work.
- C. Give attention to the effect of work operations upon the landscape, and take care to maintain natural surroundings undamaged. Disturbances of land or waters outside the limits of construction shall be rehabilitated by Contractor at its expense, when and as directed by the OCTA.
- D. Prevent pollution of storm drains, rivers, streams, irrigation ditches, and reservoirs with sediment or other harmful materials. Fuels, oils, bitumen, calcium chloride, cement, or other contaminants that would contribute to water pollution shall not be dumped into or placed where they will leach into storm drains, rivers, streams, irrigation ditches, or reservoirs. If operating equipment in streambeds or in and around open waters, protect the quality of ground water, wetlands, and surface waters.
- E. Protect adjacent properties and water resources from erosion and sediment damage throughout the duration of the contract. Comply with applicable NPDES

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- permits and Storm Water Pollution Prevention Plan (SWPPP) requirements. See Section 01 14 25, Procedures in Construction, and Section 01 57 13, Temporary Erosion and Sedimentation Control.
- F. Do not conduct construction activities outside the right-of-way during muddy or wet ground conditions.
 - G. If archaeological remains are uncovered during construction, stop grading operations in the vicinity of the find and immediately notify the OCTA. Refer to Section 01 14 43, Environmental and Resource protection for additional requirements.
 - H. Costs associated with environmental and pollution control measures are considered incidental to the contract work, at no additional cost to OCTA.
 - I. Take the following actions and others as necessary to control environmental pollution:
 - 1. Reduce air pollution by minimizing dust, containing chemical vapors, and controlling engine exhaust gases. Limit idling of machinery as directed by the OCTA.
 - 2. Reduce water pollution by control of sanitary facilities and proper storage of fuel and other contaminants.
 - 3. Reduce turbidity and siltation by controlling erosion and sedimentation.
 - 4. Minimize noise levels.
 - 5. Dispose of waste and spoil properly.
 - 6. Prevent landscape defacement and damage.
 - J. Comply with South Coast Air Quality Management District (SCAQMD) Rule 403 to control fugitive dust emissions. In addition to the requirements contained therein, comply with the following:
 - 1. Water all land clearing/earth moving activity areas to control dust as required by the OCTA. Areas shall remain visibly moist during active operations.
 - 2. Visually inspect construction equipment prior to leaving work sites. Wash off any loose dirt with wheel washers as necessary.
 - 3. Properly tune and maintain all construction equipment in accordance with manufacturer's specifications.
 - 4. Maintain and operate construction equipment so as to minimize exhaust emissions. During construction activities, trucks and vehicles in loading and unloading queues shall have their engines turned off when not in use to reduce noise and exhaust emissions.

5. Establish on-site construction equipment staging areas and construction worker parking lots on either paved surfaces or unpaved surfaces treated with soil stabilization materials.
6. Use electricity from power poles where feasible, rather than temporary diesel or gasoline powered generators. Muffle noise from generators to the extent practical.
7. Use on-site mobile equipment powered by alternative fuel sources, such as ultra-low sulfur diesel, methanol, natural gas, propane or butane.
8. Construction grading or earth moving on days when wind gusts exceed or are forecast to exceed 25 mph is prohibited.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

- A. There will be no separate measurement for work of this section.
- B. Full compensation for all work involved shall be included in the various items of work, and no separate payment shall be allowed therefor.

END OF SECTION

SECTION 01 14 43

ENVIRONMENTAL RESOURCE PROTECTION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Protection of species habitat.
2. Protection of archaeological resources.
3. Protection of paleontological resources (fossils).
4. Protection of human remains.
5. Protection from previously existing contamination.
6. Prevention of fuel spills and hazardous material spills.
7. Prevention of stored fuel leaks.
8. Protection of stormwater quality and control of stormwater quantity.
9. Prevention of traffic impacts.
10. Prevention of road damage.
11. Prevention of fugitive dust.
12. SCAQMD requirements.
13. Disposal of refuse.

B. Related Sections:

1. Section 01 14 25, Procedures in Construction.
2. Section 01 14 27, Legal Relations and Responsibility.

1.02 SUBMITTALS

- A. Submit under Section 01 33 00, Submittal Procedures.
- B. Written commitment to clean up leaks of fuel or hazardous materials.
- C. Traffic Management plan.

1.03 GENERAL

- A. Provisions of this section are required to reduce or avoid potential environmental impacts of the project, in accordance with environmental mitigation measures imposed by the OCTA and other responsible agencies.
- B. This section summarizes required mitigation. Proceed with mitigation only after consultation with OCTA and Contractor's biological, archaeological, and geological consultants.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 PROTECTION OF SPECIES HABITAT

- A. Avoid placement of construction equipment and personnel within environmentally sensitive habitat areas used by target species of concern. Activities that cannot be conducted without placement of construction equipment and personnel within sensitive habitats shall be timed to avoid the breeding season of the target species of concern. Coordinate such activities and their timing with the OCTA.
- B. Locate equipment storage, fueling and staging areas to minimize risks of direct drainage or runoff into riparian areas or other environmentally sensitive habitats. Take every precaution to prevent the release of toxic substances into surface waters. Report immediately all project spills of hazardous materials to the OCTA, OCTA, US Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and Regional Water Quality Control Board (RWQCB). Immediately clean up hazardous materials and remove all contaminated soils; dispose of only at approved disposal sites.
- C. Stockpiling and staging of materials shall be limited to disturbed areas without native vegetation, areas to be impacted by the project or in non-sensitive habitats.
- D. Establish No-Fueling zones within a minimum of 33 feet from all drainages and fire-sensitive areas.
- E. Maintain project areas clean of debris to avoid attracting predators of the target species of concern. Enclose all food related trash in sealed containers and regularly remove from site. Pets of construction personnel shall not be allowed on site where they may come into contact with any listed species.

- F. If dead or injured listed species are located, biologist, in consultation with the OCTA, will notify the USFWS and the CDFG according to required protocols. Obtain instructions from the OCTA on how to proceed following such discovery.
- G. Nesting avian species protected by the Migratory Bird Treaty Act (MBTA):
 - 1. For any construction activities or vegetation removal between February 15 and August 31, a nesting bird survey shall be conducted by contractor's qualified biologist of all habitats within 250 feet of the construction area. Surveys shall be conducted no less than 14 days and no more than 30 days prior to commencement of construction activities and vegetation removal. The nesting bird surveys will be conducted in accordance with CDFG protocol as applicable. If no active nests are identified on or within 250 feet of the construction site, no further mitigation is necessary. A copy of the pre-construction survey shall be submitted to the local agencies jurisdiction. If an active nest of a MBTA protected species is identified onsite (per established thresholds) a 100-foot no-work buffer shall be maintained between the nest and construction activity. This buffer can be reduced in consultation with CDFW and/or USFWS.
 - 2. Completion of the nesting cycle shall be determined by qualified ornithologist or biologist.

3.02 PROTECTION OF ARCHAEOLOGICAL RESOURCES

- A. If evidence of an archaeological site or other suspected historical resource as defined by CEQA Guidelines Section 15064.5, including darkened soil representing past human activity, that could conceal material remains (e.g., worked stone, fired clay vessels, faunal bone, hearths, storage pits, or burials) are discovered during any project-related earth-disturbing activities (including projects that would not encounter undisturbed soils), all earth-disturbing activity within 100 feet of the find shall be halted and OCTA shall be notified.

3.03 PROTECTION OF PALEONTOLOGICAL RESOURCES (FOSSILS)

- A. Should paleontological resources (i.e., fossil remains) be identified at a particular site during project construction, the construction foreman shall cease construction within 100 feet of the find until a qualified professional can provide an evaluation.

3.04 PROTECTION OF HUMAN REMAINS

- A. In the event of the discovery of human remains during construction, procedures outlined in Section 15064.5(e) of the CEQA Guidelines shall be strictly followed. Upon discovery all excavation at the site or any nearby area reasonably suspected to overlie human remains shall cease immediately. Notify OCTA immediately. OCTA will notify County Coroner who will determine if remains are Native American. If the remains are determined to be Native American, the coroner will contact the Native American Heritage OCTA (NAHC). The NAHC will identify the Most Likely

Descendent (MLD). The MLD will make recommendations for the appropriate treatment and disposition of the remains and any associated artifacts in accordance with Public Resources Code (PRC), Section 5097.98. Do not commence construction in the area until notified to do so by the OCTA.

3.05 PROTECTION FROM PREVIOUSLY EXISTING CONTAMINATION

- A. In the event that previously unknown or unidentified soil and/or groundwater contamination that could present a threat to human health or the environment is encountered during construction of the proposed project, construction activities in the immediate vicinity of the contamination shall cease immediately. If contamination is encountered, a Risk Management Plan shall be prepared and implemented that (1) identifies the contaminants of concern and the potential risk each contaminant would pose to human health and the environment during construction and post development and (2) describes measures to be taken to protect workers, and the public from exposure to potential site hazards. Such measures could include a range of options, including, but not limited to, physical site controls during construction, remediation, long-term monitoring, post development maintenance or access limitations, or some combination thereof. Depending on the nature of contamination, if any, appropriate agencies shall be notified. If needed, a Site Health and Safety Plan that meets Occupational Safety and Health Administration requirements shall be prepared and in place prior to commencement of work in any contaminated area.

3.06 PREVENTION OF FUEL SPILLS AND HAZARDOUS MATERIAL SPILLS

- A. Store fuel, hazardous materials, and chemicals of all types in a contained staging area.
- B. Conduct equipment refueling and maintenance in the contained staging area.
- C. Check vehicles daily for leaks.

3.07 PREVENTION OF STORED FUEL LEAKS

- A. Provide berms or other secondary containment at fuel/chemical storage areas.
- B. Test storage tanks, valves, etc., for leaks.
- C. Submit a written commitment to provide labor, equipment, and materials to promptly clean up any leakage.

3.08 PROTECTION OF STORMWATER QUALITY AND CONTROL OF QUANTITY

- A. Comply with the stormwater quality plan prepared before issuance of construction permits. The plan will incorporate the state's industrial best management practices and other techniques if more effective. Refer to Section 01 14 25 Procedures in Construction for additional requirements.

- B. Runoff from impervious areas is to be detained, treated to industrial standards, and released under control.

3.09 PREVENTION OF TRAFFIC IMPACTS

- A. The Contractor shall prepare and submit a Traffic Management Plan in conjunction with local jurisdictions addressing the following:
 - 1. Detours.
 - 2. Coordination with any other construction projects.
 - 3. Length and timing of street closures.
 - 4. Coordination with police and fire departments regarding changes in emergency access routes.
 - 5. Temporary access routes and signage for any affected commercial property.
 - 6. Contact information for OCTA, contractors and their personnel.
- B. Conform to all conditions required therein. Notify Resident Inspector in advance of any constructions activities that could potentially violate the requirements and conditions set forth in the plan.
- C. Construction parking shall be configured to minimize traffic interference during the construction period and, therefore, reduce idling of traffic.
- D. Temporary traffic controls are provided, such as a flag person, during all phases of construction to facilitate smooth traffic flow.
- E. Construction activities that affect traffic flow on the arterial system be scheduled to off-peak hours (10:00 A.M. to 4:00 P.M.).
- F. Dedicated on-site and off-site left-turn lanes on truck hauling routes be utilized for movement of construction trucks and equipment on site and off site to the extent feasible during construction activities.
- G. To ensure adequate access for emergency vehicles when construction activities would result in temporary lane or roadway closures, the contractor shall consult with the local agencies, Police and Fire Departments to disclose temporary lane or roadway closures and alternative travel routes. The contractor shall be required to keep a minimum of one lane in each direction free from encumbrances at all times on perimeter streets accessing the project site. If construction activities require the complete closure of a roadway segment, the Contractor shall coordinate with the local agencies, Police and Fire Departments to designate proper detour routes and signage indicating alternative routes.

3.10 PREVENTION OF ROAD DAMAGE

- A. Before and after offsite road and utility construction, videotape the affected roadway and its access roads.
- B. Temporarily repair roadway damage caused during construction.
- C. Permanently restore damaged roadway to its original condition immediately after offsite improvements are completed.
- D. Establish construction truck routes with local jurisdictions before beginning offsite work. Refer to Section 01 14 27 Legal Relations and Responsibility for additional requirements.
- E. Consult with local jurisdictions to coordinate offsite work with other projects in the vicinity.

3.11 SCAQMD REQUIREMENTS

- A. Refer to Section 01 14 27 Legal Relations and Responsibility for these requirements.
- B. All diesel-powered equipment used will be retrofitted with after-treatment products (e.g., engine catalysts).
- C. All heavy-duty diesel-powered equipment operating and refueling at the project site use low-NOX diesel fuel to the extent that it is readily available and cost effective (up to 125 percent of the cost of California Air Resources Board diesel) in the South Coast Air Basin (this does not apply to diesel powered trucks traveling to and from the project site).
- D. Construction equipment engines be maintained in good condition and in proper tune per manufacturer's specification for the duration of construction.
- E. Construction operations rely on the electricity infrastructure surrounding the construction site rather than electrical generators powered by internal combustion engines.
- F. As required by South Coast Air Quality Management District Rule 403—Fugitive Dust, all construction activities that are capable of generating fugitive dust are required to implement dust control measures during each phase of project development to reduce the amount of particulate matter entrained in the ambient air. These measures include the following:
 - 1. Application of soil stabilizers to inactive construction areas.
 - 2. Quick replacement of ground cover in disturbed areas.
 - 3. Watering of exposed surfaces three times daily.

4. Watering of all unpaved haul roads three times daily.
5. Covering all stock piles with tarp.
6. Reduction of vehicle speed on unpaved roads.
7. Post signs on-site limiting traffic to 15 miles per hour or less.
8. Sweep streets adjacent to the project site at the end of the day or hourly per Section 01 14 27, 1.10 J if visible soil material is carried over to adjacent roads.
9. Cover or have water applied to the exposed surface of all trucks hauling dirt, sand, soil, or other loose materials prior to leaving the site to prevent dust from impacting the surrounding areas.

3.12 PREVENTION OF NOISE IMPACTS

- A. Limit noise-producing activities to hours required by the local jurisdictions for construction activities.
- B. Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 30 minutes. Diesel-fueled commercial motor vehicles with gross vehicular weight ratings of greater than 10,000 pounds shall be turned off when not in use for more than 5 minutes.
- C. Contractor shall require by contract specifications that the following construction best management practices (BMPs) be implemented by contractors to reduce construction noise levels:
 1. As requested by the OCTA's Project Manager and/or specified in Contract Document, two weeks prior to the commencement of construction, the Contractor shall provide notification to surrounding land uses within 300 feet of the project site disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period.
 2. Ensure that construction equipment is properly muffled according to industry standards and be in good working condition.
 3. Place noise-generating construction equipment and locate construction staging areas away from sensitive uses, where feasible.
 4. Schedule high noise-producing activities between the hours of 8:00 A.M. and 3:30 P.M. to minimize disruption on sensitive uses, Monday through Friday.
 5. Implement noise attenuation measures, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources.

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6. Use electric air compressors and similar power tools rather than diesel equipment, where feasible.
 7. Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 10 minutes.
 8. Construction hours, allowable workdays, and the phone number of the job superintendent shall be clearly posted at all construction entrances to allow for surrounding owners and residents to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective action, and report the action taken to the reporting party.
- D. Construction staging areas along with the operation of earthmoving equipment within the project area would be located as far away from vibration and noise sensitive sites as possible.
- E. Heavily loaded trucks used during construction would be routed away from residential streets.

3.13 DISPOSAL OF REFUSE

The Contractor shall establish a construction management plan with Disposal Company to divert a target of 50 percent of construction, demolition, and site clearing waste.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work of this section.

END OF SECTION

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**SECTION 01 25 00
SUBSTITUTION PROCEDURES**

PART 1 - GENERAL

1.02 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for requesting substitutions.

B. Definitions:

1. Substitutions: Requests by the Contractor to deviate from specified requirements for products, material, equipment, and methods, or to provide products other than those specified, shall be considered requests for substitutions, limited to the following conditions:
 - a. Substitutions requested during the proposal period and accepted prior to the execution of the Contract.
 - b. Substitutions requested after execution of the Contract.

C. Substitution Provisions: Refer to substitution provisions of the RFP documents, in addition to the following specific requirements.

D. Substitution Request Submittal Period:

1. Time Limit:

- a. Substitutions requested during proposal period: OCTA will consider requests for substitutions if received during proposal period. Request permission for substitutions from the OCTA per provisions of the RFP documents. If approved, OCTA will issue an addendum allowing all proposers to incorporate the request substitution.
 - b. Substitutions requested after execution of Contract: Only within 14 calendar days of the Notice to Proceed will the Authority and the Engineer consider requests for substitutions, requests submitted after this will be denied.
2. Product Availability Waiver: Substitutions will be considered 21 calendar days of execution of the Agreement only when a product becomes unavailable due to no fault of the Contractor. Failure to place orders for specified products sufficiently in advance of required date for incorporation into the Work will not be considered as a valid reason for which Contractor may request a substitution or deviation from requirements of the Drawings and Specifications.

1.02 SUBMITTAL REQUIREMENTS

- A. Substitution Requests: Submit three copies of each request for consideration to the OCTA. Identify product or fabrication or installation method proposed for substitution. Include specification section number and title and drawing numbers and titles.
1. Substitution Request Form: Use form acceptable to OCTA Project Manager.
 2. Documentation: Substitutions will not be considered when they are indicated or implied on shop drawings, product data or sample submittals without a separate written request, or when acceptance will require substantial revision of the Contract Documents. Show compliance with requirements and the following, as applicable:
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by OCTA and separate contractors, which will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated or specified.
 - d. Product data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated or specified.
 - h. Research/evaluation reports evidencing compliance with building code in effect for project, from a model code organization acceptable to Inspector and authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the work, including effect on the overall contract time. If specified product or method of construction cannot

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be provided within the contract time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.

- j. Cost information, including a proposal of change, if any, in the contract sum.
 - k. Contractor's certification that Contractor has investigated proposed substitution and that it complies with requirements in the contract documents and is appropriate for applications indicated. Contractor further certifies that Contractor will provide the same or better guarantee or warranty as for specified product or method of construction. Contractor shall also certify that Contractor will coordinate installation of accepted substitution into work, making any changes as may be required for work to be complete in all respects as specified.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 - m. Only one request for substitution will be considered for each product.
 - n. If the proposed substitution is not accepted, provide the specified product.
3. OCTA Project Manager's Action: If necessary, OCTA Project Manager will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. OCTA Project Manager will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
- a. Form of Acceptance: Change Order, if costs involved; otherwise written approval.
 - b. Use product specified if OCTA Project Manager is unable to make a decision on proposed substitution within time allocated.

1.03 COMPARABLE PRODUCTS

- A. See Section 01 60 00, Product Requirements, for discussion of comparable products.

1.04 PRODUCT SUBSTITUTIONS

- A. OCTA Project Manager will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, OCTA Project Manager will return requests without action, except to record noncompliance with these requirements:

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1. Requested substitution is submitted within the time frame stated herein above.
 2. Requested substitution offers OCTA a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities OCTA must assume. OCTA's additional responsibilities may include compensation to consultants for redesign and evaluation services, increased cost of other construction by OCTA, and similar considerations.
 3. Requested substitution does not require extensive redesign of the project or revisions to the contract documents.
 4. Requested substitution is consistent with the contract documents and will produce indicated results.
 5. Substitution request is fully documented and properly submitted.
 6. Requested substitution will not adversely affect Contractor's Construction Schedule.
 7. Requested substitution has received necessary approvals of authorities having jurisdiction.
 8. Requested substitution is compatible with other portions of the work.
 9. Requested substitution has been coordinated with other portions of the work.
 10. Requested substitution provides specified warranty.
 11. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions will not be considered if they are indicated or implied on shop drawings or project data submittals or Requests for Information without formal submittal request detailed in this section.

1.05 AVAILABILITY OF SPECIFIED ITEMS

- A. Prior to execution of Contract, Contractor shall verify that all specified items will be available as required by the schedule for orderly and timely progress of the work. Notify OCTA Project Manager if specified items will not be available.
- B. Costs of delays because of non-availability of specified items, when such delays could have been avoided by the Contractor, will deducted from amounts due or to become due the contractor, and will not be borne by OCTA.

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- C. Substitutions during construction for prior approved items will only be considered under the following circumstances:
1. Substitution is required for compliance with subsequent interpretation of code.
 2. Specified item cannot be provided within the contract time or becomes unavailable through no fault of contractor.
 3. Subsequent information discloses that specified item or system will not perform properly or fit in designated space, or manufacturer or supplier refuses to certify or warrant performance as required.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

- A. No separate measurement will be made for the work of this section.
- B. No separate payment will be made for the work of this section.

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for handling and processing contract modifications.

B. Related Sections:

1. Section 01 60 00, Product Requirements, for procedures to approve comparable products.
2. Section 01 25 00, Substitution Procedures, for procedures to propose substitutions.
3. Section 01 26 13 Requests for Information, for procedures to clarify and interpret the contract documents.

1.02 MINOR CHANGES IN THE WORK / FIELD ORDERS

- A. OCTA will issue supplemental instructions authorizing minor changes in the work, not involving adjustment to the Contract Price or the Contract Time, in written form.

1.03 DOCUMENTATION OF CHANGES IN AGREEMENT PRICE AND AGREEMENT TIME

- A. Documentation of Changes in Contract Sum and Contract Time: Contractor shall provide full information required for evaluation of proposed changes and to substantiate costs of changes in the Work.
1. Maintain detailed records of Work completed on time and material basis. Contractor shall use "Daily Extra Work Report" provided by the Authority. All extra work reports shall be signed by the Authority and the Contractor verifying all extra materials and labor incorporated into the project at the end of each work day.
 2. Document each quotation for a change in Contract Sum and Contract Time, with sufficient cost breakdown data for labor, materials, and equipment to allow evaluation of the quotation.
 3. Provide details of cost of all material used for change in work. Provide detail of labor hours expended in change of work, and wage rate of worker. Provide total of hours equipment was used in the work, and hourly rate of the equipment.

- B. Additional Data: Upon request by the Engineer, provide additional data to support computations:
1. Quantity of product, material, labor, and equipment.
 2. Overhead and profit (20% includes all superintendence, taxes, insurance, bonds, overhead and profit, etc.). 20 percent overhead and profit shall be divided between Contractor and sub-contractor(s).
 3. Justification for change in Contract Time, if claimed.
 4. Credit for deletions from Contract, similarly documented.

1.04 CHANGE PROCEDURES

- A. Change Procedure – General: The following describe administrative procedures to be followed in complying with provisions of the Conditions of the Contract for changes in the Work.
- B. The Engineer's Supplemental Instructions: Minor changes in the Work, not involving an adjustment in either the Contract Sum or Contract Time, as authorized by the Conditions of the Contract. The Contractor shall take prompt action on such instructions.
- C. OCTA-Initiated Proposal Requests: OCTA will issue a detailed description of proposed changes in the work that may require adjustment to the Contract Price or the Contract Time. If necessary, the description will include supplemental or revised drawings and specifications.
1. Proposal Requests issued by OCTA are not instructions either to stop work in progress or to execute the proposed change.
 2. Proposal Request may include an estimate of additional or deductions in Contract Sum or Contract Time for executing the change and may include stipulations regarding overtime work and period of time the requested response from the Contractor shall be considered valid.
 - a. Within time specified in Proposal Request or five (5) calendar days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Price and the Contract Time necessary to execute the change. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

- c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Submit name of individual authorized to receive construction change documents and who is responsible for informing others in Contractor's employ or subcontractors of changes in the Work.
 - f. Quotation Form: Use forms acceptable to OCTA.
- D. Upon OCTA's approval of a Proposal Request, OCTA will issue a Change Order for signatures of OCTA and Contractor. The OCTA and Contractor will sign the Change Order indicating acceptance and approval of the change.

1.05 WORK CHANGE DIRECTIVE

- A. Work Change Directive: In accordance with provisions of the Conditions of the Contract, OCTA may issue a Work Change Directive. A Work Change Directive instructs Contractor to proceed with a change in the work, for subsequent inclusion in a Change Order.
- B. Work Change Directive contains a complete description of change in the work. It also designates method to be followed to determine change in the Contract Price or the Contract Time. Contractor shall promptly execute the change in the Work.
- C. Changes Based on Stipulated Sum or Time: Construction Change Directive shall be based on stipulated adjustment in Contract Sum and Contract Time as mutually-acceptable to the Authority and Contractor and the change shall be performed immediately. A Change Order for this amount shall be executed at the earliest convenience of all parties. Contractor shall provide a cost estimate based on section 1.03 of this section.
- D. Changes Based on Unit Costs or Quantities: When scope of change cannot be accurately determined in advance, a Construction Change Directive shall be executed based on mutually-acceptable quantities and pre-determined unit prices. Actual costs shall be determined after completion of the Work and a Change Order for this amount shall be executed.
- E. Changes Based on Time and Material Costs: If directed for changes for which amounts are not defined or are disputed, a Construction Change Directive will be issued by the Authority and Contractor shall execute the Work, keeping accurate records of time, both labor and calendar days, and cost of materials. See Section 1.03. A. 1.
- F. Cost and Time Resolution: If amounts for changes in Agreement price and Agreement time cannot be agreed upon by the Authority and Contractor, amounts

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shall be resolved in accordance with requirements of the Conditions of the Contract for resolution of disputes.

- G. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive. The total construction cost of the change shall not exceed the mutually agreed adjustment in Contract Sum and Contract time of the Change Order.
- H. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the contract.

1.06 CHANGE ORDER

A. Change Orders, General:

- 1. In accordance with provisions of the Conditions of the Contract, the Engineer and Authority will review Contractor's response to a Proposal Request or a Construction Change Directive and determine with the Contractor the acceptable amount, if any, of the change in Contract Sum and Contract Time.
- 2. When agreement is reached on the change in Contract Time and Sum, the Engineer will prepare a Change Order, with supplementary documents (Contractor's cost estimate) as necessary to describe the change and the associated costs and schedule impacts, if any.
- 3. The Authority and Contractor will sign the Change Order indicating acceptance and approval of the change.

1.07 RECONCILIATION OF CHANGE ORDER

- A. Schedule of Values: Promptly revise the Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjustment to the Contract Sum.
- B. Schedules: Promptly revise progress schedules to reflect changes in Contract Time, revising sub-schedules to adjust time for other items of Work as may be affected by the change. Submit revised schedules at the next Application for Payment following approval and acceptance of the Change Order.
- C. Change in work due to request for information, or any other reason shall not be reason for claims of delays by the contractor. Contractor shall allow the Consultant seven (7) days to respond to request for information, and additional fourteen (14) days to the Authority to make necessary changes to resolve changes in work and change orders. Allow the Authority 30 calendar days for final Change Order approval.

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PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 4 - MEASUREMENT AND PAYMENT

Not Used.

END OF SECTION

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SECTION 01 26 13

REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section Includes:

1. The general requirements for Contractor's requests for information and pertains to all portions of the contract documents.

1.02 DEFINITION

- A. A "Request for Information" is defined as a document submitted by the Contractor requesting clarification of a portion of the contract documents, hereinafter referred to as RFI.
- B. All questions and requests for clarification of the Contract Documents from the contractor and subcontractors shall be submitted in writing as a "Request for Information".

1.03 CONTRACTOR'S REQUESTS FOR INFORMATION (RFI)

- A. When the Contractor is unable to determine from the contract documents, the exact material, process or system to be installed, the Contractor shall request the OCTA to make a clarification of the indeterminate item. Wherever possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need or the complexity of the item, the Contractor shall prepare and submit an RFI to the OCTA.
- B. RFI's shall be submitted on a form provided by the OCTA. The Contractor will be given the form electronically upon Notice To Proceed.
- C. RFI forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying. Each page of attachments to RFI's shall bear the contract number, project name, RFI number. Each RFI shall reference a drawing number and/or Specification Section. The Contractor shall include sketches, mark ups on the contract drawings, and/or photographs to clearly demonstrate its requests or questions in each RFI. Contractor shall indicate on the RFI the date by which response is required.
- D. RFI's from Subcontractors or Material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the OCTA.

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- E. Prior to submitting an RFI, the Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. Contractor shall be responsible for insuring that RFI's are not frivolous or excessive.
- F. Frivolous RFIs: Frivolous RFIs include requests for information shown in the contract documents or resulting from Contractor's failure to study and compare contract documents or to coordinate its own work; and RFIs that are incomplete, contain errors, or include unrelated items. The cost in time and materials on the part of OCTA and related design professionals to review unnecessary or frivolous RFIs will be assessed and deducted from the Contractor's final payment.
- G. RFI's shall not be used for the following purposes:
 - 1. To request approval of submittals.
 - 2. To request approval of substitutions.
 - 3. To request changes which entail additional cost or credit or changes in the contract time.
 - 4. To request different methods of performing work than those shown or specified.
- H. In the event the Contractor believes that a clarification by the OCTA results in additional cost, the Contractor shall not proceed with the Work indicated by the RFI until a Change Order is prepared and approved. Answered RFI's shall not be construed as approval to perform extra work.
- I. RFIs submitted to request clarification of issues related to means, methods, techniques and sequencing of construction, or to establish scope of subcontractors' work will be returned without response.
- J. Unanswered RFI's will be returned with a stamp or notation indicating: "Not Reviewed."
- K. Assign each RFI a sequential number starting from 001. Contractor shall prepare and maintain a log of RFI's and, at any time requested by the OCTA, Contractor shall furnish copies of the log showing all outstanding RFI's. Contractor shall also note all unanswered RFI's in the log.
- L. Contractor shall allow for 14 calendar days review and response time for RFI's.

1.04 RESPONSE TO RFI'S

- A. OCTA's response to RFIs will be in writing. RFIs received after 12:00 noon will be considered as received on the following working day for purposes of establishing the start of the 14 day response time. OCTA's response may include a request for additional information, in which case OCTA's time for response will date from time of receipt of additional information.

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- B. No extension of time will be granted because of Contractor's failure to submit RFIs in a timely manner or to allow a sufficient amount of time for review.
- C. OCTA's response will confirm a stated interpretation or solution or otherwise interpret the design intent; this may include an alternative solution, consistent with the design intent of the Contract Documents. Where such a solution would result, in the contractor's opinion, in an extra cost or time extension to the project, contractor shall notify the OCTA prior to implementing the response.
- D. Each RFI and the OCTA's response shall become a part of the Contract Documents. To the extent that OCTA's response changes, modifies or amends any portion of the Contract Documents, the response shall be deemed sufficient. No revised Contract Documents will be issued unless the RFI response is insufficient in providing direction to the Contractor. Whenever possible, revised contract documents will be issued in 8-1/2x11 inch or 11x17 inch size, suitable for inclusion with the RFI response. Re-issuance of full size drawings or sets of drawings will be kept to an absolute minimum.

1.05 SPOKEN COMMUNICATIONS

- A. Any spoken instructions given to the Contractor on the job site by any person other than the OCTA's personnel is subject to nullification by the OCTA. Contractor shall obtain written documentation of any and all spoken instructions (especially if instructions may reflect an addition to or deduction from the contract sum) from the OCTA prior to commencement of the work resulting from the verbal instructions.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this Section.

END OF SECTION

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SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements necessary to prepare and process Applications for Payment.
2. Administrative and procedural requirements for preparing and submitting a Schedule of Values.

B. Related Sections:

1. Section 01 26 00, Contract Modification Procedures, for administrative procedures for handling changes to the contract.
2. Section 01 32 00, Construction Progress Documentation, for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
3. Section 01 33 00, Submittal Procedures, for administrative requirements governing the preparation and submittal of the Schedule of Values.

1.02 DEFINITIONS

- A. Schedule of Values (Cost Breakdown): A document furnished by Contractor allocating portions of the Contract Price to various portions of the work and used as the basis for reviewing Contractor's Applications for Payment. The Contract Scope of Work including any and all required deliverables are considered by OCTA to be part of the Schedule of Values upon which progress payments will be made to the Contractor, and if not clearly identified in the Contractor's Schedule of Values, 100% of progress payment will not be made until all required Scope of Work items are completed and received by OCTA.

1.03 SCHEDULE OF VALUES

- A. Prepare and submit within 15 calendar days after the effective date in the Notice to Proceed, but in any event prior to the Contractor's first Application for Payment, for approval by OCTA, a Schedule of Values. If the schedules are affected by Change Orders, prepare and submit updated copies of the schedules under this Section.
- B. Submit, under the provisions of Section 01 33 00, Submittals, and a Schedule of Values including the following information:

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1. Identify items in the Schedule of Values with the title of Project and location, agreement number, name and address of the Contractor, date of submission, Specification Section/Subsection number, Specification Section/Sub-section title, and task payment schedule in the Agreement.
 2. Contractor shall indicate subcontracted work items the Schedule of Values including the related subcontractor name(s) and subcontracted amount(s).
 3. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values as itemized in the Cost Breakdown for progress payments during construction. Percentage of completed items installed will be paid.
 4. Provide a line item to identify each of the following:
 - a. Bonds;
 - b. Insurance premiums;
 - c. Field supervision;
 - d. Mobilization cost (not to exceed 10% of the total contract amount).
 5. Upon request by OCTA, support values given with data, which will substantiate the correctness of the values.
 6. In addition to the requirements stated in the General Conditions, the Schedule of Values shall be in the form of an Excel hardcopy spreadsheet along with the electronic file on a read-only compact disk (CD-ROM).
- C. Each item shall include a directly proportional amount of Contractor's overhead and profit, which will not be paid separately.
- D. Task payment based on Schedule of Values approved by OCTA based on percentage of work completed.
- E. The sum of all values listed in the schedule shall equal the total contract Sum.
- F. Cost loading of Schedule of Values is for fund management purposes only and will not be constructed to establish unit cost.
- G. OCTA's Review: OCTA will review the Schedule of Values to assure that they are reasonable and balanced. When approved, they will be used in reviewing and approving the monthly partial payment requests. If review by OCTA indicates that changes to the schedules are required, upon five (5) calendar days from receipt of notice from the OCTA, the Contractor shall revise and resubmit schedules in the same manner as the original schedules were prepared and submitted.

1.04 APPLICATION FOR PAYMENT – GENERAL

- A. Progress Payment Application: The Authority, no later than 25th day of each month, shall prepare a progress payment estimate based on the estimated percentage of completion of work in the approved Schedule of Values and on the Contractor's actually incurred allowable expenses on such work. Fabricated materials, materials on site but not installed in construction and work items not completed shall not be included in progress payment and will not be paid by the Authority. The Authority will issue the progress payment, in the amount it deems appropriate, by approximately the 15th days of the following month.
- B. Application for progress payments and partial progress payments shall be in accordance with Contract General Provision and the approved Schedule of Values.
- C. The Contractor shall submit the progress payment application prepared by the Authority and signed by the Contractor's authorized representative and furnish an invoice for further process based on a schedule to be established at the pre-construction meeting. Submit other documentation such as certified payroll, monthly labor utilization form, and waivers as required by contract.
- D. For the final payment, OCTA shall determine if all Work of the Contract has been performed by the Contractor according to the provisions of the Contract. OCTA shall make a final estimate and determine the amount remaining due the Contractor. This amount shall include any amounts withheld from previous estimates, but exclude any and all deductions that have been or should be made at the time under other sections of these Specifications.

1.05 WORK AUTHORIZATION CHANGE NOTICE WORK

- A. Measurement and payment of Work associated with a Work Authorization Change Notice (WACN) shall be as detailed in the OCTA's Exhibit A.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

PART 4 - MEASUREMENT AND PAYMENT

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Not Used.

END OF SECTION

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SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative provisions for coordinating construction operations on project including, but not limited to, the following:
 - a. General project coordination procedures.
 - b. Administrative and supervisory personnel.
 - c. Project meetings.

B. Contractor is responsible for coordination with OCTA selected material suppliers and contractors involved in the project.

C. Related Sections:

1. Section 01 32 00, Construction Progress Documentation, for preparing and submitting Contractor's construction schedule.
2. Section 01 43 01, Contractor Qualifications and Requirements, for required staff and qualifications.
3. Section 01 71 23, Field Engineering, for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Section 01 77 00, Closeout Procedures, for coordinating closeout of the contract.
5. Individual specification sections for normal startup, testing, and adjusting procedures required.

1.02 COORDINATION

- A. Coordination:** Coordinate construction operations with those of other OCTA selected material suppliers and contractors. Coordinate construction operations included in different sections of the specifications to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different

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sections, which depend on each other for proper installation, connection, and operation. Contractor is responsible for progress and performance of the work, and shall provide direction to others as required to properly coordinate trades and processes.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
 4. Coordinate equipment installation requirements with equipment contractors to prevent delays and facilitate proper installation. Acknowledge, accommodate, and respect equipment contractors' needs for access to the work for the periods required to complete equipment installation. Incorporate these periods into the construction progress schedule and work plan before commencing work.
- B. Prepare memoranda for distribution to each party involved (including OCTA and separate contractors and suppliers) outlining special procedures required for coordination. Include such items as required notices, actions, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Commissioning, Startup and adjustment of systems.
 8. Training activities.
 9. Project closeout activities.

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

1.03 KEY PERSONNEL

- A. Key Personnel Names: Within 5 days of date of Notice to Proceed, submit a list of key personnel assignments, including superintendent and other personnel in attendance at project site. Conform to requirement of Section 01 43 01 Contractor Qualifications and Requirements. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to project.
 - 1. Post copies of list in project meeting room and in temporary field office. Keep list current at all times.

1.04 INITIAL CONSTRUCTION MEETING

- A. The OCTA will schedule the Initial Construction Meeting (Pre-construction meeting) after the Contractor has been provided the written Notice to Proceed.
- B. OCTA will distribute a notice of this meeting, along with an agenda of the subjects to be addressed at least one (1) work day prior to the meeting.
- C. Contractor's Construction Project Manager and key staff, as defined in Section 01 43 01, and as identified per the requirements of 1.03, shall attend the meeting.
- D. The following is a minimum agenda for the Initial Construction Meeting:
 - 1. OCTA will explain and discuss:
 - a. Insurance, laws, codes, maintenance of traffic, permits, quality control, inspection, and related items.
 - b. Preparation, submittal, and review of Site Specific Work Plans (SSWP)
 - c. Procedures for processing RFI's and Submittals
 - d. Monthly estimate cutoff dates, and procedures for processing Applications for Payment.

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- e. Distribution of the contract documents.
 - f. Preparation of record documents.
 - g. Use of the premises.
 - h. Work restrictions and permitted working hours.
 - i. Owner's occupancy requirements.
 - j. Responsibility for temporary facilities and controls.
 - k. Procedures for disruptions and shutdowns.
 - l. Construction waste management and recycling.
 - m. Parking availability.
 - n. Areas available for Contractor's Office, work, and storage areas.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Level 3 Health, Safety and Environmental Specifications.
2. The Contractor shall introduce, explain, and discuss the following:
- a. Contractor's representatives and personnel, briefly describing each person's responsibilities, and furnishing complete contact information for the Contractor's staff.
 - b. Arrangements for safety, first aid, emergency actions, and security.
 - c. A list of Subcontractors and suppliers.
 - d. Sequence of critical Work, the construction schedule and the submittal schedule.
 - e. Plan for construction sequencing of entire Contract, general worksite layout, temporary facilities, erosion and sedimentation control plans, haul routes, noise, air and water pollution control and temporary closure plans.
 - f. Breakdown of lump sum items and Schedule of Values.
 - g. Status of coordination and notification for utility Work.

- h. Locations and use of office, storage, parking and construction areas.
- i. Method of providing security to the Worksite.
- j. Construction methods and coordination of Work within the provisions of the Contract Documents.
- k. Coordination with the Work of Subcontractors and procedures for sharing access to the Worksite.
- l. Plan for deliveries of major construction equipment and deliveries of long lead-time materials and products needed in the construction of this Contract.

1.05 PROGRESS MEETINGS

- A. Progress meetings will be scheduled by OCTA on a weekly basis and more often as necessary. OCTA will make every effort to accommodate the Contractor's availability in establishing the meeting schedule.
- B. Attendees: In addition to OCTA and representatives of the Contractor, subcontractors, suppliers, and other entities concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with project and authorized to conclude matters relating to the work.
- C. Meetings will focus on the competent and timely execution of the Work under the Contract. The OCTA will chair these meetings. Weekly site meetings will start when Contract Work commences. At the weekly meetings the Contractor shall present a review of the following topics:
 - 1. Safety and accidents.
 - 2. Contractor's Schedule status.
 - 3. Progress according to the current approved schedule.
 - 4. Presentation of new 28-day schedule.
 - 5. Critical activities on the 28-day schedule.
 - 6. OCTA's needs and requests
 - 7. Specific late items of Work.
 - 8. Overall Project schedule status.

9. Contract time.
10. Public impacts, notifications, and contacts.
11. RFI, submittal and change order logs and status.
12. Contract Issues including:
 - a. Status of proposal requests.
 - b. Pending changes.
 - c. Status of Change Orders.
 - d. Pending claims and disputes.
 - e. Documentation of information for payment requests.

1.06 PRE-INSTALLATION CONFERENCES:

- A. Contractor shall conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction, as required in individual specification sections.
- B. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advice OCTA of scheduled meeting dates.
- C. Suggested Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 1. Contract Documents.
 2. Options.
 3. Related RFIs.
 4. Purchases.
 5. Deliveries.
 6. Submittals.

7. Review of any required mockups.
 8. Possible conflicts.
 9. Compatibility problems.
 10. Time schedules.
 11. Weather limitations.
 12. Manufacturer's written recommendations.
 13. Warranty requirements.
 14. Compatibility of materials.
 15. Acceptability of substrates.
 16. Installation procedures.
 17. Coordination with other work.
 18. Required performance results.
 19. Protection of adjacent work.
- D. Contractor shall record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- E. Reporting: Distribute minutes of the meeting to OCTA, each party present and to other parties requiring information.
- F. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the work and reconvene the conference at earliest feasible date.

1.07 PROJECT CLOSEOUT MEETING:

- A. OCTA will schedule and conduct a project closeout conference, at a time convenient to Contractor, but no later than 15 calendar days prior to the scheduled date of Substantial Completion. The conference will review requirements and responsibilities related to project closeout.

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- B. Attendees: OCTA, Contractor's key personnel, major subcontractors and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with project and authorized to conclude matters relating to the work.
- C. Agenda: OCTA will introduce and discuss items of significance that could affect or delay Project closeout, including the following:
 - 1. Preparation of record documents.
 - 2. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - 3. Submittal of written warranties.
 - 4. Requirements for preparing operations and maintenance data.
 - 5. Requirements for demonstration and training.
 - 6. Preparation of Contractor's punch list.
 - 7. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - 8. Final Submittal procedures.
 - 9. Coordination of separate contracts.
 - 10. Owner's partial occupancy requirements.
 - 11. Installation of Owner's fixtures, and equipment.
 - 12. Responsibility for removing temporary facilities and controls.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 REPORTING

- A. Minutes: OCTA Project Manager will record significant discussions and agreements achieved at all conference chaired by OCTA Project Manager, including initial

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construction meeting, progress meetings and project closeout meeting. OCTA Project Manager will distribute the meeting minutes to everyone concerned within five (5) working days of the meeting.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section specifies the requirements for preparation of a preliminary schedule, a Contractor's Progress Schedule, related narratives, and progress reporting.
- B. The reports and schedules shall be designed to:
 - 1. Assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract
 - 2. Assist the Contractor and OCTA Project Manager in appraising:
 - a. The attainability of the proposed schedule.
 - b. Conformance to contract requirements.
 - c. The progress of Work.
- C. For all schedules and scheduling requirements/activities related to this Contract, the Contractor shall utilize Primavera Project Planner version 7 or later, or Microsoft Project software as directed by the OCTA Project Manager.

1.02 SUBMITTALS

- A. Submit the following information under the provisions of 01 33 00, Submittal Procedures. All electronic file submittals shall include the entire schedule, which is typically provided by utilizing the file backup routine in the software. Electronic submittals shall be on read-only compact disc (CD-ROM) media.
 - 1. Construction Schedule (with narrative) in print and electronic format.
 - 2. Contractor's Progress Schedule in print and electronic format.
 - 3. Weekly Progress Reports (28 day schedule) in print and electronic format.
- B. Milestones, as specified in the Contract Documents, shall be incorporated into all areas of the scheduling process.

1.03 CONTRACTOR'S CONSTRUCTION SCHEDULE (BASE SCHEDULE)

- A. Within five (5) calendar days of the Notice to Proceed, the Contractor shall prepare and submit to the Engineer for approval a detailed schedule of work. This schedule shall indicate the areas in which the Contractor anticipates working and the dates during which construction operations will be performed. All submittals by the Contractor shall be listed as separate activities in the schedule. The Contractor shall submit three (3) hard copies and a PDF file of the schedule to the Engineer for approval.
- B. The detailed schedules shall be of the bar chart or network diagram method, at the Contractor's option. The schedule shall be comprehensive, covering activities at the site of the work, procurement, and construction.
- C. The schedule shall identify work items or Milestones that affect or are affected by OCTA Project Manager, other utilities, and other third parties including Subcontractors.
- D. The work activities making up the schedule shall be of sufficient detail to assure that adequate planning has been done for proper execution of the Work and such that, in the judgment of the OCTA Project Manager, it provides an appropriate basis for monitoring and evaluating the progress of the Work. A work activity is defined as any activity requiring time and resources (manpower, equipment and/or material) to accomplish. Activity durations will be in workdays. Typical construction activity durations should be between 3 and 14 workdays. Exceptions may be reviewed by the OCTA Project Manager where sub-schedules will be used to define critical portions of prime schedules, materials delivery, key submittals, etc. Activities shall include but not necessarily be limited to the following:
 - 1. Project mobilization.
 - 2. Submittal and review of plans and procedures.
 - 3. Procurement of Materials.
 - 4. Each item of Work.
 - 5. Final cleanup.
 - 6. Final inspection.
 - 7. All activities by Contractor, OCTA Project Manager, and others, which affect progress or required dates for completion, or both, for each part of the Work.
 - 8. Release of areas to OCTA Project Manager according to Milestone Dates.
- E. Other requirements that shall be incorporated into the Contractor's schedule include
 - 1. Division of Work into major work areas (i.e. Areas 1, 2, etc.).

2. Manpower required to perform the Work in total man-hours by craft for each activity.
 3. All activities that require unusual shift work, such as two shifts, 6-day workweek, etc. shall be clearly identified in the schedule.
- F. Each activity shall be labeled with an alphanumeric work breakdown structure/sorting/selection code.
- G. The sequence, duration in workdays, and interdependence of activities required for the complete performance of all work shall be shown.
- H. The schedule shall begin with the date of the Notice to Proceed and conclude with the date of Final Completion shown in the Contract.
- I. The network diagram shall include the following:
1. Time scaled network diagrams based on calendar days and shall be critical path method (CPM) precedence format showing the sequence/interdependence of activities required for complete accomplishment of all items of work.
 2. Each activity shall be plotted so that the start/finish dates can be determined graphically (by comparison) with the calendar scale.
 3. All network diagrams shall be drawn legibly and accurately on 22" x 34" size media, or other size acceptable to the OCTA Project Manager.
 4. Each activity shall be labeled with complete description, planned duration in workdays, and total float time.
 5. The schedules shall accurately indicate the sequence and interdependency of all work activities.

1.04 CONTRACTOR'S PROGRESS SCHEDULE

- A. The Contractor shall update the Progress Schedule monthly (the "Schedule Update") and submit to the OCTA Project Manager for review concurrent by the 5th of the month following month for which the progress reflected on schedule.
- B. Progress Payment to Contractor will not be made until a schedule conforming to the requirements stated herein is submitted each month to the OCTA Project Manager. A continued failure to supply such schedule data shall be grounds for declaring Contractor in default of the Contract.
- C. Contractor's progress schedule shall:

1. Become an integral part of the Contract and will establish interim completion dates for the various activities under the Contract and shall reflect and be consistent with the Milestone Dates established by the Contract.
2. Be used to determine if any activity is not completed by the Milestone date.
3. Be combined with the Schedule of Values for use in the Contractor's submittal/application for and the OCTA Project Manager's review and approval of monthly partial payments.

1.05 PROGRESS REPORTING

- A. Contractor shall provide regular progress reports monthly along with progress schedule submittal to include as described herein.
- B. A statement that the approved Contractor's Progress Schedule has not changed or has been revised. Only the revisions described in this statement shall be made to the progress schedule.
- C. A 28-day schedule covering the past week, current week and two weeks ahead at each scheduled weekly meeting. The schedule shall be a bar chart schedule, divided into 28 calendar days, listing all activities for the four-week period. Scheduled and actual start and finish dates shall be shown. Each activity shall be identified by its approved activity number and a brief description. The bar chart schedule shall have in the heading the Project Title, Contract Number, Contractor's Name, Date, Contract Day Number and Remaining Contract Days.

1.06 PROGRESS EVALUATION

- A. If at any time during the Project, the Contractor fails to complete any activity by its latest scheduled completion date and which late completion of such activity will impact the end date of the work past the Contract Completion Date, Contractor shall within five (5) working days, submit to the OCTA Project Manager a written statement as to how and when Contractor will reorganize his work force to return to the current Contractor's construction schedule. Whenever it becomes apparent from progress evaluation and updated construction schedule data that any Milestone Date(s) or the Contract Completion Date will not be met, Contractor, at his sole cost, shall take some or all of the following actions:
 1. Increase construction manpower in such quantities and crafts as shall substantially eliminate the backlog of work and meet the current Contract Completion Date.
 2. Increase the number of working hours per shift, the number of shifts per day, the number of work days per week, the amount of construction equipment, or any combination of the foregoing sufficient to substantially eliminate the backlog of work.

3. Reschedule work items to achieve concurrent accomplishment of work activities.
- B. Under no circumstances will the addition of equipment or construction forces, increasing work hours, or any other method, manner, or procedure required to return to the contractually required completion date be considered justification for a change order or treated as an acceleration.
- C. The Contractor's Progress Schedule shall begin with the date of issuance of the Notice to Proceed (NTP) and conclude with the date of final completion of the project. Float or slack time within the Progress Schedule is not for the exclusive use or benefit of either the OCTA Project Manager or the Contractor but is a jointly owned expiring project resource available to both parties as needed to meet contract milestones and the Contract completion date.

1.07 SUBMITTAL OF SCHEDULES

- A. The Contractor shall submit to the OCTA Project Manager for review, two (2) copies of the construction schedule (base schedule) within time frame specified herein. Allow OCTA a minimum of 2 weeks to review the construction schedule. Contractor shall address OCTA's comments on schedule and resubmit within five (5) workdays from receipt of OCTA's comments.
- B. The Contractor shall submit to the OCTA Project Manager for review two (2) hard copies of the Contractor's Progress Schedule, one (1) copy of all schedule data, along with one electronic copy within the time frames specified herein. Updates of the Contractor's schedule shall be submitted monthly as part of the payment application submittal.
- C. OCTA Project Manager will have five (5) workdays after receipt of the Contractor's Progress Schedule to respond. Upon receipt of OCTA Project Manager's comments, the Contractor shall confer with the OCTA Project Manager on the appraisal and evaluation of the proposed Contractor's Progress Schedule. The Contractor shall make necessary changes resulting from this review, and the Contractor's Progress Schedule shall be resubmitted for review within three (3) workdays after the receipt of comments.
- D. The Contractor's construction schedule (base schedule) when reviewed and recognized by the OCTA Project Manager shall stand until updated schedules are submitted to reflect actual completed work, reviewed changes, or recognized delays.
- E. All updated or revised schedules submitted after the base schedule shall be in the same detail as the base submittal unless modified in writing by the OCTA Project Manager.

1.08 REVISIONS TO REVIEWED SCHEDULE

- A. The Contractor shall accomplish the Work in accordance with Contractor's construction schedule recognized by the OCTA Project Manager. Changes made to

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Contractor's construction schedule for accomplishing the Work shall in all cases require prior approval by the OCTA Project Manager.

- B. The Contractor shall reflect processed Change Orders that affect the schedule, and issuance of emergency change authorizations in the next schedule submittal.
- C. If Contractor desires to make a major change to Contractor's construction schedule, the Contractor shall submit to the OCTA Project Manager a schedule change request in writing stating the reasons and justification for the change, for OCTA's review and acceptance. Major changes are defined as follows:
 - 1. Those that affect the time estimate for the accomplishment of an activity.
 - 2. Those that affect the sequence when varied from the original schedule to a degree that there is doubt that the agreed Contract Completion Date will be met.
 - 3. Changes to activities having adequate float to absorb the change shall be considered as minor changes, except that an accumulation of minor changes may be considered a major change when the effect of such changes impact the Project Milestones or the Contract Completion date.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

- A. No separate measurement or payment shall be made under this section. Contractor's Progress Schedule will be reviewed each month. The monthly progress payment will not be made until the Contractor's Progress Schedule is found by the OCTA Project Manager to be in conformance with the requirements of this Section.

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section consists of requirements for Contractor submittals to the OCTA Project Manager including plans, procedures, certificates, shop drawings, product data, samples, and miscellaneous Work-related submittals. Individual submittal requirements are specified in the applicable specification section for each unit of Work. No construction work shall be commenced prior to submittals and acceptance of all submittals and shop drawings required per contract documents.

1.02 DEFINITIONS

- A. Submittals are categorized for convenience as follows:
1. Plans and Procedures: Include narrative descriptions, diagrams, equipment, procedures for excavation, demolition, site clearing, maintenance of traffic, etc.
 2. Certificates: Include certified material test reports, certification of proper disposal of demolition materials, or tickets demonstrating compliance with materials, tests or specifications indicated.
 3. Equipment: Include equipment specifications, manufacturer information and demonstration of suitability of equipment for intended use.
 4. Product Data: Standard published information ("catalog cuts") and specially prepared data for the Work of the Contract, including standard illustrations, schedules, brochures, diagrams, performance charts, instructions and other information to illustrate a portion of the Work. Include standard printed information on materials, products and systems to be furnished by the Contractor for this Contract.
 5. Shop Drawings: Include detailed manufacturing and layout information, drawings, diagrams, schedules, and illustrations, demonstrating the contractor's understanding and approach to meeting the intent of the plans and specifications. Shop drawings shall be submitted to the Engineer for review and comment on the conformance of the submitted information to the general intent of the design.
 6. Samples: Include physical examples of materials either for limited visual inspection or selection, or (where indicated) for confirmation, testing, and analysis by the OCTA Project Manager.

7. Miscellaneous Submittals: Such submittals shall be related directly to the Work, not administration related. Include but not be limited to asphalt concrete mix design, work schedule, phasing plans, warranties, guarantees, maintenance agreements, workmanship bonds, survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, operating and maintenance materials, overrun stock (and similar information) and, devices and materials applicable to the Work but not processed as shop drawings, product data or samples. Beside the shop drawings required in the project plans or specifications, the OCTA Project Manager may require additional shop drawings demonstrating the contractor's approach to meeting the intent of the plans and specifications as a part of Quality Control/Quality Assurance.
- B. Product data, shop drawings, samples, and any other submittals are not contract documents.

1.03 SCHEDULE OF SUBMITTALS

- A. It is the Contractor's responsibility to identify the submittals that will be required in each section of specifications and on the contract drawings and determine the date on which each submittal will be made. The submittal schedule, the timeline for which Contractor plans to deliver required submittals to OCTA shall be submitted by the Contractor at time of initial construction meeting to the OCTA Project Manager for review and acceptance. Allow OCTA a minimum of 14 calendar days to review Schedule of Submittal. After review and return by the Engineer, resubmit Schedule of Submittal within 7 calendar days.
- B. Throughout the duration of the Contract, Contractor shall, at the OCTA Project Manager's request, submit all product or procedure documentation for any activity in the Contract.

1.04 GENERAL SUBMITTAL REQUIREMENTS

- A. Administrative Requirements for Submittal: Submittals shall be made in accordance with requirements specified herein and in Product Sections of the Specifications.
- B. Transmission of Submittals: Transmit all submittals through the Project Engineer, unless otherwise directed. Include all information specified below for identification of submittals and for monitoring of review process.
- C. Make submittal at time required per the contract documents and per the Submittal Schedule accepted by the OCTA. Allow three (3) weeks for the OCTA's Consultant to review and accept submittals.
- D. OCTA Project Manager and Contractor shall discuss at the initial construction meeting, the exact procedure to be adopted for the processing of submittals. Generally, submittals shall be made at the time indicated in Contractor's approved submittal schedule. OCTA Project Manager will process submittals within 21

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calendar days after receipt of each of submittals and resubmittals from Contractor. After review and return by the Engineer, resubmit the submittals within 7 calendar days.

- E. Contractor shall be responsible for on time delivery and processing of submittals so as not to impede the progress of the Work. Contractor shall submit an electronic copy of each submittal in PDF format, plus up to three (3) hard copies of each submittal if requested by OCTA.
- F. Contractor shall provide, unless otherwise indicated, five (5) hard copies of each submittal.
- G. Contractor shall, before making submittals, ensure that products will be available in the quantities and in the time required by the Contract.
- H. Contractor shall coordinate and sequence different categories of submittals for same work, and interface units of work, so that one will not be delayed for coordination with another.
- I. Contractor shall maintain a file of all approved submittal documents on work site.
- J. Where required by California law, or as specified in the Contract Documents, submittals shall be signed and sealed by a Professional Engineer licensed in the State of California, or Land Surveyor licensed in the State of California as applicable.
- K. Submittals shall be consecutively and uniquely numbered using a document identifier including Contract number and the appropriate suffix, which will include specification section number and submittal number. Submittals under each specification section shall be in a separate package.
- L. Submittals Identification: Identify each submittal by Specification Section number in order of submittal submitted to OCTA starting from 001 as the first submittal. Re-submittals shall use same number as original submittal, followed by a point number indicating sequential re-submittal. For example:

001	First submittal of the project
002	Second submittal of the project
002.1	First re-submittal of second submittal of the project
002.2	Second re-submittal of second submittal of the project

- 1. Title each submittal with Project name, the Contract number (C-X-XXXX), Submittal number, Contractor's Project number and submission date.
- 2. Identify each element on submittal by reference to Drawing sheet number, detail, schedule, number, assembly or equipment number, Specifications article and paragraph, and other pertinent information to clearly correlate submittal with Contract Drawings. Identify field dimensions clearly and relationships to adjacent

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or critical features of Work, any deviations from the contract documents and applicable standards, ASTM, ACI, OSHA, ect.

- M. Contractor's review of submittals: Prior to submission to the Engineer for review, Contractor shall review each submittal for completeness and conformance to specified requirements. Contractor shall stamp each submittal with a review action stamp and sign each copy certifying that:
1. Field measurements have been determined and verified.
 2. Field construction criteria have been verified.
 3. Catalog numbers and similar data are correct.
 4. Conformance with requirements of Contract Drawings and Specifications is confirmed.
 5. All deviations from requirements of Drawings and Specifications have been identified and noted, and product is available.
- N. Submittals which are received from sources other than through Contractor's office or which have not undergone Contractor's review, will be returned marked "Without Action".
- O. Contractor shall be responsible for timely delivery of submittals in the proper specified format for each submittal category.
- P. Except as otherwise indicated in individual work sections, the Contractor shall comply with requirements specified herein for each indicated category of submittal.
- Q. The Contractor shall include an up-to-date log of submittals in each submittal package.
- R. Grouping of Submittals: Unless otherwise specifically permitted by the Engineer, make all submittals in groups containing all associated items. The Engineer may reject partial submittals as incomplete or hold them until related submittals are made. Submittals under a specification section shall be in one submittal package.
- S. Unsolicited Submittals: Unsolicited submittals will be returned un-reviewed.
- T. Record Submittals: When record submittals are specified, submit three hard copies or sets only. Record submittals will not be reviewed but will be retained for historical and maintenance purposes.

1.05 CITY PLAN CHECK DRAWINGS AND SHOP DRAWINGS

- A. Contractor shall submit to OCTA a full size hard copy and an electronic copy in PDF format of all approved plan check permit drawings issued by the local City, immediately after obtaining the plan check permits drawings from the City.

- B. Shop drawings shall be prepared using AutoCAD. Unless otherwise approved by the OCTA Project Manager or indicated in specific sections of the project specific specifications, shop drawings shall be scaled sufficiently large to accurately show all pertinent aspects of the item and its relationship to the work. Acceptable shop drawings hard copy sizes are 22" x 34", 11" x 17" and 8½" x 11" and are scalable. The Contractor shall additionally submit the shop drawing on electronic media in PDF format and in AutoCAD format compatible with AutoCAD version 2012.
- C. Shop drawings shall be original drawings prepared for submittal review, fabrication and execution of Work. Direct copies and modified reproductions of Contract Drawings will not be accepted for review. Provide space for review action stamps. Contractor shall field verify all existing conditions and all measurements on site before preparing and submitting shop drawings.
- D. Shop drawings shall show, at a minimum, the following:
 - 1. General project information:
 - a. The original date of issue;
 - b. The dates of all applicable revisions;
 - c. The project title, project number, and address;
 - d. The names of contractor, subcontractors, suppliers, manufacturers, separate detailers, etc...
 - 2. Detailed manufacturing and layout information.
 - 3. Drawings, diagrams, schedule and illustrations.
 - 4. Bill of materials including materials types, dimensions and weights, quantities, origin of the materials, material certifications.
 - 5. Welding procedure specifications.
 - 6. Erection or installation plans.
 - 7. Any other important items related to specific work of the Project and as requested by the OCTA's Project Manager.
- E. Detailed work drawings shall be submitted by Contractor for temporary structures and for such other temporary work as may be required for construction, but which does not become an integral part of the completed project. Submittals shall include back-up calculations or any information needed to explain the structure or system or its intended use.
- F. Where a submittal involves engineering computations or original design work is depicted, the submittal shall show the name, the State of California registration

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number, seal, and signature of the Professional Engineer certifying that such computations or design work are correct and in conformance with standards, codes, and acceptable engineering practice.

- G. Contractor shall submit 5 hard copies and a PDF file of each shop drawing submittal. Distribution of submitted shop and working drawings by Contractor for OCTA Project Manager's use will be performed by OCTA Project Manager. Review comments of OCTA Project Manager, and other parties as may be required will be shown on the reproducible set when it is returned to Contractor. Contractor shall make and distribute all copies required for his purposes.

1.06 PRODUCT DATA

- A. Contractor shall collect required data into one submittal for each unit of work or system, and mark each copy to show which choices and options are applicable to the Project.
- B. Contractor shall include the manufacturer's standard printed recommendations for application and use, certification of compliance with standards, notation of field measurements, which have been checked, and special coordination requirements. A Material Safety Data Sheet (MSDS) shall be submitted for each product.

1.07 CERTIFICATES OF COMPLIANCE

- A. Certificates of Compliance shall be submitted by Contractor to OCTA Project Manager for those materials and products for which no samples and test results are specified. The certificates shall:
 - 1. State that the product complies with the respective contract specification and contract drawing requirements.
 - 2. Be accompanied by a certified copy of test results pertaining to the product. All test equipment used shall be verified to be in calibration at the time of each test and test reports shall so indicate. No test shall be made without such verification. When required by the Contract Documents or by law, certified test results shall be sealed by a Professional Engineer licensed to practice in the State of California.
 - 3. Show product represented and its location in the Contract, producer's name, product trade name and catalog number as applicable, place of product origin, test date, testing organization's name and address, quantity of the product to be furnished, and the related Contract Drawing and specification section numbers.

1.08 SAMPLES

- A. Provide samples of each color, texture and pattern identical with final condition of proposed materials or products for the work. Include range of samples (not less than

three units) where unavoidable variations may be expected. Submit one item only of actual assembly or product. Full-size and complete samples may be returned or may be incorporated into field mock-up and the Work.

- B. Submit actual samples. Photographic or printed reproductions will not be accepted. For manufacturer's products, the Contractor shall submit samples from manufacturer, with manufacturer's finish.
- C. Include information with each sample showing generic description, source or product name, manufacturer and compliance with standards and specifications.
- D. Samples are submitted for review and confirmation by OCTA Project Manager. The Engineer will review and select material for Project only after all samples are received, so that materials may be probably coordinated. OCTA Project Manager will not test samples (except as otherwise indicated) for compliance with specifications. Contractor shall have the exclusive responsibility of demonstrating material compliance.

1.09 SURVEY DATA

- A. As required per contract documents and/or by OCTA Project Manager, Contractor shall submit survey data, signed and sealed by a Land Surveyor licensed to practice in the State of California. Refer to Section 01 71 23, Field Engineering for requirements.

1.10 GENERAL DISTRIBUTION

- A. Contractor shall provide distribution of OCTA Project Manager's reviewed submittals (not included in foregoing copy submittal requirements) to subcontractors, suppliers, fabricators and installers, governing authorities, and others as necessary for proper performance of the Work.
- B. Contractor shall include such additional copies of transmittal to OCTA Project Manager, where required, to receive status marking before final distribution.

1.11 REVIEW OF SUBMITTALS

- A. Submittals shall be a communication aid between Contractor and the Engineer by which interpretation of Contract Documents requirements may be confirmed in advance of construction. OCTA Project Manager will review submittals for general conformance with the design concept only. Such review by OCTA Project Manager shall not relieve Contractor or any subcontractor of responsibility for full compliance with contract requirements, for proper design of details, for proper fabrication and construction techniques, for proper coordination with other trades, or for providing all devices required for safe and satisfactory construction and operation.

- B. Changes shall only be authorized by separate written Change Order or Construction Change Authorization, in accordance with the Conditions of the Contract and Section 01 26 00 - Contract Modification Procedures.

1.12 SUBMITTAL STATUS

- A. Submittals reviewed by OCTA Project Manager and returned to Contractor will be marked with one of the following designations:
 - 1. Conforms
 - 2. Revise as Noted and Resubmit
 - 3. Rejected. Resubmit
 - 4. No Action Taken
- B. Contractor shall not proceed with procurement, manufacture or fabrication of items submitted for review, until such submittals have been designated by OCTA Project Manager as "Conforms". Until submittal items receive a conforming designation by OCTA Project Manager, any costs associated with procurement for these items shall be at the Contractor's risk.

1.13 SUBMITTALS DESIGNATED AS "CONFORMS"

- A. Each copy of the submittal so designated by OCTA Project Manager will be identified accordingly by being so stamped and dated.
- B. One reproducible copy will be returned to Contractor.
- C. When a submittal has been designated as "Conforms" by OCTA Project Manager, Contractor shall carry out construction in accordance therewith and no further changes shall be made therein except upon written approval and instructions from OCTA Project Manager.
- D. Contractor shall take responsibility for and bear all cost of damages, which may result from the ordering of any material or from proceeding with any part of the Work prior to submittal being marked "Conforms" by OCTA Project Manager.
- E. Submittals stamped "Conforms" do not relieve the contractor from the responsibility of performance of Work as intended in the plans and specifications. Refer to 1.11 of this Section.

1.14 SUBMITTALS DESIGNATED AS “REVISE AND RESUBMIT,” OR “REJECTED. RESUBMIT”

- A. Each copy of the submittal so designated by OCTA Project Manager will be identified accordingly by being so stamped and dated.
- B. One copy will be returned to Contractor.
- C. If corrections to the submittals are required, copies returned to Contractor will be marked "Rejected. Resubmit", or "Revise and Resubmit", and the required corrections shall be made on the re-submittal copies.
- D. Re-submittals will be handled in the same manner as first submittals. Direct specific attention in writing on re-submittals to revisions other than the corrections requested by OCTA Project Manager on previous submittals. A resubmittal shall contain all information required specifically for the submittal per contract documents including corrections requested and approved information in the previous submittals. A resubmittal will supersede the previous version of a submittal and/or resubmittal as applicable. Incomplete or missing information submittals/resubmittals will be returned without review.
- E. Contractor shall notify OCTA Project Manager prior to execution of any correction, which constitutes a change of the contract requirements indicated on the submittals.

1.15 SUBMITTALS DESIGNATED AS “NO ACTION TAKEN”

- A. Each copy of the submittal so designated by OCTA Project Manager will be identified accordingly by being so stamped and dated.
- B. One reproducible copy will be returned to Contractor.
- C. Submittals made by the Contractor that are not required by the contract documents or were not otherwise requested shall be designated “No Action Taken”

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

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PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this Section.

END OF SECTION

SECTION 01 35 13

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Products and installation for patching and extending Work.
- B. Transitions and adjustments.
- C. Repair of damaged surfaces, finishes, and cleaning.

1.02 RELATED SECTIONS

- A. Section 01 14 23 - Coordination with OCTA and Local Agencies: Authority occupancy and maintenance of utility services.
- B. Section 01 73 29 - Cutting and Patching: General requirements for cutting and patching requirements.
- C. Section 01 50 00 - Temporary Facilities and Controls: Temporary enclosures, protection installed Work, and cleaning during construction.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

- A. New Materials: As specified in PART 2 - PRODUCTS of applicable product Specification Sections, provide suitable products and construction procedures for patching and extending Work.
- B. Type and Quality of Existing Products: Determine by inspection and testing of Products where necessary, referring to existing construction as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that demolition is complete, and areas are ready for execution of Work.
- B. Beginning of alteration Work will be interpreted to mean that Contractor has examined existing conditions and determined that they are acceptable.

3.02 PREPARATION

A. Coverings:

1. Provide weather- and dust-protection coverings as necessary to contain dust and debris. Protect OCTA Property, buses, equipment, utilities, landscaping, and accessories from dust. Provide appropriate covers over all buses parked adjacent to the work area or protect by sprinkling water over work area to control dust.
2. Close area of work with barricades to protect existing construction and new Work from traffic, weather, and extremes of temperature and humidity. At end of work day, provide enclosure around work area with flashing lights so that traffic is aware of construction excavations and new work.
3. Coordinate construction delineation with barricades, but provide OCTA staff cars buses adequate passage to enable the Authority to continue to pass through to parking areas. Provide Bus passage through construction areas if required. OCTA Facility will remain operational during construction.
4. Adjacent bus parking stalls will be used during construction. Provide adequate passage for OCTA buses and staff cars to park in adjacent parking stalls during construction. Do not allow contractor's cars or equipment to park in bus parking stalls adjacent to construction
5. See Section 01 50 00 - Temporary Facilities and Control for additional requirements.

B. Protective Devices and Directional Signage: Provide barricades, directional signage and other protective devices to enable the Authority to continue bus operations, bus traffic through construction areas, occupancy and operation in the existing buildings and adjacent parking stalls. See Section 01 50 00 - Temporary Facilities and Control for additional requirements.

C. Access for Work: Demolish, Cut, move or remove items as necessary for access for alterations, renovation and extension Work. Replace and restore at completion.

D. Disposal of Materials: Immediately remove unsuitable material not marked for salvage, such as decayed wood, insulation, asphalt concrete, corroded rebar, accessories and other materials as required to complete the work. Replace materials as specified for finished Work.

1. Do not allow debris to accumulate in work areas. Dispose debris daily off-site in a legal manner. Dispose all existing asphalt concrete and accessories that are to be removed, and legally dispose off-site.
2. Remove debris and abandoned items from work area and from parking spaces.

E. Surface Preparation: Remove surface finishes and prepare surfaces to provide for

proper installation of new materials and finishes.

- F. Protection: Protect buses and equipment parked adjacent to construction area from damage.

3.03 INSTALLATION

- A. Coordinate Work for alterations and renovations to expedite completion and to accommodate the Authority's concurrent occupancy and use of the facility.
- B. Coordinate Work for alterations and renovations in a timely manner to expedite completion and minimize disruption to the Authority's continued use occupied areas and spaces. Park all construction equipment and materials inside areas of construction and barricade construction area on all sides at end of work day. Provide flashing lights around work area from dusk to dawn.
- C. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring products and finishes to original or specified new condition. Refer to Section 01 73 29 - Cutting and Patching.
- D. Refinish visible existing surfaces to condition before start of construction. Match adjacent finish surface in color and material. Finish to specified condition for each material, with a near transition to adjacent finishes.
- E. In addition to specified work, in case of breakdown of under or above ground utilities, plumbing, electrical power, signal systems, and lighting, restore to fully operational condition immediately as before construction commenced. All power, and other systems should be operational at end of work day. The plans are diagrammatic and do not show all utilities, ducting, equipment, and accessories on the site. Contractor will be required to repair immediately utilities, ducting, plumbing lines, power lines, signal and communication system, data lines, equipment, and accessories in case of breakdown or disruption due to construction work and as required to complete the work. Review OCTA record drawings of construction area before excavation.
- F. Install products as specified in applicable product specification Sections.

3.04 TRANSITIONS

- A. Where Work abuts or aligns with existing construction, perform a smooth and even transition. Patches shall match existing adjacent construction in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition is not possible, terminate existing surface along a straight line at a natural line of division. Refer to Section 01 73 29 - Cutting and Patching.

3.05 ADJUSTMENTS

- A. Where removal of materials results in adjacent spaces becoming one, rework to a smooth plane without breaks, steps or bulkheads.
- B. Where a change of plane of 1/4-inch or more occurs, submit recommendation for providing a smooth transition for the Engineer's review.
- C. Fit Work at penetrations of surfaces as specified in Section 01 73 29 - Cutting and Patching.

3.06 REPAIR OF DAMAGED SURFACES

- A. Replace portions of adjacent existing surfaces which are damaged, lifted, discolored, or showing other imperfections or require replacement or repairs during replacement work. Extent of replacement will be required to nearest construction joint, expansion joint, break line, natural break, or in a straight line. Provide a smooth transition between existing and new surface.
- B. Repair substrate prior to patching finish.
- C. Unless noted otherwise or directed by the OCTA Project Manager, all pavement striping, markings, and markers affected by the construction activities shall be reinstalled to match the existing conditions.

3.07 FINISHES

- A. Finish surfaces as specified in applicable Sections.
- B. Finish patches with material and paint to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections or joints.

3.08 CLEANING

- A. In addition to cleaning specified in Section 01 74 23 - Cleaning, clean the Authority-occupied areas affected by construction activities. Clean areas around the site where asphalt concrete material has fallen during work day. Clean site of work daily before leaving site at end of each work day. Haul debris off-site daily. Clean adjacent bus parking areas daily before leaving site

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

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END OF SECTION

SECTION 01 35 23

OWNER SAFETY REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. The Contractor shall comply with OCTA Level 3 Health, Safety and Environmental Specifications in the contract documents.
- B. Work specified in this section consists of furnishing, operating, maintaining, and utilizing safety equipment; providing safety aids on construction equipment; and assuring safe operation. Compliance with requirements of this section shall not relieve Contractor from other obligations imposed elsewhere in contract, by law and by regulation.

1.02 OTHER SECTIONS WITH SAFETY REQUIREMENTS

- A. OCTA Level 3 Health, Safety and Environmental Specifications
- B. Section 01 14 22, Rules and Hours of Operation
- C. Section 01 14 23, Coordination with OCTA and Local Agencies
- D. Section 01 14 25, Procedures in Construction
- E. Section 01 43 01, Contractor Qualifications and Requirements

1.03 REFERENCE STANDARDS

- A. Comply with the provisions of all local, State and Federal codes, specifications, standards and recommended practices, and OCTA Project Manager Policy, in particular:
 - 1. Cal/OSHA: California State Occupational Safety and Health Administration
 - 2. OSHA: Federal Occupational Safety and Health Administration

1.04 QUALITY CONTROL AND QUALITY ASSURANCE

- A. Contractor's selection and operation of construction equipment and tools shall meet requirements of California State and Federal Occupational Safety and Health Administration (Cal/OSHA, OSHA).
- B. If there is a conflict between the above, the most stringent requirement will apply.

1.05 SUBMITTALS

- A. Contractor shall submit, under provisions of Section 01 33 00, Submittals, the following information:
 - 1. Information required by OCTA Level 3 Health, Safety and Environmental Specifications.
 - 2. Material Safety Data Sheet, per Section 01 14 25, Procedures in Construction.
 - 3. Notification to OCTA Project Manager as soon as reasonably possible of any injury to Contractor's employee, subcontractor of any tier, supplier or other entity engaged in any portion of the work while on OCTA Project Manager property. Contractor shall submit an injury report to OCTA Project Manager within 24 hours of said injury.
 - 4. Other records as required by agencies listed in Part 1.03.

1.06 SAFETY AND HEALTH PERSONNEL

- A. Provide a Site Safety Representative, as described in Sections 01 43 01 Contractor Qualifications and Requirements, OCTA Level 3 Health, Safety and Environmental Specifications, and the General Provisions, who shall coordinate and supervise onsite safety and health, including training and testing Contractor's personnel.

1.07 CONSTRUCTION AND SAFETY EQUIPMENT

- A. Contractor shall conform to requirements of the OCTA Project Manager, Cal/OSHA, and to applicable codes and regulations of Federal, State, and local authorities having jurisdiction over jobsite safety.

1.08 TESTING EQUIPMENT

- A. Testing equipment as applicable to work site safety shall conform to requirements of California Code of Regulations, Title 8, Division of Industrial Safety, unless indicated otherwise.

1.09 IDENTIFICATION OF CONTRACTOR/SUBCONTRACTOR PERSONNEL

- A. While performing work at worksite, Contractor personnel of any tier shall be identified with employee's company name or logo affixed to employee's hardhat, identification badge, or other identification acceptable to OCTA Project Manager.

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- B. Contractor personnel shall wear hard hats, orange safety vests or orange T-shirts with reflective strips, safety glasses, and safety shoes at all times while on the project.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this Section.

END OF SECTION

SECTION 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Requirements associated with regulations, standards, and requirements of authorities having jurisdiction.

B. Related Sections:

1. Section 01 14 25, Procedures in Construction.
2. Section 01 14 27, Legal Relations and Responsibility.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00, Submittal Procedures.

B. Before starting the work, submit to OCTA Project Manager copies of permit applications, permits, licenses, receipts for fee payments, judgments, and other similar documents, correspondence, and records obtained for performance of the work.

C. At completion, submit certifications, releases, jurisdictional settlements, notices and other similar documents under Section 01 77 00, Closeout Procedures.

1.03 APPLICABILITY OF INDUSTRY STANDARDS

A. Construction Industry Standards referenced in the contract documents have the same force and effect as if published herein and are made a part of the contract documents. Refer to Section 01 42 00 References.

B. Reference standards (referenced in the contract documents or by governing regulations) have precedence over non-referenced standards that are recognized in the industry for applicability to the work.

1. Building Codes: Performance of the Work shall meet or exceed the minimum requirements of California Code of Regulations (CCR), Title 24, including the following:

- a. CCR Title 24, Part 2: Uniform Building Code (UBC), latest edition, with State of California amendments; referenced as California Building Code (CBC).

- b. CCR Title 24, Part 3: National Fire Protection Association (NFPA) 13 - National Electrical Code (NEC), latest edition, with State of California Amendments, referenced as California Electrical Code (CEC).
 - c. CCR Title 24, Part 9: Uniform Fire Code (UFC), latest edition, with State of California Amendments, referenced as California Fire Code (CFC).
 - d. CCR Title 24, Part 12: Uniform Building Code Standards (UBC Standards), latest edition, with State of California Amendments; referenced as California Building Standards Code (CBSC).
 - 2. Performance of the Work shall also comply with applicable requirements of California Code of Regulations (CCR), as follows:
 - a. Title 19 - Public Safety.
 - b. Title 22 - Social Security.
 - c. Title 24 - Building Standards, Parts 2 through 7, and Title 25 as applicable.
 - 3. References on the Drawings or in the Specifications to "code", "Code" or "building code" similar terms, not otherwise identified, shall mean the codes specified above, together with all additions, amendments, changes, and interpretations adopted by code authorities of the jurisdiction having authority over the Project.
 - 4. The applicable edition of all codes shall be that adopted at the time of issuance of permits by the jurisdiction having authority and shall include all modifications and additions adopted by that jurisdiction(s).
- C. Recognized industry standards shall be used where no specific standard is referenced in the contract documents. Obtain OCTA Project Manager's approval before using any non-referenced standards.

1.04 GOVERNING REGULATIONS AND AUTHORITIES

- A. Contact authorities having jurisdiction directly for necessary information and decisions having a bearing on performance of the work.
- B. Utility location and protection shall conform to Section 5, Utilities, of the Standard Specifications for Public Works Construction (SSPWC). At each OCTA's property, the contractor shall utilize an independent underground utility locating service, which uses standard locating techniques other than excavating, to identify the location of underground utilities in the areas of the work prior to excavating. The contractor shall determine the exact location of utilities identified in the work area by potholing using hand tools before using any power operated excavating equipment. Utilities now shown on the plans which are in direct conflict with the work will be dealt with by change orders.

- C. Comply with requirements under the National Pollutant Discharge Elimination System (NPDES).

1.05 OTHER APPLICABLE LAWS, ORDINANCES AND REGULATIONS

- A. Work shall be accomplished in conformance with all applicable laws, ordinances, rules and regulations of Federal, State and local governmental agencies and jurisdictions, County of Orange, AQMD, CAL-OSHA, and all other agencies having authority over the Project.
- B. Work shall be accomplished in conformance with all rules and regulations of public utilities, utility districts, and public agencies providing utility services.
- C. Where such laws, ordinances, rules and regulations require more care or greater time to accomplish Work, or require better quality, higher standards or greater size of products, Work shall be accomplished in conformance to such requirements with no change to the Contract Sum And Contract Time, except where changes in laws, ordinances, rules and regulations occur subsequent to the execution date of the Agreement.
- D. Contractor shall pay for and obtain all permits required by all agencies having jurisdiction over the work. Contractor shall be required to pay for all temporary utility connections and use to the respective utility company during construction.

1.06 PERMITS

- A. Obtain required permits from regulating agencies. Do not start work in areas requiring permits before issuance of permits from authorities having jurisdiction.
 - 1. Coordinate with regulating agencies to obtain required permits.
 - 2. Submit copies of permit applications and permits to OCTA Project Manager.
 - 3. Comply with permit requirements and assume responsibility for any violations.
- B. Prepare permit applications and obtain permits as necessary for performance of the work, including but not limited to:
 - 1. Maintenance and protection of vehicle traffic.
 - 2. Excavation, dewatering and discharge of surface water and runoff into existing drainage systems or surface waters.
 - 3. Disposal of debris and soils.
 - 4. All other activities with potential to adversely affect the environment.

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5. Written permission from property owner for right of entry onto private property where necessary.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 4 - MEASUREMENT AND PAYMENT

4.01 MEASUREMENT

No separate measurement will be made for work of this section.

4.02 PAYMENT

Work of this section is considered incidental to work under other payment item(s) listed in the Agreement firm fixed price.

END OF SECTION

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SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Use of references in Drawings and Specifications, including requirements for copies of reference standards at Project site.
2. Abbreviations and acronyms.
3. General provisions regarding references.

1.02 USE OF REFERENCES

- A. References: The Drawings and Specifications contain references to various standards, standard specifications, codes, practices and requirements for products, execution, tests and inspections. These reference standards are published and issued by the agencies, associations, organizations and societies listed in this Section or identified in individual product specification Sections.
- B. Relationship to Drawings and Specifications: Such references are incorporated into and made a part of the Drawings and Specifications to the extent applicable.
- C. Referenced Grades Classes and Types: Where an alternative or optional grade, class or type of product or execution is included in a reference but is not identified on the Drawings or in the Specifications, provide the highest, best, and greatest of the alternatives or options for the intended use and prevailing conditions.
- D. Copies of Reference Standards:
1. Reference standards are not furnished with the Drawings and Specifications because it is presumed that the Contractor, subcontractors, manufacturers, suppliers, trades and crafts are familiar with these generally-recognized standards of the construction industry.
 2. Copies of reference standards may be obtained from publishing sources.
- E. Jobsite Copies:
1. Contractor shall obtain and maintain at the Project site copies of reference standards identified on the Drawings and/or in the Specifications in order to properly execute the Work.

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2. At a minimum, the following shall be readily available at the site:
 - a. Local and State Building Codes: As referenced in Section 01060 - Regulatory Requirements.
 - b. Safety Codes: State of California, California Code of Regulations (CCR), Title 8 - Industrial Relations, Chapter 4, Subchapter 7, General Industry Safety Orders.
 - c. General Standards: UBC Standards, other model Code standards, UL Building Products Listing, FM Approval Guide and ASTM Standards in Building Codes.
 - d. Fire and Life Safety Standards: All referenced standards pertaining to fire rated construction and exiting.
 - e. Common Materials Standards: American Concrete Institute (ACI), American Institute of Steel Construction (AISC), American Welding Society (AWS), Gypsum Association (GA), National Fire Protection Association (NFPA), Tile Council of America (TCA) and Woodwork Institute of California (WIC) standards to the extent referenced within the Contract Specifications.
 - f. Research Reports: ICBO Evaluation Service (ICBO ES) Research Reports and CABO National Evaluation Service Reports (NER), for products not in conformance to prescribed requirements stated in Building Code.
 - g. Product Listings: Approval documentation, indicating approval of authorities having jurisdiction for use of product with local City.
- F. Edition Date of References:
 1. When an edition or effective date of a reference is not given, it shall be understood to be the current edition or latest revision published as of the date indicated on the Drawings and Specifications.
 2. All amendments, changes, errata and supplements as of the effective date shall be included.
- G. ASTM and ANSI References: Specifications and Standards of the American Society for Testing and Materials (ASTM) and the American National Standards Institute (ANSI) are identified in the Drawings and Specifications by abbreviation and number only and may not be further identified by title, date, revision or amendment. It is presumed that the Contractor is familiar with and has access to these nationally- and industry-recognized specifications and standards.

1.03 DEFINITIONS OF TERMS

- A. Words and Terms Used on Drawings and in Specifications: Additional words and terms may be used in the Drawings and Specifications and are defined as follows:

1. Applicable: As appropriate for the particular condition, circumstance or situation.
2. Approved: Limited to duties and responsibilities of the Authority and the Engineer as stated in the Conditions of the Contract, for actions performed in the professional judgment of the Engineer or the Engineer's responsible design consultant, in conjunction with submittals, applications, and requests. Approvals shall be valid only if obtained in writing and shall not apply to matters regarding the means, methods, techniques, sequences and procedures of construction. Approval action shall not relieve the Contractor from responsibility to fulfill Contract requirements.
3. And/or: If used, shall mean that either or both of the items so joined are required.
4. Authority or Owner: The Orange County Transportation Authority, a legal entity organized and existing in the County of Orange under and by virtue of the laws of the State of California. All necessary action by the Authority pertaining to the contract will be taken by legally constituted authorities empowered to on behalf of the Orange County Transportation Authority.
5. Contractor: shall mean the individual, partnership, corporation, or other legal entity entering into contract with the Authority to perform the work covered by the contract documents, and these specifications.
6. Directed: Limited to duties and responsibilities of the Engineer as stated in the Conditions of the Contract, and meaning as instructed by the Engineer, in writing, regarding matters other than the means, methods, techniques, sequences and procedures of construction. Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Engineer", "requested by the Engineer", and similar phrases. No implied meaning shall be interpreted to extend the Engineer's responsibilities into the Contractor's supervision of construction.
7. Equal or Equivalent: As determined by the Engineer as being equivalent, considering such attributes as durability, finish, function, suitability, quality, utility, performance, and aesthetic features.
8. Engineer: shall mean the Project Manager of the Orange County Transportation Authority, acting either directly or through properly authorized agents or representatives acting within the scope of the particular duties entrusted to them.
9. Furnish: Means "supply and deliver, to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations."
10. Indicated: The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as "shown", "noted", "scheduled", and "specified" are used to help the reader locate the reference. There shall be no limitation on location.

11. Install: Describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations.
12. Installer:
 - a. "Installer" refers to the Contractor or an entity engaged by the Contractor, such as an employee, subcontractor, or sub-subcontractor, for performance of a particular construction activity, including installation, erection, application and similar operations. Installers shall be adequately skilled and experienced in the operations they are engaged to perform.
 - b. Experienced Installer: The term "experienced," when used with "installer" shall mean having a minimum of 5 previous projects similar in size to this Project, knowing the precautions necessary to perform the Work, and being familiar with requirements of authorities having jurisdiction over the Work.
13. Jobsite: Same as "Site."
14. Necessary: With due consideration of the conditions of the Project and, as determined in the professional judgment of the Engineer as being necessary for performance of the Work in conformance with the requirements of the Contract Documents, but excluding matters regarding the means, methods, techniques, sequences and procedures of construction.
15. Noted: Same as "Indicated."
16. Per: In accordance with or in compliance with.
17. Products: Material, system or equipment.
18. Project Site: Same as "Site."
19. Proper: As determined by the Engineer as being proper for the Work, excluding matters regarding the means, methods, techniques, sequences and procedures of construction, which are solely the Contractor's responsibility to determine.
20. Provide: "Furnish and install, complete, and ready for the intended use."
21. Regulation: Includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, as well as and rules, conventions and agreements within the construction industry that control performance of the Work.
22. Required: Necessary for performance of the Work in conformance with the requirements of the Contract Documents, excluding matters regarding the means, methods, techniques, sequences and procedures of construction, such as:
 - a. Regulatory requirements of authorities having jurisdiction.

- b. Requirements of referenced standards.
- c. Requirements generally recognized as accepted construction practices of the locale.
- d. Notes, schedules and graphic representations on the Drawings.
- e. Requirements specified or referenced in the Specifications.
- f. Duties and responsibilities stated in the RFP documents and Agreement.

23. Scheduled: Same as "Indicated."

24. Selected: As selected by the Engineer or Authority from the full selection of the manufacturer's products, unless specifically limited in the Contract Documents to a particular quality, color, texture, or price range.

25. Shown: Same as "Indicated."

26. Site: Same as "Jobsite", "Site of the Work" or "Project Site;" the area or areas or spaces occupied by the Project and including adjacent areas and other related areas occupied or used by the Contractor for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.

27. Subcontractor: The individual, partnership, corporation or other legal entity entering into a contract with the Contractor to perform a portion of the work.

28. Testing Laboratory or Laboratories: Same as "Testing and Inspection Agency."

29. Testing and Inspection Agency: An independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.

1.03 ABBREVIATIONS, ACRONYMS, NAMES AND TERMS, GENERAL

- A. Abbreviations, Acronyms, Names and Terms: Where acronyms, abbreviations names and terms are used in the Drawings, Specifications or other Contract Documents, they shall mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable.
- B. Abbreviations: The following are commonly-used abbreviations which may be found on the Drawings or in the Specifications:

AC or ac	Alternating current or air conditioning (depending upon context)
AMP or amp	Ampere
C	Celsius
CFM or cfm	Cubic feet per minute
CM or cm	Centimeter
CY or cy	Cubic yard

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DC or dc	Direct current
DEG or deg	Degrees
F	Fahrenheit
FPM or fpm	Feet per minute
FPS or fps	Feet per second
FT or ft	Foot or feet
Gal or gal	Gallons
GPM or gpm	Gallons per minute
IN or in	Inch or inches
Kip or kip	Thousand pounds
KSI or ksi	Thousand pounds per square inch
KSF or ksf	Thousand pounds per square foot
KV or kv	Kilovolt
KVA or kva	Kilovolt amperes
KW or kw	Kilowatt
KWH or kwh	Kilowatt hour
LBF or lbf	Pounds force
LF or lf	Lineal foot
M or m	Meter
MPH or mph	Miles per hour
MM or mm	Millimeter
PCF or pcf	Pounds per cubic foot
PSF or psf	Pounds per square foot
PSI or psi	Pounds per square inch
PSY or psy	Per square yard
SF or sf	Square foot
SY or sy	Square yard
V or v	Volts

C. Undefined Abbreviations, Acronyms, Names and Terms: Words and terms not otherwise specifically defined in this Section, in the RFP documents, in the Conditions of the Contract, on the Drawings or elsewhere in the Specifications, shall be as customarily defined by trade or industry practice, by reference standard and by specialty dictionaries such as the following:

1. The American Institute of Architects (AIA) Document M101, "Glossary of Construction Industry Terms".
2. The Construction Specifications Institute (CSI) Technical Document TD 2-4, "Abbreviations".
3. Dictionary of Architecture and Construction, (Cyril M. Harris, McGraw-Hill Book Company, 1975).
4. Encyclopedia of Associations, published by Gale Research Co., available in most libraries.

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1.04 ABBREVIATIONS FOR AGENCIES, ASSOCIATIONS, CODES AND STANDARDS

- A. Abbreviations for Agencies, Associations, Codes and Standards: The following abbreviations and acronyms may be used in the Drawings and Specifications. When used, the abbreviation or acronym shall mean the full name of the applicable agency, association, organization, society or standard.

AAMA	American Architectural Manufacturers Association
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AGA	American Galvanizers Association
AGA	American Gas Association
AHRI	Air-Conditioning, Heating, and Refrigeration Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALSC	American Lumber Standard Committee
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
APA	APA – The Engineered Wood Association (formerly American Plywood Association)
AREMA	American Railway Engineering and Maintenance-of-Way Association
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	ASME International (formerly American Society of Mechanical Engineers)
ASSE	American Society of Safety Engineers
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (formerly American Society for Testing and Materials)
AWI	Architectural Woodwork Institute
AWPA	American Wood Protection Association (formerly American Wood-Preservers' Association)
AWS	American Welding Society
BHMA	Building Hardware Manufacturers Association
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Department of Industrial Relations, Division of Occupational Safety and Health
Caltrans	California Department of Transportation, Standard Plans & Specifications 2010 Edition
CBC	California Building Code
CEC	California Electrical Code
CFR	Code of Federal Regulations
CMC	California Mechanical Code
CPA	Composite Panel Association
CPC	California Plumbing Code
CPUC	California Public Utilities Authority

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CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
DHI	Door and Hardware Institute
DOC	U.S. Department of Commerce
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FM	FM Approvals
FM	FM Global (formerly Factory Mutual)
FRA	Federal Railroad Administration
FS	Federal Specification
FSC	Forest Stewardship Council
FTA	Federal Transit Administration
GA	Gypsum Association
GANA	Glass Association of North America
HI	Hydraulics Institute
HMMA	Hollow Metal Manufacturers Association
ICC	International Code Council
IEEE	Institute of Electrical and Electronics Engineers
IGCC	Insulating Glass Certification Council
IGMA	Insulating Glass Manufacturers Alliance
ISO	International Organization for Standardization
LBTC	Laguna Beach Transportation Center
LEED	Leadership in Energy and Environmental Design
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (formerly National Association of Corrosion Engineers)
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFRC	National Fenestration Rating Council
NHLA	National Hardwood Lumber Association
NSF	NSF International (formerly National Sanitation Foundation)
OSHA	Occupational Safety and Health Administration
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
PS	Product Standard (US Department of Commerce)
RCSC	Research Council on Structural Connections
RIS	Redwood Inspection Service
RTA	Railway Tie Association
SDI	Steel Deck Institute
SDI	Steel Door Institute
SCRRA	Southern California Regional Rail Authority
SCAQMD	South Coast Air Quality Management District
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPPWC	Standard Plans for Public Works Construction, 2015 Edition
SSPC	Society for Protective Coatings (formerly Steel Structures Painting Council)

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SSPWC	Standard Specifications for Public Works Construction, 2015 Edition
TCNA	Tile Council of North America
UL	Underwriters Laboratories Inc.
USDOJ	U.S. Department of Justice
USDOT	U.S. Department of Transportation
USGBC	U.S. Green Building Council
WCLIB	West Coast Lumber Inspection Bureau (stamped WCLB)
WI	Woodwork Institute
WWPA	Western Wood Products Association

1.05 REFERENCE STANDARDS

A. General

1. Specifications, standards, and guidelines referenced in the text are incorporated by reference as if fully set forth. Where a referenced standard includes both administrative and technical provisions, and the administrative provisions conflict with the contract documents, only the technical provisions shall apply. If a referenced standard appears to conflict with the drawings and specifications, consult OCTA Project Manager for resolution.
2. The governing versions of reference standards and codes are those current at the time of contract execution, including errata, amendments, updates, etc., unless noted otherwise.
3. Contractor shall maintain the latest copy of applicable standards at jobsite during submittals, planning and progress of the work. Make standards available for use by OCTA Project Manager upon request.
4. Caltrans: Standard Plans and Specifications 2010 Edition.
5. Standard Plans for Public Works Construction (SPPWC) 2012 Edition, Standard Specifications for Public Works Construction (SSPWC) 2015 Edition.

B. ADA Standards

1. References to ADAAG or the ADA Accessibility Guidelines refer to the ADA [Americans with Disabilities Act] Accessibility Guidelines for Buildings and Facilities, adopted 7/23/04 by the U.S. Access Board, amended 8/5/05, supplemented 3/23/07 reflecting amendments by the U.S. Department of Transportation, available at www.access-board.gov.
2. References to USDOT ADA Standards refer to the U.S. Department of Transportation ADA Standards for Transportation Facilities, effective 11/29/06, available at www.access-board.gov.

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3. References to USDOJ ADA Standards are to the U.S. Department of Justice ADA Standards for Accessible Design, 1994, available at www.access-board.gov, or to new standards (currently pending) if in effect at the time of execution of the contract documents.

PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 4 - MEASUREMENT AND PAYMENT

Not Used.

END OF SECTION

SECTION 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 GENERAL

This Section provides definition of terms cited in the Contract Documents.

1.02 DEFINITION OF TERMS

- A. Wherever in the specifications and other Contract Documents, the following terms and abbreviations or pronouns in place of them, are used, the intent and meaning shall be interpreted as provided in this section unless the context otherwise requires.
 - 1. Quality Assurance (QA): The process by which the OCTA Project Manager elects to monitor and assure that it receives proper construction related documentation from the Contractor. QA procedures measure the setting of schedules for the receipt and review of documentation and the quality of the information contained within the documentation.
 - 2. Quality Control (QC): The process by which the OCTA Project Manager receives documentation from the Contractor that proves that the Contractor is providing the contractually mandated services, such as training, testing and inspection. Contractor must show evidence of internal procedures demonstrating how he will perform these mandated functions and submit documentation that QC verifications have been completed. QC is the responsibility of the Contractor.
 - 3. Roadway Worker: Any OCTA Project Manager or Contractor employee whose duties include inspection, construction, roadway facilities or roadway machinery within the OCTA and/or City right of way.
 - 4. Salvage: To save any removed item. The salvaged item shall be reused in the contract or delivered and stockpiled for the OCTA Project Manager as specified in the Contract Documents.
 - 5. Site Specific Work Plan (SSWP): A program, plan, and schedule prepared and submitted by the Contractor and approved by the OCTA Project Manager that accurately describes and illustrates the manner in which work within the operating envelope will be accomplished, the impacts on any elements of the Operating System and the manner in which work will be accomplished with the OCTA Project Manager allotted work windows.
 - 6. Project Applicant: all references made by City, local agencies, or other agencies to Project Applicant means the Contractor and not OCTA.

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PART 2 – PRODUCTS

Not Used.

PART 3 – EXECUTION

Not Used.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this Section.

END OF SECTION

SECTION 01 43 00

QUALITY ASSURANCE

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Administrative and procedural requirements for quality assurance.
 - 1. Specific quality assurance requirements for individual construction activities are specified in the sections that specify those activities. Requirements in those sections may also cover production of standard products.
 - 2. Requirements for Contractor to provide quality assurance services required by OCTA, or authorities having jurisdiction are not limited by provisions of this section.
- B. Related Sections:
 - 1. Section 01 43 01, Contractor Qualifications and Requirements.
 - 2. Section 01 45 00, Quality Control.

1.02 DEFINITIONS

- A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the work to evaluate that actual products incorporated into the work and completed construction comply with requirements. Refer to Section 01 45 00, Quality Control.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not samples. Approved mockups establish the standard by which the work will be judged.
- D. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that

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requirements specified apply exclusively to trades people of the corresponding generic name.

- E. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this project; having a minimum of five years' experience in work similar to that required for this project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.03 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to OCTA for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to OCTA for a decision before proceeding.

1.04 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual specification sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced (as defined above) in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced (as defined above) in manufacturing products or systems similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced (as defined above) in producing products similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where project is located and who is experienced (as defined above) in providing engineering services of the kind indicated. Engineering services

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are defined as those performed for installations of the system, assembly, or product which are similar to those indicated for this project in material, design, and extent.

- F. Specialists: Certain sections of the specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented by a recognized OCTA; and with additional qualifications specified in individual sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups, where indicated, using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed work.

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- f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to OCTA, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the contract documents.
- J. Mockups: Before installing portions of the work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed work:
 1. Build mockups in location and of size indicated or, if not indicated, as directed by OCTA.
 2. Notify OCTA seven days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain OCTA's approval of mockups before starting work, fabrication, or construction.
 5. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 7. Demolish and remove mockups when directed, unless otherwise indicated.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement will be made for the work of this section.

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END OF SECTION

SECTION 01 43 01

CONTRACTOR QUALIFICATIONS AND REQUIREMENTS

PART 1 – GENERAL

1.01 CONTRACTOR DUTIES

- A. Except as specifically noted otherwise, provide:
 - 1. A Construction Project Manager, who shall serve as the Contractor's Representative for the Contract, at or beyond the requirements described in this section.
 - 2. Other labor, supervision, and materials required for the work.
 - 3. Other tools, equipment, and machinery required for the work.
 - 4. Water, heat, and utilities required for the work.
 - 5. Support facilities and services, including fully furnished field office facilities, necessary for the proper execution and completion of the work.
- B. Pay legally required sales, consumer, and use taxes.
- C. Secure and pay for fees, surcharges, taxes, permits, and licenses necessary for the proper execution of the work.

1.02 REFERENCE STANDARDS

- A. OSHA: Occupational Safety and Health Administration regulations.

1.03 CONSTRUCTION PROJECT MANAGER

- A. Provide for the work a Construction Project Manager who will manage and coordinate the overall aspects of the work. The Construction Project Manager's qualifications and experience shall include:
 - 1. A minimum of five years of progressing work responsible experience on public works construction projects that include coordination, and scopes, types, and characters of work directly related to the scope of work of this contract.
 - 2. Demonstrated ability to work safely and supervise individuals in safe work.
 - 3. Previous positions and experience supervising and planning work activities of construction superintendents, project engineers, and support personnel foreman and crews.

4. Ability to read and understand survey, grading, paving, striping, utility, and structural plans.
 5. Ability to develop and work from construction schedules.
- B. The Construction Project Manager must:
1. Visit the site daily during the work to verify the work is proceeding per contract documents.
 2. Be on the job during the work week to manage and coordinate all aspects of work for the full duration of the project.
 3. Be able to respond immediately to emergency or problem calls, 24 hours a day, 7 days a week.
- C. The Construction Project Manager shall have the necessary authority to provide instructions and orders to his authorized representatives. The Construction Project Manager shall not be replaced without advance approval by the OCTA Project Manager; OCTA Project Manager will have sole approval of the replacement. The Contractor may propose a supervisory personnel such as superintendent to serve as Construction Project Manager.

1.04 SITE SAFETY REPRESENTATIVE

- A. Provide Site Safety Representative.
- B. Site Safety Representative qualifications and experience must include:
1. Meeting qualifications set forth in the General Provision. Pass OCTA Level 3 Health, Safety and Environmental Requirements.
- C. The Site Safety Representative must be headquartered for the duration of the project at Contractor's construction field office. .
- D. The Site Safety Representative will be required to train and test Contractor's employees as described in Section 01 35 23, Owner Safety Requirements.

1.05 SUBMITTALS

- A. Contractor shall submit for OCTA Project Manager's approval the name and professional history of each of the key positions identified in this specification section.

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PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 PERSONNEL QUALIFICATION

- A. Within five calendar days after Notice to Proceed, submit to OCTA Project Manager resumes of personnel listed above in Part 1 above. Each resume shall provide sufficient detail to demonstrate compliance with requirements. Submit a schedule showing, for each employee classification, number of personnel to be assigned to the work and duration of their assignments.
- B. The OCTA Project Manager will review resumes to determine acceptability of qualifications and experience. The OCTA Project Manager's decision is final. Do not resubmit resumes of personnel deemed unacceptable by the OCTA Project Manager.
- C. Substitutions: To replace any personnel identified in Part 1, follow this section's procedures for obtaining approval of the original personnel. This qualification process, shall be completed before the vacancy occurs. Provision for substitutions does not relieve Contractor of the responsibility to provide personnel as provided in Part 1.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work of this section.

END OF SECTION

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SECTION 01 45 00

QUALITY CONTROL

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Authority of OCTA Project Manager.
2. Responsibilities of the Contractor.
3. Inspection and testing by OCTA Project Manager.

B. Related Sections:

1. Section 01 14 23, Coordination with OCTA and Local Agencies.
2. Section 01 33 00, Submittal Procedures.
3. Section 01 41 00, Regulatory Requirements.
4. Section 01 43 00, Quality Assurance.
5. Section 01 60 00, Product Requirements.

1.02 AUTHORITY OF OCTA PROJECT MANAGER

- A. OCTA Project Manager will determine whether the work is completed in accordance with the contract documents. OCTA Project Manager will decide all questions that may arise as to the quality or acceptability of materials furnished and work performed, and interpretations of the contract documents.
- B. OCTA Project Manager may require the Contractor to finish a section on which work is in progress before work is started on any additional section. Refer to Section 01 14 22, Rules and Hours of Operation for requirements.
- C. OCTA Project Manager may require the Contractor to submit additional shop drawings or documents to demonstrate the Contractor's understanding the intents of contract plans and specifications as part of quality control.

1.03 REFERENCES

- A. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection Used in Engineering Design and Construction.

1.04 REGULATORY REQUIREMENTS FOR TESTING AND INSPECTION

- A. Regulatory Requirements for Testing and Inspection: Inspections, testing and approvals as required by authorities having jurisdiction. Refer to Section 01060 - Regulatory Requirements.
 - 1. California Code of Regulations (CCR) - Title 24, State Building Code (Uniform Building Code with State of California Amendments), latest edition, as adopted and interpreted by authorities having jurisdiction.
 - 2. California Code of Regulations (CCR) - Title 22, Sections 94065, 94067 and 94069.

1.05 RESPONSIBILITIES OF THE CONTRACTOR

- A. Cooperate with OCTA Project Manager and with other contractors as detailed in Section 01 14 24, Coordination with OCTA and Local Agencies.
- B. Ensure that products, services, workmanship and site conditions comply with requirements of the Drawings and Specifications by coordinating, supervising, testing and inspecting the Work and by utilizing only suitably qualified personnel.
- C. Perform the work to achieve the level of quality prescribed in the contract documents, including by reference, all Codes, laws, rules, regulations and standards. The no quality basic is prescribed, the quality shall be in accordance with the best accepted practices of the construction industry for the locale of the Project, for projects of this type.
- D. Perform the work in the proper sequence in relation to the requirements of the OCTA and other contractors, all as may be directed by OCTA Project Manager.
- E. Employ and assign knowledgeable and skilled personnel as necessary to perform quality control functions to ensure that the Work is provided as required.
- F. Be responsible for any damage done by it or its agents to the work performed by the OCTA or another contractor.

1.06 SUPERVISION AND CONSTRUCTION PROCEDURES

- A. Give the work the constant attention necessary to facilitate the progress of the work.
- B. Be solely responsible for all construction means, methods, techniques, and procedures and for coordinating all portions of the work under the contract. Permission given by OCTA Project Manager to use any particular methods, equipment, or appliances shall not be construed to relieve the Contractor from furnishing other equipment or other appliances or adopting other methods when those in use prove unsatisfactory, or as to bind OCTA Project Manager to accept work which does not comply with the contract.

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- C. Immediately remove from the work, when so ordered by OCTA Project Manager, and do not re-employ on any of the work, without written permission from OCTA Project Manager, any contractor or subcontractor employee doing unsafe, improper, or defective work; who, in OCTA Project Manager's judgment, refuses or neglects the direction of OCTA Project Manager given to the Contractor; who is deemed incompetent or disorderly; or who commits trespassing on public or private property in the vicinity of the work.
- D. Be responsible for securing all work areas by barricade in accordance with local and State requirements as applicable at the end of each day.

1.07 QUALITY OF THE WORK

- A. Quality of Products: Unless otherwise indicated or specified, all products shall be new, free of defects and fit for the intended use.
- B. Quality of Installation: All Work shall be produced plumb, level, square and true, or true to indicated angle, and with proper alignment and relationship between the various elements. New material shall be installed so that drainage merges with existing flow patterns on the site towards the drains.
- C. Protection of Existing and Completed Work: Take all measures necessary to preserve and protect existing and completed Work free from damage, deterioration, soiling and staining, until Acceptance by the Authority.
- D. Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Unless more stringent requirements are indicated or specified, comply with manufacturer's instructions and recommendations, reference standards and building code research report requirements in preparing, fabricating, erecting, installing, applying, connecting and finishing Work.

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- E. Deviations from Standards and Code Compliance and Manufacturer's Instructions and Recommendations: Document and explain all deviations from reference standards and building code research report requirements and manufacturer's product installation instructions and recommendations, including acknowledgement by the manufacturer that such deviations are acceptable and appropriate for the Project.
- F. Verification of Quality: Work shall be subject to verification of quality by the Authority or Engineer in accordance with provisions of the Conditions of the Contract.
 - 1. Contractor shall cooperate by making Work available for inspection by the Authority or Engineer or their designated representative.
 - 2. Such verification may include mill, plant, shop, or field inspection as required. OCTA designated Inspector shall access to material inspection.
 - 3. Provide access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated.
 - 4. Provide all information and assistance as required, including that by and from subcontractors, fabricators, materials suppliers and manufacturers, for verification of quality by the Authority or Engineer.
 - 5. Contract modifications, if any, resulting from such verification activities shall be governed by applicable provisions in the Conditions of the Contract.
- G. Observations by the Engineer and Engineer's Consultants: Periodic and occasional observations of Work in progress may be made by the Engineer and Engineer's consultants as deemed necessary to review progress of Work and general conformance with design intent.
- H. Limitations on Inspection, Test and Observations: Neither employment of an Inspector of Record, independent testing and inspection agency, or observations by the Engineer and Engineer's consultants shall in no way relieve Contractor of obligation to perform Work in full conformance to all requirements of Contract Documents and applicable Building Code and other regulatory requirements.
- I. The Engineer's Acceptance and Rejection of Work: The Engineer reserves the right to reject all Work not in conformance to the requirements of the Drawings and Specifications.
- J. Correction of Non-Conforming Work: Non-conforming Work shall be modified, replaced, repaired or redone by the Contractor at no change in Contract Sum or Contract Time.
- K. Acceptance of Non-Conforming Work: Acceptance of non-conforming Work, without specific written acknowledgement and approval of the Authority, shall not relieve the Contractor of the obligation to correct such Work.
- L. Contract Adjustment for Non-conforming Work: Should the Authority or Engineer determine that it is not feasible or in Authority's interest to require non-conforming Work to be repaired or replaced, an equitable reduction in Contract Sum shall be

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made by agreement between the Authority and Contractor. If equitable amount cannot be agreed upon, a Construction Change Directive will be issued and the amount in dispute resolved in accordance with the Conditions of the Contract.

- M. Non-Responsibility for Non-Conforming Work: The Engineer and the Engineer's consultants disclaim any and all responsibility for Work produced not in conformance with the Drawings and Specifications.

1.08 INSPECTION AND TESTING

- A. The work is to be completed in accordance with the specifications, the drawings, and such instructions or directions as OCTA Project Manager may give to supplement drawings and specifications. Wherever the words "directed," "permitted," "approved," "acceptable," "satisfactory to," or similar words or phrases occur in the contract documents, they shall be understood to be functions of OCTA Project Manager to be exercised at his discretion.
- B. The OCTA shall not be responsible for and shall not have control or charge over the acts or omissions of the Contractor, subcontractors, or any of their agents or employees, or any other persons performing any of the work.
- C. Inspections and Tests by Authorities Having Jurisdiction: Contractor shall cause all tests and inspections required by authorities having jurisdiction to be made for Work under this Contract, Public Works Department, Fire Department, Health Department, AQMD, SCE and similar agencies. Except as specifically noted, scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.
- D. Inspections and Tests by Serving Utilities: Contractor shall cause all tests and inspections required by serving utilities to be made for Work under this Contract. Scheduling, conducting and paying for such inspections shall be solely the Contractor's responsibility.
- E. Inspections and Tests by Manufacturer's Representatives: Contractor shall cause all tests and inspections specified to be conducted by materials or systems manufacturers to be made. Additionally, all tests and inspections required by materials or systems manufacturers as conditions of warranty or certification of Work shall be made, the cost of which shall be included in the Contract Sum.
- F. Inspections by Independent Testing and Inspection Agency or Agencies: The following applies to tests and inspections:
1. The Authority will select and pay for an independent testing and inspection laboratory or agency, to conduct tests and inspections as indicated on Drawings or Specifications, and as required by authorities having jurisdiction.
 2. Costs for additional tests, inspections and related services, due to the following, shall be reimbursed to the Authority by the Contractor and no change in Contract Time shall result.

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- a. Failure to properly schedule or notify testing and inspection agency or authorities having jurisdiction.
 - b. Changes in sources, lots or suppliers of products after original tests or inspections.
 - c. Changes in means methods, techniques, sequences and procedures of construction which necessitate additional testing, inspection and related services.
 - d. Changes in material after review and acceptance of submittal.
3. Test and Inspection Reports: After each inspection and test, one copy of report shall be promptly submitted to the Engineer, Engineer's consultant (as applicable), Authority, Contractor, City Inspector, and to agency having jurisdiction (if required by Code).
- a. Reports shall clearly identify the following:
 - Date issued.
 - Project name and number.
 - Identification of product and Specifications Section in which Work is specified.
 - Name of inspector.
 - Date and time of sampling or inspection.
 - Location in Project where sampling or inspection was conducted.
 - Type of inspection or test.
 - Date of test.
 - Results of tests.
 - Comments concerning conformance with Contract Documents and other requirements.
 - b. Test reports shall indicate specified or required values and shall include statement whether test results indicate satisfactory performance of products.
 - c. Samples taken, but not tested, shall be reported.
 - d. Test reports shall confirm that methods used for sampling and testing conform to specified test procedures.
- G. Contractor shall provide OCTA Project Manager, independent testing and inspection agency personnel, inspector of record and OCTA's consultant with full access to the work and reasonable time for inspection for ascertaining whether or not the work is performed in accordance with the requirements and intent of the contract. No work shall be covered or materials used without making the work or materials available for inspection by OCTA Project Manager. If OCTA Project Manager so requests, the Contractor shall, at any time before acceptance of the work, remove or uncover such portions of the finished work as may be directed.
- H. After examination, Contractor shall restore the work to the standard required by the contract documents. If the work examined proves acceptable, uncovering, removal, and replacement of the work in question will be paid for by OCTA by change order to

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the Contractor; but if the work proves unacceptable, the uncovering or removal and replacement of the work in question shall be at the Contractor's expense. Inspection will not relieve the Contractor from the responsibility for the quality of this work and to perform the work in accordance with the requirements of the contract documents.

- I. All materials and every process of manufacture and construction shall be subject to inspection at all times. OCTA Project Manager and his designated representatives shall have free access to all operations. Contractor shall provide necessary materials and OCTA Project Manager shall have the right to select suitable samples of materials for testing or examination which the contractor shall supply without charge. In case such samples must be shipped to some other point for inspection or testing, Contractor shall box or crate samples as necessary and shall deliver them at points designated for shipment without charge. Omission of inspection shall not relieve the Contractor of its obligations to produce the work required by the contract documents. Materials not in compliance with contract requirements shall be removed promptly from the vicinity of the work, and the Contractor, at its expense, shall promptly remove, reconstruct, replace, and make good any defective work as directed in writing by OCTA Project Manager. Oversight or error in judgment of inspectors, or previous acceptance of the work, shall not relieve Contractor from the obligation to correct defects whenever discovered.
- J. If the Contractor does not correct nonconforming work or remove rejected materials within a reasonable time fixed by written notice, OCTA Project Manager may direct that removals and corrections be performed by other contractors. Charges for such removals and corrections shall be deducted from the Contractor's payment due under this contract or may be paid for by the Contractor's bonds held for this contract.

- K. All inspection by OCTA Project Manager is for the protection of the OCTA and its interest and shall not relieve the Contractor of responsibility for providing work in accordance with the contract documents. After completion of the work, a final inspection will be made and any previous inspection or acceptance will not preclude rejection at the final inspection of any item that is not satisfactory to OCTA Project Manager or is not in accordance with the contract documents.
- L. If, within the period of time prescribed by law or by the terms of any applicable special warranty required by the contract documents, whichever is longer, any of the work is found to be defective or not in accordance with the contract documents, the Contractor shall correct it promptly after receipt of a written notice from OCTA Project Manager. This obligation shall survive acceptance of the work or termination of the contract. In the event the OCTA prefers to accept or not require correction of defective or nonconforming work, the OCTA may do so instead of requiring its removal and correction, in which case OCTA Project Manager shall determine an appropriate sum to be deducted from the contract price or otherwise charged against the Contractor, which determination shall be final and binding upon the parties. Such adjustment shall be effected whether or not final payment has been made.
- M. All defective work which has been rejected shall be remedied or removed and replaced by the Contractor at its own expense, in a manner acceptable to OCTA Project Manager.
- N. Whenever all of the work provided for in the contract or authorized as force account work has been completed and the final cleaning-up performed, OCTA Project Manager will make the final inspection, and, if the work is found to be satisfactory, Contractor will be notified in writing of the acceptance. All portions of the work shall be maintained by the Contractor at the standards required by the contract documents until final acceptance.
- O. At OCTA Project Manager's discretion, portions of the work that are determined to be substantially complete may be accepted before all the project work is completed. After acceptance of substantially completed work, Contractor shall not use the finished product for any purpose without permission of OCTA Project Manager.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 FIELD QUALITY CONTROL/QUALITY ASSURANCE

- A. Give minimum of 48 hour advance notice of each test and inspection to OCTA Project Manager when ready for testing, observation and inspection.
- B. Should any compaction density/strength test or inspection fail to meet specification requirements, necessary corrective work shall be performed by the Contractor.

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Additional testing shall be required to determine that corrective work provides compaction in the failed area meeting requirements of these Specifications.

- C. Contractor shall provide a record of testing results including corrective actions taken if necessary on the approved form to the OCTA Project Manager.
- D. Contractor's corrective work to meet requirements and retesting resulting from failing tests shall be at no additional cost to OCTA.
- E. Obtain all inspections required by the local regulatory agencies and provide the Authority with the final sign-off cards for the project from the local regulatory agencies.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Temporary facilities and controls used during construction.

B. Related Sections:

1. Section 01 14 25, Procedures in Construction.
2. Section 01 14 27, Legal Relations and Responsibility.
3. Section 01 14 43, Environmental Resource Protection.
4. Section 01 71 13, Mobilization and Demobilization
5. Section 01 74 19, Construction Waste Management and Disposal.

1.02 SUBMITTALS

A. Submit in accordance with Section 01 33 00, Submittal Procedures.

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

C. Moisture Protection Plan: Describe procedures and controls for: protecting materials and construction from water absorption and damage, including delivery, handling, and storage; discarding water-damage materials; protocols for mitigation of water into completed work; and replacing water-damaged work.

1.03 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES, PRODUCTS, AND CONTROL

- A. Common-Use Field Office: not required.
- B. Storage and Fabrication Sheds: No equipment or tools are allowed to be stored at the jobsite without the OCTA Project Manager's written permission. If on-site storage is permitted, provide access and orderly provision for maintenance and for inspection of products.
- C. Telephone Service: Provide mobile telephone service for project superintendent.
- D. Temporary Electricity:
 - 1. Connect to existing power service at location as directed. Power consumption shall not disrupt Owner's need for continuous service. Exercise measures to conserve energy.
 - 2. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
 - 3. Provide main service disconnect and over current protection at convenient location.
 - 4. Comply with NECA, NEMA, and UL standards and regulations for temporary electric service.
 - 5. Permanent convenience receptacles may be utilized during construction.
- E. Temporary Fire Protection:
 - 1. Maintain temporary fire protection facilities of the types needed until permanent facilities are installed. Fire Extinguishers shall be portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
 - 2. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".
 - 3. Fire safety during construction shall comply with CFC - California Fire Code (CCR) California Code of Regulations, Title 24, Part 9, Article 87.
 - 4. Store combustible materials in containers in fire-safe locations.
 - 5. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes.
 - 6. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- F. Barriers, enclosures and fencing:

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1. Provide traffic cones to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
 2. Provide protection for plant life and trees designated to remain and for soft and hardscape areas adjacent to work, replace damaged materials in kind.
 3. Protect non-owned vehicular traffic, stored materials, if allowed, site and structures from damage.
- G. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- H. Pollution Control:
1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
 2. Conform to Best Management Practices for waste management and material controls as defined in Section 4 of the Construction Activity Handbook published by the Storm Water Quality Association.
 3. Coordinate construction activities with control procedures established in the Storm Water Pollution Prevention Plan (SWPPP).
- I. Security:
1. Provide security and facilities to protect Work, from unauthorized entry, vandalism, or theft.
 2. Coordinate with Owner's security program.
- J. Parking: No Contractor's employees' parking is allowed on site.
- K. Traffic Control:
1. Comply with requirements of authorities having jurisdiction.
 2. Obtain all required permits, provide all materials and maintain controls as required of authorities having jurisdiction.
 3. Maintain access for fire-fighting equipment and access to hydrants.
- L. Progress Cleaning:
1. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
3. Provide walk-off mats at each building entry affected by construction activities.

M. Waste Disposal:

1. Waste Management: In compliance with City regulations.
2. Maintain work areas free of waste materials, debris, and rubbish.
3. Remove waste materials, debris, and rubbish from site periodically during a work day and legally dispose of off-site at the end of each work day at 3:30 pm.
4. Maintain site area in a clean and orderly condition.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required by progress of the work.
 1. Locate facilities to avoid protected areas as specified in Section 01 14 43, Environmental Resource Protection.

3.02 TEMPORARY UTILITIES

- A. Provide and pay for temporary utility services and facilities such as sanitary facilities, telephone service and internet service adequate for construction and related activities.

3.03 TEMPORARY ROADS, PAVING, PARKING, AND SIMILAR IMPROVEMENTS, AND USE OF SITE

- A. See Section 01 14 25, Procedures in Construction.
- B. See Section 01 14 27, Legal Relations and Responsibility

3.04 PROTECTION OF AIR AND WATER RESOURCES AND OTHER ENVIRONMENTAL RESOURCES

- A. See Section 01 14 25, Procedures in Construction.

- B. See Section 01 14 27, Legal Relations and Responsibility.
- C. See Section 01 14 43, Environmental Resource Protection.

3.05 CONSTRUCTION WASTE

- A. See Section 01 74 19, Construction Waste Management and Disposal.

3.06 SECURITY AND FIRE PROTECTION

- A. See Section 01 14 27, Legal Relations and Responsibility.

PART 4 - MEASUREMENT AND PAYMENT

Work of this section is incidental to other work and no separate measurement or payment will be made.

END OF SECTION

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SECTION 01 57 13

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Temporary erosion and sedimentation control.
2. Accessories required for a complete installation.

B. Related Sections:

1. Section 01 14 25, Procedures in Construction.
2. Section 01 50 00, Temporary Facilities and Controls.
3. Section 01 14 43, Environmental Resource Protection

1.02 REFERENCE STANDARDS

- A. Caltrans: State of California Department of Transportation, Standard Specifications.
- B. Standard Specifications for Public Works Construction (SSPWC).
- C. California Stormwater Quality Association (CASQA)

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, Submittal Procedures.
- B. Working drawings and data on proposed straw bales and fiber rolls, including physical properties of various products.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store materials in accordance with recommendations of manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Miscellaneous Materials:

1. Plastic sheeting: Clear polyethylene plastic sheeting at least 10 mils thick, secured with anchor restrainers (gravel filled bags) per the Construction Best Management Practices (BMP) handbook prepared by the California Stormwater Quality Association (CASQA), *www.cabmphandbooks.com*.
2. Temporary Fiber Rolls and Straw Bales: Provide fiber rolls and straw bales with staking per the Construction BMP handbook prepared by the CASQA, *www.cabmphandbooks.com* . If staking is not feasible, contractor shall develop other suitable methods of anchoring that will be acceptable to OCFCD.
3. Temporary concrete washout facility, per the Construction BMP handbook prepared by the CASQA, *www.cabmphandbooks.com*.
4. Gravel bags per the Construction BMP handbook prepared by the CASQA, *www.cabmphandbooks.com*

PART 3 - EXECUTION

3.01 GENERAL

- A. Conform to all applicable local, state and Federal Regulations and laws pertaining to water pollution control and as specified in SSPWC section 7-8.6.
- B. Accomplish erosion and sediment control through use of berms, dikes, swales, dams, fiber mats, plastic sheeting, netting, gravel, storm drain inlet protection, slope drains, sediment fences, and other sediment barriers; gravel construction entrances; and other erosion control devices or methods. Cover material stockpiles with plastic sheeting.
- C. Coordinate temporary pollution control provisions with permanent erosion control features specified elsewhere in the contract documents to the extent practicable to assure economical, effective, and continuous erosion control throughout the construction and post-construction period.
- D. OCTA Project Manager may limit surface area of erodible earth material exposed by clearing, grubbing, excavation, borrow, embankment, and fill operations
 1. Provide immediate, permanent or temporary pollution control measures to prevent contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

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2. Work may involve construction of temporary berms, dikes, dams, sediment basins, and slope drains; use of temporary mats; or other control devices or methods as necessary to control erosion.
- E. Construct facilities required for clearing, grading, and land alteration activities, to ensure that sediment-laden water does not enter drainage systems or violate applicable water standards. Conform to requirements of Section 01 14 43, Environmental Resource Protection.
- F. Permanent Features:
1. Incorporate permanent erosion control features at earliest practicable time. Use temporary pollution control measures to correct unforeseen conditions that develop during construction, to provide measures that are needed prior to installation of permanent pollution control features, or to temporarily control erosion that develops during normal construction.
 2. Where erosion interferes with clearing and grubbing operations, schedule and perform work so that grading operations and permanent erosion control features can follow immediately; otherwise, provide temporary erosion control measures between successive construction stages.
- G. Areas of Work:
1. Limit the area of clearing, grubbing, excavation, borrow, and embankment operations in progress commensurate with progress. Should seasonal limitations result in unrealistic coordination of operations, take temporary erosion control measures immediately.
 2. Flag boundaries of clearing limits prior to construction.
 - a. Do not disturb or permit disturbance of ground beyond flagged boundary. Conform to requirements of Section 01 14 43, Environmental Resource Protection
 - b. Maintain flagging for duration of work.
 3. Temporary soil erosion and sediment control may include construction work outside right of way where work is necessary as a result of project construction such as borrow pit operations, haul roads, and equipment storage sites.
- H. Maintenance:
1. Maintain erosion control features installed, including replacement and upgrading of facilities when needed, until work is completed and notice of Final Acceptance issued.
 2. Maintain catch basins (inlets with sumps or inverted siphons) so that not more than one foot depth of sediment is allowed to accumulate within a trap (or sump).

- a. Clean catch basins and storm drains prior to paving and prior to Substantial Completion.
 - b. Remove sediment. Do not flush sediment-laden water into downstream system.
3. Keep paved areas clean for the duration of the project.
4. Measures in addition to those indicated may be required.
5. Do not permit more than a one-foot depth of sediment to accumulate behind a silt fence.
 - a. Remove sediment or regrade it into slopes, and repair and reestablish silt fences as needed.
6. Remove silt fences in entirety when no longer required. Fences are required until uphill area has been permanently stabilized.
7. Remove pipes, end sections, drainage curbs, silt fences, and other materials from temporary erosion control devices; those not incorporated into permanent work become property of Contractor.

3.02 STORM DRAIN INLET PROTECTION

- A. Storm drain inlet protection must prevent sediment from entering storm drain systems prior to permanent stabilization of disturbed areas.
- B. Use storm drain inlet protection per the Construction BMP handbook prepared by the CASQA, www.cabmphandbooks.com:
 1. Where storm drain inlets are operational before permanent stabilization of disturbed drainage area.
 2. Adjacent to and immediately downhill of utility type construction in existing paved areas with catch basin drainage.
 3. When cleaning streets.
- C. Use berms when required to direct drainage to flow through filters and prevent bypassing of inlets.
- D. Do not permit more than one-foot depth of sediment to accumulate against storm drain inlet protection.
 1. Remove sediment and restore inlet protection as needed to maintain sediment trapping and filtering capability.

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PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work of this section.

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SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes administrative and procedural requirements for selection of products for use in the project; product delivery, storage, and handling.

1.02 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

- A. OCTA Project Manager shall approve the source of supply of each of the materials supplied by the Contractor before the purchase or delivery of materials to the work site. Promptly after receiving the Contract award, the Contractor shall notify OCTA Project Manager of all proposed material sources. If it is found after trial that sources of supply previously approved do not produce uniform and satisfactory products, or if the product from any source proves unacceptable at any time, the Contractor shall furnish materials from other sources as approved by OCTA Project Manager.
- B. Only materials conforming to Specifications and approved in advance by OCTA Project Manager shall be used in the work. All material being used shall be subject to inspection or test at any time during their preparation or use. No material that after approval has in any way become unfit for use shall be used in the Work.

1.03 UNLOADING, HAULING AND STORING MATERIALS

- A. The Contractor shall, at its expense, deliver, unload, store, handle, and be responsible for all materials whether furnished by the OCTA or by the Contractor.
- B. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Periodically inspect to ensure products are undamaged, and are maintained under required conditions.
 - 2. Products damaged by improper storage or protection shall be removed and replaced with new products at no change in Contract Sum or Contract Time.
- C. Store products to facilitate inspection and measurement of quantity or counting of units.
- D. The unloading, storing and hauling of all the OCTA's or Contractor's material shall be considered as incidental to contract pricing.

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- E. When permission to do so is given in writing by OCTA Project Manager, the Contractor may store materials and erect temporary buildings on OCTA property provided such property is not required for the OCTA's use or is not under lease to other parties.
- F. Store moisture-sensitive products in a weathertight enclosure or covered with an impervious sheet covering. Provide adequate ventilation to avoid condensation. Maintain product storage within temperature and humidity ranges required by manufacturer's instructions.
 - 1. For exterior storage of fabricated products, place on sloped supports above ground.
 - 2. Store loose granular materials on solid surfaces in a well-drained area. Prevent mixing with foreign matter. Prevent material from flowing or blowing away to other areas of the site. Provide covers for sand, aggregate base, and debris so that wind does not cause it to blow away.
 - 3. Arrange storage to provide access for inspection. Periodically inspect to assure products are undamaged, and are maintained under required conditions.
- G. All electrical and mechanical equipment shall be stored so as to be protected from rain, sun, wind, sand, dust, moisture, etc. The equipment shall be stored on supports off the ground or on concrete slabs with all factory provided dust and moisture protection left in place until equipment is installed.
- H. Electrical and mechanical equipment shall be maintained in accordance with the manufacturer's operation and maintenance instructions until the Contractor is relieved of the responsibility by OCTA Project Manager.
- I. Store heavy materials away from the structure in a manner that will not endanger supporting construction.
- J. Building materials shall be stored in a protected environment safe from sun, rain and excessive dust. Store cementitious products and materials on elevated platforms. Damaged or excessively dirty materials will not be permitted to be installed.
- K. Protection:
 - 1. Provide barriers, flashing lights, substantial coverings and notices to protect installed Work from traffic and subsequent construction operations.
 - 2. Remove protective measures when no longer required and prior to Acceptance of the Work.
- L. Delivery Requirements:
 - 1. Schedule delivery to minimize long-term storage at project site and to prevent overcrowding of construction spaces.

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2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Comply with manufacturer's instructions and recommendations for transportation, delivery and handling. Provide equipment and personnel to handle products by methods to prevent soiling, marring or other damage.
4. Deliver products to project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with manufacturer's labels and instructions for handling, storing, unpacking, protecting, and installing.
5. Contractor is responsible and shall be present at work side for receiving his material delivery at the work site. Promptly inspect products on delivery to ensure compliance with the contract documents and to ensure that products are undamaged and properly protected.
6. Contractor shall give OCTA a 48 hours notice prior to delivery of any products and materials.

1.04 PRODUCT SELECTION PROCEDURES

- A. Products: Items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchase stock, and include material, equipment, assemblies, fabrications and systems.
- B. General Product Requirements: Provide products that comply with the contract documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
 1. It is OCTA policy that all manufactured products and supplies be provided by United States manufacturing industries in agreement with related Union organizations. Therefore in the performance of the contract, Contractor shall give United States made products preference.
 2. Named Product: Items identified by manufacturer's product name, including make or model designations indicated in the manufacturer's published product data.
 3. Specific Product Requirements: Refer to requirements of Section 01 45 00 - Quality Control and individual product Specifications Sections in the project specifications for specific requirements for products.
 4. Materials: Products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed or installed to form a part of the Work.

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5. Product Completeness: Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
6. Minimum Requirements: Specified requirements for products are minimum requirements.
7. Standard Products: Where specific products are not specified, provide standard products of types that are suitable for the intended use in similar conditions and that have been produced and used successfully in similar situations on similar projects. Products shall be selected by the Contractor and subject to review and acceptance by the Engineer.
8. Code Compliance: All products, other than commodity products prescribed by Code, shall have a current ICBO Evaluation Service (ICBO ES) Research Report or CABO National Evaluation Report (NER).
9. Interchangeability: To the fullest extent possible, provide products of the same kind from a single source. Products required to be supplied in quantity shall be the same product and interchangeable throughout the Work. When options are specified for the selection of any of two or more products, the product selected shall be compatible with products previously selected.
10. Nameplates:
 - a. Except for require labels and operating and safety instructions, do not attach manufacturer's identifying nameplates or trademarks on surfaces exposed to view in occupied spaces or to the exterior.
 - b. Provide a permanent nameplate on each item of service-connected or power-operated equipment. Nameplates shall contain identifying information and essential operating data such as the following example:

Name of manufacturer
Name of product
Model and serial number
Capacity
Power Characteristics
Speed
11. OCTA reserves the right to limit selection to products with warranties not in conflict with requirements of the contract documents.
12. Where products are accompanied by the term "as selected" or similar, OCTA Engineer will make selection.
13. Where products are accompanied by the term "match sample" or similar, sample to be matched is OCTA Project Manager's.

14. Descriptive, performance, and reference standard requirements in the specifications establish salient characteristics of products.

C. General Product Selection Requirements:

1. Where products or manufacturers are identified in the specifications, the intent is not to limit competition or to restrict the work to only those products or manufacturers named. Rather, the intent is to establish the level of quality required and the product characteristics important to the success of the work. Subject to compliance with requirements, products of any manufacturer may be incorporated into the work, if shown to be equal to those listed to the satisfaction of OCTA Project Manager.
2. "Or Equal" Provision: Where "or equal" is included after named manufacturer(s) and product(s), equivalent products of unnamed manufacturers will be considered in accordance with requirements specified in Section 01 25 00 Substitution Procedures.
 - a. Prior to submitting "Or Equal" product(s) for consideration, Contractor shall review and determine that product(s) meet or exceed the minimum quality and warranty provisions of the specified product.
 - b. Cost and time considerations will be waived for products and manufacturers submitted under the "Or Equal" provision, except no increase in Contract Sum or Contract Time shall result.
 - c. Contractor's attention is called to the substitution provisions of the Conditions of the Contract.
3. Products Specified by Description: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with the specified requirements.
4. Products Specified by Performance Requirements: Where Specifications require compliance with performance requirements, provide product(s) that comply with performance requirements and are recommended by the manufacturer for the intended application. Verification of manufacturer's recommendations may be by product literature or by certification of performance from manufacturer.
5. Products Specified by Reference to Standards Only: Where Specifications require compliance with a standard, provided product shall fully comply with the standard specified.
6. Products Specified by Combination of Methods: Where products are specified by a combination of described characteristics, performance characteristics, reference standards and manufacturer identification, provide products conforming to all such characteristics.

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7. Use of products or manufacturers, whether listed or not, is subject to demonstrated compliance with requirements of the contract documents.

D. Product Selection Procedures:

1. Basis of Design: Where products or manufacturers are identified as "basis of design" or where sizes, profiles, and dimensional requirements on drawings are based on a specific product or system, comply with provisions for comparable products to obtain approval for listed alternate products or manufacturers. Comply with provisions for substitutions to obtain approval for use of an equal unnamed product or manufacturer.
2. Specified Products: Where the specifications indicate that a product or manufacturer is to be selected from those listed, comply with the provisions for substitutions to obtain approval for use of an equal unnamed product.
3. Other Named Products: Where products or manufacturers are indicated without qualification, or with the words "or approved equal" or similar terms, comply with provisions for comparable products to obtain approval for use of an equal unnamed product.
4. Visual Matching Specification: Where specifications require matching an established sample, select a product that complies with requirements and matches Engineer's sample. OCTA Project Manager's decision will be final on whether a proposed product matches.
5. Visual Selection Specification: Where specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, Contractor shall select a product that complies with other specified requirements.
6. Full Range: Where specifications include the phrase "to match existing colors, patterns, textures" or similar phrase, OCTA Project Manager will select color, pattern, density, or texture from manufacturer's product line submitted by the Contractor, that includes both standard and premium items.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not Used.

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PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work of this section.

END OF SECTION

SECTION 01 71 13

MOBILIZATION AND DEMOBILIZATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section consists of the Contractor furnishing all transportation, labor, materials and equipment necessary and incidental to mobilization and demobilization to perform the work of this contract. Work for mobilization and demobilization as specified in this section consists of preparatory work and operations at the start of the Contract Work and removal of those items at Contract completion. Contractor shall provide written construction notices to residents and tenants adjacent to the project site per City requirements.

1.02 DEFINITIONS

- A. Mobilization is operations necessary for the movement and arrival at the worksite of personnel, equipment, supplies, and appurtenances, all in ready and satisfactory working and operational order, which the Contractor intends to use for the work; for the establishment of all temporary offices and Contractor-owned structures and other temporary facilities necessary to perform the work; proper safety training of project personnel; and for incidental work and operations which must be performed prior to beginning work on the various contract items.
- B. Demobilization is operations necessary for the removal of all personnel, equipment, supplies, appurtenances, Contractor-owned structures, temporary facilities, materials, and debris from the worksite and restoration of site and surrounding properties, affected by the Contractor's activities, to pre-construction conditions, as approved by OCTA Project Manager.

1.03 SUBMITTALS

- A. Shop Drawings showing the installation of any pollution control/SWPPP features required for the Project to be established on the site prior to initiating construction, maintained for the duration of construction and removed upon completion of construction.
- B. Copies of all required permits obtained prior to starting Work covered by the permit.
- C. List of tenants that need to get the construction notice.
- D. Proof from the post office that all letters (construction notices) got sent.

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 GENERAL

- A. The Contractor shall provide personnel, equipment, temporary facilities, construction materials, tools, and supplies at the worksite at the time they are scheduled to be required.
- B. The Contractor shall locate plant or equipment appropriately close to the portion of the work for which it will be used.
- C. The Contractor shall obtain all necessary permits required by the local jurisdictions to perform the work of this Contract. The Contractor shall provide OCTA Project Manager copies of all permits obtained prior to starting work covered by the permit.
- D. The Contractor shall install pollution control features required by permits for the construction. These features shall be maintained throughout the duration of construction and removed at the completion of construction.
- E. Upon completion of the work, the Contractor shall remove all equipment, temporary facilities, construction tools, apparatus, equipment, unused materials and supplies, plant, and personnel from the worksite and shall leave the worksite in a clean and satisfactory condition as approved by OCTA Project Manager.

PART 4 – MEASUREMENT AND PAYMENT

Work is considered incidental to work under other payment items and no separate payment will be made.

END OF SECTION

SECTION 01 71 23

FIELD ENGINEERING

PART 1 – GENERAL

1.01 DESCRIPTION

A. Work Includes:

1. Employ land surveyors and professional engineers, licensed in the State of California, to perform surveying and field engineering as required per Contract Documents.
2. Establish and maintain baselines and field control points as required for construction layout survey.
3. Perform survey and measurement to establish design lines and grades.
4. Layout of the Work.
5. Other engineering services, as necessary, to accomplish the Work.

1.02 GENERAL

- A. Contractor shall locate and protect all adjacent areas, utilities, equipment, buses, cars, and appurtenances.
- B. Control area of work, so that it does not interrupt bus maintenance and operations activities, or bus or car traffic flow on the site. Provide barricade and traffic signs around work area, excavations, and contractor's equipment. Provide flashing lights from dusk to dawn on all sides of construction work.
- C. Promptly report and repair to the Engineer's satisfaction disruption in utilities caused by construction work. Repair disruption of utilities immediately.
- D. Make no changes without prior written notice to the Engineer.

1.03 SUBMITTALS

- A. Submit for OCTA's approval the name and professional history of the land surveying firm designated by the Contractor as its project surveyor.
 1. At a minimum the project surveyor must have five to ten years of verifiable experience performing field survey.
- B. On request, submit to OCTA Project Manager documentation that verifies accuracy of field engineering work and surveying work. Submit data certifying the all

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dimensions, elevations, and locations of improvement are in conformance, or non-conformance, with Contract Documents at end of Project.

- C. Prior to completion of project and when requested by OCTA Project Manager, submit a copy of site drawing prepared by California registered engineer and signed by land surveyor verifying that the elevations and locations of the work are in conformance with contract documents.
- D. Contractor shall submit a complete copy of the baseline survey field notes and final layout.
- E. Contractor shall provide As-built redline drawings to the Authority at the completion of the Project.

1.04 REQUIREMENTS

- A. Field Engineering: Provide field engineering services, as necessary. Utilize recognized engineering practices.
- B. Verification: Verify all existing dimensions before starting work. Record all existing pavement striping and markings and submit this record to OCTA before commencing any demolition work.
- C. Layout and Control of the Work: Establish elevations, lines, and grade for all Work under this Contract. Locate and lay out by instrumentation and similar appropriate means. Contractor is responsible for all construction field survey and setting of grades and slopes. New asphalt or concrete paving flow patterns should merge with existing flow patterns on the site so that flow of water is directed towards existing gutters, swales, and storm drains on site. Protect in place existing storm drain system, swales, gutters, concrete walk, storm drain inlets, channel wall, fencing, on-site storage, OCTA equipment, and property during construction.
- D. Verification of Work: Periodically verify layout and completed conditions of the Work by same means.
- E. Project area shall be cordoned off using traffic cones during each construction phase on all sides at end of work day. Traffic cones shall be removed by the end of each work day.

1.05 QUALITY CONTROL

- A. Contractor shall maintain a complete and accurate log of control and survey work as it progresses.
- B. OCTA Project Manager reserves the option to check Contractor's survey measurements and calculations. Whether OCTA Project Manager exercises this option or not, the requirement for accuracy will not be waived.

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- C. On completion of construction and major site improvements, Contractor shall prepare a final certified survey illustrating dimensions, locations, angles, and elevations of construction and work site.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify locations of survey control points prior to starting any work on the project site. Contractor shall field verify all existing dimensions, conditions, layout, grading that will affect the project before commencing any work.
- B. Review OCTA record drawings for underground utilities and field verify all utilities that may affect construction activities before demolition work and excavation. Contractor shall utilize an independent utility locator company to survey and map any and all utilities that may affect construction activities and determine if there are any utility lines in conflict with construction of this project.
- C. Contractor shall conduct survey (line and grade) of existing improvements such as top of curb, finished surface, flow lines etc. before any demolition or removal is undertaken. Areas where pavement has failed or settled shall be documented.
- D. Immediately notify OCTA Project Manager of any discrepancies discovered.
- E. Finished grade shall match existing grade and ensure positive drainage is provided.

3.02 SURVEYS AND RECORDS

- A. Working from lines and grades established by baseline survey as shown in relation to work, establish and maintain bench marks and other dependable markers to set lines and levels for work on site as needed to locate each element of the project.
- B. Contractor shall inform tradesmen performing the work of marked lines and grades provided for their use in layout work.
- C. Contractor shall provide a complete copy of baseline survey field notes and final layout to OCTA Project Manager prior to starting construction.
- D. Certify all lines and grades to OCTA.

3.03 SURVEY REFERENCE POINTS

- A. Contractor shall locate and protect survey control and reference points. Preserve permanent reference points during construction.
- B. Contractor shall establish appropriate control datum for construction survey.
- C. Contractor shall report to OCTA Project Manager the loss or destruction of any reference points or relocation required because of changes in grades or other reasons.
- D. Contractor shall replace dislocated survey control points based on original survey control and shall make no changes without prior written notice to and approval by OCTA Project Manager.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made under this section.

END OF SECTION

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SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

1.02 RELATED SECTIONS

- A. Section 01 11 00 - Summary of Work.
- B. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to Work specified in the Section.
 - 2. Coordination with Work specified in other Sections for openings required to accommodate Work specified in those other Sections.
- C. Include:
 - 1. Identification of Project.
 - 2. Location and description of affected Work.
 - 3. Explanation of necessity for irregular cutting and patching procedures.
 - 4. Description of proposed special work and alternate products to be used.
 - 5. Alternatives to cutting and patching.
 - 6. Effect on existing construction and, if applicable, work being performed for the Authority under separate contracts.
 - 7. Date and time Work will be executed.
 - 8. Written permission of affected separate contractor.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Primary Products: As required for original installation and to match surrounding construction.

- B. Product Substitution: For each proposed change in materials, submit request for substitution under provisions of Section 01 60 00 - Product Requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examination, General: Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing Work, inspect conditions affecting proper accomplishment of Work.
- C. Beginning of cutting or patching shall be interpreted to mean that existing conditions were found by Contractor to be acceptable.

3.02 PREPARATION

- A. Temporary Supports: Provide devices and methods to protect other portions of Project from damage by providing temporary supports.

3.03 CUTTING AND PATCHING

- A. Cutting and Patching:
1. Execute cutting, fitting, patching, excavation, and fill, to complete Work.
 2. Coordinate installation or application of products for integrated Work.
- B. Remedial Work: Remove and replace defective or non-conforming Work.

3.04 PERFORMANCE

- A. Cutting and Patching:
1. Execute demolition, cutting and patching by methods to avoid damage to adjoining Work, and which will provide appropriate surfaces to receive final finishing.
 2. Saw cut asphalt concrete or Portland cement concrete paving for smooth edges. Do not overcut corners.
 3. Contractor is required to take all precautions during construction to prevent damage to OCTA buses, property, equipment, utilities, and OCTA personnel. All

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precautions are to taken per CAL-OSHA code to prevent accidents, and damage to adjacent OCTA property and appurtenances.

B. Restoration:

1. Restore Work with new products as specified in individual Sections.
 2. Where affected or uncovered by construction work, finish adjacent surfaces and background to condition before construction. Match material, paint, and finish to nearest joint. Re-paint all curbs, traffic striping, legends, parking stalls, numbers, and paving as existed before construction. Damage to adjacent or OCTA property shall be repaired, at the Contractor's expense, to a condition as existed before construction and to OCTA's Project Manager's satisfaction.
- C. Finishing: Refinish (material and paint) surfaces to match adjacent and similar finishes as used for the Project. (match material and paint finish). For continuous surfaces, refinish with material and paint to nearest intersection or natural break or joint. Replace equipment or appurtenances damaged due to demolition, cutting or patching work during construction. Provide material quality to level equal to or better than that which existed before construction started.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made under this section.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Work Includes: Procedures for ensuring optimal diversion of construction and demolition waste generated by the Project, and documentation procedures for tracking waste generation and diversion.

1.02 DEFINITIONS

- A. Certified Mixed Debris Processing Facility: A solid waste processing facility that accepts loads of mixed debris for the purpose of recovering re-usable and recyclable materials and disposing of the non-recyclable residual material.
- B. Class III Landfill: A landfill that accepts non-hazardous solid waste such as household, commercial, and industrial solid waste. A Class III landfill shall have a California Integrated Waste Management Board (CIWMB) solid waste facilities permit and is regulated by the Local Enforcement Agency.
- C. Construction and Demolition (C&D) Debris: Solid waste and recyclable materials that result directly from construction and demolition of buildings and other structures, do not contain hazardous waste (as defined in CCR Title 22, Section 66621.3, *et seq.*), and contain no more than 1 percent putrescible wastes by volume, calculated on a monthly basis. C&D debris includes, but is not limited to: asphalt, concrete, portland cement, brick, lumber, wallboard, roofing material, ceramic tile, pipe, glass and associated packaging.
- D. Disposal: Acceptance of solid waste at a legally operating facility for the purpose of landfilling.
- E. Diversion: Activities that result in reducing the amount of waste disposed at a landfill. This can include source reduction activities, composting, recycling, and reuse.
- F. Inert Backfill Site: A location, other than inert fill or other disposal facility, to which inert waste is taken for the purpose of filling an excavation, shoring, or another soils engineering operation.
- G. Inert Fill: A facility that can legally accept inert waste such as asphalt and concrete exclusively for the purpose of disposal.
- H. Inert Debris/Inert Waste: Solid waste and recyclable materials that are source separated or separated for reuse, do not contain hazardous waste (as defined in CCR, Title 22, section 66261.3 *et. seq.*) or soluble pollutants at concentrations in excess of applicable water quality objectives, and do not contain significant

quantities of decomposable waste. Inert debris may not contain more than 1 percent putrescible wastes by volume calculated on a monthly basis. Gravel, rock, soil, sand and similar materials, whether processed or not, that have never been used in connection with any structure, development, or other human purpose are not inert debris.

- I. Mixed Debris: Material that includes commingled recyclable and non-recyclable construction and demolition debris.
- J. Mixed Debris Processing Facility: A solid waste processing facility that accepts loads of mixed debris for the purpose of recovering re-usable and recyclable materials and disposing of the non-recyclable residual materials. Refer also to Certified Mixed Debris Processing Facility.
- K. Permitted Waste Hauler: A company that possesses a valid and current permit from the County of Riverside to collect and transport solid waste from individuals or businesses in the County of Riverside.
- L. Recycling: The process of sorting, cleaning, treating, and reconstituting materials for the purpose of using the altered form in the manufacture of a new product. Recycling does not include burning, incinerating, or thermally destroying solid waste.
 - 1. On-site recycling materials that are sorted and processed for use in an altered form in the Project, (e.g. concrete is crushed for use as base for a parking lot on the site).
 - 2. Off-site recycling source-separated materials hauled to another location and used in an altered form in the manufacture of a new product.
- M. Recycling Facility: An operation that can legally accept materials for the purpose of processing the materials into an altered form for the manufacture of a new product. Depending on the types of materials accepted and operating procedures, a recycling facility may or may not be required to have a Solid Waste Facilities permit from the CIWMB or be regulated by the Local Enforcement Agency.
- N. Reuse: Materials that are recovered for use in the same form. This includes materials that are reused on-site or off-site.
- O. Salvage: Materials recovered for reuse or sale or donation to a third party.
- P. Source Reduction: Any action causing a net reduction in the generation of solid waste. Source reduction includes, but is not limited to, reducing the use of non-recyclable materials, replacing disposable materials and products with reusable materials and products, reducing packaging, and reducing the amount of yard waste generated.
- Q. Source-Separated Materials (Construction and Demolition Debris): Material that is sorted at the site of generation by individual material type for the purpose of reuse or recycling, i.e., loads of concrete that are source-separated for delivery

to a base course recycling facility to be crushed into road base material.

- R. Solid Waste: Shall mean waste that the CIWMB has deemed acceptable for disposal at a Class III landfill and shall not include source-separated material.
- S. Transfer Station: A facility that can legally accept solid waste for the purpose of temporarily storing the materials for re-loading onto other trucks and transporting materials to a landfill for disposal, or recovering some materials for reuse or recycling. Transfer stations must be permitted by the CIWMB and regulated by the Local Enforcement Agency.

1.03 SUBMITTALS

- A. Waste Management Plan (WMP): Conduct a site assessment and estimate the types and quantities of materials, under the Project, that are anticipated for on-site or off-site processing, recycling, reuse, or disposal.
 - 1. Not more than 10 working days after Notice to Proceed, submit to OCTA Project Manager a written WMP. The plan shall show the percentage of recycling for inert debris expected from the Project and the percentage recycling for the remaining C&D debris expected from the Project. While no minimum amounts of recycling have been established for this project, Contractor shall make every reasonable effort to achieve a minimum of 50% by weight of material that is recycled, re-used, salvaged or otherwise diverted from landfill.
 - 2. OCTA Project Manager's approval of the Contractor's WMP will not otherwise relieve the Contractor of responsibility for adequate and continuing control of pollutants and other environmental protection measures.
 - 3. Dirt and excavation spoils, whether reused as fill or not, will not be counted in the calculation of diverted and disposed materials.
- B. Solid Waste Diversion and Disposal Report (SWDD Report): One week prior to the first of every month, and prior to Contractor's monthly progress estimate for payment, Contractor shall prepare and submit to OCTA Project Manager a written SWDD report quantifying all material generated in the Project which was either disposed or diverted from disposal through reuse or recycling during the time period covered by the SWDD report and progress payment. Include in the Report a cumulative history of the diversion and disposal for the Project. Attach supporting documentation including manifests, weigh tickets, receipts, reports, invoices, and other supporting documents specifically identifying the project, the recyclables and solid waste generated by the Project, and where the material was sent. The final SWDD report shall cover the complete time period of the Project and shall contain a list of the total waste disposed and/or diverted for each reporting period. The final SWDD report and supporting documentation shall be submitted within 30 Calendar Days of Project completion.

1.04 WASTE MANAGEMENT PLAN SUBMITTAL MEETING

- A. On or about 5 working days after Notice to Proceed, OCTA Project Manager will schedule and attend a meeting with the Contractor to discuss the proposed WMP submittal. This meeting shall be held to allow the OCTA and the Contractor an opportunity to develop a mutual understanding regarding the recycling and reuse requirements and programs.

1.05 REUSE, SALVAGE, AND RECYCLING OPTIONS

- A. Contractor shall make use of as many reuse and salvage options as is feasible. One option is the California Materials Exchange (CalMAX), a free program sponsored by the CIWMB.
- B. Recycling shall include both on-site and off-site recycling of source-separated materials, as well as mixed debris recycling efforts.
- C. On-site recycling program shall produce a quality product to meet the specifications identified in the Contract Documents, subject to approval. Estimate the amount of material to be used in the Project and include a program for off-site recycling of any excess material that cannot be used in the Project.
- D. Develop and implement a program to include source separation of solid waste, to the greatest extent feasible, of the following types:
 - 1. Asphalt
 - 2. Concrete and concrete block
 - 3. Rock
 - 4. Wood (lumber)
 - 5. Green material (i.e. tree trimmings)
 - 6. Metals
- E. Mixed Debris Recycling: Develop and implement a program to transport loads of commingled construction and demolition materials that cannot be feasibly source separated to a mixed debris recycling facility.

1.06 HAULING AND DISPOSAL OPERATIONS

- A. Hauling: Arrange the collection and hauling of C&D debris by a waste hauler that is permitted by the County of Orange Waste Management Department and Agencies as applicable.
- B. Recycling And Processing Facilities: Transport C&D debris to recycling or processing facilities. Contractor shall be familiar with the requirements for acceptance of C&D materials at the recycling and processing facilities before the

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material is delivered. Always call facilities in advance to verify requirements.

- C. Disposal Facilities: Transport C&D debris that cannot be delivered to a recycling or processing facility, to a transfer station or disposal facility that can legally accept the materials for the purpose of disposal.
- D. Site Disposal: Do not burn, bury, or otherwise dispose of solid waste on the Project job-site. All trash, debris, and removed materials shall be hauled away and legally disposed off-site on the same day they are removed.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment will be made under this section.

END OF SECTION

SECTION 01 74 23

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION.

A. Work Included:

1. Execute cleaning, during progress of the work, and at completion of the work.

B. Related Work Specified Elsewhere:

1. Cleaning for specific products or work; the respective specification section for that work.
2. Refer to Section 01 14 25, Procedures in Construction for requirements for restoration of project site(s), including but not limited to photographic documentation.
3. Refer to Section 01 71 13, Mobilization and Demobilization for requirements for removal of all of Contractors facilities, equipment and tools.

1.02 DISPOSAL REQUIREMENTS.

- A. Conduct cleaning and disposal operations to comply with all applicable codes, local codes, ordinances, regulations and laws, rules and practices.
- B. Conform to requirements of 01 74 19, Construction Waste Management and Disposal.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 CLEANING DURING CONSTRUCTION

- A. Provide all labor and equipment required to remove trash and broom clean project sites as required, including surrounding areas affected by construction activities.
- B. Provide all labor and equipment required to load, haul, and legally dispose of all construction trash and debris at the end of each work day throughout the duration of the project.
- C. Pay all dump fees required to legally dispose of materials.
- D. Clean streets adjacent to the project site as required to meet the requirements of all local, City, County and State authorities.
- E. Clean and wash parking lots and driveways.
- F. Provide labor to clean the office trailer once a week.
- G. Clean up all excess concrete from site concrete work.
- H. Wet down dry materials and rubbish to prevent blowing dust.
- I. At reasonable intervals during progress of work and at the end of each work day, remove waste materials, debris and rubbish from site and dispose of legally away from site.
- J. Handle waste materials and debris in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- K. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly painted surfaces.
- L. Do not place in fills or backfills or bury at site any waste material, rubbish or debris. Remove such material from project to a lawful disposal area by the end of each work day; pay all associated hauling and dumping charges.
- M. Perform any additional cleaning or cleaning at shorter intervals when instructed to do so by OCTA Project Manager.

3.02 FINAL CLEANING

- A. SUBSTANTIAL COMPLETION REVIEW CLEANING, GENERAL
 - 1. Substantial Completion Review Cleaning, General: Execute a thorough cleaning prior to Substantial Completion review by the Engineer.

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- a. Clean surrounding areas affected by construction. Clean and repair all surrounding areas and appurtenances such as curbs, gutters, swales, storm drain, platforms, equipment, vents, buses, fences, Apex boxes, light concrete pedestal, landscaping, and driveways. Repair equipment, curbs, surrounding driveways, landscaping, and site affected by the construction work by thorough brooming and washdown. Remove all oil, concrete, debris, and paint from the surfaces mentioned.
 - b. Remove waste and surplus materials, rubbish and temporary construction facilities, utilities and controls from site.
 2. Employ experienced workmen, or professional cleaners, for final cleaning.
 3. In preparation for occupancy, conduct final inspection of sight-exposed surfaces, and of concealed spaces.
 4. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from sight-exposed finished surfaces; polish surfaces so designated to shine finish.
 5. Wash and shine glazing and mirrors.
 6. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
 7. Water-jet clean paved surfaces; rake clean other surfaces of grounds. Comply with SWPPP BMP measures.
 8. Remove all protective construction coverings and coatings.
 9. Contaminated Earth: Final clean-up operations shall include removal and lawful disposal of earth that is contaminated or unsuitable for support of plant life in planting areas, as well as filling of resulting excavations with suitable soil. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry and similar materials; areas in which washing out of concrete and plaster mixes or washing of tools and other similar cleaning operations have been performed; and areas that have been oiled, paved or chemically treated. Do not dispose of waste oil, solvents, paints, solvents and similar material of a penetrating nature by depositing or burying on OCTA's property.
 10. Maintain cleaning until project is occupied.
 11. Final cleaning shall be done to the satisfaction of OCTA Project Manager.
- B. FINAL COMPLETION INTERIOR CLEANING**
1. Final Completion Cleaning, General: Complete final cleaning before submitting final Application for Payment.

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- a. Remove asphalt, oil, grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, concrete material, and other foreign materials from all visible exterior surfaces.
 - b. Remove dust from all horizontal surfaces not exposed to view, including equipment, light standards, ledges, utilities, buses, apex boxes, and plumbing fixtures on site affected by construction.
 - c. Repair all disrupted or broken appurtenances which were damaged during construction to a new condition to the OCTA's Project Manager's satisfaction.
2. Clean all adjacent walls, equipment, and other appurtenances mentioned in article 3.1.A.1 above affected by construction work including areas adjacent to construction and on site.
 3. Clean construction area in which phase has been completed and re-stripe before begin of next phase of work

C. FINAL COMPLETION SITE CLEANING

1. Site Cleaning: Broom clean exterior paved surfaces. Rake clean other surfaces of the grounds affected by construction material.
 - a. Wash down and scrub where necessary all paving soiled as a result of construction activities. Thoroughly remove material droppings, asphalt splatters, stains, oil, and adhered soil.
 - b. Remove from the site all construction waste, unused materials, excess soil and other debris resulting from the Work.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment will be made under this section.

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END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - a. Substantial Completion procedures.
 - b. Final Acceptance procedures.

B. Related Sections:

1. Section 01 74 23, Cleaning, for final cleaning of project site(s).
2. Section 01 78 00, Closeout Submittals, for operation and maintenance manual requirements.
3. Section 01 78 00, Closeout Submittals, for submitting record drawings, record specifications, and record product data.
4. Section 01 78 36, Warranties and Guarantees and Bonds, for submitting Warranties.
5. Divisions 02 through 49 sections for any specific closeout requirements for the work in those sections.

1.02 SUBSTANTIAL COMPLETION

- A. Preliminary punch list review: At Contractor's request, the Engineer will attend a preliminary Contract closeout review, not earlier than 14 days prior to anticipated Substantial Completion review day. The Engineer and Contractor shall conduct a brief walk-through of Project to review scope, adequacy and completeness of the Work. The Engineer will prepare a typewritten list of items to be completed and corrected (preliminary punch list).

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- B. Before requesting review/inspection for determining date of Substantial Completion, the Contractor shall complete the following:
1. Execute cleaning and clear site of temporary facilities and controls, as specified in Section 01 50 00 Temporary Facilities and Controls and in Section 01 74 23 Cleaning.
 2. Prior to Substantial Completion review, complete all testing, inspection, balancing, sterilization and cleaning of the Work. Obtain final City Inspection and City sign-off required for the Project. Provide original of final sign-off cards to the Authority.
 3. Advise OCTA of pending insurance changeover requirements.
 4. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents. Refer to Section 01 78 00, Closeout Submittals for requirements.
 5. Obtain and submit releases permitting OCTA unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 6. Prepare and submit project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information. Refer to Section 01 78 00, Closeout Submittals for requirements.
 7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 8. Make final changeover of permanent locks and deliver keys to OCTA Project Manager. Advise OCTA's personnel of changeover in security provisions.
 9. Complete startup testing of systems.
 10. Submit test/adjust/balance records.
 11. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements. Refer to Section 01 71 13, Mobilization and Demobilization for requirements.
 12. Advise OCTA Project Manager of changeover in utilities.

13. Submit changeover information related to OCTA's occupancy, use, operation, and maintenance.
 14. Complete final cleaning requirements, including touchup painting. Refer to Section 01 74 23, Cleaning for requirements.
 15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- C. Contractor's Certification: The Contractor shall submit to the Engineer written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Substantial Completion review by the Engineer. Provide five working days notice to the Engineer that Work is substantially complete.
- D. Punch List Review: The Authority's Engineer, and the responsible design consultants, as may be necessary, will attend a Contract closeout review and conduct a walk-thorough of Project to review the updated list of items to be completed and corrected (Punch List).
1. Contractor shall prepare a list and record additions, deletions, and revisions as noted by the Engineer for completion or correction.
 2. The Contractor shall complete all items on the punch list and notify the Engineer the completed items. The Engineer will update and distribute the revised Punch List after his next walk-through.
 3. Costs of additional visits caused by incomplete scope of work or punch list items after the second visit to the site by the Engineer and the design consultants, to review completion and correction of Work, shall be reimbursed to the Authority by the Contractor.
- E. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, OCTA Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. OCTA Project Manager will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by OCTA Project Manager, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the work identified in previous inspections as incomplete is completed or corrected.

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2. Results of completed inspection will form the basis of requirements for final completion.

1.03 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for determining final acceptance, complete the following:
 1. A final Application for Payment according to Section 01 29 00, Payment Procedures and the General Provisions of the Contract.
 2. Submit certified copy of OCTA Project Manager's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by OCTA Project Manager. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Instruct OCTA's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for final acceptance. On receipt of request, OCTA Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. OCTA Project Manager will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Re-inspection: Request re-inspection when the work identified in previous inspections as incomplete is completed or corrected.
- C. Engineer's Certification: The Engineer determines that the list of items to be completed and corrected (Punch List) is sufficiently complete for the Authority to occupy the Project area for the use to which it is intended.
- D. Notice of Completion: The Authority, after receipt of the Engineer's certification, will record a Notice of Completion with the county.

PART 2 – PRODUCTS

Not Used

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PART 3 - EXECUTION

Not Used

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this section.

END OF SECTION

SECTION 01 78 00

CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Maintain at the site for OCTA Representative one record copy of Project record documents, including:
 - a. Record drawings.
 - b. Record specifications.
 - c. Addenda.
 - d. Change Orders and other Modifications to the Contract.
 - e. OCTA's field orders and written instructions.
 - f. Reviewed and Accepted Shop Drawings, Product Data and Samples.
 - g. Field Test Reports.
 - h. Referenced Documents.

B. Related Sections:

1. Section 01 77 00, Closeout Procedures.
2. Section 01 78 36, Warranties and Guarantees and Bonds.
3. Section 01 33 00, Submittal Procedures.
4. Sections in Division 26-28 for specific requirements related to work of those sections.
5. General Conditions for all financial and payment requirements.

1.02 SUBMITTALS

- A. At Contract close-out, deliver Record Documents to the OCTA's representative.
- B. Accompany submittal with transmittal letter in duplicate, containing:
 1. Date;

2. Project title and contract number;
 3. Contractor's name and address;
 4. Title and number of each Record Document; and
 5. Signature of Contractor or his authorized representative.
- C. Submit in accordance with Section 01 33 00, Submittal Procedures.
- D. Record Drawings: Submit one set of full size marked-up record prints. Submit also as pdf electronic file on electronic media acceptable to OCTA Project Manager.
- E. Record Specifications: Submit one set of contract specifications, including addenda and contract modifications. Submit also as pdf electronic file on electronic media acceptable to OCTA Project Manager.
- F. Record Product Data: Submit one marked-up copy of each product data submittal. Submit also as pdf electronic file on electronic media acceptable to OCTA Project Manager.
1. Product data need not be submitted separately if included in operation and maintenance manuals.
- G. Shop Drawings: Submit one hard copy of reviewed and accepted shop drawings. Also submit as PDF files and AutoCAD files on a CD ROM.
- H. Operations and Maintenance Manual:
1. Manual content is specified in individual specification sections to be reviewed at the time of section submittals. Submit review manual content formatted and organized as required by the section. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
 2. Submit three paper copies of each Operations and Maintenance Manual. Include a complete operation and maintenance directory. Enclose tile pages and directories in clear plastic sleeves.
 3. Submit PDF electronic file on digital media acceptable to OCTA Project Manager. Assemble each manual into a composite electronically-indexed file.
 4. Initial Manual Submittal: Submit draft copy of each manual at least 30 calendar days before commencing demonstration and training. OCTA Project Manager will comment on whether general scope and content of manual are acceptable.
 - a. Correct or modify each manual to comply with OCTA Project Manager's comments. Submit copies of corrected manual within 15 calendar days of receipt of comments and prior to commencing demonstration and training.

5. Final Manual Submittal: Submit each manual in final form before requesting inspection for Substantial Completion and at least 15 calendar days before commencing demonstration and training.
- I. Other Documents: Unless otherwise specified, submit one (1) hard copy and a PDF electronic file of each document required herein.

1.03 FINAL COMPLETION SUBMITTALS:

- A. Final Submittals: Submit to the Engineer all documents and products required by Specifications to be submitted, including the following which apply:
 1. Project record drawings and specifications.
 2. Operations and Maintenance data.
 3. Guarantees, warranties and bonds.
 4. Test reports and certificates of compliance.
 5. Local Regulatory Jurisdiction(s) final Sign-off, including any and all documents required by governing authorities, utilities and other agencies, building permit cards, inspection cards signed-off as final by the inspectors, and certifications of inspections and tests.
- B. Certificates of Compliance and Test Report Submittals: Submit to the Engineer certificates and reports as specified, as required by manufacturers for warranty and guarantee purposes, and as required by authorities having jurisdiction.
- C. Subcontractor List: Submit to the Engineer five copies of updated Subcontractor and Materials Supplier List.
- D. Warranty Documents: Prepare and submit to the Engineer warranties and bonds as specified in Section 01 78 36 Warranties and Guarantees and Bonds.
- E. Final Payment: A final Application for Payment will be furnished by the Authority. The Authority will process the final payment per the General Provisions of the Contract.

1.04 PROJECT RECORD DOCUMENTS - GENERAL

- A. Maintain on site, one set of the following record documents and record actual construction and all revisions to the Work:
 1. Contract Drawings.
 2. Project Manual, with Specifications, Addenda, Change Orders and other instruments modifying the Contract.

3. Reviewed shop drawings, product data and samples.
4. Store Record Documents separate from documents used for construction.

1.05 RECORD DRAWINGS:

- A. Record Prints: Maintain one set of black-line white prints of the contract drawings and shop drawings for the sole purpose of recording all as-built changes to the work.
- B. Preparation: Record information continuously as Work progresses. Do not conceal Work permanently until all required information is recorded. Require individual or entity who obtained record data, where individual or entity is installer, subcontractor, or similar entity, to prepare the marked-up record prints. Legibly and to scale, mark a reproducible set of Contract Drawings to record actual construction where installation varies from that shown on contract drawings, including:
 1. Measured dimensions and cross section of work.
 2. Measured horizontal and vertical locations of underground utilities, ducts, and vents from specific wall locations, including all new utilities installed and utilities found, abandoned or left in place, referenced to permanent surface improvements and to visible and accessible features of the structure.
 3. Field changes of dimensions and details.
 4. Details not on original Contract Drawings and any other changes to the original Contract Drawings (Changes of location of utilities, equipment, and other accessories).
 5. As-Built information shall be shown along with RFIs, Submittals, Change Orders, or other indicating source of changes. References to written changes such as RFI's of Field Directives should be clouded on the drawings with a copy of the written direction attached to the set of drawings.
 6. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 7. Accurately record information in an understandable drawing technique.
 8. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
- C. Mark record sets in red ink. Use other colors as required to distinguish between changes for different categories of the work at same location.
 1. Mark important additional information that was either shown schematically, such as conduit runs, or omitted from original drawings.

2. Note work change RFI numbers, directive numbers, alternate numbers, change order numbers, and similar identification, where applicable.

1.06 RECORD SPECIFICATIONS

- A. Preparation: In PART 2 – PRODUCTS in each specification section, legibly mark in red ink and record actual products installed or used
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number or catalog number of products, materials, and equipment furnished, including substitutions or alternates utilized and product options selected.
 3. Record the name of manufacturer, supplier, installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record product data has been submitted in operation and maintenance manuals instead of submitted as record product data.
 5. Note related addenda, change orders, record product data, and record drawings, and other instruments modifying the Contract, where applicable.

1.07 SHOP DRAWINGS

- A. Maintain as record documents.
 1. Legibly annotate drawings to record changes made after review.
 2. Record Shop Drawings:
 - a. Revise the shop drawings CAD files to reflect annotations made on record copy.
 - b. Submit hard copies, PDF files and CAD files compatible with AutoCAD 2012 and in accordance with paragraph 1.02.

1.08 OPERATIONS AND MAINTENANCE DOCUMENT DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.

3. List of equipment.
4. Tables of contents.
- B. List of systems and subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the document directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the contract documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, Preparation of Operating and Maintenance Documentation for Building Systems.

1.09 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of project.
 3. Name and address of OCTA.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for OCTA Project Manager.
 7. Names and contact information for major consultants to OCTA Project Manager that designed the systems contained in the manuals.

8. Cross-reference to related systems described elsewhere in the operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to specification section number in project manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Provide manuals for each piece of equipment including individual components and subsystems of complete assembly. Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder. Line out non-applicable text and illustration. The section of the manual on operation shall describe the functions and limitations of each component and its relationship to the system of which it is a part. Where several models, options, or styles are described, the manual shall identify the items actually provided.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch paper; with clear plastic sleeve on cover to hold label and cover sheet describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "Operation and Maintenance Manual," project name, subject matter of contents, and

specification section number (on bottom of spine). Indicate volume number for multiple-volume sets.

2. Dividers: Heavy paper dividers with plastic covered tabs for each section of manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to specification section number and title of project manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2 by 11 inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled enveloped and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
- G. Manuals shall contain the following minimum information for each product or system:
1. List of equipment furnished for project with name, address, and telephone number of each vendor.
 2. Name, address and telephone number for nearest manufacturer's service representative.
 3. Catalog, model and serial number for the installed equipment.
 4. Description of the normal and emergency operations of the equipment.
 5. Statement of warranty and date warranty begins and ends.
 6. Standard starting, stopping and operating instructions.
 7. Emergency and special operating instructions and a list of service organizations (including addresses and telephone numbers) capable of rendering emergency service to the various parts of the system.
 8. Copy of each wiring and control diagram.
 9. Routine maintenance procedures.
 10. Servicing and lubrication schedule.

11. Manufacturer's printed operating and maintenance instructions and part lists. Operating and maintenance instructions for each and every item of equipment, setting forth in detail and step-by-step the procedure of starting, stopping, operating, and maintaining the entire system as installed. Include a schedule of recommended maintenance intervals.
 12. Manufacturer's recommended special maintenance tools.
 13. List of spare parts to include recommended stock quantities for one year of routine maintenance.
 14. Tabulation of motor nameplate horsepower, nameplate current, field-measured current, overlay relay setting, and catalog number for polyphase motors.
 15. List of fuses, lamps, seals, and other expendable equipment and devices. Specify size, type, and ordering description. List name, address, email address, fax number, and telephone number of vendor.
 16. A copy of shop drawings for mechanical, electrical, and instrument equipment in final form.
 17. Certified equipment drawings or reviewed shop drawing data clearly marked for equipment furnished.
- H. Brochures shall be loose leaf with durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use, and each brochure shall have the following information clearly printed on its cover:
1. Project name, name of Owner, and address.
 2. Name and address of Owner's Representative.
 3. Name and addresses of contractors and subcontractors and department to contact.
 4. Telephone number of contractors, including night and emergency numbers.
 5. Major equipment vendors' names and telephone numbers.
- I. Equipment Data Sheet: Provide six sets of equipment data sheets, bound in three-ring binders, summarizing the equipment manufacturer's maintenance instructions and recommendations. A blank data sheet and a sample data sheet are attached at the end of this specification section.

1.10 PHOTOGRAPHS

- A. Prior to performing any work on the site, the Contractor shall take a minimum of twenty (20) photographs of each project site. Each major area of work shall be the subject of at least one photograph.

- B. After construction operations have been started at the site, the Contractor shall periodically take color photographs to show general site condition and progress of work. A minimum of twenty (20) photos shall be taken throughout each month and submitted to the OCTA Project Manager by the 5th of the following month. Each major area of work shall be the subject of at least one photograph.
- C. The photo submittals shall be a read-only compact disk (CD-ROM) containing high-resolution electronic files of the color photographs. Each photograph will be captioned with date taken, location, and general description. In addition to the electronic file, the Contractor shall submit two (2) (8"X10") prints of each photograph

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 RECORDING AND MAINTENANCE OF PROJECT RECORD DOCUMENTS

- A. Recording: Post changes and modifications to project record documents as they occur; do not wait until the end of project.
- B. Maintenance of Record Documents: Store record documents in the field office apart from the contract documents used for construction. Do not use project record documents for construction purposes. Maintain one copy of each submittal during the construction period for project record document purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for OCTA Project Manager's reference during normal working hours.
- C. Label each document "PROJECT RECORD" in two-inch high printed letters, or a height appropriate to document size.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work of this section. As-Built drawings and photographs will be reviewed each month by the OCTA Project Manager. The monthly payment will be reduced by 5% if, in the opinion of the OCTA Project Manager, the Contractor is not in conformance with the requirements of this section.

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SAMPLE

Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program		Equipment Record Number	
EQUIPMENT DESCRIPTION		ELECTRICAL OR MECHANICAL DATA	
Name:		Size:	
Serial No.:		Model:	
Vendor:			
Vendor Address:		Type:	
		Mfr.:	
Vendor Rep:		Voltage:	Amps:
Phone:		Phase:	rpm:
Maintenance Work to be Done			Frequency*
OPERATING REQUIREMENTS AND REFERENCE			

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

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Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program	Equipment Record Number	
EQUIPMENT DESCRIPTION	ELECTRICAL OR MECHANICAL DATA	
Name: Pump No. 1 Tag No.: P01-1	Size: 15 hp	
Serial No.: 123456ABC Vendor: ABC Pump Co.	Model: 140T Frame Serial No. 987654ZY Class F Insulation W/Space Heater	
Vendor Address: 1111 Pump Circle Newport Beach, CA 92663	Type: Mfr.: DEF Motors, Inc.	
Vendor Rep: XYZ Equipment, Inc.	Voltage: 460	Amps: 20
Phone: 714/752-0505	Phase: 3	RPM: 1,800
Maintenance Work to be Done		Frequency*
1. Operate all valves and check such things as a) bearing temperature, b) changes in running sound, c) suction and discharge gauge readings, d) pump discharge rate, and e) general condition of the drive equipment. 2. Check packing. 3. Checking pumping unit for any dust, dirt, or debris. (Continued on attached sheet)		D D W
OPERATING REQUIREMENTS AND REFERENCE		
For manufacturer's instructions regarding installation, operation, maintenance, and trouble shooting of this equipment, see Volume ____, Section ____.		

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

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SAMPLE

Preventive Maintenance and Operating Requirement Sheets

Preventive Maintenance Program		Equipment Record Number	
EQUIPMENT DESCRIPTION		ELECTRICAL OR MECHANICAL DATA	
Name:		Size:	
Serial No.:		Model:	
Vendor:			
Vendor Address:		Type:	
		Mfr.:	
Vendor Rep:		Voltage:	Amps:
Phone:		Phase:	RPM:
Maintenance Work to be Done			Frequency*
4. Lubricate bearing frame and motor bearings (consult manufacturer's instructions for type of grease or oil).		Q	
5. Disassemble and change or repair the following a) impeller, b) shafts, c) shaft sleeve, d) rotary seals, and e) sleeve bearings.		A	
OPERATING REQUIREMENTS AND REFERENCE			

*D - Daily; W - Weekly; B - Biweekly; M - Monthly; Q - Quarterly;
S - Semiannually; A - Annually.

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END OF SECTION

SECTION 01 78 36

WARRANTIES, GUARANTEES, AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. General administrative and procedural requirements for preparation and submission of warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special Project warranties. This section specifies the general requirements for written warranties and guarantees required by the Contract Documents.
 - a. Refer to the Conditions of the Contract for terms of Contractor's special warranty of workmanship and materials.
 - b. Certifications and other commitments and agreements for continuing services to the Authority are specified elsewhere in the Contract Documents.

1.02 RELATED DOCUMENTS AND SECTIONS

- A. Section 01 33 00 – Submittal Procedures: General administrative requirements for submittals, applicable to warranties and bonds.
- B. Section 01 77 00 – Closeout Procedures: General requirements for closeout of the Contract.
- C. Section 01 78 00 – Closeout Submittals: Operating and Maintenance data binders to include copies of warranties and bonds documents.
- D. Individual Product Specifications Sections: Special Project warranty requirements for specific products or elements of the Work; commitments and agreements for continuing services to Authority.

1.03 WARRANTIES AND GUARANTEES

- A. General: Provide all warranties and manufacturer's guarantees with OCTA named as the beneficiary. For equipment, products, or components bearing a manufacturer's warranty of guarantee that extends for a period of time beyond the Contractor's warranty and guarantee, so state in the warranty or guarantee.
- B. Warranty: Assurance to the Authority by the Contractor, installer, supplier, manufacturer or other party responsible as warrantor, for the quantity, quality,

performance and other representations of a product, system service of the Work, in whole or in part, for the duration of the specified period of time. Warranty shall be an agreement to repair to repair or replace, without cost and undue hardship to the Authority, work performed under the Contract which is found to be defective during the warranty or guaranty period (correction period).

- C. Guaranty: Assurance to the Authority by the Contractor or product manufacturer or other specified party, as guarantor, that the specified warranty will be fulfilled by the guarantor in the event of default by the warrantor.
- D. Standard Product Warranty: Preprinted, written warranty published by product manufacturer for particular products and specifically endorsed by the manufacturer to the Authority.
- E. Special Project Warranty: Written warranty required by or incorporated into Contract Documents, to extend time limits provided by standard warranty or to provide greater rights for the Authority. For provisions for special warranties, refer to the Conditions of the Contract for terms of the Contractor's special warranty of the workmanship and materials.
- F. Specific Warranty and Guarantee Requirements: Refer to Divisions 02 and higher.
- G. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve the Contractor of warranty on the work that incorporates the products, nor shall they relieve suppliers, manufacturers and installers required to countersign special warranties with Contractor.
- H. Related Damages and Losses: When correcting warranted work that has been found defective, remove and replace other work that has been damaged as a result of such defect or that must be removed and replaced to provide access for correction of warranted work.
- I. Correction Period: The Correction Period shall be synonymous with warranty period and guaranty period used in the Contract Specifications. All defective work shall be initiated with 12 hours for critical system operations, as determined solely by the Authority, and within 3 calendar days for all other warranty work.
- J. Reinstatement of Warranty: When work covered by a warranty has been found defective and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- K. Replacement Cost: Upon determination that work covered by a warranty has been found to be defective, replace or reconstruct the work to a condition acceptable to the OCTA, complying with applicable requirements of the

Contract Documents. Contractor shall be responsible for all costs for replacing or reconstructing defective work regardless of whether the OCTA has benefited from use of the work through a portion of its anticipated useful service life.

- L. The OCTA's Recourse: Written warranties made to the OCTA are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under law nor shall warranty periods be interpreted as limitations on time in which the OCTA can enforce such other duties, obligation, rights, or remedies.
- M. Rejection of Warranties: The OCTA reserves the right to reject warranties and disallow the use of products with warranties in conflict with contract document requirements.
- N. Warranty as Condition of Acceptance: The OCTA reserves the right to refuse to accept work for the project where a special warranty, certification or similar commitment is required until evidence is presented that those required to countersign such commitments are willing to do so.

1.04 PREPARATION OF WARRANTY AND GUARANTEE SUBMITTALS

- A. Number of Copies: Two, unless otherwise specified or directed.
- B. Special Project Warranty and Manufacturer's Guarantee Forms: Forms for Special Project Warranties and for Manufacturer's Guarantees are included in the Conditions of the Contract at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the OCTA through OCTA Project Manager for approval prior to final execution.
 - 1. Refer to Division 02 and higher for specific content requirements and particular requirements for submittal of special project warranties.
 - 2. Prepare standard product warranties and product guarantees, excepting manufacturer's standard printed warranties and guarantees, on Contractor's, subcontractor's, material supplier, or manufacturer's own letterhead, addressed to the OCTA
 - 3. Warranty and guarantee letters shall be signed by all responsible parties and by Contractor in every case, with modifications only as approved by OCTA Project Manager to suit the conditions pertaining to the warranty or guarantee.
- C. Manufacturer's Guarantee Forms: Manufacturer's guarantee forms may be used in lieu of special project forms included at the end of the Section. Manufacturer's guarantee forms shall contain appropriate terms and identification, ready for execution by the required parties.

1. If proposed terms and conditions restrict guarantee coverage or require actions by the OCTA beyond those specified, submit draft of guarantee to the OCTA through Engineer for review and acceptance before performance of the work.
 2. In other cases, submit draft of guarantee to OCTA Project Manager for approval prior to final execution of guarantee.
- D. Signatures: By persons authorized to sign warranties, guarantees, and bonds on behalf of entity provided the warranty, guarantee, and bonds. All signatures shall be notarized.
- E. Co-Signature: the Contractor shall cosign all installer's warranties and bonds. Manufacturer's printed guarantees will not require co signatures.

1.05 FORM OF WARRANTY SUBMITTALS

- A. Form of warranty and bond submittals: At final completion, compile 2 copies of each required warranty and guaranty and bond, properly executed by the Contractor, or by the Contractor and subcontractor, supplier or manufacturer. Collect and assemble all written warranties and guarantees into binders and deliver binders to OCTA Project Manager for final review and acceptance.
- B. Prior to submission, verify that documents are in proper form, contain all required information and are properly signed.
- C. Organize the warranty documents into an orderly sequence based on the table of contents of the Specifications.
- D. Include a table of contents for the binder, neatly typed, following order, section names, and numbers of the Specifications.
- E. Bind warranties and guarantees in heavy-duty, commercial quality, 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, with clear front and spine to receive inserts, and sized for 8 ½" by 11" paper.
- F. Provide heavy paper dividers with celluloid or plastic covered tabs for each separate warranty. Mark tabs to identify products or installation, and the name, address, telephone number and responsible person for applicable installer, supplier and manufacturer.
- G. Include on a separate typed sheet, if information is not contained in warranty or guarantee form, a description of the product or installation, and the name, address, telephone number, and responsible person for applicable installer, supplier, and manufacturer.

- H. Identify each binder on front and spine with typed or printed inserts with title, "WARRANTIES, GUARANTEES, AND BONDS", the project title, and the name of the Contractor. If more than one volume of warranties and guarantees is produced, identify volume number of binder.
- I. When operating and maintenance data manuals are required for warranted construction, include additional copies of each required warranty in each required manual. Coordinate with requirements specified in Section 01 78 00 Closeout Submittals.

1.06 TIME OF WARRANTY AND GUARANTEE SUBMITTALS

- A. Preliminary Submittal: Unless otherwise specified, obtain preliminary copies of warranties and guarantees within ten (10) calendar days of completion of applicable item or work. Prepare and submit preliminary copies for review as specified herein.
- B. Final Submittal: Submit fully executed copies of warranties and guarantees within ten (10) days of date of substantial completion but not later than three (3) days prior to date of application for final payment.
- C. Date of Warranties and Guarantees: Unless otherwise directed, the commencement date for warranty and guarantee periods shall be the date of established in Certificate of Completion.
- D. For warranties for work such as designated systems, equipment, component part or other portion of the Work is completed, accepted, and occupied or put to beneficial use by the Authority, by a separate agreement with Contractor, prior to Final Completion, submit properly executed warranties to the Engineer within ten (10) calendar days of completion of that designated portion of the Work. List date of commencement of warranty, guaranty, or bond period as date of Acceptance.
- E. For warranties for Work not accepted as of the date of substantial completion, submit documents within ten (10) calendar days after acceptance. List the commencement date as the date of acceptance of such Work and as beginning of warranty, guaranty, and bond period.
- F. Duration of Warranties and Guarantees: Unless otherwise specified or prescribed by law, warranty and guaranty periods (Correction Period) for all work shall not be less than one year from the filing date of notice of completion. See product specifications Sections in contract specifications for extended warranty and guaranty beyond the minimum duration.

PARTS 2 – PRODUCTS

Not used.

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PART 3 – EXECUTION

Not used.

PART 4 – MEASUREMENT AND PAYMENT

No separate measurement or payment shall be made under this Section.

END OF SECTION

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WARRANTY/GUARANTEE

FOR WORK

We, the undersigned, do hereby warranty and guarantee that the parts of the Work described above which we have furnished and/or installed for the OCTA is in accordance with the Contract Documents and that all said Work as installed will fulfill or exceed all of the Warranty and Guarantee requirements. We agree to repair or replace Work installed by us, together with any adjacent Work, which is displaced or damaged by doing so, that proves to be defective in Workmanship, material, or operation within a period of one (1) year from the date of final acceptance by the OCTA or from the date of Certificate of Substantial Completion, whichever is the earlier. Ordinary wear and tear and unusual neglect or abuse is accepted.

In the event of our failure to comply with the above-mentioned conditions within a reasonable time period determined by the OCTA, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the OCTA to have said defective Work repaired and/or replaced and made good, and agree to pay to the OCTA upon demand all moneys that the OCTA may expend in making good said defective Work, including all collection cost and reasonable attorney fees.

(Subcontractor, Sub subcontractor, Manufacturer, or Supplier)

By_____

Title_____

State License No. _____ Date _____

(Contractor)

By_____

State License No. _____ Date _____

Local Representative. For maintenance, repair, or replacement service, contact:

Name: _____

Address: _____

Phone Number: _____

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**SECTION 01 79 00
DEMONSTRATION AND TRAINING**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Administrative and procedural requirements for instructing OCTA's personnel, including the following:
 - a. Demonstration of operation of systems, subsystems, and equipment.
 - b. Training in operation and maintenance of systems, subsystems, and equipment.
 - c. Demonstration and training video recordings.

B. Related Sections:

1. Divisions 02 through 49 sections for specific requirements for demonstration and training for products in those sections.

1.02 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.03 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies on CD within seven days of end of each training module.

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1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of OCTA Project Manager.
 - d. Name of Contractor.
 - e. Date of video recording.
2. Transcript: Prepared on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for OCTA's use.

1.04 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 43 00, Quality Assurance, experienced in operation and maintenance procedures and training.
- B. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- C. Preinstruction Conference: Conduct conference at project site to comply with requirements in Section 01 31 00, Project Management and Coordination. Review methods and procedures related to demonstration and training including, but not limited to, the following:
 1. Inspect and discuss locations and other facilities required for instruction.
 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 3. Review required content of instruction.
 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.05 COORDINATION

- A. Coordinate instruction schedule with OCTA's operations. Adjust schedule as required to minimize disrupting OCTA's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by OCTA Project Manager.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual specification sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:

- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.

- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 00, Closeout Submittals.
- B. Set up instructional equipment at instruction location.

3.02 INSTRUCTIONS

- A. Engage qualified instructors to instruct OCTA's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. OCTA Project Manager will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with OCTA personnel, through OCTA Project Manager, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration/performance-based review.
- E. Cleanup: Collect used and leftover educational materials and remove from project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.03 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.

- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to OCTA Project Manager.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.
- D. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- E. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- F. Pre-Produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for this section.

END OF SECTION

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL, SECURITY SUPPLEMENT

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Provide a conduit and supportive electrical powering systems to support Electronic Security Systems as listed in paragraph 1.1. Coordinated with Section 280500 work. See submittal requirements for submittal requirements.
- B. Refer to 28 05 00 Part 1

1.2 RELATED DOCUMENTS

- A. Refer to 28 05 00 Part 1

1.3 RELATED DIVISION PROVISIONS

- A. Refer to 28 05 00 Part 1

1.4 REFERENCES

- A. Refer to 28 05 00 Part 1

1.5 SUMMARY

- A. Section includes requirement of Division 26 contractor to support electronic security systems work. This section provides requirements for planning, supplementary submittal requirements, product specifications and installation of conduit and electrical power systems supporting electronic security.

1.6 DEFINITIONS

- A. Refer to 28 05 00 Part 1

1.7 SUBMITTALS

- A. General: Submittals shall adhere to submittal requirements outlined in Division 280500, Section 1.6. All submittals for Section 280500 including this supplement shall be submitted as one submittal as outlined in Section 280500, Paragraph 1.6.
- B. Group 1 Technical Data Package: The data package shall include the following:
 - 1. Shop Drawings: Provide conduit systems plan for routing and sizing of all security conduits, cable trays and enclosure assemblies. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.
 - 2. Construction Mock-up: In areas with exposed EMT/Conduit Raceways, Contractor shall conceal raceway as much as practical and unobtrusively, in addition the historic significance should be considered in any area in construction documents to determine installation means and methods for approval by the owner.
 - 3. Power Circuits & Calculation: Contractor shall provide power circuit schedule for each security component requiring high voltage power. The schedule shall be include the following information:
 - a. Panel Location
 - b. Panel Nomenclature
 - c. Circuit Number
 - d. Type of Circuit (emergency power, UPS, etc.)
 - e. Circuit power consumption
- C. Product Data: For each type of product indicated in Part 2 of this section.

1.8 COORDINATION

- A. Refer to 28 05 00 Part 1

1.9 QUALITY ASSURANCE

- A. Refer to 28 05 00 Part 1

1.10 MAINTENANCE & SERVICE

- A. Refer to 28 05 00 Part 1

1.11 SYSTEM DESCRIPTION

- A. **[Describe System]**. The system shall be coordinate with 280500.

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1.12 PERFORMANCE REQUIREMENTS

- A. Refer to 28 05 00 Part 1

1.13 DELIVERY HANDLING & STORAGE

- A. Refer to 28 05 00 Part 1

1.14 PROJECT CONDITIONS

- A. Refer to 28 05 00 Part 1

1.15 EQUIPMENT AND MATERIALS

- A. Refer to 28 05 00 Part 1

1.16 ELECTRICAL POWER

- A. Refer to 28 05 00 Part 1

1.17 ENVIRONMENTAL CONDITIONS

- A. Refer to 28 05 00 Part 1

1.18 LIGHTNING, POWER SURGES, & GROUNDING

- A. Refer to 28 05 00 Part 1

1.19 COMPONENT ENCLOSURES

- A. Refer to 28 05 00 Part 1

1.20 ELECTRONIC COMPONENTS

- A. Refer to 28 05 00 Part 1

1.21 SUBSTITUTE MATERIALS & EQUIPMENT

- A. Refer to 28 05 00 Part 1

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1.22 LIKE ITEMS

- A. Refer to 28 05 00 Part 1

1.23 WARRANTY

- A. Refer to 28 05 00 Part 1

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL where UL standards are established for those items, and the requirements of NFPA 70. All items shall be new unless specified or indicated otherwise.

2.2 CONDUIT AND FITTINGS

- A. Types:
1. Rigid:
 - a. Rigid Steel Conduit (Zinc-Coated) shall meet ANSI C80.1.
 - b. Rigid Aluminum Conduit shall meet ANSI C80.5.
 - c. Rigid Nonmetallic PVC Type Conduit EPC-40 in accordance with NEMA TC2, or UL approved fiberglass reinforced epoxy (FRE).
 2. EMT:
 - a. Electric Metallic Tubing (EMT) shall meet ANSI C80.3.
 3. Flexible Metal Conduit:
 - a. Liquid-Tight Flexible Metal Conduit (Steel) shall meet UL 360.
 4. Sheet Metal Cable Tray
 - a. Sheet Metal Cable Tray shall meet National Electrical Manufacturer's Association (NEMA) VE1-2002.
 5. ENT
 - a. Electrical Non-metallic Tubing (ENT) shall meet NEMA TC 13-2005.
 6. PVC:
 - a. Polyvinyl Chloride conduit shall meet NEMA TC 2-2003.

2.3 SPECIAL FIRE PANEL CONNECTIONS

- A. All conduits between the security panel assembly and fire control panels are to be recessed in the wall. These conduits shall be marked with blue and red tape to indicate their association with fire and security systems.

2.4 SECURITY JUNCTION BOX:

- A. The Contractor shall provide 100 x 100 x 50 mm (4 x 4 x 2 in) metal junction box with cover and tamper proof Torx Center post security screws. Boxes containing security electronic circuitry shall be tampered.

2.5 GALLERY JUNCTION BOX:

- A. Wall Mounted
 - 1. The contractor shall provide 150 x 150 x 50 mm (6 x 6 x 2 in) metal junction box with hinged cover and key operated locking device. The junction box shall have tamper switch circuit which shall be fully supervised and monitored by the SMS. Provide back plain for mounting terminal blocks.
- B. Ceiling Mounted
 - 1. The contractor shall provide 203 x 203 x 101 mm (8 x 8 x 4 in) metal junction box with hinged cover and key operated locking device. The junction box shall have tamper switch circuit which shall be fully supervised and monitored by the SMS. Provide back plain for mounting terminal blocks.

2.6 CAMERA JUNCTION BOXES

- 1. The contractor shall provide 203 x 203 x 101 mm (8 x 8 x 4 in) metal junction box with hinged cover and key operated locking device. The junction box shall have tamper switch circuit which shall be fully supervised and monitored by the SMS. Provide back plain for mounting terminal blocks.

2.7 ENCLOSURES:

- A. The Contractor shall provide metallic enclosures as needed for equipment not housed in racks or supplied with a housing. The enclosures shall be as specified or shown.
 - 1. Interior: Enclosures to house equipment in an interior environment shall meet the requirements of NEMA 250-Type 12.
 - 2. Exterior: Enclosures to house equipment in an outdoor environment shall meet the requirements of NEMA 250-Type 4. Enclosures exposed to direct sunlight shall be finished with white polyester powder coating and be equipped with a sun shield finished to match the enclosure. Sun shield shall be mounted to protect the top of the enclosure from direct sun and shall extend at least 25.4 mm (1 in) beyond the edges of the enclosure on all sides.
 - 3. Corrosion-Resistant: Enclosures to house equipment in a corrosive environment shall meet the requirements of NEMA 250-Type 4X.

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4. Hazardous Environment: All system electronics to be used in a hazardous environment shall be housed in a metallic enclosure which meets the requirements of paragraph "Hazardous Environment."
5. Tamper Provisions: Enclosures, cabinets, housings (other than environmental camera housings), and boxes of every description having hinged doors or removable covers, which contain any part of the data transmission media, circuits, termination or power supplies, shall be provided with cover operated, corrosion-resistant tamper switches, arranged to initiate an alarm signal when the door or cover is moved. Tamper switches shall be mechanically mounted to maximize the defeat time when enclosure covers are opened or removed. Tamper switches shall be inaccessible until the switch is activated; have mounting hardware concealed so the location of the switch cannot be observed from the exterior of the enclosure; be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode; and be wired so they break the circuit when the door or cover is disturbed. Tamper switches on the doors which must be opened to make routine maintenance adjustments to the system and to service the power supplies shall be push/pull-set, automatic reset type.
6. Enclosure Covers: Covers of pull and junction boxes provided to facilitate installation of the system need not be provided with tamper switches if they contain no splices or connections and held in place with tamper proof Torx Center post security screws. Provide stenciled labels for each box.
7. Construction of Enclosures:
 - a. Consoles, power supply enclosures, detector control and terminal cabinets, control units, wiring gutters, and other component housings, collectively referred to as enclosures, shall be so formed and assembled as to be sturdy and rigid.
 - b. Thickness of metal in-cast and sheet metal enclosures of all types shall not be less than those in Tables I and II, UL 611. Sheet steel used in fabrication of enclosures shall be not less than 14 gauge. Consoles shall be 16-gauge. Doors and covers shall be flanged. Enclosures shall not have pre-punched knockouts. Where doors are mounted on hinges with exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent removal. Doors having a latch edge length of less than 609.6 mm (24 in) shall be provided with a single construction core. Where the latch edge of a hinged door is more than 609.6 mm (24 in) or more in length, the door shall be provided with a three-point latching device with construction core; or alternatively with two, one located near each end.
 - c. Any ventilator openings in enclosures and cabinets shall conform to the requirements of UL 611. Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with tip holes slotted. Mounting holes shall be in positions that remain accessible when all major operating components are in place and the door is open, but shall be in accessible when the door is closed.

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- d. Covers of pull and junction boxes provided to facilitate initial installation of the system shall be held in place by tamper proof Torx Center post security screws. Stenciled or painted labels shall be affixed to such boxes indicating they contain no connections. These labels shall not indicate the box is part of the Electronic Security System (ESS).

B. Wire Troughs

1. Wire troughs shall be utilized for all enclosure assemblies wire management practices.
2. Security Screws: Secure trough covers with tamper proof Torx Center post security screws.
3. Trough Mounting: Wire Troughs shall be mounted securely to fire resistant plywood meeting UL Standard for fire retardant backboards.

PART 3 - EXECUTION

3.1 GENERAL

A. Power (Division 26):

1. Primary Dedicated Electrical Power (20 amp, 120 VAC) circuits shall be provided by this Contractor at locations shown on drawings. The Contractor shall provide all the connections between powered junction boxes and security equipment.
2. Division 26 Contractor shall provide cable trays required by the security systems. Cable trays below raised floor at the Security Monitoring Console or Equipment Rooms shall be elevated to prevent water from contaminating the cables in the event of water leaking in the space. Security conduits shall be labeled with blue marking band or blue paint every 9 m (29.5 ft). Security junction box covers shall be painted with paint manufactured by Benjamin Moore #791, or Duron 5085A (Americana).
3. Division 26 Contractor shall provide the uninterruptible power supplies (UPS) required for the security equipment at the Security Monitoring Console and the Equipment Room in the event of loss of primary power. The UPS units shall support the listed security equipment as described in the Equipment Section of this specification.

B. HVAC (Division 25)

1. Division 25 Contractor shall provide a Liebert Cooling System or equivalent, for the Security Monitoring Control and Equipment rooms.

C. Low Voltage (Division 28)

1. The Division 28 Contractor shall coordinate installation of the Light Control Equipment, Radio and Elevator Status Equipment installed in the Security Monitoring Console.

D. Conduit: The following security provisions apply to system conduit requirements:

1. Conduit shall be in accordance with The National Electrical Code (NEC), and the requirements of other Division 26 Sections.
2. All wiring shall be installed in conduit and in cable trays or raceways when specifically permitted in Contract Documents. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.

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4. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Conduit shall not enter the security control panel, or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the manufacturer.
6. Conduit shall be 19 mm (0.75 in) minimum, except 12.7 mm (0.5 in) flexible conduit is permitted when connecting to a single device.
7. Cable Tray below the raised floor at the Security Monitoring Console room shall be elevated in the event of water leaking into the space.
8. Security conduits and junction box covers shall be labeled by the Contractor with blue Ben Moore #791 or Duron #5085A marking tape, band or blue paint band 25.4 mm (1 in) wide every 9 m (29.5 ft). Coordinate work with Division 16 Contractor.
9. Flexible conduit connecting CCTV camera housings and junction boxes for elevator hoist ways shall be "High Flex" type, listed for intended usage and application.

E. Terminal Boxes, Junction Boxes and Cabinets:

1. All boxes and cabinets shall be UL listed for their use and purpose. Screws extending outside any cabinets shall be cut off and filed smooth to prevent any injury.
2. The security 120 VAC power supplies shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as Security. Security 120 VAC primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to a suitable ground.
3. Enclosure Penetrations: All enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer, and in such a manner that the cable is not damaged.
4. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.
5. Baseboard Junction Boxes at Corridors and Galleries (for Future Alarms): The Baseboard Junction Boxes for the Corridors and Galleries shall be provided at locations shown on the drawings. These junction boxes will be used for future alarm device installation. Provide flush mounted 101 x 54 mm (4 x 2.125 in)

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(single gang) back box with a standard blank cover plate and tamper-resistant fasteners at each location. The back box shall be mounted as shown in the typical installation detail drawing. The Contractor shall provide the specified wire from the coil unit junction box.

6. Wire Troughs: Wire troughs shall be utilized for all enclosure assemblies wire management practices. Security Screws: Secure trough covers with tamper proof Torx Center post security screws. Trough Mounting: Wire Troughs shall be mounted securely to fire resistant plywood meeting UL Standard for fire retardant backboards.
7. Wire trays and Ladder Racks: Wire Trays and Ladder Racks shall only be used in control and equipment rooms for wire management practices. Refer to security drawings for locations for wire tray locations. Wire ladders shall be used to manage vertical run wire. Secure wire and cable in accordance with BICSI standard for vertically run wire and cable.
8. Backboards: Plywood, fire-retardant treated, 19 x 1220 x 2440 mm (0.75 x 48 x 96 in) minimum with actual dimensions to match panel assembly sizing. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".

PART 4 - SYSTEM PROGRAMMING

4.1 NOT APPLICABLE

PART 5 - TESTING AND ACCEPTANCE

5.1 FIELD TESTS:

- A. Contractor shall perform field test of all electrical circuits to ensure they conform to project requirements. A ground test shall be performed on all grounding systems to ensure continuity in the entire grounding system.
- B. Unit Control Room
 - 1. Contractor shall confirm the source, operation, and labeling of all power circuits.

5.2 REFER TO 280500 PART 5

END OF SECTION

SECTION 27 05 00

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section provides overarching coordination with various Communication components. The overall communication system will provide telecommunications infrastructure for the facility.
- B. Section Includes:
 - 1. Administrative requirements
 - 2. Related documents
 - 3. Referenced standards
 - 4. Definitions
 - 5. Manufactured products
 - 6. Delivery, storage and handling
 - 7. Submittals
 - 8. Quality assurance

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Secure all necessary licenses, permits, inspections and final system acceptance from local authority having jurisdiction.
- B. Provide all labor, material and equipment for a complete and functional system.
- C. Provide new material and equipment that conforms to the applicable standards and listed for its intended purpose by a nationally recognized testing laboratory.

1.3 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. References to industry and trade association standards and codes are minimum installation requirement standards. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the referenced standards.
- C. This Section (270500) shall be used as a base document for all of Division 27 - Communications. The following sections shall be used in conjunction with the drawings to provide a complete and fully integrated communications system. Sections 275116 and 275123, along with Division 28 require coordination for conduits and cabling for Division 28 work.

1. 27 05 26 – Grounding and Bonding for Communications Systems
2. 27 05 28 – Pathways for Communications Systems
3. 27 05 44 – Sleeves and Sleeve Seals For Communications
4. 27 11 00 – Communications Equipment Room Fittings
5. 27 13 00 – Communications Backbone Cabling
6. 27 15 00 – Communications Horizontal Cabling
7. 28 05 00 - Common Work Results for Electronic Security
8. 28 23 00 - Video Surveillance System

1.4 REFERENCED STANDARDS

- A. All local codes and regulations shall be strictly observed. Standards listed below shall be the latest edition and adhered to as applicable.
- B. BICSI- Standard for Installing Commercial Building Telecommunications Cabling; Latest edition
- C. BICSI TDMM - Telecommunications Distribution Methods Manual; Latest edition
- D. TIA-526-7 (OFSTP-7)-2002+A1:2008, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.
- E. TIA-526-14-B-2010 (OFSTP-14), Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant; IEC 61280-4-1 Edition 2, Fiber-Optic Communications Subsystem Test Procedure- Part 4-1: Installed Cable Plant- Multimode Attenuation Measurement.
- F. ANSI/TIA-568-C.0–2009+A1:2010+A2:2012, Generic Telecommunications Cabling for Customer Premises.
- G. ANSI/TIA-568-C.1–2009+A1:2012, Commercial Building Telecommunications Cabling Standard.
- H. ANSI/TIA-568-C.2–2009+A1:2010, Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
- I. ANSI/TIA-568-C.3–2009+A1:2011, Optical Fiber Cabling Components Standard.
- J. ANSI/TIA-568-C.4–2011, Broadband Coaxial Cabling and Components Standard.
- K. ANSI/TIA-569-C–2012, Telecommunications Pathways and Spaces.
- L. ANSI/TIA/EIA-598-C–2005, Optical Fiber Cable Color Coding.
- M. ANSI/TIA-606-B-2012, Administration Standard for Commercial Telecommunications Infrastructure.
- N. ANSI-J-STD-607-A
- O. ANSI/TIA-607-B-2011, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

- P. ANSI/TIA-1152–2009, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling.
- Q. ANSI/TIA-1183–2012, Test Fixtures for Balun-Less Measurements of Balanced Components and Systems.
- R. NFPA 70- National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- S. Underwriters Laboratories, Inc. (UL)
- T. ASTM International
- U. NEMA – National Electrical Manufacturers Association
- V. NECA– National Electrical Contractors Association Standards for Good Workmanship
- W. ANSI/TIA-758-B–2012, Customer-Owned Outside Plant Telecommunications Infrastructure Standard.
- X. ISO/IEC 11801
- Y. IEEE 802.11
- Z. American Society of Civil Engineers (ASCE 7) Latest Edition.
- AA. International Building Code (IBC) Latest Edition

1.5 DEFINITIONS

- A. BICSI - Building Industry Consulting Service International
- B. COR – Contracting Officer Representative
- C. RCDD - Registered Communications Distribution Designer.

PART 2 - PRODUCTS AND SERVICES

2.1 MANUFACTURED PRODUCTS

- A. Provide material and equipment produced by manufacturers in the USA that regularly and presently produce the equipment and material specified for this project and whose products have been in satisfactory use in similar service for not less than 3 years, which replacement parts are available.
- B. Subject to compliance with requirements, provide products by the following manufacturers, or approved equivalent:
 - 1. Belden Inc.
 - 2. Cabolfil, Inc.
 - 3. Chatsworth Products

4. CommScope, Inc.
 5. Corning Cable Systems
 6. Erico/Caddy
 7. General Cable Technologies Corp.
 8. Hoffman; a Pentair company
 9. Middle Atlantic Products, Inc.
 10. Mohawk; a division of Belden Networking, Inc.
 11. Ortronics, Inc.
 12. Panduit Corp
 13. Quicktron/Legrand
 14. Specified Technologies
 15. Superior Essex Inc.
 16. Tyco Electronics Corporation
 17. Wiremold/ Legrand
 18. Or approved equals
- C. Where any device or part of equipment is referred to in these specifications in the singular number (e.g., "the switch"), this reference shall be deemed to apply to as many such devices as are required to complete the installation as shown on the drawings.
- D. When more than one unit of the same class of equipment is required, such units shall be the product of a single manufacturer.
- E. Equipment Assemblies and Components:
1. Components of an assembled unit need not be products of the same manufacturer.
 2. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
 3. Components shall be compatible with each other and with the total assembly for the intended service.
 4. Constituent parts which are similar shall be the product of a single manufacturer.

2.2 DELIVERY, STORAGE AND HANDLING

- A. Equipment and materials shall be protected during shipment and storage against physical damage, dirt, moisture, cold and rain:
1. During installation, enclosures, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of foreign matter; and be vacuum cleaned both inside and outside before testing and operating and repainting if required.
 2. Damaged equipment shall be, as determined by the Contracting Officer Representative placed in first class operating condition or be returned to the source of supply for repair or replacement.
 3. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
 4. Damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas are not obvious.

2.3 SUBMITTALS

- A. The Contracting Officer Representative approval shall be obtained for all equipment and material before delivery to the job site. Submittals shall be marked to show specification reference including the section and paragraph numbers. Submit each section separately.
- B. Submittals for individual systems and equipment assemblies which consist of more than one item or component shall be made for the system or assembly as a whole.
- C. Where variations from the contract requirements are requested, the connecting work and related components shall be included.
- D. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 3. Parts list which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price and availability of each part.
 - 4. Provide UL listed systems drawings for all penetrations per application.
 - 5. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration and faceplates for color selection and evaluation of technical features.
- E. Shop and Coordination Drawings
 - 1. Provide cable administration drawings and documentation, pathway routing and sizes, pull boxes, outlet types and locations, penetrations, elevations, sections, details, attachments to other work and as-built plans.
 - 2. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. See Seismic Design requirements for this facility.
 - 3. Include elementary and interconnection wiring diagrams, cross connects, patch panels and patch cords for communication and signal systems, control system and equipment assemblies. All terminal points and wiring shall be identified on wiring diagrams.
- F. Meet Seismic Design Category C, for pathway racks, conduits, enclosures, cabinets, cable trays, equipment racks include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which certification is based and their installation requirements.
 - 4. Detailed description of conduit support devices and interconnections on which certification is based and their installation requirements.

Provide Seismic Qualification Certificates from manufacturer for regions within the United States that are "At Risk" for seismic activity.

PART 3 - EXECUTION

3.1 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD or RCDD/NTS and Commercial Installer, Level 2.
 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician or Level 2 Installer, who shall be present at all times at Project site.
 3. Field Inspector: Currently registered by BICSI as RCDD to perform the on-site inspection.
 4. Installer is required to obtain certification from the manufacturer of all systems and components and install them in accordance with manufacturer's instructions.

END OF SECTION

SECTION 27 05 26

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Grounding for communications systems and equipment for reliable signal reference.
- B. Section Includes:
 - 1. Grounding connectors
 - 2. Grounding conductors
 - 3. Grounding labeling
 - 4. Ground rods

1.2 DEFINITIONS

- A. BCT: Bonding conductor for telecommunications.
- B. EMT: Electrical metallic tubing.
- C. TGB: Telecommunications grounding busbar.
- D. TMGB: Telecommunications main grounding busbar.

1.3 RELATED DOCUMENTS

- A. 27 05 00 Common Work Results for Communications

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

- A. Comply with J-STD-607-A.

2.2 CONNECTORS

- A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

- B. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.
 - 1. Electroplated tinned copper, C and H shaped.
- C. Busbar Connectors: Cast silicon bronze, solderless [compression] [or] [exothermic]-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.
- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 CONDUCTORS

- A. Comply with UL 486A-486B.
- B. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.
 - 1. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
 - 2. Cable Tray Equipment Grounding Wire: No. 6 AWG.
- C. Cable Tray Grounding Jumper:
 - 1. Not smaller than No. 6 AWG 26 kcmils (13.3 sq. mm) and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.
- D. Bare Copper Conductors:
 - 1. Stranded Conductors: ASTM B 8.
 - 2. Bonding Conductor: No. 6 AWG, stranded conductor.
 - 3. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- E. Telecom System Grounding Riser Conductor: Use a minimum 50mm² (1/0 AWG) insulated stranded copper grounding conductor unless indicated otherwise.

2.4 LABELING

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

PART 3 - EXECUTION

- A. Examine the ac grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.
- B. Inspect the test results of the ac grounding system measured at the point of BCT connection.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.
- B. Comply with NECA 1.
- C. Comply with J-STD-607-A.

3.3 APPLICATION

- A. Conductors: Install stranded conductors for No. 6 AWG and larger.
 - 1. The bonding conductors between the TGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
 - 2. The bonding conductors between the TMGB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 2 AWG minimum.
- C. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.
- D. Grounding and Bonding Conductors:
 - 1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.

2. Install without splices.
3. Support at not more than 36-inch (900-mm) intervals.
4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.
 - a. If grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in Section 270528 "Pathways for Communications Systems," and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

- A. The BCT between the TMGB and the ac service equipment ground shall not be smaller than No. 1/0 AWG.

3.5 GROUNDING BUSBARS

- A. Install busbars horizontally, on insulated spacers 4 inches (100 mm) minimum from wall, 12 inches (300 mm) above finished floor.

3.6 CONNECTIONS

- A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.
- B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.
- C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:
 1. Use crimping tool and the die specific to the connector.
 2. Pretwist the conductor.
 3. Apply an antioxidant compound to all bolted and compression connections.
- D. Primary Protector: Bond to the TMGB with insulated bonding conductor.
- E. Interconnections: Interconnect all TGBs with the TMGB with the telecommunications backbone conductor. If more than one TMGB is installed, interconnect TMGBs using the grounding equalizer conductor. The telecommunications backbone conductor and grounding equalizer conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG 168 kcmils (85 sq. mm).
- F. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install bottom-mounted rack grounding busbar unless the enclosure and rack are manufactured with the

busbar. Bond the equipment grounding busbar to the TGB No. 2 AWG bonding conductors.

- G. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each TGB and TMGB to the vertical steel of the building frame.
- H. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each TGB to the ground bar of the panelboard.
- I. Shielded Cable: Bond the shield of shielded cable to the TGB in communications rooms and spaces. Comply with TIA/EIA-568-B.1 and TIA/EIA-568-B.2 when grounding screened, balanced, twisted-pair cables.
- J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

3.7 IDENTIFICATION

- A. Labels shall be preprinted or computer-printed type.
 - 1. Label TMGB(s) with "fs-TMGB," where "fs" is the telecommunications space identifier for the space containing the TMGB.
 - 2. Label TGB(s) with "fs-TGB," where "fs" is the telecommunications space identifier for the space containing the TGB.
 - 3. Label the BCT and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - 2. Test the bonding connections of the system using an AC earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a TMGB and a TGB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
 - a. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.

3. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
 - a. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the TMGB and in each TGB. Maximum acceptable ac current level is 1 A.
- C. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.
- D. Grounding system will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

SECTION 27 05 28

PATHWAYS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes pathways for communications systems.
- B. Section Includes:
 - 1. Related documents
 - 2. Administrative requirements
 - 3. Conduits and fittings
 - 4. Boxes and enclosures
 - 5. Installation

1.2 RELATED DOCUMENTS

- A. Section 27 05 00 Common Work Results For Communications

PART 2 - PRODUCTS

2.1 CONDUIT AND FITTINGS

- A. General Requirements:
 - 1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. Minimum conduit size of 25.4 mm (1 inch), but not less than the size shown on the drawings.
 - 3. Outdoors: Apply pathway products as specified below unless otherwise indicated:
 - a. Exposed conduit: GRC.
 - b. Concealed conduit, aboveground: EMT, EPC-40-PVC.
 - c. Underground conduit: RNC, Type EPC-40-PVC
 - d. Boxes and enclosures, aboveground, Type 4x.
 - 4. Indoors: Apply pathway products as specified below unless otherwise indicated:
 - a. Exposed, not subject to severe physical damage: EMT.
 - b. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - c. Exposed and subject to severe physical damage: GRC. Example locations include, but not limited to the following:

- 1) Loading dock.
 - 2) Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - 3) Mechanical rooms.
 - 4) Damp or Wet Locations
5. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- B. Electrical Metallic Tubing (EMT)
1. Only steel or malleable iron materials are acceptable.
 2. Couplings and connectors: Concrete tight and rain tight, with connectors having insulated throats.
 3. Use gland and ring compression type couplings and connectors for conduit sizes 50 mm (2 inches) and smaller.
 4. Use set screw type couplings with four set screws each for conduit sizes over 50 mm (2 inches). Use set screws of case-hardened steel with hex head and cup point to firmly seat in wall of conduit for positive grounding.
- C. Expansion Fittings: Match conduit type, rated for environmental conditions and including flexible external bonding jumper.

2.2 BOXES AND ENCLOSURES

- A. General Requirements:
1. Provide boxes and enclosures designed and identified as defined in NFPA 70, for intended location and application.
 2. All equipment and associated hardware shall be fabricated and installed in accordance with the manufacturer's specified recommendations.
 3. Box extensions used to accommodate building finishes shall be of same material as recessed box.
 4. Cast-Metal access, pull and junction boxes: galvanized with cover.
 5. Gangable (expandable) boxes are prohibited.
 6. Hinged Cover Enclosures: Continuous-hinge cover with flush latch unless otherwise indicated.
 7. Metal Enclosures: Steel: finished inside and out with manufacturer's standard enamel.
 8. Boxes and Enclosures: NEMA 250 Type 1, except use NEMA 250 Type 4x stainless steel in institutional and damp or wet locations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General Requirements

1. Bond all conduits and piping entering the equipment room to the TGB at the perimeter of the room.
2. Examine surfaces and spaces for compliance with installation tolerances and other conditions affecting performance installation. Do not proceed with installation until unsatisfactory conditions have been corrected.
3. Deviations: Make only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted and approved by the Contracting Officer Representative.
4. Flattened, dented, or deformed conduit is not permitted. Remove and replace the damaged conduits with new undamaged material. Assure conduit installation does not encroach into the ceiling height head room, walkways, or doorways.
5. Notify the Contracting Officer Representative of conditions that may adversely affect the installation, subsequent use, or cause the pathway (or circuits to be subsequently installed in the pathway) to not comply with ANSI/TIA/EIA standards.
6. Keep pathways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal pathway runs above water and steam piping.
7. Complete pathway installation before starting cable installation.
8. Arrange stub-ups so curved portions of bends are not visible above finished slab.
9. No telecommunication Work Area Outlet (WAO) conduit shall have bends less than 90 degrees.
10. "Daisy Chaining" of telecommunication Work Area Outlet (WAO) conduit is not permitted.
11. Install no more than the equivalent of two 90-degree bends in any pathway run. Support within 12 inches (300 mm) of changes in direction. Utilize long radius elbows for all optical-fiber cables.
12. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
13. Clearance requirements for cable tray accessibility:
 - a. Maintain a clearance of 6" between top of cable tray and ceiling structure or other equipment or raceway.
 - b. Maintain a clearance of 8" between at least one side of cable tray and nearby objects.
 - c. Maintain a clearance of 6" between bottom of cable tray and ceiling grid or other equipment or raceway.
14. Clearance requirements from sources of electromagnetic interference (EMI):
 - a. Maintain a clearance of 5" or more from fluorescent lighting.
 - b. Maintain a clearance of 12" or more from conduit and cables used for electrical power distribution.
 - c. Maintain a clearance of 48" or more from motors or transformers.
 - d. Pathways shall cross perpendicularly to electrical power cables or conduits.

B. Firestopping

1. Provide UL listed firestop assemblies for penetrations through rated walls, floors and partitions to restore original rating approved for use by the Authority having Jurisdiction.

C. Conduit Supports

1. Support multiple conduit runs with trapeze hangers that are designed to support a load equal to or greater than the sum of the weights of the conduits, wires, hanger itself, and 90 kg (200 pounds).
2. Support conduit independently of junction boxes, pull boxes, fixtures, suspended ceiling T bars, angle supports, and similar items.
3. J Hooks may not be used to support cables. Outlet conduits to extend to accessible basket tray.
4. Fasteners and Supports in Solid Masonry and Concrete:
 - a. Existing Construction:
 - 1) Steel expansion anchors not less than 6 mm (1/4 inch) bolt size and not less than 28 mm (1 1/8 inch) embedment.
 - 2) Power set fasteners not less than 6 mm (1/4 inch) diameter with depth of penetration not less than 75 mm (3 inches).
 - 3) Use vibration and shock resistant anchors and fasteners for attaching to concrete ceilings.
 5. Hollow Masonry: Toggle bolts are permitted.
 6. Bolts supported only by plaster or gypsum wallboard are not acceptable.
 7. Metal Structures: Use machine screw fasteners or other devices specifically designed and approved for the application.
 8. Attachment by wood plugs, rawl plug, plastic, lead or soft metal anchors, or wood blocking and bolts supported only by plaster is prohibited.
 9. Chain, wire, or perforated strap shall not be used to support or fasten conduit.

D. Furred or Suspended Ceilings and in Walls:

1. Connect fixtures to conduit runs with maximum 1800 mm (six feet) of flexible metal conduit extending from a junction box to the fixture.

- E.** Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- F.** Cut conduit perpendicular to the length. For conduits of 2-inch (53-mm) trade size and larger, use roll cutter or a guide to ensure cut is straight and perpendicular to the length.
- G.** Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- H.** Cap underground pathways designated as spare above grade alongside pathways in use.
- I.** Pathways for Optical-Fiber Cable: Install pathways between pullboxes, metal and nonmetallic, rigid and flexible, as follows:
1. Install pathways in maximum lengths of 75 feet.
 2. Install with a maximum of two 90-degree bends or equivalent for each length of pathway with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

- J. Install devices to seal pathway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all pathways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service pathway enters a building or structure.
 3. Where otherwise required by NFPA 70.
- K. Expansion-Joint Fittings:
1. Conduits 75 mm (3 inches) and larger, that are secured to the building structure on opposite sides of a building expansion joint, require expansion and deflection couplings. Install the couplings in accordance with the manufacturer's recommendations.
 2. Provide conduits smaller than 75 mm (3 inches) with junction boxes on both sides of the expansion joint. Connect conduits to junction boxes with sufficient slack of flexible conduit to produce 125 mm (5 inch) vertical drop midway between the ends. Flexible conduit shall have a copper green ground bonding jumper installed. In lieu of this flexible conduit, expansion and deflection couplings as specified above for 375 mm (15 inches) and larger conduits are acceptable.
 3. Seismic Areas: In seismic areas, provide conduits rigidly secured to the building structure on opposite sides of a building expansion joint with junction boxes on both sides of the joint. Connect conduits to junction boxes with 375 mm (15 inches) of slack flexible conduit. Flexible conduit shall have a copper green ground bonding jumper installed.
 4. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 5. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
 6. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
 7. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.
- L. Horizontally separate boxes mounted on opposite sides of a wall so they are not in the same vertical channel.

END OF SECTION

SECTION 27 05 44

SLEEVES AND SLOTS, AND SEALS FOR COMMUNICATIONS PATHWAYS AND CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes sleeves and seals for penetrations through floors and walls
- B. Section Includes:
 - 1. Slots and Sleeves for pathway and cable penetration of non-fire-rated construction walls and floors
 - 2. Slots and Sleeve-seal systems
 - 3. Sleeve and Slot-seal fittings
 - 4. Grout
 - 5. Silicone sealants
 - 6. Firestopping

1.2 RELATED DOCUMENTS

- A. 27 05 00 Common Work Results for Communications

1.3 REFERENCE STANDARDS

- A. ASTM D1785 - 12 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
- B. ASTM A53 / A53M – 12 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- C. ASTM C1107 / C1107M – 11 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
- D. Provide UL listed firestop assemblies for penetrations through rated walls, floors and partitions to restore original rating approved for use by the Authority having Jurisdiction.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Provide conduit waterfall as strain relief for cables entering and exiting sleeves/conduits as required.

B. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

C. Position sleeves adjacent to a vertical wall. Sleeves must not obstruct wall-terminating space. That is they should not be located directly above or below wall space that is used for termination fields below

D. Floor Sleeves:

1. Extend a minimum of 1" above the floor level

2.2 **SLOTS**

A. Position slots adjacent to a vertical wall. Slots must not obstruct wall-terminating space. That is they should not be located directly above or below wall space that is used for termination fields.

B. Provide a minimum of 1" high curb

C. The minimum slot size is 6" by 10". The location and configuration of the slot(s) shall be approved by Contracting Officer Representative (COR).

2.3 **SLEEVE, SLOT-SEAL SYSTEMS**

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.

1. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.4 **SILICONE SEALANTS**

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
 - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
 - a. Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
 - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
 - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 3. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pathway or cable unless sleeve seal is to be installed.
 - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
 - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 3 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
 - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
 - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position water stop flange to be centered in concrete slab or wall.
- C. Using grout, seal the space around outside of sleeve-seal fittings.

3.4 FIRESTOPPING

- A. Provide UL listed firestop assemblies for all penetrations, used and unused, through rated walls, floors and partitions to restore original rating approved for use by the Authority having Jurisdiction.

END OF SECTION

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section involves telecommunications mounting equipment, and grounding.
- B. Section Includes:
 - 1. Related documents
 - 2. Backboards
 - 3. Equipment frames, racks and cabinets
 - 4. Patch panels and cable management
 - 5. Communications spaces

1.2 RELATED DOCUMENTS

- A. Section 27 05 00 Common Work Results For Communications

PART 2 - PRODUCTS

2.1 BACKBOARDS

- A. Backboards: Provide fire-retardant treated plywood (FRTP), $\frac{3}{4}$ " inches x 48 inches x 96 inches (19 x 1220 x 2440 mm), installed vertically and located on all wall surfaces in Communications closets.
- B. Paint all six sides with two coats of a bright (neutral) colored, fire resistant paint. Do not paint over manufacturer's label.

2.2 EQUIPMENT FRAMES, RACKS AND CABINETS

- A. General Requirements:
 - 1. Finish: Manufacturer's baked-polyester powder coat, black.
 - 2. Blanks are to be installed in any patch panel, faceplate, or fiber enclosure as required.

Distribution Frames: Provide blocks for the number of cables terminated on the block, plus 25 percent spare.
- B. Wall-Mounted Cabinets:

1. EIA compliant 19" pivoting equipment rack shall be Middle Atlantic Products model # SR-40-22 and shall have 40 useable rackspaces and a useable depth of 22 inches. Overall dimensions of rack shall be 90.75" H x 23.56" W x 32" D. SR shall have a 500-lb. weight capacity. Tool-free Quick-Mount™ system shall simplify installation. Rack shall be constructed of the following materials: top and base shall be 14-gauge steel, center section and backpan shall be 16-gauge steel and all structural elements shall be finished in a durable black powder coat. Adjustable rackrail shall be 11-gauge steel with tapped 10-32 holes in universal EIA spacing, finished in a durable black e-coat with marked rackspaces. Rack shall have 2", 3" and 4" electrical knockouts; removable plates for low-voltage Decora® devices in face of center section, top and bottom; additional Decora® cutouts in rear of center section and BNC knockouts for UHF/VHF antennas. Large laser knockout on backpan shall have a 12-1/2" x 12-1/2" opening for electrical pull-box. Fan knockouts on top and bottom shall allow installation of up to four 4-1/2" fans. Rack shall include 2", 3" and 4" knockouts for Wiremold® 4000 Series raceways and knockouts for Middle Atlantic Products Universal Connector Panels. Bottom shall have a cable entry platform with removable 4 rackspace front access cover and conceal conduit stubs.

SR Series enclosures shall satisfy the 2007, 2010, and 2013 CBC; 2006, 2009 & 2012 IBC; ASCE 7-05 (2005 Edition) & ASCE 7-10 (2010 Edition) and the 2006 & 2009 editions of NFPA 5000 for use in areas of high seismicity, Seismic Use Group III, Zone 4 or Seismic Design Category (SDC) "D" with lateral force requirements for protecting 277 lbs. of essential equipment in locations with the highest level of seismicity and top floor or rooftop installations with an Importance factor (Ip) of 1.5 when used with DWRSR-ZL Latch. Rack shall be UL Listed in the US and Canada to the UL-2416 (NWIN) Category when used with optional bonding kit, model # PET-K-___. SR Series shall be GREENGUARD Gold Certified. SR Series shall be RoHS EU directive 2011/65/EU compliant. SR shall be manufactured by an ISO 9001 and ISO 14001 registered company. Rack shall be warranted to be free from defects in material or workmanship under normal use and conditions for the lifetime of the rack.

2. Options:
 - a. Front doors shall be reinforced 16-gauge steel, model # PFD-40 (plexi),
 - b. Premium Series UPS Rackmount Power, 8 Outlet, 2150VA/1650W, Hardwired, Model: UPS-2200R-HH
 - c. Kit for mounting UPS in base of SR shall be SR-UPS-BKT
 - d. Rear rail kit shall be model # DWR-RR40 (40 space), 11-gauge, 10-32 threaded, sold in pairs, hardware included
 - e. Sub-plate mounting kit shall be model # SR-SUB. SR-SUB shall mount up to (4) 89-D type brackets, (4) 1900 boxes or (1) Racor 3 gang box. SR Series pivoting racks can mount up to 4 SR-SUB sub-plate mounting kits (2 for 24 space models)
 - f. Minimum-clearance latch shall allow side-by-side or corner mounting, shall be model # DWRSR-ZL
 - g. Gland grommet for 4" electrical knockouts at top of SR shall be model # GK-4G. 4 pieces

- h. Bonding kit for UL-2416 (NWIN) compliance shall be Middle Atlantic Products PET-K-SR (for backpan to center section), PET-K-FD (for front door to center section)
- i. Fan Kit, DWR/SR 22"D, Model: DWR-FK22
- j. Vent Blocker Kit, DWR/SR 22" Deep, Model: VBK-SD22
- k. Lace Strip, 40 RU, 3.25"W, w/Tie Posts, 6 pc.
- l. Dual LED Work Light with Interconnect Cable, Model
- m. Slim Power Strip, 24 Outlet, 20 Model: APD-2420SC-NS

2.3 PATCH PANELS AND CABLE MANAGEMENT

- 1. Metal, with integral wire retaining fingers.
- 2. Baked-polyester powder coat finish, black.
- 3. Vertical cable management panels shall have front and rear channel, with covers.
- 4. Category 6 modular patch panels
- 5. Cabinet mounted fiber termination housings
- 6. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- 7. Cable supports/Ladder Rack
- 8. Rack mounted shelves

PART 3 - EXECUTION

3.1 COMMUNICATIONS SPACES

- A. Coordinate layout and installation of communications equipment with Contracting Officer Representative and service providers.
- B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

END OF SECTION

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section involves pathways, cables, connecting hardware, and cable identification
- B. Section Includes:
 - 1. Related documents
 - 2. Description
 - 3. UTP cable and hardware
 - 4. Fiber optic cable and hardware
 - 5. Installation of cables

1.2 RELATED DOCUMENTS

- A. Section 27 05 00 Common Work Results for Communications

1.3 DESCRIPTION

- A. Backbone cabling system provides interconnections between telecommunications rooms, data center, and the entrance facility spaces.
- B. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection between telecommunications rooms, data center and the entrance facility spaces.

PART 2 - PRODUCTS

2.1 UTP CABLE AND HARDWARE

- A. 4 pair, 100-ohm, Category 6 UTP (23 AWG) Cable as required for fully functional system.
- B. Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
 - 1. Number of Jacks per Field: One for each four-pair UTP cable indicated.

- D. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- E. Patch Cords: Factory-made, 4-pair cables in 48-inch lengths; terminated with 8-position modular plug (8P8C) at each end.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 (23 AWG) performance. Patch cords shall have latch guards to protect against snagging.
 - 2. Patch cords shall have color-coded boots for circuit identification.

2.2 OPTICAL FIBER CABLE AND HARDWARE

- A. Provide Multimode, 50/125 –micron, OM3, 12-fiber, tight buffer, optical fiber cable.
 - 1. Maximum Attenuation: 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - 2. Minimum Modal Bandwidth: 4700 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
 - 3. Jacket Color: Aqua.
- B. Provide Singlemode, 12-fiber, tight buffer, optical fiber Cable
 - 1. Maximum Attenuation: .35 dB/km at 1310 nm; .25 dB/km at 1550 nm.
 - 2. Jacket Color: Yellow.
- C. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
 - 1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- D. Cable Connecting Hardware:
 - 1. Quick-connect, duplex, Type LC connectors. Insertion loss not more than 0.75 dB.

PART 3 - EXECUTION

3.1 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
 - 2. Install cables in conduit except within consoles, cabinets, desks, and counters.

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3. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
4. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.
5. Terminate all conductors. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced.
7. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot-long service loop on each end of cable.

C. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 6 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.

6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.2 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.
 1. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- C. Cable and Wire Identification:
 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware.

3.3 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. Visually inspect UTP and optical fiber jacket materials for nationally recognized testing lab (NRTL) certification markings.
 2. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-C.1.
 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 4. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with

measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

5. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and multimode backbone link measurements: Test at 850 and 1300 nm in 1 direction. Use TIA/EIA-526-14-A, Method B, One Reference Jumper.
 - 2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
 - 3) TIA-526-7 (OFSTP-7)-2002+A1:2008, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant.

END OF SECTION

SECTION 27 15 00

COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section involves Cables, MUTOAs, connecting hardware, and identification and administration systems.
- B. Section Includes:
 - 1. Related documents
 - 2. Description
 - 3. Performance requirements
 - 4. UTP cable and hardware
 - 5. Coax cable and hardware
 - 6. Cabling system identification

1.2 RELATED DOCUMENTS

- A. Section 27 05 00 Common Work Results For Communications

1.3 DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called the "permanent link".
- B. The maximum allowable "horizontal link" cable length is 295 feet. This allows for an extra 33 feet for the entire channel length of 328 feet. The 33 feet provides for the maximum length of 16 feet to the workstation equipment, 7 feet or in the horizontal cross-connect, and 10 feet for a service loop in the telecommunications room.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-C.1 when tested per test procedures of this standard.

- C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- D. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - 1. Communications, General Purpose: Type CM or CMG.
 - 2. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
 - 3. Communications, Riser Rated: Type CMR, complying with UL 1666.
 - 4. Communications, Limited Purpose: Type CMX.
 - 5. Multipurpose: Type MP or MPG.
 - 6. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - 7. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Provide cable, patch cords and hardware solutions matched and coordinated by the manufacturers. Cables shall be terminated and patched with connecting hardware of same category or higher.
- G. Provide cables with imprinted cable type, length, category and/or strand count.
- H. Provide cable and hardware for the number of cables terminated on the block or housing, plus 25 percent spare. Integral with connector bodies, including plugs and jacks.

2.2 UTP CABLE AND HARDWARE

- A. Provide CAT6 100-ohm, four-pair UTP cable.
 - 1. Color at Contracting Officer Representative discretion.
- B. Connecting Hardware:
 - 1. Terminate T568B
 - 2. Provide modular connecting blocks and patch panels with 110-style IDC punch-down caps or crimp tools.
 - 3. Patch panels to have clear window displays covering outlet labels.
 - 4. Jacks and Jack Assemblies: 100-ohm, balanced, modular, color-coded, four-pair, eight-position units with integral IDC-type terminals.
 - 5. Workstation Outlets:
 - a. Four port-connector assemblies mounted in single-gang faceplate.
 - b. High impact plastic with clear label lens.
 - c. Color at Contracting Officer Representative discretion.
 - d. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.

- e. Flush mounting jacks, positioning the cord at a 45-degree angle.
- f. Black blanks are to be installed in any patch panel, faceplate, or fiber enclosure as required.

C. Patch Cords:

- 1. Terminate T568B
- 2. Factory-made, four-pair cables terminated with eight-position modular plug at each end.
- 3. Patch cords shall have bend-relief-compliant boots and latch guards to protect against snagging.
- 4. Inventory and color at Contracting Officer Representative discretion.

2.3 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP cables on reels according to TIA/EIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

2.4 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP cables on reels according to TIA/EIA-568-C.2.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF CABLES

- A. Coordinate layout and installation of telecommunications cabling with Contracting Officer Representative telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.
- C. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
- D. Bridged taps and splices shall not be installed in the horizontal cabling.

- E. Splitters shall not be installed as part of the optical fiber cabling.
- F. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters. Conceal pathways and cables except in unfinished spaces.
- G. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- H. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter.
 - 1. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
- I. Comply with NECA 1.
- J. Comply with TIA/EIA-568-C.1.
- K. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
- L. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
 - a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - b. Locate consolidation points for UTP at least 49 feet from communications equipment room.
- M. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- N. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- O. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
- P. In the communications equipment room, install a 10-foot- long service loop on each end of cable.
- Q. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - 2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- R. Group connecting hardware for cables into separate logical fields.
- S. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 6 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.2 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 1. Comply with TIA/EIA-568-C.1.
 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 3. Terminate conductors: no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 8. Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
 9. Unless otherwise noted, install a 10-foot- long service loop on each end of cable.
 10. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-C.0.
 2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.
- D. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- E. Group connecting hardware for cables into separate logical fields.
- F. Separation from EMI Sources:
1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 6 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.3 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.
 1. Administration Class: 2.
 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
 3. Legend: Machine printed, in the field, using adhesive-tape label for plastic faceplates.
 - a. Data: D001, D002, etc.
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- C. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Contracting Officer Representative.
- E. Cable and Wire Identification:
 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting

- hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
3. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
1. Visually inspect UTP cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-C.0.
 2. Visually confirm Category 6 marking of outlets, cover plates, outlet/connectors, and patch panels.
 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 4. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 5. UTP Performance Tests:
 - a. Test each outlet according to TIA/EIA-568-C.2
 - b. Wire map
 - c. Length (physical vs. electrical, and length requirements)
 - d. Insertion loss
 - e. Near-end crosstalk (NEXT) loss
 - f. Power sum near-end crosstalk (PSNEXT) loss
 - g. Equal-level far-end crosstalk (ELFEXT)
 - h. Power sum equal-level far-end crosstalk (PSELFEXT)
 - i. Return loss
 - j. Propagation delay
 - k. Delay skew
 6. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.

- B. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- C. End-to-end cabling will be considered defective if it does not pass tests and inspections.
 - 1. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Train Contracting Officer Representative maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets. Include training in cabling administration software.

END OF SECTION

SECTION 28 05 00.01

COMMON WORK RESULTS FOR ELECTRONIC SECURITY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section provides overarching coordination with various Electronic Security Systems sections, including Physical Access Control System, Video Assessment Surveillance System, Electronic Personal Protection Systems, PLC Electronic Detention Monitoring and Control Systems, Security Intercommunication Systems, Public Address Systems, and Contraband Screening and Detection Systems.

1.2 DESCRIPTION OF WORK

- A. The electronic security system (ESS) or security management system (consisting of all 28 series security sub-systems) shall be provided and installed in accordance with the drawings, specifications, and referenced publications.
- B. The Contractor shall perform all work, provide products, systems integration, engineering, and design work required for the project in order to ensure complete and fully operational systems and proper installation of equipment. The Contractor shall provide calculations and analysis to support design and engineering decisions as specified in submittals. The Contractor shall provide and pay all labor, materials, and equipment, sales and gross receipts and other taxes. The Contractor shall secure and pay for plan check fees, permits, other fees, and licenses necessary for the execution of work as applicable for the project. Give required notices; the Contractor will comply with codes, ordinances, regulations, and other legal requirements of public authorities, which bear on the performance of work.
- C. The Contractor shall provide an ESS, installed, programmed, configured, documented, and tested. The security system shall include but not limited to: access control, intrusion detection, duress alarms, elevator control interface, video management, video recording and storage, delayed egress, PLC electronic interlock controls and monitoring, intercommunication system, fire alarm interface, equipment cabinetry and racks, dedicated photo badging system and associated live camera, and uninterruptible power supplies (UPS) interface. Operator training shall be required as part of the Security Contractors scope. The Security Contractor shall still be required to provide necessary maintenance and troubleshooting manuals as well as submittals as identified herein. The work shall include the procurement and installation of electrical wire and cables, the installation and testing of all system components. Inspection, testing, demonstration, and acceptance of equipment, software, materials, installation, documentation, and workmanship, shall be as specified herein. The Contractor shall provide all associated installation support, including the provision of primary electrical input power circuits. All access control system will be compliant with Homeland Security Presidential Directive 12 (HSPD-12) and conform to the latest requirements from the NIST, Federal Information Processing Standard (FIPS) Publication 201-2,

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Personal Identity Verification (PIV) of Federal Employees and Contractors. Access Control products will be on the Approved Products List located on GSA's managed IDManagement.gov listing.

- D. Repair Service Replacement Parts On-site service during the warranty period shall be provided as specified under "Emergency Service". The Contractor shall guarantee all parts and labor for a term of one (1) year, unless dictated otherwise in this specification from the acceptance date of the system as described in Part 5 of this Specification. The Contractor shall be responsible for all equipment, software, shipping, transportation charges, and expenses associated with the service of the system for one (1) year. The Contractor shall provide 24-hour telephone support for the software program at no additional charge to the owner. Software support shall include all software updates that occur during the warranty period.
- E. Where specific manufacturers are identified, approved equals will be considered.

1.3 **RELATED DOCUMENTS**

- A. All contract documents apply to this Section. Requirements of Part 5, Acceptance Testing shall take precedence over Division 01 System Acceptance requirements.
- B. Safety Systems: This Division shall apply to Common Work Results for "Electronic Security" only. When applicable, Common Work Results for "Safety" shall precede this division.
- C. Security Management System: This Division 28 Electronic Safety and Security) shall be used as a base document for electronic security systems. The following sections shall be used in conjunction to provide a complete and fully integrated security management system.
 - 1. 28 23 00 – Video Surveillance System
- D. Related Sections include the following:
 - 1. Division 27, sections listed below:
 - a. 27 05 00 – Common Work Results for Communications
 - b. 27 05 26 – Grounding and Bonding for Communications Systems
 - c. 27 05 28 – Pathways for Communications Systems
 - d. 27 05 44 – Sleeves and Sleeve Seals For Communications
 - e. 27 11 00 – Communications Equipment Room Fittings
 - f. 27 13 00 – Communications Backbone Cabling
 - g. 27 15 00 – Communications Horizontal Cabling

1.4 **RELATED DIVISION PROVISIONS**

- A. Division 1 Provisions: Comply with all applicable requirements including bonding, submittals, testing, and site safety.

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- B. Division 8 Provisions: The division 8 Contractor at locations shown on the drawings shall provide all door hardware as shown in the door schedule. Door schedule shall detail all necessary components to interface with the security management system. The Security Contractor shall provide all connections between power supplies and the locking equipment.
- C. Division 26 Provisions:
1. Dedicated Emergency Electrical Power (120 VAC) circuits shall be provided by the contractor as required to provide full system functionality. All data transmission and communications devices shall be on uninterrupted power supplies that provide continuous power for a minimum of (8) eight hours. The Contractor shall provide, terminate, and test all system connections.
 2. Contractor shall provide cable trays required by the security systems. Cable trays shall to prevent water from contaminating the cables in the event of water leaking in the space (no ground level conduits should be used). Security conduits shall be labeled with blue marking band or blue paint every 9000mm. Security junction box covers shall be painted with paint manufactured by Benjamin Moore #791, Duron 5085A (Americana) or approved equal.
 3. Contractor shall provide the uninterruptible power supplies (UPS) required for the security equipment at the Security Monitoring Console and the Equipment Room in the event of primary power loss. The UPS units shall support the listed security equipment as described in the Equipment Section of this specification.

1.5 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic design only. We intend all publications to be the most current editions but where otherwise noted.
1. American National Standards Institute (ANSI)
 - a. ANSI C2 (1990; TIA 90-2; Errata); National Electrical Safety Code
 - b. ANSI C39.1 (1981; R 1992); Requirements for Electrical Analog Indicating Instruments
 - c. ANSI C42.100 (2000); Standard Dictionary of Electrical and Electronics Terms
 - d. ANSI INCITS 154 (1988; R 1999); Office Machines and Supplies - Alphanumeric Machines-KeyBoard Arrangement
 - e. ANSI INCITS 92 (1980; R 2003); Data Encryption Algorithm
 - f. ANSI X3.154 (1988); office machine and supply alphanumeric machine keyboard arrangement.
 - g. ANSI X3.64 (1990); Additional Controls for Use by American National Standard Code for ANSI C2(1993); National Electrical Safety Code Information Exchange
 - h. ANSI X3.92 (1988); Data Encryption Standard
 - i. Alphanumeric Machines/Keyboard Arrangement
 - j. ANSI X9.52 (1998); Triple Data Encryption Algorithm Modes of Operation
 - k. ANSI/TIA/EIA-568-A Commercial Building Telecommunications Cabling Standard (October 1995 or newer).

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- l. ANSI/TIA/EIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces (October 1990 or newer).
 - m. ANSI/EIA/TIA-570 Residential and Light Commercial Telecommunications Wiring Standard (June 1991 or newer).
 - n. ANSI/TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings (February 1993 or newer).
 - o. ANSI-J-STD-607-A (2002); Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
 - p. ANSI/TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications (August 1994 or newer).
- 2. ASTM International (ASTM)
 - a. ASTM A 123/A 123M (2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - b. ASTM B 3 (2001) Standard Specification for Soft or Annealed Copper Wire
 - c. ASTM B 32 (2004) Solder Metal
 - d. ASTM C 1107 (2007) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - e. ASTM D 709 (2001) Laminated Thermosetting Materials
 - f. ASTM E 84 (2007) Standard Test Method for Surface Burning Characteristics of Building Materials
- 3. Consumer Electronics Association (CEA)
 - a. CEA 170 (1957); Electrical Performance Standards - Monochrome Television Studio Facilities
 - b. CEA-310-E (2005); Racks, Panels, and Associated Equipment
 - c. CEA-330 (2004); Electrical Performance Standards for Closed Circuit Television Camera 525/60
 - d. CEA-375-A (2004); Direct View Monochrome Closed Circuit Television Monitors 525/60 Interlaced 2:1
- 4. Electronic Industries Association (EIA)
 - a. EIA 170 (1957); Electrical Performance Standards
 - b. EIA 232-E (1991); Interface Between Data Terminal Equipment and Data Circuit - Terminating Equipment Employing Serial Binary data Exchange
 - c. EIA 310-C (1982); Racks, Panels and Associated Equipment
 - d. EIA 330 (1968); Electrical Performance Standards for Closed Circuit Television Camera 525/60 Interlaced 2:1
 - e. EIA 375-A (1974) Electrical Performance Standards – direct view CCTV Monitors
 - f. EIA 445 (1980); Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices
 - g. EIA/TIA-455-3A FOTP-3 Procedure to Measure Temperature Cycling Effects on Optical Fibers, Optical Cable, and Other Passive Fiber Optic Components

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- h. EIA/TIA-455-B Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components
5. Institute of Electrical and Electronics Engineers (IEEE)
- a. IEEE Std 81 (1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
 - b. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms
 - c. IEEE Std 142 (1991; Err 2006) Recommended Practice for Grounding of Industrial and Commercial Power Systems - IEEE Green Book (Color Book Series)
 - d. IEEE Std. 503 (1978) Measurement and Characterization of Diode-Type Cameras.
 - e. IEEE C2 (2005) National Electrical Safety Code
 - f. IEEE C62.41 (1991; R 1995) Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits
6. International Organization for Standardization (ISO)
- a. ISO 7810 (2003) Identification Cards – Physical Characteristics
 - b. ISO 7811-1 (2002) Identification Cards – Recording Technique - Part 1: Embossing
7. International Telecommunications Union (ITU)
- a. ITU V.34 (1998) Data Communication Over the Telephone Network: A Modem Operating at Data Signaling Rates of up to 33,600 bits for use on the General Switched Telephone Network and on Leased Point-to-Point Two-Wire Telephone Type Circuits
 - b. ITU V.42 (CORR 1 2003) Data Communications Over the Telephone Network: Error-Correcting Procedures for DCEs Using Asynchronous-to-Synchronous Conversion
 - c. ITU V.42 bis (1990) Data Communication over the Telephone Network: Data Compression Procedures for Data Circuit Terminating Equipment (DCE) Using Error Correction Procedures
 - d. ITU V.92 (AMD 2001, AMD 2002 and CORR 2003) Enhancements to Recommendation V.90 Series: V, with Amendments 1 and 2
8. National Electrical Manufacturers Association (NEMA)
- a. NEMA 250 (2003) Enclosures for Electrical Equipment (1000 Volts Maximum)
 - b. NEMA ICS 1 (2000; R 2005) Industrial Control and Systems: General Requirements
 - c. NEMA ICS 2 (2000; Errata 2002; R 2005; Errata 2006) Standard for Industrial Control and Systems: Controllers, Contractors, and Overload Relays Rated Not More than 2000 Volts AC or 750 Volts DC: Part 8 - Disconnect Devices for Use in Industrial Control Equipment
 - d. NEMA ICS 6 (1993; R 2006) Industrial Control and Systems: Enclosures

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9. National Fire Protection Association (NFPA)
 - a. NFPA 70 (2005; TIA 2005); National Electrical Code
 - b. NFPA 72 (2007);– National Fire Alarm Code.
 - c. NFPA 101 Chapter 5 (1999); Life Safety Code
 - d. NFPA 262 (2007); Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
 - e. NFPA 730 (2006 or Newer); Guide for Premises Security
 - f. NFPA 731 (2006 or Newer); Standard for the Installation of Electronic Premises Security Systems
10. Security Industry Association
 - a. SIA BIO-01(2000 or Newer); Biometric Standard, Vocabulary for Testing
 - b. SIA CP-01 (2000 or Newer); Control Panel Standard
 - c. SIA DC-01 (1988 or Newer); Digital Communications Technical Report - Receiver-to- Computer Interface Protocol
 - d. SIA DC-03 (1990 or Newer); Digital Communications Standard - "SIA Format" Protocol - for Alarm System Communications
 - e. SIA DC-07 (2001); SIA Digital Communications Standard - Receiver-to-Computer Interface Protocol (Type 2) - for Central Station Equipment Communications
11. Society of Motion Picture and Television Engineers (SMPTE)
 - a. SMPTE 170M (2004) Television - Composite Analog Video Signal - NTSC for Studio Applications
12. Telecommunication Industry Association (TIA)
 - a. TIA-232-F (1997; R 2002); Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange
 - b. ANSI/TIA/EIA 492AAAA-A (2002); Detail Specification for 62.5µm Core Diameter / 125µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers.
 - c. ANSI/TIA/EIA-526-14-A – Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant OFSTP-14A
 - d. ANSI/TIA/EIA-568-B.1 (2001 Addendums 2001, 2003, 2003, 2003, 2004, 2007) Commercial Building Telecommunications Cabling Standard – Part 1: General Requirements
 - e. ANSI/TIA/EIA-568-B.2 (2002); Commercial Building Telecommunications Cabling Standard. Part 2: Balanced Twisted-Pair Cabling Components
 - f. ANSI/TIA/EIA-568-B.3 (2002); Commercial Building Telecommunications Cabling Standard. Part 3: Optical Fiber Cabling Components Standard
 - g. ANSI/TIA/EIA-569-B (2004); Commercial Building Standard for Telecommunications Pathways and Spaces
 - h. ANSI/TIA/EIA-598-B (2001); Optical Fiber Cable Color Coding
 - i. ANSI/TIA/EIA-604-2 (2002); Fiber Optic Connector Intermateability ST-Style Connectors

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- j. ANSI/TIA/EIA-604-3-A (2002); Fiber Optic Connector Intermateability SC-Style Connectors
 - k. ANSI/TIA/EIA-604-12(2002); FOCIS 3A Fiber Optic Connector Intermateability Standard
 - l. ANSI/TIA/EIA-606-A (2002); Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
 - m. ANSI/TIA/EIA TSB-67 (1995 or Newer); Transmission Performance Specifications for Field Testing of Unshielded Twisted- Pair (UTP) Cabling Systems - Draft
 - n. ANSI/T1A/E1A TSB-72 (1995 or Newer); Centralized Optical Fiber Cabling Guidelines - Draft.
13. Code of Federal Regulations
- a. 21 CFR 1020 (2006); Performance Standards for Ionizing Radiation Emitting Products
 - b. 14 CFR 108.17 & 129.26 (2006);U.S. Federal Aviation Standards
 - c. 29 CFR 1910.7 (2004); Definition and requirements for a nationally recognized testing
 - d. 47 CFR 15 (2007); Radio Frequency Devices
 - e. 47 CFR 68 (2006); Connection of Terminal Equipment to the Telephone Network
14. Underwriters Laboratories (UL) - The Contractor shall provide evidence of system compliance and shall clearly indicate any specific departures from the UL Listed configuration for the system provided.
- a. UL 6 (2004); Rigid Metal Conduit
 - b. UL 50 (1995); Electrical Cabinets and Boxes
 - c. UL 83 (2003); Thermoplastic-Insulated Wires and Cables
 - d. UL 294 (1999; Rev thru Aug 2005) Access Control System Units
 - e. UL 444 (2002); Communications Cables
 - f. UL 464 (2003; Rev thru Oct 2003) Audible Signal Appliances
 - g. UL 467 (2004); Standard for Grounding and Bonding Equipment
 - h. UL 497B (2004); Protectors for Data Communication and Fire Alarm Circuits
 - i. UL 609 (1996; Rev thru Mar 2005) Local Burglar Alarm Units and Systems
 - j. UL 634 (2000); Connectors and Switches for Use with Burglar-Alarm Systems
 - k. UL 636 (1996; Rev thru Mar 2001) Holdup Alarm Units and Systems
 - l. UL 639 (1997; Rev thru Sep 2002) Intrusion Detection Units
 - m. UL 681 (1999; Rev thru Jan 2001) Installation and Classification of Burglar and Holdup Alarm Systems
 - n. UL 796 (2006); Printed-Wiring Boards
 - o. UL 797 (2004); Electrical Metallic Tubing -- Steel
 - p. UL 827 (1996; Rev thru Apr 1999) Central Station Alarm Services
 - q. UL 910 (1998); UL 910 UL Standard for Safety Test for Flame-Propagation and Smoke-Density Values for Electrical and Optical-Fiber Cables Used in Spaces Transporting Environmental Air
 - r. UL 969 (1995); Standard for Marking and Labeling Systems
 - s. UL 972 (2006);Burglary Resisting Glazing Material

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- t. UL 1037 (1999; Rev thru Nov 2004); Standard for Safety Antitheft Alarms and Devices
 - u. UL 1076 (1995; Rev thru Mar 2005); Standard for Safety Proprietary Burglar Alarm Units and Systems
 - v. UL 1410 (1991); Television Receivers and High Voltage Video Products
 - w. UL 1424 (2005); Standard for Cables for Power-Limited Fire-Alarm Circuits
 - x. UL 1492 (1996; R May 2004); Safety Audio-Video Products and Accessories
 - y. UL 1581 (2001); Reference Standard for Electrical Wires, Cables, and Flexible Cords
 - z. UL 1610 (1998; Rev thru Aug 2005); Central-Station Burglar-Alarm Units
 - aa. UL 1635 (1996; Rev thru Aug 2005); Digital Alarm Communicator System Units
 - bb. UL 1638 (2001; Rev thru Nov 2003); Visual Signaling Appliances - Private Mode Emergency and General Utility Signaling
 - cc. UL 1655 (1997); Standard for Community-Antenna Television Cables
 - dd. UL 1660 (2004); Liquid-Tight Flexible Nonmetallic Conduit
 - ee. UL 1666 (2007); Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
 - ff. UL 1981 (1994; Rev. 1999); Central Station Automation Systems
 - gg. UL 2050 (2003; 4th Edition); National Industrial Security Systems
 - hh. UL 2196 (2007); Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
15. Federal Communication Commission (FCC)
- a. FCC Part 15 (July 1986) rules and regulations; Radio Frequency Devices.
16. Federal Specifications (FS)
- a. WC-586 (Revised) conduit outlet boxes, bodies, and entrance caps electrical; cast metal.
17. Federal Information Processing Standards (FIPS)
- a. FIPS 201-2 (2013) Personal Identity Verification (PIV) of Federal Employees and Contractors

1.6 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International
- C. Controller: An intelligent peripheral control unit that uses a computer for controlling its operation. Where this term is presented with an initial capital letter, this definition applies.

- D. CPU: Central processing unit.
- E. Credential: Data assigned to an entity and used to identify that entity.
- F. DGP: Data Gathering Panel
- G. EMI: Electromagnetic interference.
- H. EMT: Electric Metallic Tubing
- I. ESS: Electronic Security System
- J. File Server: A PC in a network that stores the programs and data files shared by users.
- K. GFI: Ground fault interrupter.
- L. Identifier: A credential card, keypad personal identification number or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
- M. I/O: Input/Output.
- N. Intrusion Zone: A space or area for which an intrusion must be detected and uniquely identified, the sensor or group of sensors assigned to perform the detection, and any interface equipment between sensors and communication link to central-station control unit.
- O. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- P. LAN: Local area network.
- Q. LCD: Liquid-crystal display.
- R. LED: Light-emitting diode.
- S. Location: A Location on the network having a PC-to-Controller communications link, with additional Controllers at the Location connected to the PC-to-Controller link with RS-485 communications loop. Where this term is presented with an initial capital letter, this definition applies.
- T. LOD: Level of Detail
- U. LOE: Level of Effort
- V. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
- W. M-JPEG: Motion – Joint Photographic Experts Group.

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- X. MPEG: Moving picture experts group.
- Y. NEC: National Electric Code
- Z. NEMA: National Electrical Manufacturers Association
- AA. NFPA: National Fire Protection Association
- BB. NTSC: National Television System Committee.
- CC. NRTL: Nationally Recognized Testing Laboratory.
- DD. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- EE. PC: Personal computer. This acronym applies to the Central Station, workstations, and file servers.
- FF. PDF: (Portable Document Format.) The file format used by the Acrobat document exchange system software from Adobe.
- GG. PIR: Passive infrared.
- HH. RCDD: Registered Communications Distribution Designer.
- II. RF: Radio frequency.
- JJ. RFI: Radio-frequency interference.
- KK. RIGID: Rigid conduit is galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded.
- LL. Solid-Bottom or Non-ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.
- MM. SMS: Security Management System – A SMS is a software that incorporates multiple security subsystems (e.g., access control, intrusion detection, closed circuit television, intercom) into a single platform and graphical user interface.
- NN. Standard Intruder: A person who weighs 45 kg (100 lb.) or less and whose height is 1525 mm (60 in) or less; dressed in a long-sleeved shirt, slacks, and shoes.
- OO. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.
- PP. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
- QQ. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

- RR. UPS: Uninterruptible Power Supply
- SS. UTP: Unshielded Twisted Pair
- TT. VPN: Virtual Private Network
- UU. VM: Virtual machine (VM) is an emulation of a particular computer system. Virtual machines operate based on the computer architecture and functions of a real or hypothetical computer, and their implementations may involve specialized hardware, software, or a combination of both.
- VV. WAN: Wide Area Network.
- WW. WAV: The digital audio format used in Microsoft Windows.
- XX. Windows: Operating system by Microsoft Corporation.
- YY. Workstation: A PC with software that is configured for specific limited security system functions.

1.7 GENERAL ARRANGEMENT OF CONTRACT DOCUMENTS

- A. The Contract Documents supplement to this specification indicates approximate locations of equipment. The installation and/or locations of the equipment and devices shall be governed by the intent of the design; specification and Contract Documents, with due regard to actual site conditions, recommendations, ambient factors affecting the equipment and operations in the vicinity. The Contract Documents are diagrammatic and do not reveal all offsets, bends, elbows, components, materials, and other specific elements that may be required for proper installation. If any departure from the contract documents is deemed necessary, or in the event of conflicts, the Contractor shall submit details of such departures or conflicts in writing to the owner or owner's representative for his or her comment and/or approval before initiating work.
- B. Anything called for by one of the Contract Documents and not called for by the others shall be of like effect as if required or called by all, except if a provision clearly designed to negate or alter a provision contained in one or more of the other Contract Documents shall have the intended effect. In the event of conflicts among the Contract Documents, the Contract Documents shall take precedence in the following order: the Form of Agreement; the Supplemental General Conditions; the Special Conditions; the Specifications with attachments; and the drawings.

1.8 SUBMITTALS

- A. General: Submittals shall be in full compliance of the Contract Documents. All submittals shall be provided in accordance with this section. Submittals lacking the breath or depth these requirements will be considered incomplete and rejected. Submissions are considered multidisciplinary and shall require coordination with applicable divisions to provide a complete and comprehensive submission package. Additional general provisions are as follows:

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1. The Contractor shall schedule submittals in order to maintain the project schedule. For coordination drawings refer to Specification Section 01331 - Design Submittal Procedures, which outline basic submittal requirements and coordination. Section 01331 shall be used in conjunction with this section.
2. The Contractor shall identify variations from requirements of Contract Documents and state product and system limitations, which may be detrimental to successful performance of the completed work or system.
3. Each package shall be submitted at one (1) time for each review and include components from applicable disciplines (e.g., electrical work, architectural finishes, door hardware, etc.) which are required to produce an accurate and detailed depiction of the project.
4. Manufacturer's information used for submittal shall have pages with items for approval tagged, items on pages shall be identified, and capacities and performance parameters for review shall be clearly marked through use of an arrow or highlighting. Provide space for Owner and Contractor review stamps.
5. Technical Data Drawings shall be in the latest version of AutoCAD®, drawn accurately, and in accordance with owners CAD Standards. **FREEHAND SKETCHES OR COPIED VERSIONS OF THE CONSTRUCTION DOCUMENTS WILL NOT BE ACCEPTED.** The Contractor shall not reproduce Contract Documents or copy standard information as the basis of the Technical Data Drawings. If departures from the technical data drawings are subsequently deemed necessary by the Contractor, details of such departures and the reasons thereof shall be submitted in writing to the Owner for approval before the initiation of work.
6. Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
 - a. Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, sized to receive 8.5 x 11 in paper, and appropriate capacity to accommodate the contents. Provide a clear plastic sleeve on the spine to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
 - 1) Where two (2) or more binders are necessary to accommodate data; correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-referencing other binders where necessary to provide essential information for communication of proper operation and/or maintenance of the component or system.
 - 2) Identify each binder on the front and spine with printed binder title, Project title or name, and subject matter covered. Indicate the volume number if applicable.
 - b. Dividers: Provide heavy paper dividers with celluloid tabs for each Section. Mark each tab to indicate contents.
 - c. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
 - d. Text Material: Where written material is required as part of the manual use the manufacturer's standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inches by 11 inches 20 pound white bond paper.

- e. Drawings: Where drawings and/or diagrams are required as part of the manual, provide reinforced punched binder tabs on the drawings and bind them with the text.
 - 1) Where oversized drawings are necessary, fold the drawings to the same size as the text pages and use as a foldout.
 - 2) If drawings are too large to be used practically as a foldout, place the drawing, neatly folded, in the front or rear pocket of the binder. Insert a type written page indicating the drawing title, description of contents and drawing location at the appropriate location of the manual.
 - 3) Drawings shall be sized to ensure details and text is of legible size. Text shall be no less than 1/16" tall.
- f. Manual Content: In each manual include information specified in the individual Specification section, and the following information for each major component of building equipment and controls:
 - 1) General system or equipment description.
 - 2) Design factors and assumptions.
 - 3) Copies of applicable Shop Drawings and Product Data.
 - 4) System or equipment identification including: manufacturer, model and serial numbers of each component, operating instructions, emergency instructions, wiring diagrams, inspection and test procedures, maintenance procedures and schedules, precautions against improper use and maintenance, repair instructions, sources of required maintenance materials and related services, and a manual index.
- g. Binder Organization: Organize each manual into separate sections for each piece of related equipment. At a minimum, each manual shall contain a title page, table of contents, copies of Product Data supplemented by drawings and written text, and copies of each warranty, bond, certifications, and service Contract issued. Refer to Group I through V Technical Data Package Submittal requirements for required section content.
- h. Title Page: Provide a title page as the first sheet of each manual to include the following information; project name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor, and cross references to related systems in other operating and/or maintenance manuals.
- i. Table of Contents: After the title page, include a type written table of contents for each volume, arranged systematically according to the Project Manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume of the set.
- j. General Information Section: Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name,

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- address, and telephone number of the installer and maintenance Contractor. In addition, list a local source for replacement parts and equipment.
- k. Drawings: Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship between components of equipment or systems, or provide control or flow diagrams. Coordinate these drawings with information contained in Project Record Drawings to assure correct illustration of the completed installation.
 - l. Manufacturer's Data: Where manufacturer's standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the Contract Documents. Identify data that is applicable to the installation and delete references to information which is not applicable.
 - m. Where manufacturer's standard printed data is not available and the information is necessary for proper operation and maintenance of equipment or systems, or it is necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure. Where similar or more than one product is listed on the submittal the Contractor shall differentiate by highlighting the specific product to be utilized.
 - n. Calculations: Provide a section for circuit and panel calculations.
 - o. Loading Sheets: Provide a section for DGP Loading Sheets.
 - p. Certifications: Provide section for Contractor's manufacturer certifications.
- 7. Contractor Review: Review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer's catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying the review and verification of products occurred, and the field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.
 - 8. Resubmission: Revise and resubmit submittals as required within 15 calendar days of return of submittal. Make resubmissions under procedures specified for initial submittals. Identify all changes made since previous submittal.
 - 9. Product Data: Within 15 calendar days after execution of the contract, the Contractor shall submit for approval a complete list of all of major products proposed for use. The data shall include name of manufacturer, trade name, model number, the associated contract document section number, paragraph number, and the referenced standards for each listed product.
- B. Group 1 Technical Data Package: Group I Technical Data Package shall be one submittal consisting of the following content and organization. Consult the project Security Consultant for drawing format and content requirements. The data package shall include the following:

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1. Section I - Drawings:
 - a. General – Drawings shall conform to facility conditions and CAD Standards Documents. All text associated with security details shall be 1/8" tall and meet owner text standard for AutoCAD™ drawings.
 - b. Cover Sheet – Cover sheet shall consist of Project Title and Address, Project Number, Area and Vicinity Maps.
 - c. General Information Sheets – General Information Sheets shall consist of General Notes, Abbreviations, Symbols, Wire and Cable Schedule, Project Phasing, and Sheet Index.
 - d. Floor Plans – Floor plans shall be produced from the Architectural backgrounds issued in the Construction Documents. The contractor shall receive floor plans from the prime A/E to develop these drawing sets. Security devices shall be placed on drawings in scale. All text associated with security details shall be 1/8" tall and meet owner text standard for AutoCAD™ drawings. Floor plans shall identify the following:
 - 1) security devices by symbol,
 - 2) the associated device point number (derived from the loading sheets),
 - 3) wire & cable types and counts
 - 4) conduit sizing and routing
 - 5) conduit riser systems
 - 6) device and area detail call outs
 - e. Architectural details – Architectural details shall be produced for each device mounting type (door details for EECS and IDS, Intrusion Detection system (motion sensor, vibration, microwave Motion Sensor and Camera mounting,
 - f. Riser Diagrams – Contractor shall provide a riser diagram indicating riser architecture and distribution of the SMS throughout the facility (or area in scope).
 - g. Block Diagrams – Contractor shall provide a block diagram for the entire system architecture and interconnections with SMS subsystems. Block diagram shall identify SMS subsystem (e.g., electronic entry control, intrusion detection, closed circuit television, intercom, and other associated subsystems) integration; and data transmission and media conversion methodologies.
 - h. Interconnection Diagrams – Contractor shall provide interconnection diagram for each sensor, and device component. Interconnection diagram shall identify termination locations, standard wire detail to include termination schedule. Diagram shall also identify interfaces to other systems such as elevator control, fire alarm systems, and security management systems.
 - i. Security Details –
 - 1) Panel Assembly Detail – For each panel assembly, a panel assembly details shall be provided identifying
 - 2) Panel Details – Use manufacturer recommended details for SMS and CCTV power supplies, DGP, Field Panel configurations and layouts

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- 3) Device Mounting Details – Provide mounting detailed drawing for each security device (electronic entry control, intrusion detection, video surveillance and assessment, and intercom systems) for each type of wall and ceiling configuration in project. Device details shall include device, mounting detail, wiring and conduit routing. Each detail shall incorporate project architectural details to provide
 - 4) Details of connections to power supplies and grounding
 - 5) Details of surge protection device installation
 - 6) Sensor detection patterns – Each system sensor shall have associated detection patterns.
 - 7) Equipment Rack Detail – For each equipment rack, provide a scaled detail of the equipment rack location and rack space utilization. Use of BSCI wire management standards shall be employed to identify wire management methodology. Transitions between equipment racks shall be shown to include use vertical and horizontal latter rack system.
 - 8) Security Control Room – The contractor shall provide a layout plan for the Security Control Room. The layout plan shall identify all equipment and details associated with the installation.
 - 9) Operator Console – The contractor shall provide a layout plan for the Operator Console. The layout plan shall identify all equipment and details associated with the installation. Equipment room - the contractor shall provide a layout plan for the equipment room. The layout plan shall identify all equipment and details associated with the installation.
 - 10) Equipment Room – Equipment room details shall provide architectural, electrical, mechanical, plumbing, IT/Data and associated equipment and device placements both vertical and horizontally.
- j. Electrical Panel Schedule – Electrical Panel Details shall be provided for all SMS systems electrical power circuits. Panel details shall be provided identifying panel type (Standard, Emergency Power, Emergency/Uninterrupted Power Source, and Uninterrupted Power Source Only), panel location, circuit number, and circuit amperage rating.
- k. Door Schedule – A door schedule shall be developed for each door equipped with electronic security components. At a minimum, the door schedule shall be coordinated with Division 08 work and include the following information:
- 1) Item Number
 - 2) Door Number (Derived from A/E Drawings)
 - 3) Floor Plan Sheet Number
 - 4) Standard Detail Number
 - 5) Door Description (Derived from Loading Sheets)
 - 6) Data Gathering Panel Input Number
 - 7) Door Position or Monitoring Device Type & Model Number
 - 8) Lock Type, Model Number & Power Input/Draw (standby/active)
 - 9) Card Reader Type & Model Number
 - 10) Shunting Device Type & Model Number

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- 11) Sounder Type & Model Number
- 12) Manufacturer
- 13) Misc. devices as required
 - a) Delayed Egress Type & Model Number
 - b) Intercom
 - c) Camera
 - d) Electric Transfer Hinge
 - e) Electric Pass-through device
- 14) Remarks column indicating special notes or door configurations

I. Camera Schedule - A camera schedule shall be developed for each camera. Contractors shall coordinate with the Owner to determine camera starting numbers and naming conventions. All drawings shall identify wire and cable standardization methodology. Color coding of all wiring conductors and jackets is required and shall be communicated consistently throughout the drawings package submittal. At a minimum, the camera schedule shall include the following information:

- 1) Item Number
- 2) Camera Number (Correspond with input into video switcher, and recorder)
- 3) Naming Conventions
- 4) Description of Camera Coverage
- 5) Camera Location
- 6) Floor Plan Sheet Number
- 7) Camera Type
- 8) Mounting Type
- 9) Standard Detail Reference
- 10) Power Input & Draw
- 11) Power Panel Location
- 12) Remarks Column for Camera

2. Section II – Data Gathering Panel Documentation Package

For the purpose of establishing project requirements, this section identifies manufacturer specific terms (I-8, R-8, iStar, etc.) for the purpose of communicating requirements; although specific products are outlined in the related section 281300.

- a. Contractor shall provide Data Gathering Panel (DGP) input and output documentation packages for review at the Shop Drawing submittal stage and also with the as-built documentation package. The documentation packages shall be provided in both printed and magnetic form at both review stages.
- b. The Contractor shall provide loading sheet documentation package for the associated DGP, including input and output boards for all field panels associated with the project. Documentation shall be provided in current version Microsoft Excel spreadsheets following the format currently utilized by owner. (See attached sample.) A separate spreadsheet file shall be

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- generated for each DGP and associated field panels (I-8 input board and R-8 relay output board).
- c. The spreadsheet names shall follow a sequence that shall display the spreadsheets in numerical order according to the DGP system number. The spreadsheet shall include the prefix in the file name that uniquely identifies the project site. (Example: Site Name DGP-01.xls, Site Name DGP-01 I8-01)
 - d. The spreadsheet shall detail all connected items such as card readers, alarm inputs, and relay output connections. The spreadsheet shall include an individual section (row) for each panel input, output and card reader. The spreadsheet shall automatically calculate the system numbers for card readers, inputs, and outputs based upon data entered in initialization fields.
 - e. All entries must be verified against the field devices. Copies of the floor plans shall be forwarded under separate cover.
 - f. The DGP spreadsheet shall include an entry section for the following information:
 - 1) DGP number
 - 2) First Reader Number (Except I-8 and R-8)
 - 3) First Monitor Point Number (Except R-8)
 - 4) First Relay Number (Except I-8)
 - 5) DGP, I-8 or R-8 Location
 - 6) DGP Chain Number
 - 7) DGP Cabinet Tamper Input Number (Except R-8 and R-8)
 - 8) DGP Power Fail Input Number (Except R-8 and R-8)
 - 9) Number of Monitor Points Reserved For Expansion Boards (Except R-8 and R-8)
 - 10) Number of Control Points (Relays) Reserved For Expansion Boards (Except R-8 and R-8)
 - g. The DGP, I-8 (input module) and R-8 (output module) spreadsheets shall automatically calculate the following information based upon the associated entries in the above fields:
 - 1) System Numbers for Card Readers (Except R-8)
 - 2) System Numbers for Monitor Point Inputs
 - 3) System Numbers for Control Points (Relays)
 - 4) Next DGP or I-8 First Monitor Point Number
 - 5) Next DGP or R-8 First Control Point Number
 - h. The DGP spreadsheet shall provide the following information for each card reader:
 - 1) DGP Reader Number
 - 2) System Reader Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device Type i.e.: In Reader, Out Reader, etc.)
 - 6) Description Field (Area Description i.e.: Hall 21, Office, etc.)
 - 7) DGP Input Location
 - 8) Date Test

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- 9) Date Passed
 - 10) Cable Type
 - 11) Camera Numbers (of cameras viewing the reader location)
- i. The DGP and I-8 spreadsheet shall provide the following information for each monitor point (alarm input). (Note: Communication for I/8 Boards in security closets are daisy chained. Communication for I/8 Boards in galleries, and display cases are home run back to the DGP.)
- 1) DGP Monitor Point Input Number
 - 2) System Monitor Point Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device Type i.e.: Door Contact, Motion Detector, etc.)
 - 6) Description Field (Area Description i.e.: Hall 21, Storage, Office, etc.)
 - 7) DGP or I-8 Input Location
 - 8) Date Test
 - 9) Date Passed
 - 10) Cable Type
 - 11) Camera Numbers (of associated alarm event preset call-ups)
- j. The DGP and R-8 (output module) spreadsheet shall provide the following information for each control point (output relay). (Note: Communications for R/8 Boards in Security Closets are Daisy Chained. Communication lines for R/8 Boards in Galleries are home run back to the DGP.)
- 1) DGP Control Point (Relay) Number
 - 2) System (Control Point) Number
 - 3) Cable ID Number
 - 4) Description Field (Room Number)
 - 5) Description Field (Device: Lock Control, Local Sounder, etc.)
 - 6) Description Field (Area Description i.e.: Hall 21, Storage, Office, etc.)
 - 7) DGP or R-8 Output Location
 - 8) Date Test
 - 9) Date Passed Cable Type
 - 10) Camera Number (of associated alarm event preset call-ups)
- k. The DGP, I-8 and O-8 spreadsheet shall include the following information or directions in the header and footer:
- 1) Header
 - a) DGP Input and Output Worksheet
 - b) Enter Beginning Reader, Input, and Output Starting Numbers and Sheet Will Automatically Calculate the Remaining System Numbers.
 - 2) Footer
 - a) File Name

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- b) Date Printed
- c) Page Number

3. Section III - Construction Mock-up: In areas with exposed EMT/Conduit Raceways, contractor shall conceal raceway as much as practical and unobtrusively. In addition, historic significance must be considered to determine installation means and methods for approval by the owner.
4. Section IV - Manufacturers' Data: The data package shall include manufacturers' data for all materials and equipment, including sensors, local processors and console equipment provided under this specification.
5. Section V - System Description and Analysis: The data package shall include system descriptions, analysis, and calculations used in sizing equipment required by these specifications. Descriptions and calculations shall show how the equipment will operate as a system to meet the performance requirements of this specification. The data package shall include the following:
 - a. Central processor memory size; communication speed and protocol description; rigid disk system size and configuration; flexible disk system size and configuration; back-up media size and configuration; alarm response time calculations; command response time calculations; start-up operations; expansion capability and method of implementation; sample copy of each report specified; and color photographs representative of typical graphics.
 - b. Software Data: The data package shall consist of descriptions of the operation and capability of the system, and application software as specified.
 - c. Overall System Reliability Calculations: The data package shall include all manufacturers' reliability data and calculations required to show compliance with the specified reliability.
6. Section VI – Certifications & References: All specified manufacturer's certifications shall be included with the data package. Contractor shall provide Project references as outlined in Paragraph 1.10 A "Contractor Qualifications".

C. Group II Technical Data Package

1. The Contractor shall prepare a report of "Current Site Conditions" and submit a report to the Owner documenting changes to the site, particularly those conditions that affect performance of the system to be installed. The Contractor shall provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions which affect the installation of the system or its performance. The Contractor shall not correct any deficiency without written permission from the Owner.
2. System Configuration and Functionality: The contractor shall provide the results of the meeting with OWNER to develop system requirements and functionality including but not limited to:
 - a. Baseline configuration
 - b. Access levels
 - c. Schedules (intrusion detection, access control, holidays, etc.)
 - d. Badge database

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- e. System monitoring and reporting (unit level and central control)
- f. Naming conventions and descriptors
- g. Sequencing of PLC interfaces

D. Group III Technical Data Package

1. Development of Test Procedures: The Contractor will prepare performance test procedures and reports for the pre-delivery test (PDT). The pre-delivery test procedures shall follow the format of the testing procedures and be customized to the contract requirements. For a copy of the testing procedures, contact security consultant through the Owner. The Contractor will deliver the test procedures to the Owner for approval at least 60 calendar days prior to the requested test date.
2. Perform Pre-delivery Testing: The Contractor will perform the pre-delivery test only after receiving written approval of the test procedures. The contractor shall deliver a final pre-delivery test report within 15 calendar days from completion of the pre-delivery test and request to initiate system installation process to continue. Refer to Part 5 of this section for system Testing and Acceptance requirements. No systems or devices shall be installed prior to successful completion of the PDT and written notice to proceed.

E. Group IV Technical Data Package

1. Performance Verification Test
 - a. Based on the successful completion of the pre-delivery test, the Contractor shall finalize the test procedures and report forms for the performance verification test (PVT) and the endurance test. The PVT shall follow the format, layout and content of the pre-delivery test. The Contractor shall deliver the PVT and endurance test procedures to the Owner for approval. The Contractor may schedule the PVT after receiving written approval of the test procedures. The Contractor shall deliver the final PVT and endurance test reports within 14 calendar days from completion of the tests. Refer to Part 5 of this section for System Testing and Acceptance requirements.
2. Training Documentation
 - a. New Facilities: Familiarization training shall be provided for new equipment or systems. Training can include site familiarization training for owner technicians and administrative personnel. General information on new system layout including closet locations, turnover of the completed system including all documentation, including manuals, software, key systems, and full system administration rights. Lesson plans and training manuals training shall be oriented to type of training to be provided. See "Familiarization Training" for specific training requirements.
 - b. New Control Room:
 - 1) Provide the security personnel with training in the use, operation, and maintenance of the entire system. The training documentation must include the operation and maintenance. The first of training sessions

to be prior to system turnover and the second immediately after turnover. Coordinate the training sessions with the Owner. Completed classroom sessions will be witnessed and documented by the Architect/Engineer, and approved. Instruction is not to begin until the system is operational as designed.

- 2) The training documents will cover the operation and the maintenance manuals and the control console operators' manuals and service manuals in detail, stressing all important operational and service diagnostic information necessary for the maintenance and operations personnel to efficiently use and maintain all systems.
- 3) Provide an illustrated control console operator's manual and service manual. The operator's manual shall be written in laymen's language and printed so as to become a permanent reference document for the operators, describing all control panel switch operations, graphic symbol definitions and all indicating functions and a complete explanation of all software.
- 4) The service manual shall be written in laymen's language and printed so as to become a permanent reference document for maintenance personnel, describing how to run internal self diagnostic software programs, troubleshoot head end hardware and field devices with a complete scenario simulation of all possible system malfunctions and the appropriate corrective measures.
- 5) Provide a professional color DVD instructional recording of all the operational procedures described in the operator's manual. All charts used in the training session shall be clearly presented on the video. Any DVD found to be inferior in recording or material content shall be reproduced at no cost until an acceptable DVD is submitted. Provide four copies of the training DVD, one to the architect/engineer and three to the owner.
- 6) See "Familiarization Training" for specific training requirements.

3. System Configuration and Data Entry:

- a. The contractor is responsible for providing all system configuration and data entry for the SMS and subsystems (e.g., video system, PLC, intercom, digital video recorders). All data entry shall be performed Owner's standards & guidelines. The Contractor is responsible for participating in all meetings with the OWNER and the client to compile the information needed for data entry. These meetings shall be established at the beginning of the project and incorporated in to the project schedule as a milestone task. The contractor shall be responsible for all data collection, data entry, and system configuration. The contractor shall collect, enter, & program and/or configure the following components:
 - 1) Access control system components
 - 2) All intrusion detection system components
 - 3) Video surveillance, control and recording systems
 - 4) Intercom systems components
 - 5) Programmable Logic Controllers
 - 6) All other security subsystems shown in the contract documents

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- b. The Contractor is responsible for compiling the card access database for the Owner's employees, including programming reader configurations, access shifts, schedules, exceptions, card classes and card enrollment databases.
 - c. Refer to Part 4 for system programming requirements and planning guidelines.
 - 4. Graphics: Based on CAD as-built drawings developed for the construction project, create all map sets showing locations of all alarms and field devices. Graphical maps of all alarm points installed under this contract including perimeter and exterior alarm points shall be delivered with the system. The Contractor shall create and install all graphics needed to make the system operational. The Contractor shall utilize data from the contract documents, Contractor's field surveys, and all other pertinent information in the Contractor's possession to complete the graphics. The Contractor shall identify and request from the Owner, any additional data needed to provide a complete graphics package. Graphics shall have sufficient level of detail for the system operator to assess the alarm. The Contractor shall supply hard copy, color examples at least 203.2 x 254 mm (8 x 10 in) of each type of graphic to be used for the completed Security system. The graphics examples shall be delivered to the Owner for review and approval at least 90 calendar days prior to the scheduled date the Contractor requires them. Confirm locations where graphic map displays will be loaded.
- F. Group V Technical Data Package: Final copies of the manuals shall be delivered to the Owner as part of the acceptance test. The draft copy used during site testing shall be updated with any changes required prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of each sub-contractor installing equipment or systems, as well as the nearest service representatives for each item of equipment for each system. The manuals shall include a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the endurance test shall include all modifications made during installation, checkout, and acceptance. Six (6) hard-copies and one (1) soft copy on CD of each item listed below shall be delivered as a part of final systems acceptance.
 - 1. Functional Design Manual: The functional design manual shall identify the operational requirements for the entire system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included for all system operating modes. Manufacturer developed literature may be used; however, shall be produced to match the project requirements.
 - 2. Equipment Manual: A manual describing all equipment furnished including:
 - a. General description and specifications; installation and checkout procedures; equipment electrical schematics and layout drawings; system schematics and layout drawings; alignment and calibration procedures; manufacturer's repair list indicating sources of supply; and interface definition.

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3. Software Manual: The software manual shall describe the functions of all software and include all other information necessary to enable proper loading, testing, and operation. The manual shall include:
 - a. Definition of terms and functions; use of system and applications software; procedures for system initialization, start-up, and shutdown; alarm reports; reports generation, database format and data entry requirements; directory of all disk files; and description of all communications protocols including data formats, command characters, and a sample of each type of data transfer.
4. Operator's Manual: The operator's manual shall fully explain all procedures and instructions for the operation of the system, including:
 - a. Computers and peripherals; system start-up and shutdown procedures; use of system, command, and applications software; recovery and restart procedures; graphic alarm presentation; use of report generator and generation of reports; data entry; operator commands' alarm messages, and printing formats; and system access requirements.
5. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, recommend schedules, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
6. Spare Parts & Components Data: At the conclusion of the Contractor's work, the Contractor shall submit to the Owner a complete list of the manufacturer's recommended spare parts and components required to satisfactorily maintain and service the systems, as well as unit pricing for those parts and components.
7. Operation, Maintenance & Service Manuals: The Contractor shall provide two (2) complete sets of operating and maintenance manuals in the form of an instructional manual for use by the owner Security Guard Force personnel. The manuals shall be organized into suitable sets of manageable size. Where possible, assemble instructions for similar equipment into a single binder. If multiple volumes are required, each volume shall be fully indexed and coordinated.
8. Equipment and Systems Maintenance Manual: The Contractor shall provide the following descriptive information for each piece of equipment, operating system, and electronic system:
 - a. Equipment and/or system function.
 - b. Operating characteristics.
 - c. Limiting conditions.
 - d. Performance curves.
 - e. Engineering data and test.
 - f. Complete nomenclature and number of replacement parts.
 - g. Provide operating and maintenance instructions including assembly drawings and diagrams required for maintenance and a list of items recommended to stock as spare parts.
 - h. Provide information detailing essential maintenance procedures including the following: routine operations, trouble shooting guide, disassembly, repair and re-assembly, alignment, adjusting, and checking.

- i. Provide information on equipment and system operating procedures, including the following; start-up procedures, routine and normal operating instructions, regulation and control procedures, instructions on stopping, shut-down and emergency instructions, required sequences for electric and electronic systems, and special operating instructions.
 - j. Manufacturer equipment and systems maintenance manuals are permissible.
- 9. **Project Redlines:** During construction, the Contractor shall maintain an up-to-date set of construction redlines detailing current location and configuration of the project components. The redline documents shall be marked with the words 'Master Redlines' on the cover sheet and be maintained by the Contractor in the project office. The Contractor will provide access to redline documents anytime during the project for review and inspection by the Owner or authorized owner representative. Master redlines shall be neatly maintained throughout the project and secured under lock and key in the contractor's onsite project office. Any project component or assembly that is not installed in strict accordance with the drawings shall be so noted on the drawings. Prior to producing Record Construction Documents, the contractor will submit the Master Redline document to the Owner for review and approval of all changes or modifications to the documents. Each sheet shall have Owner initials indicating authorization to produce "As Built" documents. Field drawings shall be used for data gathering & field changes. These changes shall be made to the master redline documents daily. Field drawings shall not be considered "master redlines".
- 10. **Record Specifications:** The Contractor shall maintain one (1) copy of the Project Specifications, including addenda and modifications issued, for Project Record Documents. The Contractor shall mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in the Contract Specifications and modifications issued. (Note related Project Record Drawing information where applicable). The Contractor shall pay particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later. Upon completion of the mark ups, the Contractor shall submit record Specifications to the Owner. As with master relines, Contractor shall maintain record specifications for Owner review and inspection at anytime.
- 11. **Record Product Data:** The Contractor shall maintain one (1) copy of each Product Data submittal for Project Record Document purposes. The Data shall be marked to indicate the actual product installed where the installation varies substantially from that indicated in the Product Data submitted. Significant changes in the product delivered to the site and changes in manufacturer's instructions and recommendations for installation shall be included. Particular attention will be given to information on concealed products and installations that cannot be readily identified or recorded later. Note related Change Orders and mark up of Record Construction Documents, where applicable. Upon completion of mark up, submit a complete set of Record Product Data to the Owner.
- 12. **Miscellaneous Records:** The Contractor shall maintain one (1) copy of miscellaneous records for Project Record Document purposes. Refer to other Specifications for miscellaneous record-keeping requirements and submittals concerning various construction activities. Before substantial completion, complete miscellaneous records and place in good order, properly identified and

bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records include, a minimum of the following:

- a. Certificates received instead of labels on bulk products.
- b. Testing and qualification of tradesmen. ("Contractor's Qualifications")
- c. Documented qualification of installation firms.
- d. Load and performance testing.
- e. Inspections and certifications.
- f. Final inspection and correction procedures.
- g. Project schedule

13. Record Construction Documents (Record As-Built)

- a. Upon project completion, the contractor shall submit the project master redlines to the Owner prior to development of Record construction documents. The Owner shall be given a minimum of a thirty (30) day review period to determine the adequacy of the master redlines. If the master redlines are found suitable by the Owner, the Owner will initial and date each sheet and turn the redlines over to the contractor for as built development.
- b. The Contractor shall provide the Owner a complete set of "as-built" drawings and original master redlined marked "as-built" blue-line in the latest version of AutoCAD drawings unlocked on CD or DVD. The as-built drawing shall include security device number, security closet connection location, data gathering panel number, and input or output number as applicable. All corrective notations made by the Contractor shall be legible when submitted to the Owner. If, in the opinion of the Owner, any redlined notation is not legible, it shall be returned to the Contractor for re-submission at no extra cost to the Owner. The Contractor shall organize the Record Drawing sheets into manageable sets bound with durable paper cover sheets with suitable titles, dates, and other identifications printed on the cover. The submitted as built shall be in editable formats and the ownership of the drawings shall be fully relinquished to the owner.
- c. Where feasible, the individual or entity that obtained record data, whether the individual or entity is the installer, sub-contractor, or similar entity, is required to prepare the mark up on Record Drawings. Accurately record the information in a comprehensive drawing technique. Record the data when possible after it has been obtained. For concealed installations, record and check the mark up before concealment. At the time of substantial completion, submit the Record Construction Documents to the Owner. The Contractor shall organize into bound and labeled sets for the Owner's continued usage. Provide device, conduit, and cable lengths on the conduit drawings. Exact in-field conduit placement/routings shall be shown. All conduits shall be illustrated in their entire length from termination in security closets; no arrowed conduit runs shall be shown. Pull box and junction box sizes are to be shown if larger than 100mm.

1.9 PROJECT PROCESS DIAGRAM

- A. Figure 1 - ESS Project Process Diagram (below) is provided to identify key consecutive or concurrent tasks and milestones required by the contractor to ensure the project is completed prior to owner occupancy. Substantial completion shall mean all systems have been fully tested and accepted in writing. Minor or non-life safety related punch list items may continue through owner occupancy, but shall be resolved within 2 weeks of official date of occupancy. Administrative Group V Technical Data Package submission may be complete after substantial completion, however shall be completed within the specified time period (See Part 5 of this specification).
- B. The contractor is encouraged to utilize the diagram for the development of project schedules, and coordinating submissions.

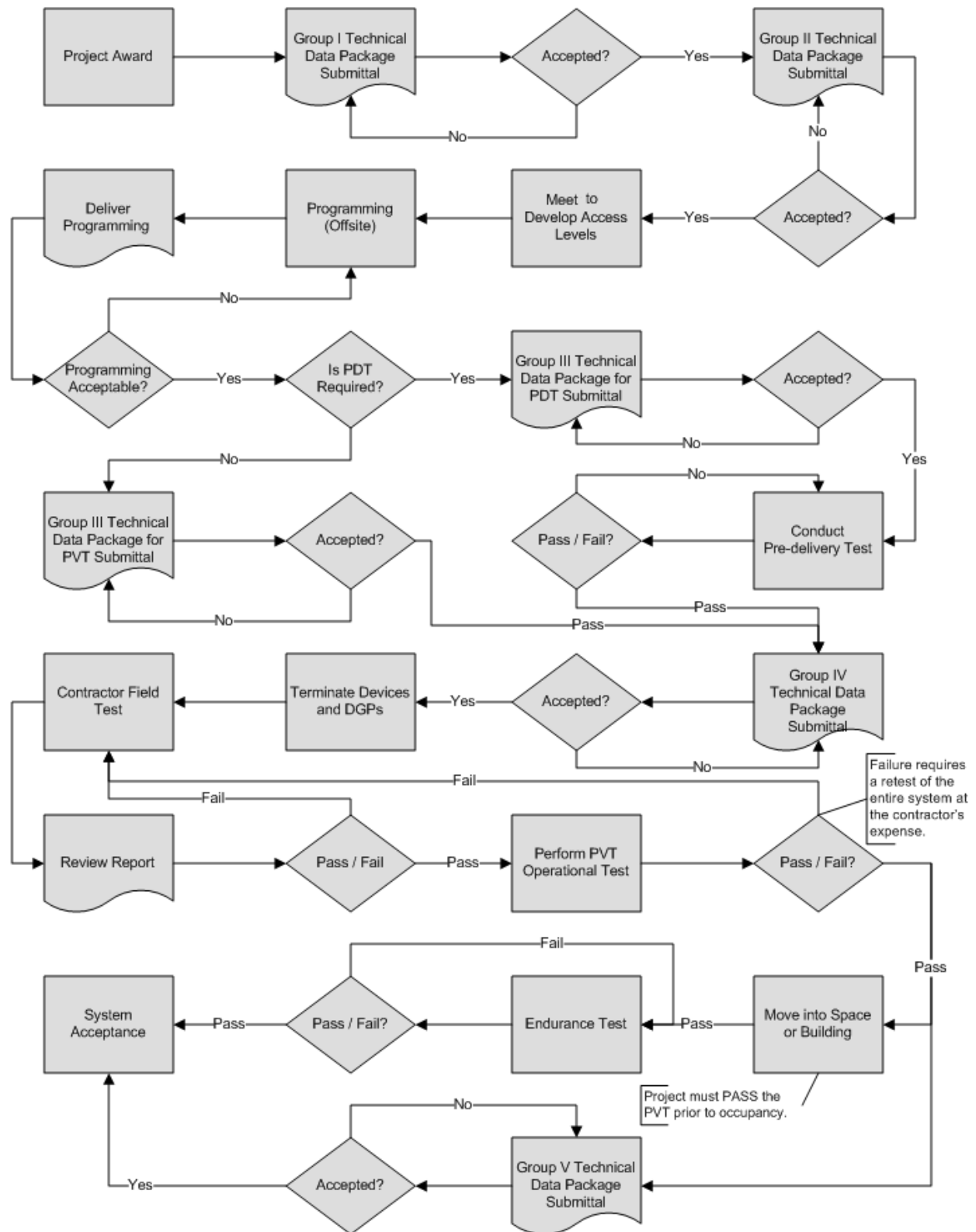


Figure 1 - ESS Project Process Diagram (Typical)

1.10 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required heights.
 - 4. Ensure raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment. Meet seismic requirements as identified in this section.
- B. Coordinate the installation of required supporting discipline devices placement and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate the locations of access panels and doors for electronic security items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping.".
- E. Contractor shall coordinate as needed with all related Divisions.

1.11 QUALITY ASSURANCE

- A. Contractor Qualifications
 - 1. The Contractor or security sub-contractor shall be a licensed security Contractor with a minimum of five (5) years experience installing and servicing systems of similar scope and complexity. The Contractor shall be an authorized regional representative of the Security Management System's (SMS) manufacturer. The Contractor shall provide four (4) current references from clients with systems of similar scope and complexity which became operational in the past three (3) years. At least three (3) of the references shall be utilizing the same system components, in a similar configuration as the proposed system. The references must include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion, and approximate cost of the project. The owner reserves the option to visit the reference sites, with the site owner's permission and representative, to verify the quality of installation and the references' level of satisfaction with the system. The Contractor shall provide copies of system manufacturer certification for all technicians. The Contractor shall only utilize factory-trained technicians to install, program, and service the SMS. The Contractor shall only utilize factory-trained technicians to install, terminate and service controller/field panels and reader

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modules. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems. The Contractor shall have a local service facility. The facility shall be located within 60 miles of the project site. The local facility shall include sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The Owner reserves the option of surveying the company's facility to verify the service inventory and presence of a local service organization.

2. The Contractor shall provide proof project superintendent with BICSI Certified Commercial Installer Level 1, Level 2, or Technician to provide oversight of the project.
 3. Cable installer must have on staff a Registered Communication Distribution Designer (RCDD) certified by Building Industry Consulting Service International. The staff member shall provide consistent oversight of the project cabling throughout design, layout, installation, termination and testing.
- B. Source Limitations: Obtain Central Station, workstations, Controllers, Identifier readers, and all software through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Experience
1. The Contractor shall submit written proof that the following experience requirements are being met.
 - a. Hardware Manufacturer's Experience: All system components shall be produced by manufacturers who have been regularly engaged in the production of electronic security system components of the types to be installed for at least five (5) years.
 - b. Software Manufacturer's Experience: All system and application software shall be produced by manufacturers who have been regularly engaged in the production of electronic security system and application software of similar type and complexity as the specified system for at least five (5) years. Experience shall include similar experience in facilities law enforcement facilities.
 - c. System Installer Experience: The system shall be installed by a Contractor who has been regularly engaged in the installation of electronic security system equipment of similar type and complexity.
- E. Manufacturers' Representatives
1. The Contractor shall retain a manufacturers' technical representative or technician to consult on equipment selection, installation, testing, and training personnel. The manufacturers' technical representative or technician shall be thoroughly experienced in the installation and operation of the system being provided under this contract with no less than five (5) continuous years of technical experience.

F. Material & Workmanship

1. Unless otherwise specifically provided under this contract, all equipment, material and articles to be incorporated in the work shall be new and of the most suitable grade for the purposes intended. References to any equipment, material, article or patented process, by trade name, make or catalog number shall be regarded as establishing a standard of performance and quality, and shall not be construed as limiting competition. The Contractor may, at his or her option, use any equipment, material, article, or process which, in the judgment of the Owner, is equivalent to or better than that specified. When required by this contract or when called for by the Owner, the Contractor shall furnish the name of the manufacturer, model number, and other identifying data and information that reflects the performance, capacity, nature and rating of the electrical, mechanical, and other equipment that the Contractor contemplates incorporating in the work to the Owner for approval. When so directed, the Contractor shall submit samples for approval at the Contractor's expense. Equipment, materials and articles installed or used without the required approval shall be at the Contractor's risk of rejection. Warranties of all work and installed products shall be according to the Contract General Provisions. The Contractor shall be responsible for assuring the compatibility of new systems with Owners pre-existing card format and Security Management Systems.

1.12 **MAINTENANCE & SERVICE**

- A. General Requirements: The Contractor shall provide all services required and equipment necessary to maintain the entire integrated electronic security system in an operational state as specified for a period of one (1) year after formal written acceptance of the system. The Contractor shall provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. See also General Project Requirements.
- B. Description of Work: The adjustment and repair of the security system includes all software updates, panel firmware, and the following new items computers equipment, communications transmission equipment and data transmission media (DTM), local processors, security system sensors, access control equipment, facility interface, signal transmission equipment, and video equipment.
- C. Personnel: Service personnel shall be certified in the maintenance and repair of the selected type of equipment and qualified to accomplish all work promptly and satisfactorily. The Owner shall be advised in writing of the name of the designated service representative, and of any change in personnel. The Owner shall be provided copies of system manufacturer certification for the designated service representative.
- D. Schedule of Work: The work shall be performed during regular working ours, Monday through Friday, excluding federal holidays. These inspections shall include:
 1. The Contractor shall perform two (2) minor inspections at six (6) month intervals or more if required by the manufacturer, and two (2) major inspections offset

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equally between the minor inspections to effect quarterly inspection of alternating magnitude.

- a. Minor Inspections shall include visual checks and operational tests of all console equipment, peripheral equipment, local processors, sensors, electrical and mechanical controls, and adjustments on printers.
 - b. Major Inspections shall include all work described for Minor Inspections and the following: clean all system equipment and local processors including interior and exterior surfaces; perform diagnostics on all equipment; operational tests of the CPU, switcher, peripheral equipment, recording devices, monitors, picture quality from each camera; check, walk test, and calibrate each sensor; run all system software diagnostics and correct all problems; and resolve any previous outstanding problems.
- E. Emergency Service: The owner shall initiate service calls whenever the system is not functioning properly. The Contractor shall provide the owner with an emergency service center telephone number. The emergency service center shall be staffed 24 hours a day 365 days a year. The Owner shall have sole authority for determining catastrophic and non-catastrophic system failures within parameters stated in General Project Requirements.
1. For catastrophic system failures, the Contractor shall provide same day four (4) hour service response with a defect correction time not to exceed eight (8) hours from [notification] [arrival on site]. Catastrophic system failures are defined as any system failure that the Owner determines will place the facility(s) at increased risk.
 2. For non-catastrophic failures, the Contractor within eight (8) hours with a defect correction time not to exceed 24 hours from notification.
- F. Operation: Performance of scheduled adjustments and repair shall verify operation of the system as demonstrated by the applicable portions of the performance verification test.
- G. Records & Logs: The Contractor shall maintain records and logs of each task and organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log shall contain all initial settings, calibration, repair, and programming data. Complete logs shall be maintained and available for inspection on site, demonstrating planned and systematic adjustments and repairs have been accomplished for the system.
- H. Work Request: The Contractor shall separately record each service call request, as received. The record shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials used, and the date and time of commencement and completion. The Contractor shall deliver a record of the work performed within five (5) working days after the work was completed.
- I. System Modifications: The Contractor shall make any recommendations for system modification in writing to the Owner. No system modifications, including operating parameters and control settings, shall be made without prior written approval from the

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Owner. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and other documentation affected.

- J. Software: The Contractor shall provide all software updates when approved by OWNER from the manufacturer during the installation and 12-month warranty period and verify operation of the system. These updates shall be accomplished in a timely manner, fully coordinated with the system operators, and incorporated into the operations and maintenance manuals and software documentation. There shall be at least one (1) scheduled update near the end of the first year's warranty period, at which time the Contractor shall install and validate the latest released version of the Manufacturer's software. All software changes shall be recorded in a log maintained in the unit control room. An electronic copy of the software update shall be maintained within the log. At a minimum, the contractor shall provide a description of the modification, when the modification occurred, and name and contact information of the individual performing the modification. The log shall be maintained in a white 3 ring binder and the cover marked "SOFTWARE CHANGE LOG".

1.13 SYSTEM DESCRIPTION

- A. System consists of an existing PC-based central computer or more networked PC-based workstations, and new contractor field-installed Controllers, connected by a high-speed electronic data transmission network.
- B. Network(s) Controllers shall consist of one or more of the following:
 - 1. Local area, IEEE 802.3 Fast Ethernet 100 BASE-TX based on TCP/IP.

1.14 PERFORMANCE REQUIREMENTS

- A. Distributed Processing: System shall be a fully distributed processing system so information, including time, date, valid codes, access levels, and similar data is downloaded to Controllers so each Controller makes access-control decisions for that Location. Do not use intermediate Controllers for access control. If communications to Central Station are lost, all Controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the Central Station.
- B. Field equipment shall include Controllers, sensors, and controls. Controllers shall serve as an interface between the Central Station and sensors and controls. Data exchange between the Central Station and the Controllers shall include down-line transmission of commands, software, and databases to Controllers. The up-line data exchange from the Controller to the Central Station shall include status data such as intrusion alarms, status reports, and entry-control records. Controllers are classified as alarm-annunciation or entry-control type.
- C. System Response to Alarms: Field device network shall provide a system end-to-end response time of one (1) second or less for every device connected to the system. Alarms shall be annunciated at the Central Station within 1 second of the alarm occurring at a Controller or device controlled by a local Controller, and within 100 ms if

the alarm occurs at the Central Station. Alarm and status changes shall be displayed within 100 ms after receipt of data by the Central Station. All graphics shall be displayed, including graphics-generated map displays, on the console monitor within five (5) seconds of alarm receipt at the security console. This response time shall be maintained during system heavy load.

- D. False Alarm Reduction: The design of Central Station and Controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.
- E. Error Detection: A cyclic code error detection method shall be used between Controllers and the Central Station, which shall detect single- and double-bit errors, burst errors of eight (8) bits or less, and at least 99 percent of all other multi-bit and burst error conditions. Interactive or product error detection codes alone will not be acceptable. A message shall be in error if one bit is received incorrectly. System shall retransmit messages with detected errors. A two-digit decimal number shall be operator assignable to each communication link representing the number of retransmission attempts. When the number of consecutive retransmission attempts equals the assigned quantity, the Central Station shall print a communication failure alarm message. System shall monitor the frequency of data transmission failure for display and logging.
- F. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.
- G. Door Hardware Interface: Coordinate with Division 08 Sections that specify door hardware required to be monitored or controlled by the security access system. The Controllers in this Section shall have electrical characteristics which match the signal and power requirements of door hardware. Integrate door hardware specified in Division 08 Sections to function with the controls and PC-based software and hardware in this Section.

1.15 DELIVERY, STORAGE, & HANDLING

- A. Controllers:
 - 1. Store in temperature and humidity controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 10 to 30 deg C (50 to 85 deg F), and not more than 80 percent relative humidity, non-condensing.
 - 2. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.
 - 3. Mark packing list with designations which have been assigned to materials and equipment for recording in the system labeling schedules generated by cable and asset management system specified in Part 2.
 - 4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.16 PROJECT CONDITIONS

- A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
1. Control Station: Rated for continuous operation in ambient conditions of 16 to 30 deg C (60 to 85 deg F) and a relative humidity of 20 to 80 percent, non-condensing.
 2. Interior, Controlled Environment: System components, except central-station control unit, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 2 to 50 deg C (36 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 1 enclosure.
 3. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of -18 to 50 deg C (0 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, non-condensing. NEMA 250, Type 4x enclosures.
 4. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of -34 to 50 deg C (-30 to 122 deg F) dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 137 km/h (85 mph) and snow cover up to 610 mm (24 in) thick. NEMA 250, Type 4X enclosures.
 5. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
 6. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X enclosures.
 7. Security Environment: Use vandal resistant enclosures in high-risk areas where equipment may be subject to damage.

1.17 EQUIPMENT AND MATERIALS

- A. General Equipment Requirements: Equipment and materials furnished shall be new, first grade, standard, current products of the manufacturer, and be suitable for the systems being installed and the intent of the design.
1. Plastic laminated nameplates shall be installed on all components accessed by - Owner Security Maintenance Personnel. Each nameplate shall identify the component and it's location within the security system. The laminated plastic shall be 1.6 mm thick, black with white lettering center core. Nameplates shall be a minimum of 19 mm (0.75 in) high, with a minimum of 3.3 mm (0.13 in) high-engraved block lettering. Nameplates are to be attached to the component with screws or located as required by security documentation plans and specifications. All console monitors shall be labeled with the monitor number and

intended function. Contractor shall submit planned naming conventions for approval.

2. Where the words, "or shall be an approved equivalent" or like words are used, it shall mean that materials, devices, or equipment of equivalent or equal quality, function, operation, and appearance shall be furnished upon the approval of the Owner. If the contractor recommends equipment substitution, the contractor is responsible for complete documentation of the reason for the change and is financially liable for the design time expended by the security consultant to research the substitution.
3. Any material, device, or equipment damages before or during installation and before acceptance of the completed system, shall be replaced unless repairs can be made that are acceptable to the Owner. Any such replacement or repairs, including repairs to the finish, shall be made at no cost to the Owner.
4. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected according to the manufacturers' recommendations. Equipment provided with a factory finish shall be maintained free of dust, dirt, and foreign matter. Dents, marred finishes, and other damage shall be repaired to its original condition or replaced at no additional cost to the Owner.
5. Parts of the project site are finished spaces, including paint, trim, wall covering, floor treatments, lighting, and building mechanical systems. Therefore, the Contractor shall perform the work specified herein, such that, at the completion of his work, all finished space is restored to the original condition existing prior to the commencement of work. During the course of performing the work specified herein, if the Contractor should encounter any damaged finish in any area where the Contractor's work is to be performed, the Contractor shall notify the Owner in writing prior to performing work in that area. Only after receiving written confirmation that the existing conditions have been documented and authorization has been given to proceed, shall the Contractor proceed with the work in these areas.

B. Extra Materials

1. Furnish extra materials described below which match products installed and are packaged with protective covering for storage and identified with labels describing contents.
 - a. Fuses, power supply, equal to 20 percent of amount installed for each size used, but no fewer than three (3) units.

1.18 ELECTRICAL POWER

- A. Electrical power of 120 Volts Alternating Current (VAC) shall be indicated on the Division 16 drawings. Additional locations requiring primary power required by the security system shall be shown as part of these contract documents. Primary power for the security system shall be configured to switch to emergency backup sources automatically if interrupted without degradation of any critical system function. Alarms shall not be generated as a result of power switching, however, an indication of power

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switching on (on-line source) shall be provided to the alarm monitor. The Security Contractor shall provide an interface (dry contact closure) between the SMS and the UPS system so the UPS trouble signals and main power fail appear on the SMS operator terminal as alarms.

- B. Failure of any on-line battery shall be detected and reported as a fault condition. Battery backed-up power supplies shall be provided sized for eight (8) hours of operation at actual connected load. Requirements for additional power or locations shall be included with the contract to support equipment and systems offered. The following minimum requirements shall be provided for power sources and equipment.

1. EMERGENCY UNINTERRUPTIBLE POWER SUPPLY (UPS)

- a. The following 120VAC circuits shall be provided by others. The Security Contractor shall coordinate exact locations with the Electrical Contractor:
- 1) Security System Monitors and Keyboards
 - 2) CPU
 - 3) Communications equipment
 - 4) Video Monitors
 - 5) Intercom Stations
 - 6) Radio System
 - 7) Outlets: Security Outlets dedicated to security equipment racks or security enclosure assemblies.
 - 8) Security Device Power Supplies (DGP, CCTV, Card Access, Programmable Logic Controllers, Lock Power, etc.) powered from the security closets or remotely: various locations
 - 9) Intercom Master Control System
 - 10) Fiber Optic Receivers/Transmitters
 - 11) All Server Room rack and wall mounted equipment.

1.19 ENVIRONMENTAL CONDITIONS

- A. Interior, Controlled Environment: All system components except the console equipment installed in interior locations having controlled environments which shall be rated for continuous operation under ambient environmental condition of 0 to 48.9 deg C (32 to 120 deg F) dry bulb and 5 to 100 percent relative humidity, non-condensing.
- B. Interior, Uncontrolled Environment: All system components installed in interior locations with uncontrolled environments shall be rated for continuous operation under ambient environmental condition of -17.8 to 48.9 deg C (0 to 120 deg F) dry bulb and 5 to 100 percent relative humidity, non-condensing.
- C. Exterior Environment: All system components that are installed in locations exposed to weather shall be rated for continuous operation under ambient environmental conditions of -34 to 48.9 deg C (-30 to 120 deg F) dry bulb and 5 to 100 percent relative humidity, condensing. In addition, the system components shall be rated for continuous operation as specified in UL 294 for outdoor use equipment.

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- D. Hazardous Environment: All system components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated and installed according to Chapter 5 of the NFPA 70.
- E. Console: All console equipment shall, unless noted otherwise, be rated for continuous operation under ambient environmental conditions of 15.6 to 29.4 deg C (60 to 85 deg F) and a relative humidity of 20 to 80 percent.

1.20 LIGHTNING, POWER SURGES, & GROUNDING

- A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference.
 - 1. A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
 - 2. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.
 - 3. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B.
 - 4. Operating Temperature and Humidity: -40 to 85 deg C (-40 to 185 deg F), 0 to 95 percent relative humidity.
 - 5. Grounding and Surge Suppression
 - a. The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. To ensure the operation of over current devices, such as fuses, circuit breakers, and relays, under ground-fault conditions.
 - b. Security Contractor shall engineer and provide proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards referenced in this document.
 - c. Principal grounding components and features. Include main grounding buses and grounding and bonding connections to service equipment.
 - d. Details of interconnection with other grounding systems. The lightning protection system shall be provided by the Security Contractor.
 - e. Locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
 - f. AC power receptacles are not to be used as a ground reference point.
 - g. Any cable that is shielded shall require a ground in accordance with the best practices of the trade and manufactures installation instructions.
 - h. Protection should be provided at both ends of cabling.

6. See Part 2 for approved TVSS devices.

1.21 COMPONENT ENCLOSURES

A. Construction of Enclosures

1. Consoles, power supply enclosures, detector control and terminal cabinets, control units, wiring gutters, and other component housings, collectively referred to as enclosures, shall be so formed and assembled as to be sturdy and rigid.
2. Thickness of metal in-cast and sheet metal enclosures of all types shall not be less than those in Tables I and II, UL 611. Sheet steel used in fabrication of enclosures shall be not less than 14 gauge. Consoles shall be 16-gauge.
3. Doors and covers shall be flanged. Enclosures shall not have pre-punched knockouts. Where doors are mounted on hinges with exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent removal. Doors having a latch edge length of less than 609.6 mm (24 in) shall be provided with a single construction core. Where the latch edge of a hinged door is more than 609.6 mm (24 in) or more in length, the door shall be provided with a three-point latching device with construction core; or alternatively with two, one located near each end.
4. Any ventilator openings in enclosures and cabinets shall conform to the requirements of UL 611. Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with tip holes slotted. Mounting holes shall be in positions that remain accessible when all major operating components are in place and the door is open, but shall be inaccessible when the door is closed.
5. Covers of pull and junction boxes provided to facilitate initial installation of the system shall be held in place by tamper proof Torx Center post security screws. Stenciled or painted labels shall be affixed to such boxes indicating they contain no connections. These labels shall not indicate the box is part of the Electronic Security System (ESS).

B. Tamper Provisions and Tamper Switches:

1. Enclosures, cabinets, housings, boxes and fittings or every product description having hinged doors or removable covers and which contain circuits, or the integrated security system and its power supplies shall be provided with cover operated, corrosion-resistant tamper switches. In addition, Gallery I-8 junction boxes and enclosures in the security closets will be provided with tamper switches.
2. Tamper switches shall be arranged to initiate an alarm signal that will report to the monitoring station when the door or cover is moved. Tamper switches shall be mechanically mounted to maximize the defeat time when enclosure covers are opened or removed. It shall take longer than 1 second to depress or defeat the tamper switch after opening or removing the cover. The enclosure and tamper switch shall function together in such a manner as to prohibit direct line of sight to any internal component before the switch activates.
3. Tamper switches shall be inaccessible until the switch is activated. Have mounting hardware concealed so the location of the switch cannot be observed from the exterior of the enclosure. Be connected to circuits which are under electrical supervision at all times, irrespective of the protection mode in which the

circuit is operating. Be spring-loaded and held in the closed position by the door or cover and be wired so they break the circuit when the door cover is disturbed. Tamper circuits shall be adjustable type screw sets and shall be adjusted by the contractor to eliminate nuisance alarms associated with incorrectly mounted tamper device shall annunciate prior to the enclosure door opening (within 1/4 " tolerance. The tamper device or its components shall not be visible or accessing with common tools to bypass when the enclosure is in the secured mode.

4. The single gang junction boxes for the portrait alarming and pull boxes with less than 102 square mm will not require tamper switches.
5. All enclosures over 305 square mm shall be hinged with an enclosure lock.
6. Control Enclosures: Maintenance/Safety switches on control enclosures, which must be opened to make routing maintenance adjustments to the system and to service the power supplies, shall be push/pull-set automatic reset type.
7. Provide one (1) enclosure tamper switch for each 609 linear mm of enclosure lock side opening evenly spaced.
8. All security screws shall be Torx-Post Security Screws.
9. The contractor shall provide the owner with two (2) torx-post screwdrivers.

1.22 ELECTRONIC COMPONENTS

- A. All electronic components of the system shall be of the solid-state type, mounted on printed circuit boards conforming to UL 796. Boards shall be plug-in, quick-disconnect type. Circuitry shall not be so densely placed as to impede maintenance. All power-dissipating components shall incorporate safety margins of not less than 25 percent with respect to dissipation ratings, maximum voltages, and current-carrying capacity.

1.23 SUBSTITUTE MATERIALS & EQUIPMENT

- A. In addition to this Section the Security Contractor shall also reference Section II, Products and associated divisions. Acceptable manufacturers of products included in this specification are indicated in Part 2.0 Products, Acceptable Manufacturers or approved equal. The Contractor shall list and identify those materials, devices, or equipment for which he intends a substitution. The Owner shall have final authority on the authorization or refusal of substitutions. If there are no proposed substitutions, a statement in writing from the Contractor shall be submitted to the Owner stating same. In the preparation of a list of substitutions, the following information shall be included, as a minimum:
 1. Identity of the material or devices specified for which there is a proposed substitution.
 2. Description of the segment of the specification where the material or devices are referenced.
 3. Identity of the proposed substitute by manufacturer, brand name, catalog or model number and the manufacturer's product name.
 4. A technical statement of all operational characteristic expressing equivalence to items to be substituted and comparison, feature-by-feature, between specification requirements and the material or devices called for in the specification; and
 5. Price differential.

- B. **Materials Not Listed:** Furnish all necessary hardware, software, programming materials, and supporting equipment required to place the specified major subsystems in full operation. Note that some supporting equipment, materials, and hardware may not be described herein. Depending on the manufacturers selected by the Owner, some equipment, materials and hardware may not be contained in either the Contract Documents or these written specifications, but are required by the manufacturer for complete operation according to the intent of the design and these specifications. In such cases, the Owner shall be given the opportunity to approve the additional equipment, hardware and materials that shall be fully identified in the proposal and in the equipment list submittal. The Owner shall be consulted in the event there is any question about which supporting equipment, materials, or hardware is intended to be included.
- C. **Response to Specification:** The Contractor shall submit a point-by-point statement of compliance with each paragraph of the security specification. The statement of compliance shall list each paragraph by number and indicate "COMPLY" opposite the number for each paragraph where the Contractor fully complies with the specification. Where the proposed system cannot meet the requirements of the paragraph, and does not offer an equivalent solution, the offers shall indicate "DOES NOT COMPLY" opposite the paragraph number. Where the proposed system does not comply with the paragraph as written, but the proposer feels it will accomplish the intent of the paragraph in a manner different from that described, the offers shall indicate "COMPARABLE". The offers shall include a statement fully describing the "comparable" method of satisfying the requirement. Where a full and concise description is not provided, the offered system shall be considered as not complying with the specification. Any submission that does not include a point-by-point statement of compliance, as described above, shall be disqualified. Submittals for products shall be in precise order with the product section of the specification. Submittals not in proper sequence will be rejected.

1.24 **LIKE ITEMS**

- A. Where two or more items of equipment performing the same function are required, they shall be exact duplicates produced by one manufacturer. All equipment provided shall be complete, new, and free of any defects.

1.25 **WARRANTY**

- A. The Contractor shall, as a condition precedent to the final payment, execute a written guarantee (warranty) to the Owner certifying all contract requirements have been completed according to the final specifications. Contract drawings and the warranty of all materials and equipment furnished under this contract are to remain in satisfactory operating condition (ordinary wear and tear, abuse and causes beyond his control for this work accepted) for one (1) year from the date the Contractor received written notification of final acceptance from the Owner. All defects or damages due to faulty materials or workmanship shall be repaired or replaced without delay, to the Owner's satisfaction, and at the Contractor's expense. The Contractor shall provide quarterly inspections during the warranty period. The contractor shall provide written documentation to the Owner on conditions and findings of the system and device(s). In

addition, the contractor shall provide written documentation of test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty. The warranty period shall be extended until the last inspection and associated corrective actions are complete. When equipment and labor covered by the Contractor's warranty, or by a manufacturer's warranty, have been replaced or restored because of it's failure during the warranty period, the warranty period for the replaced or repaired equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work. In the event any manufacturer customarily provides a warranty period greater than one (1) year, the Contractor's warranty shall be for the same duration for that component.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Low-Voltage Control Cable
 - 1. Belden
 - 2. WestPenn
 - 3. Or approved equivalent
- B. Wireline Transmission Media for Electronic Security
 - 1. Cisco Ethernet Level 3 Switches or approved equivalent
 - 2. DITEK for Transient Voltage Surge Suppression (TVSS)
 - 3. Or approved equivalent
- C. Miscellaneous Equipment
 - 1. Dell CPU/Monitors or equivalent
 - 2. Panasonic High Definition TV
 - 3. Or approved equivalent

2.2 RS-232 CABLE

- A. Standard Cable: NFPA 70, Type CM.
 - 1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - 2. Polypropylene insulation.
 - 3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - 4. PVC jacket.
 - 5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - 6. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated Cable: NFPA 70, Type CMP.

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1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 2. Plastic insulation.
 3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 4. Plastic jacket.
 5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 6. Flame Resistance: Comply with NFPA 262.
- 2.3 RS-485 CABLE
- A. Standard Cable: NFPA 70, Type CM or CMG.
1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with UL 1581.
- B. Plenum-Rated Cable: NFPA 70, Type CMP.
1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 2. Fluorinated ethylene propylene insulation.
 3. Unshielded.
 4. Fluorinated ethylene propylene jacket.
 5. Flame Resistance: NFPA 262, Flame Test.
- 2.4 LOW-VOLTAGE CONTROL CABLE
- A. Card Reader Cable: NFPA 70, CM (2 Cables).
1. RS485: 1 pair, twisted shielded, No. 22 AWG, Stranded tinned copper conductors.
 2. 12VDC Power: 1 pair, twisted, No 18 AWG, Stranded tinned copper conductors,
 3. PVC Insulation.
 4. Flame Resistance: Comply with UL 1581.
- B. Paired Lock Power Cable: NFPA 70, Type CMG.
1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with UL 1581.
- C. Plenum-Rated, Paired Lock Power Cable: NFPA 70, Type CMP.
1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
 2. PVC insulation.
 3. Unshielded.

4. PVC jacket.
 5. Flame Resistance: Comply with NFPA 262.
 - D. Paired Lock Power Cable: NFPA 70, Type CMG.
 1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with UL 1581.
 - E. Plenum-Rated, Paired Lock Power Cable: NFPA 70, Type CMP.
 1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 2. Fluorinated ethylene propylene insulation.
 3. Unshielded.
 4. Plastic jacket.
 5. Flame Resistance: NFPA 262, Flame Test.
- 2.5 **CONTROL-CIRCUIT CONDUCTORS**
- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
 - B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway or conduit complying with UL 83.
 - C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.
- 2.6 **CABLE IDENTIFICATION PRODUCTS**
- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Brady Corporation
 2. HellermannTyton.
 3. Kroy LLC.
 4. Panduit Corp.
 5. EZ Label.
 6. Or equivalent.
 - B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
 - C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."
- 2.7 **ETHERNET SWITCHES**
- A. Network(s) connecting PCs, Handheld Devices, Cameras, Intercoms and PA systems, and Controllers (ESS) shall consist of one or more of the following:

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1. Local area, IEEE 802.3 or 802.11 (where required) Fast Ethernet 1000 BASE-TX star topology network based on TCP/IP.
 - a. Utilize VPN when connecting to facility systems.
 - b. Utilize VPN for logical traffic management.
 - c. Use best practices when configuring the Network Switches. Cisco 3560 PoE+ 48 Port Ethernet Switch or approved equal.
 - d. The Ethernet Switch will be equipped with two (2) SFP Modules (1 Gigabit).

2.8 **POWER SURGES AND GROUNDING**

A. Transient Voltage Surge Suppression

1. All cables and conductors extending beyond building perimeter, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage surges and have Transient Voltage surge suppression protection (TVSS) UL listed in accordance with Standard 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 915 mm (36 in) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following waveforms:
 - a. A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
 - b. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.
 - c. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equivalent.
 - d. Operating Temperature and Humidity: -40 to + 85 deg C (-40 to 185 deg F), and 0 to 95 percent relative humidity, non-condensing.

B. Access Control Systems

1. Suppressors shall be installed on AC power at the point of service and shall meet the following criteria:
 - a. UL1449 2nd Edition, 2007, listed
 - b. UL1449 S.V.R. of 400 Volts or lower
 - c. Status Indicator Light(s)
 - d. Minimum Surge Current Capacity: 40,000 Amps (8 x 20 μ sec)
 - e. Maximum Continuous Current: 15 Amps
 - f. MCOV: 125 VAC
 - g. Service Voltage: 110-120 VAC
 - h. Ten Year Limited Warranty

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- i. Acceptable Manufacturer: DITEK CORP. DTK-8FF, or approved equivalent.
2. Suppressors shall be installed on the Low Voltage circuit at both the point of entrance and exit of the building. Suppressors shall meet the following criteria:
 - a. UL 497B
 - b. Minimum Surge Current Capacity: 2,000 Amps per pair
 - c. Maximum Continuous Current: 5 Amps
 - d. MCOV: 33 Volts
 - e. Service Voltage: 24Volts
 - f. Ten Year Limited Warranty
 - g. Acceptable Manufacturer: DITEK CORP. DTK-2MHLP24BWB DTK-1LVLPLV, or approved equivalent.
3. Suppressors shall be installed on the communication circuit between the access controller and card reader at both the entrance and exit of the building. Suppressors shall meet the following criteria:
 - a. Conforms with UL497B standards (where applicable)
 - b. Clamp level for 12 and 24V power: 18VDC / 38VDC
 - c. Clamp level for Data/LED: 6.8VDC
 - d. Service Voltage for Power: 12VDC/24VDC
 - e. Service Voltage for Data/LED: <5VDC
 - f. Clamp level – PoE Access Power: 72V
 - g. Clamp level – PoE Access Data: 7.9V
 - h. Service Voltage – PoE Access: 48VAC – 54VAC
 - i. Service Voltage – PoE Data: <5VDC
 - j. Ten Year Limited Warranty
 - k. Acceptable Manufacturer – DITEK CORP., or approved equivalents
 - 1) DTK-4LVLPCR (use DTK-3LVLP-X for “Wiegand” type readers)
 - 2) DTK-4LVTEP (commercial telephone entry)
 - 3) DTK-4LVXR (residential telephone entry)
 - 4) DTK-MRJPOE (Power over Ethernet access control)

C. Intercom Systems

1. Suppressors shall be installed on the AC power at the point of service and shall meet the following criteria:
 - a. UL 1449 Listed
 - b. UL 1449 S.V.R. of 400 Volts or lower
 - c. Diagnostic Indicator Light(s)
 - d. Integrated ground terminating post (where case/chassis ground exists)
 - e. Minimum Surge Current Capacity of 13,000 Amps (8 x 20 μ Sec)
 - f. Ten Year Limited Warranty
 - g. Acceptable Manufacturer: DITEK CORP. DTK 3GTP, DTK-3GTPX, or approved equivalent.

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2. Suppressors shall be installed on incoming central office lines and shall meet the following criteria:
 - a. UL 497A Listed
 - b. Multi Stage protection design
 - c. Auto-reset current protection not to exceed 2 Amps per pair
 - d. Minimum Surge Current of 500 Amps per pair (8 x 20 μ Sec)
 - e. Ten Year Limited Warranty
 - f. Acceptable Manufacturer: DITEK CORP. DTK-SL Series or DTK-MT_SCP Series, or approved equivalent.
3. Suppressors shall be installed on all telephone/intercom circuits that enter or leave separate buildings and shall meet the following criteria:
 - a. UL 497A Listed (where applicable)
 - b. UL 497B Listed (horns, strobes, speakers or communication circuits over 300 feet)
 - c. Multi Stage protection design
 - d. Auto-reset over-current protection not to exceed 5 Amps per pair
 - e. Minimum Surge Current of 1000 Amps per pair (8 x 20 μ Sec)
 - f. Ten Year Limited Warranty
 - g. Acceptable Manufacturer: DITEK CORP., or approved equivalent
 - 1) DTK-SL Series
 - 2) DTK-MT_SCP Series
 - 3) DTK-2MHLP/2MHTP Series
 - 4) DTK-LVLP Series

D. Intrusion Detection Systems

1. Suppressors shall be installed on AC at the point of service and shall meet the following criteria:
 - a. UL 1449, 2nd Edition 2007, listed
 - b. UL 1449 S.V.R. of 400 Volts or lower
 - c. Status Indicator Lights
 - d. Center screw for terminating Class II transformers
 - e. Minimum Surge Current Capacity of 32,000 Amps (8 x 20 μ Sec)
 - f. Ten Year Limited Warranty
 - g. Acceptable Manufacturer: DITEK CORP. DTK-1F, or approved equivalent.
2. Suppressors shall be installed on all Telephone Communication Interface circuits and shall meet the following criteria:
 - a. UL 497A Listed
 - b. Multi Stage protection design
 - c. Surge Current Capacity: 9,000 Amps (8x20 μ Sec)
 - d. Clamp Voltage: 130Vrms
 - e. Auto reset current protection not to exceed 150 milliAmps
 - f. Ten Year Limited Warranty

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- ### E. Closed Circuit Television Systems (CCTV)

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- 4) The Contractor shall provide detail drawings of interconnection with other grounding systems including lightning protection systems.
- 5) The Contractor shall provide details of locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
- 6) AC power receptacles are not to be used as a ground reference point.
- 7) Any cable that is shielded shall require a ground in accordance with applicable codes, the best practices of the trade, and all manufactures' installation instructions.

F. 120 VAC Surge Suppression

1. Shall be Ditek HW Series, or approved equivalent.
2. Continuous Current: Unlimited (parallel connection)
3. Max Surge Current: 13,500 Amps
4. Protection Modes: L - N, L - G, N - G
5. Warranty: Ten Year Limited Warranty
6. Dimension: 73.7 x 41.1 x 52.1 mm (2.90 x 1.62 x 2.05 in)
7. Weight: 2.88 g (0.18 lbs)
8. Housing: ABS
9. Other Specifications:

a. 120HW or approved equal

- 1) Agency Approvals: UL1449, cUL
- 2) Connection: 110-120VAC
- 3) MCOV: 130VAC
- 4) Max Surge Current: 22,500A

b. 240HW or approved equal

- 1) Agency Approvals: N/A
- 2) Connection: 120/240VAC
- 3) MCOV: 130/260VAC
- 4) Max Surge Current: 27,000A

c. 3W220HW or approved equal

- 1) Agency Approvals: N/A
- 2) Connection: 220-240VAC
- 3) MCOV: 250VAC
- 4) Max Surge Current: 13,500A

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 GENERAL

- A. The Contractor shall install all system components and appurtenances in accordance with the manufacturer's instructions, ANSI C2, and furnish all necessary interconnections, services, and adjustments required for a complete and operable system as specified. Control signals, communications, and data transmission lines grounding shall be installed as necessary to preclude ground loops, noise, and surges from affecting system operation. Equipment, materials, installation, workmanship, inspection, and testing shall be in accordance with manufacturers' recommendations and as modified herein.
- B. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation. Refer to the Riser/Connection diagram for all schematic system installation/termination/wiring data.
- C. All equipment shall be attached to walls and ceiling/floor assemblies and held firmly in place (e.g., sensors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.
- D. Current Site Conditions: The Contractor shall visit the site and verify site conditions are in agreement with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Owner in a report as defined in paragraph Group II Technical Data Package. The Contractor shall take no corrective action without written permission from the Owner.
- E. The system shall be installed by qualified technicians who have been factory trained and certified in the installation and maintenance of this particular system.

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- F. Wiring shall be uniform, approved for intercom use and in accordance with national electric codes and manufacturer's instructions. Contractor shall install the appropriate size wire for the distances involved on this project.
- G. Equipment shall be firmly secured, plumb, and level.
- H. All splices shall be in stations or in appropriate enclosed junction boxes
- I. All cable runs shall be tagged and identified.
- J. All work shall be coordinated with other trades involved.

3.3 WIRE AND CABLE

- A. Wire: For Category 5 & 6 Cabling, refer to Division 27 specifications. The following security provisions apply to systemizing requirements:
 - 1. All security system wiring must be new. All existing wiring not noted for reused and replaced shall be removed.
 - 2. Wiring shall be in accordance with local, state and national codes and as recommended by the manufacturer and compatible with the security system. Number and size and type of conductors shall be as recommended by the security system manufacturer, but not less than 22 AWG twisted shield pair. Network and computer devices may require 24 AWG solid copper conductors for video/data transmission (e.g., TCP/IP, Video) as recommended by the equipment manufacturer.
 - 3. All wire and cable shall be listed and/or approved by a recognized testing agency for intended application and use with a protective signaling system. Provide 300 VAC/60° C rated insulated conductors unless noted otherwise.
 - 4. Wire and cable in air circulation areas which is not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
 - 5. Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically accepted by the security equipment manufacturer.
 - 6. All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring, a trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
 - 7. Wiring conductors provided in elevator hoist ways and traveling cables shall be listed and approved for elevator use. Conductor insulation shall be TFN, TFFN, THWN, THHN or other insulation designated as Flame Retardant. Insulation rating shall equal or exceed the maximum normal circuit voltage applied to any conductor within the cable or raceway.
- B. Method of Wiring

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1. General: Wire each alarm, trouble, and supervisory signal, initiating circuit, communication circuit, and each security notifying appliance circuit for supervised operation.
2. Wiring within Cabinets: Provide wiring within cabinets installed parallel with or at right angles to the sides and back of the enclosure. All conductors which are terminated, spliced, or otherwise interrupted in any enclosure associated with the security system shall be connected to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with either crimp-on terminal spade lugs or approved pressure type terminal blocks. Terminal blocks shall be secured in each junction box to the junction box cover plate.
3. Interior Work: Cables installed in plenums shall meet UL 910, and cables to be installed in risers shall meet UL 1666.
4. Installation in Ducts or Conduits: A cable lubricant compatible with the cable sheathing material shall be used on all cables pulled. Pulling fixtures shall be attached to the cable strength members. If indirect attachments are used, the grip diameter and length shall be matched to the cable diameter and characteristics. If indirect attachment is used on cables having only central strength members, the pulling forces shall be reduced to ensure the fibers are not damaged from forces being transmitted to the strength member. During pulling the cable pull line tension shall be continuously monitored and not exceed the maximum tension as given by the cable manufacturer. The mechanical stress placed upon a cable during installation shall not twist or stretch the cable.
 - a. A cable feeder guide shall be used between the cable reel and the face of the duct or conduit to protect the cable and guide it into the duct or conduit as it is played off the reel. As the cable is played off the reel, it shall be carefully inspected for jacket defects. Precautions shall be taken during installation to prevent the cable from being kinked or crushed and the minimum bend radius of the cable is not exceeded at any time. Cable shall be hand fed and guided through each manhole and additional lubricant shall be applied at all intermediate manholes.
 - b. When practicable, the center pulling techniques shall be used to lower pulling tension. That is, the cable shall be pulled from the center point of the cable run towards the end termination points. The method may require the cable to be pulled in successive pulls. If the cable is pulled out of a junction box or manhole the cable shall be protected from dirt and moisture by laying the cable on a ground covering.
5. Vertically Run Cable: When possible, use gravity to assist in cable pulling; pull cable from top of run to bottom of run. Hand-pull cables if possible; if machine assistance is required, monitor tension and do not exceed the specific cable tension limits. After installation, the vertical tension on the cable shall be relieved at maximum intervals of 30.48 m (100 ft) using a split support grip.
6. Cable Taps: The Contractor shall provide a terminal cabinet where any circuit tap is made.
7. Color Coding: The Contractor shall distinctively color code all wiring differently from the normal building wiring. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves. Wire the alarm initiating

and notification signal devices so removal will cause the system trouble device to sound. Each conductor used for the same specific function shall be distinctively color coded. Use two (2) different color codes for each interior alarm circuit; one (1) for each loop. Each circuit color code wire shall remain uniform throughout the circuit.

8. Termination: End-of-line supervisory resistors or devices are to be provided at the sensor device location. The end of line resistor network shall be per manufacturer's recommendations; in the absence of such, it shall consist of two (2) 1k resistors, one (1) across the normally closed contact of the device and the other in series with the normally closed circuit. See drawing details for further information. Use of GRI Resistor Packs is preferred.
9. No "stick-on" cable ties shall be used within the enclosure.

C. Cable Installation

1. All field wiring required for interconnection of the various security system components shall be installed within conduit.
2. All circuits shall be protected to avoid interruption of service due to short-circuiting or other conditions which may adversely affect the connecting devices. Each individual signaling circuit shall be classified as a circuit pair.
3. Screw terminal blocks or connectors shall be furnished for all cables which interface with racks, cabinets, consoles or equipment modules. No more than 2 mm of exposed bare wire may show when either crimped or fastened to a connector block or terminal strip.
4. Every cable or wire shall be permanently labeled at each end. Marking labels used on cables shall correspond to labels shown on as-built drawings and matrix sheets. Utilize a cable administration and labeling solution compliant TIA/EIA-606-A, such as Panduit TIA/EIA-606-A compliant Cable Identification and Labeling System. Wire cable numbers cannot repeat anywhere on the project. Each terminal of each field terminal strip shall be permanently labeled to show the zone, instrument or item served. Terminal blocks shall be numbered by circuit pairs, such as 1 to 25, 26 to 50, etc.
5. Care shall be exercised in wiring to avoid damage to the cables or the equipment. All joints and connections shall be made with mechanical butt splice connectors. The crimping tool used shall be recommended by the manufacturer. Wire nuts shall not be an acceptable splice method.
6. To reduce the possibility of signal contamination, all cables shall be grouped according to the signals being carried. The horizontal and vertical cable runs should be bundled or grouped as follows:
 - a. Low Voltage Power
 - b. Signal, Control Cables, and Video Cables
7. All cabling shall be U.L. listed for its intended application and meet or exceed the standards as recommended by the manufacturers of the components being interconnected. All shielded cabling used shall be 100 percent shielded.
8. All system wiring shall be installed in accordance with the instructions provided by the manufacturers of the components being used in the system and in accordance with codes, specifications, and standards as referenced herein.

9. Splices shall not be permitted in system wiring between components which are incorporated in the system. Wiring runs must terminate at either a system component or a junction box where wiring is interconnected using terminal strips or connectors. Wire ends shall be prepared for attachment to component terminals in accordance with the recommendations of the equipment manufacturers. If there is no alternative and a wire/cable splice must be made, the Contractor shall notify the Owner and request approval through a formal RFI process prior to making the wire splice.
 - a. The RFI shall include the following:
 - 1) The Contractor shall identify the device and/or system affected by the proposed splice and why the splice is required.
 - 2) Provide in detail the methodology which shall be utilized for the wire/cable splice. A diagram may be used to demonstrate methodology but shall not replace the written methodology requirement.
 - 3) If splicing is required for more than five (5) wires/cables, a formal wire management plan shall be developed to provide methodology for maintaining wire/cable consistency and performance.
 - 4) In all instances the Contractor shall provide the Owner with a mock-up of the proposed splice and samples of the materials to be used.
 - 5) The Contractor shall not proceed until written approval has been received from the Owner for the splice and the splice materials.
 - b. The following criteria shall be utilized for installing wire/ cable splices.
 - 1) Twist type connectors shall not be used for wire splicing.
 - 2) Wire splices shall be made on binding screw captive mechanical compression terminal strips.
 - 3) Soldered and crimped connections are allowed and shall be accomplished with crimping Lug Manufacturers Calibrated Tool.
 - 4) Solder connections shall be applied in accordance with BICSI standards.
 - 5) Mechanical splices shall utilize a UL listed ratchet type connector. The Contractor shall select the appropriate connector size based on gauge of the wire/cable being spliced. The Contractor shall only use manufacture approved full cycle ratchet crimping devices.
 - 6) The Contractor shall utilize appropriately sized UL listed heat shrink tubing. Splices shall be encapsulated with an epoxy or ultraviolet light cured splice encapsulator, particularly if the spliced wire/cable is direct-buried, environmentally exposed, or located in an exterior hand hold.
 - 7) The Contractor shall ensure all completed splices are accessible. Splices shall be made in lockable/tampered security enclosures or in security junction/pull boxes that use tamper proof Torx Center post security screws to secure the box cover. At no time shall spliced wires/cables be permitted to be pulled into the conduit system.
 - 8) For all splices, the Contractor shall affix a permanent label (self-adhesive or heat shrink type) to the wire/cable adjacent to the splice. The label shall indicate the device or circuit the wire/cable originates

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- at. The label shall be identical to the labels found at either terminated end of the wire/cable.
- 9) All spliced wires/cables shall be tested in witness of the Owner to ensure system performance is not adversely affected by the splices' presence.
- c. All copper conductor splices shall be accomplished in the following method:
 - 1) Strip insulation from wires to be spliced using caution not to score or strip away the actual conductor.
 - 2) Twist together the stripped conductors for a minimum of four rotations.
 - 3) Solder the twisted conductors using rosin core solder.
 - 4) Trim the twisted and soldered conductors to a length accommodated by the vinyl insulated closed end splice or butt splices in the next step. Trimmed bare conductors shall not extend beyond the insulated closed end splice (or equal).
 - 5) Crimp insulated closed end splice utilizing a full cycle ratchet crimp tool approved by the splice manufacturer. The crimped connections shall be free of any movement between the wire and crimp splice device.
- 10. Connections at devices shall be soldered or fastened with approved crimp connectors. No wire nuts will be permitted. Wire should be twisted four times before a crimp connector is applied. The Manufacturers crimping tool shall be utilized for the crimp connectors of choice. Environmental connectors shall be used in harsh or outdoor environments. Devices requiring connections within metal extrusions associated with perimeter windows and doors are considered to be a harsh environment.
- 11. All mounted wire ties shall be the screw down type. Wire ties utilizing only an adhesive back are not acceptable.
- 12. Heat shrink tubing must be installed on all cable ends within cabinets.
- 13. Cable shields are to be grounded only at the DGP end, for alarms and CCTV. Shields are to be carefully insulated to prevent conductor shorts.
- 14. Permanent labels, attached to each cable end, shall be close to cable ends in cabinets and not hidden from view by cable ties. Labels must be visible without having to cut cable ties to read the number.
- D. Grounding Practices
 - 1. The existing single system ground point shall be maintained for all security and security related systems described in the BICSI guidelines and is to be provided and installed by the Contractor.
 - 2. Under no circumstances shall either the conduit or AC neutral be used for the security system ground reference point.
- E. Control of Electromagnetic Interference (EMI)
 - 1. The control of EMI is critical to the reliable operations of the systems described in these specifications. It is the responsibility of the Security Contractor to ensure all equipment and systems proposed meet FCC requirements and certifications

for type regarding electromagnetic emissions. The Security Contractor shall submit evidence of such certifications with their pre-fabrication submittals.

2. All equipment shall be installed in accordance with manufacturers' specifications and recommendations to assure compliance with FCC certifications and requirements. This shall include proper installation to maintain case integrity; proper fastening of conductors, wires, cables, and connectors; use of appropriate connectors and fasteners; and following manufacturers' recommendations for grounding practices.
3. The Security Contractor shall certify compliance with manufacturers' recommendations and specifications regarding control of EMI.

3.4 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Pathway Installation in Equipment Rooms:
 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of the room where multiple sheets of plywood are installed around perimeter walls of room.
 2. Install cable trays to route cables if conduits cannot be located in these positions.
 3. Secure conduits to backboard when entering room from overhead.
 4. Extend conduits 75 mm (3 in) above finished floor (AFF).
 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 2440 mm (96 in) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.5 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 1. Comply with TIA/EIA-568-B.1.
 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 3. Install 110-style IDC termination hardware unless otherwise indicated.
 4. Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 5. Cables may not be spliced. Secure and support cables at intervals not exceeding 760 mm (30 in) and not more than 150 mm (6 in) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

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6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 9. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable". Monitor cable pull tensions.
- C. UTP Cable Installation:
1. Comply with TIA/EIA-568-B.2.
 2. Do not untwist UTP cables more than 12 mm (0.5 in) from the point of termination to maintain cable geometry.
- D. Optical Fiber Cable Installation:
1. Comply with TIA/EIA-568-B.3.
 2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.
- E. Open-Cable Installation:
1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 2. Suspend copper cable not in a wireway or pathway a minimum of 200 mm (8 in) above ceilings by cable supports not more than 1525 mm (60 in) apart.
 3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- F. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
 2. Install cabling after the flooring system has been installed in raised floor areas.
 3. Coil cable 1830 mm (72 in) long shall be neatly coiled not less than 300 mm (12 in) in diameter below each feed point.
- G. Outdoor Coaxial Cable Installation:
1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
 2. Attach antenna lead-in cable to support structure at intervals not exceeding 915 mm (36 in).
- H. Separation from EMI Sources

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 127 mm (5 in).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 300 mm (12 in).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 600 mm (24 in).
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 64 mm (2.5 in).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 150 mm (6 in).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 300 mm (12 in).
 4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 75 mm (3 in).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 150 mm (6 in).
 5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 1200 mm (48 in).
 6. Separation between Cables and Fluorescent Fixtures: A minimum of 127 mm (5 in).
- 3.6 CONTROL-CIRCUIT CONDUCTORS
- A. Minimum Conductor Sizes:
1. Class 1 remote-control and signal circuits, No. 14 AWG.
 2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
 3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.
- 3.7 CONNECTIONS
- A. Comply with requirements in Division 28 Section "Perimeter Security Systems" for connecting, terminating, and identifying wires and cables.
- B. Comply with requirements in Division 28 Section "Intrusion Detection" for connecting, terminating, and identifying wires and cables.

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- C. Comply with requirements in Division 28 Section "Access Control" for connecting, terminating, and identifying wires and cables.
- D. Comply with requirements in Division 28 Section "Video Surveillance" for connecting, terminating, and identifying wires and cables.
- E. Comply with requirements in Division 28 Section "PLC Electronic Detention Monitoring and Control Systems" for connecting, terminating, and identifying wires and cables.

3.8 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".
- B. Comply with TIA/EIA-569-A, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.9 GROUNDING

- A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.10 CABLE IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- D. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

3.12 WIRELINE DATA TRANSMISSION

- A. Installation: The Contractor shall install all system components including Owner furnished equipment, and appurtenances in accordance with the manufacturer's instructions, ANSI C2 and as shown, and furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable data transmission system.
- B. Identification and Labeling: The Contractor shall supply permanent identification labels for each cable at each end that will appear on the as-built system loading sheets. The labeling format shall be identified and a complete record shall be provided to the

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Owner with the final documentation. Each cable shall be identified by type or signal being carried and the termination points. The labels shall be printed on letter size label sheets that are self laminated vinyl which can be printed from a computer data base or spread sheet. The labels shall be E-Z code WES12112 or equivalent. Contractor shall create a unique cable identification system where no two cables will have the same identification label.

- C. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.
- D. Identification and Labeling: The Contractor shall supply identification tags or labels for each cable. Cables shall be labeled at both end points and at intermediate hand holes, manholes, and junction boxes. The labeling format shall be identified and a complete record shall be provided to the Owner with the final documentation. Each cable shall be identified with type of signal being carried and termination points.

PART 4 - SYSTEM PROGRAMMING

4.1 GENERAL

- A. Refer to format provided under submittals section. The following Loading Sheet submittals are required:
 - 1. Shop Drawings – Technical Data Group I Submittal
 - 2. Final Construction Document Submittal – Technical Group VI Submittal
- B. Loading Sheets
 - 1. See the attached loading sheets. Refer to Section 1 regarding loading sheet submissions.

4.2 SYSTEM INITIALIZING & PROGRAMMING

- A. The system shall be turned on and adjustments made to meet all requirements of the specifications and on-site conditions.
- B. The system shall be programmed to function as specified.
- C. Directory numbers, codes, and any special programming shall be documented and written copy made available to the owner.

4.3 SYSTEM NAMING CONVENTIONS

- A. Alarm / Event Identification Format for Monitoring Station
 - 1. Initial descriptor: The Initial Descriptor is a brief description of the event taking place and shall be no more than 50 characters in length. For any Building ID, Area ID or Device / Condition Type that is not listed below, owner shall be contacted for the appropriate descriptor.
 - a. Building ID: This shall be a two (2) or four (4) character identification of the building where the event is taking place. This shall follow the standard format as shown in the listing below. Confirm buildings and identifications with the owner.
 - b. Monitor Point Location:
 - 1) This is the monitor point physical location. There shall be no separation between the Building ID and the Monitor Point Location.
 - c. Area ID (Type)
 - 1) This shall be a brief description of the location of the alarm / event. There shall be a one (1) character space between the Monitor Point

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Location and the Area ID. At a minimum level of description, this shall follow the standard format as shown in the listing below. Confirm areas and identifications with the owner.

d. Device / Condition Type

- 1) This shall be a two (2) digit descriptor for the type of device / condition that initiated the alarm / event. There shall be a one (1) character space between the Area ID and the Device / Condition Type. This shall follow the standard format as shown in the listing below. Confirm device / condition identifications with the owner.
2. Secondary descriptor (128 character): This shall be an in-depth description for the location of the alarm / event taking place. If multiple devices are connected to the same monitor point the number of devices should be indicated.

a. Linked Instruction Event

- 1) This shall be a full instructional description for the processing of the alarm / event and shall follow the standard format of:
 - Repeat 50 character descriptor
 - In-depth description of location
 - Response instructions
 - Logging instructions
 - Reset instructions
 - Nearest camera location (If multiple views are available list all)
 - DGP that input is connected to

B. Alarm / Event Mapping Requirements

1. General: All maps associated with alarm / event call-ups shall be a black foreground on a white background.
2. Map Information Screen: The map information screen shall provide access to three different map levels for each event:
 - a. Building Floor Map: This map shall have the quadrant where the event is taking place line colored blue or the colored event icon in place. This map shall be identified with the building name and floor at the bottom of the map.
 - b. Quadrant Map: This shall be the map that is called up by the system automatically upon event activation. This map shall be identified with the building name, floor number, and quadrant at the bottom of the map. This map shall have the icon representing the event shown upon call up. Clicking on the icon or a map "zoom in" icon at this map level shall call up the Area map.
 - c. Area Map: This map shall represent the local area of the building where the event is taking place. This map shall contain all icons associated with this area. These icons shall be "living", changing colors as the associated devices change state. This map shall be identified with the building name, floor number, quadrant, and area name at the bottom of the map.

3. Mapping icons

- a. Mapping icons shall be “living” changing color as the associated devices change state.
 - 1) Red = alarm / activated state
 - 2) Green = secure / normal state
 - 3) Yellow = masked, shunted, accessed, etc. state
- b. Mapping icons represented on the Area map shall be grouped and positioned as follows:
 - 1) Motion detectors providing back up to perimeter door(s) / window(s).
 - a) A Single icon shall be placed in a close geographical position to the protected door(s) or window(s), to represent all devices in that zone or group
 - 2) Motion detectors providing back up to public staff separation doors and other internal doors.
 - a) A single icon shall be placed in a close geographical position to the protected door.
 - 3) Motion detectors providing volumetric protection of a room.
 - a) A single icon shall be placed in the center of the room, to represent all devices in that zone or group
 - 4) Glass break detectors protecting perimeter windows
 - a) A single icon shall be placed in a close geographical position to the center of the window or group of windows, to represent all devices in that zone or group
 - 5) Door contacts protecting individual perimeter doors or logical groups of perimeter doors.
 - a) A single icon shall be placed in a close geographical position to the center of the door or group of doors, to represent all devices in that zone or group
 - 6) Delayed egress pre alarm contacts protecting individual doors or logical groups of doors.
 - a) A single icon shall be placed in a close geographical position to the center of the door or group of doors, to represent all devices in that zone or group.
 - 7) Window contacts protecting individual perimeter windows or logical groups of perimeter windows.

- a) A single icon shall be placed in a close geographical position to the center of the window or group of windows, to represent all devices in that zone or group.
- 8) Card reader events to include door forced open and door held open alarms.
 - a) A single icon shall be the same as the door contact protecting the door.
 - b) Icon descriptor shall identify the appropriate event taking place.
- 9) Tamper alarms protecting panels in security closets.
 - a) A single icon shall be placed in the center of the room, to represent all devices in that zone or group.
- 10) Tamper alarms protecting individual devices or logical groups of devices.
 - a) A single icon shall be placed in close geographical position to the device or group of devices, to represent all devices in that zone or group.

4.4 FAMILIARIZATION TRAINING

- A. The purpose is to familiarize operators, security management, and technicians with the basic operating components of all control room system. This training will provide operators with sufficient information to monitor the alarm system during system installation, before final system configuration and acceptance has been completed. It will also provide technicians with enough information to provide a basic level of system service during the construction period.
- B. The course shall be taught at the project site for a period of five (5) consecutive training days. Generally, the contractor should plan for the course to begin approximately 15 days before scheduled system cut-over. Project management and system installation progress will determine the appropriate time for familiarization training, and the contractor will submit the dates for familiarization training to the Owner within 60 days of proposed date of delivery.
- C. The contractor shall submit for approval the training schedule and course curriculum 30 days prior to course delivery. Course curriculum information shall include written learning objectives for each block of instruction. A maximum of 15 students per day will attend this course.
- D. The general outline for the course will contain, at a minimum, the subject areas listed below. In-depth training in these areas will be addressed in follow-up courses for operators, supervisors and maintenance technicians. Upon completion of the course, operators should be able to perform elementary monitoring operations with guidance and describe the general hardware and architecture of the system.

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Day	Attendees	Subject Areas
1	Operators	General security system configuration and architecture System interface familiarity System monitoring components (CCTV and card access) Operator Commands Access to all systems Object (intelligent) Video Training (provided by object video personnel under separate work – contractor to coordinate.) Receive and test individual Login and passwords New room layout and operation
2	Supervisors	General system configuration and architecture System interface familiarity System monitoring components (CCTV and card access) All systems operations Operator Commands (override functions) New Room layout Preliminary troubleshooting of all systems
3	Administrator	All functional requirements of the Administrator (all systems)
4	Technicians	Database Entry System Network Configurations (security privileges, setups, etc.) Reports Generation Diagnostics Technicians Basic Maintenance Board Configuration Processor Unit Orientation Installation System back-ups
5	TBD by Owner	Curriculum shall be one, or a combination of, the above topics.

E. Classroom Configuration

1. The familiarization course will be taught on site. The contractor shall coordinate classroom location and configuration with Owner. Generally, five to seven (5-7) additional training workstations (two (2) students per workstation) will be configured in a network environment to receive alarms from the installed security

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management system (Note: Additional temporary cabling will be necessary). Hands-on training scenarios will use the installed database of the security management system and alarm information shall be pre-loaded to facilitate practical exercises and demonstration.

F. Operator Training

1. The purpose of this course is to thoroughly train operators and supervisors in the operation, monitoring, and proper response procedures for the new security system. Operator training shall be taught approximately 10 days prior to scheduled system start-up date. Attendees will be future system operators and security unit supervisors. Operator training shall consist of five (5) two-day instruction periods (10 days total). Five to ten (5-10) operators or supervisors will attend each course at five (5) workstation monitors. The first day of the course will be dedicated to system architecture, interface orientation, and alarm system monitoring. The second day of training will emphasize Owner alarm monitoring procedures, reports, and practical scenarios. Contractor will submit course curriculum and learning objectives 30 days prior to training. Practical scenarios and tests will be developed in consultation with owner. After consultation with contractor, owner will provide pertinent procedural information bearing upon Day 2 of training approximately 15 days prior to training.
2. Training will include, at a minimum, the following:
 - a. Windows Operating System Training (Brief Orientation)
 - b. General security system hardware architecture
 - c. Functional operation of system, including CCTV operation, backups, NVR operation and Intercom training
 - d. Operator commands and response to alarms
 - e. Alarm reporting
 - f. Operator trouble-shooting
 - g. Resolution to system error messages
 - h. Practical scenarios and hands-on test for certification.
3. The contractor can teach all operators and supervisors on or off site, providing that the site offers all of the needed requirements. The contractor will establish a training environment and curriculum format adhering to the following conditions:
 - a. Five training workstations shall be configured in a networked environment.
 - b. A network printer capable of printing reports from each workstation shall be provided.
 - c. The interface shall emulate the interface of the installed system.
 - d. The security management database in the classroom shall emulate the database in the field.
 - e. Graphics, maps, and zone terminology shall emulate the system conditions. Use of the new control center may be considered.
 - f. Practical, hands-on scenarios shall replicate system monitoring conditions (i.e.: duress alarms, communication failures, receipt of multiple alarms, etc.)
 - g. Overheads, slides, power point presentations, and take home documents displayed used for classroom edification shall emulate the interface, graphics, and terminology of the installed system at the project site.

- h. Alarm CCTV call-ups
- i. The minimum number of scenarios for all the above is 10.

G. Alarm Technician Training

- 1. The purpose of this course is to train alarm technicians to install, trouble shoot and maintain alarm system data gathering panels and security devices. The contractor shall familiarize the class with data gathering panels and intrusion detection, delayed-egress, access control and CCTV equipment installed under the project. At the end of the class the technicians shall be capable of replacing damaged devices or data gathering panels and installing new devices or data gathering panels to the system. The course shall have a duration of one (1) day and take place in a classroom setting on site. Training shall not be Manufacturer level training but more of current site considerations, setup, etc.

H. Administrator Training

- 1. Administrator training shall consist of administrator level function for all systems under this project. Administrator shall be training in general system administrative functions prior to the training.

4.5 SYSTEM PROGRAMMING

A. General Programming Requirements

- 1. This following section shall be used by the contractor to identify the anticipated level of effort (LoE) required setup, program, and configure the ESS. The contractor shall be responsible for providing all setup, configuration, and programming to include data entry for the SMS and subsystems [(e.g., video matrix switch, intercoms, digital video recorders, intrusion devices, including integration of subsystems to the SMS (e.g., camera call up, time synchronization, intercoms)]. System programming for existing or new SMS servers shall not be conducted at the project site.

B. Level of Effort for Programming

- 1. The Contractor shall perform and complete system programming (including all data entry) at an offsite location using the Contractor's own copy of software. The Contractor's copy of the SMS software shall be of the OWNER current version. Once system programming has been completed, the Contractor shall deliver the data to the Owner on data entry forms (loading sheets) and an approved electronic medium, utilizing data from the contract documents. The completed forms shall be delivered to the Owner for review and approval at least 90 calendar days prior to the scheduled date the Contractor requires it. The Contractor shall not upload system programming until the Owner has provided written approval. The Contractor is responsible for backing up the system prior to uploading new programming data. Additional programming requirements are provided as follows.

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- a. Programming for New SMS Server: The contractor shall provide all other system related programming. The contractor will be responsible for uploading personnel information (e.g., ID Cards backgrounds, names, access privileges, personnel photos, access schedules, personnel groupings) along with coordinating with owner representative for device configurations, standards, and groupings. OWNER shall provide database to support Contractor's data entry tasks. The contractor shall anticipate a weekly coordination meeting and working alongside of owner to ensure data uploading is performed without incident of loss of function or data loss.
 - b. Programming for Existing SMS Servers: The contractor shall perform all related system programming except for personnel data as noted. The contractor will not be responsible for uploading personnel information (e.g., ID Cards backgrounds, names, access privileges, access schedules, personnel groupings). The contractor shall anticipate a weekly coordination meeting and working alongside of owner to ensure data uploading is performed without incident of loss of function or data loss. System programming for SMS servers shall be performed by using the Contractor's own server and software. These servers shall not be connected to existing devices or systems at any time.
2. The Contractor shall identify and request from the Owner, any additional data needed to provide a complete and operational system as described in the contract documents.
3. Contractor and owner coordination on programming requires a high level of coordination to ensure programming is performed in accordance with OWNER requirements and programming uploads do not disrupt existing systems functionality. The contractor shall anticipate a minimum a weekly coordination meeting. Contractor shall ensure data uploading is performed without incident of loss of function or data loss. The following Level of Effort Chart is provided to communicate the expected level of effort required by contractors on OWNER ESS projects. Calculations to determine actual levels of effort shall be confirmed by the contractor before project award.

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Description of Tasks							
Description of Systems	Develop System Loading Sheets	Coordination	Initial Set-up Configuration	Graphic Maps	System Programming	Final Checks	Level of Effort (Typical Tasks)
SMS Setup & Configuration	e.g., program monitoring stations, programming networks, interconnections between CCTV, intercoms, time synchronization	e.g., retrieve IP addresses, naming conventions, standard event descriptions, programming templates, coordinate special system needs	e.g., Load system Operating System and Application software, general system configurations	e.g., develop naming conventions, develop file folders, confirming accuracy of AutoCAD Floor Plans, convert file into jpeg file	e.g., program monitoring stations, programming networks, interconnections between CCTV, intercoms, time synchronization	e.g., check all system diagnostics (e.g., clients, panels)	Load and set-up 4-6 CDs and configure servers (to configure Loading and Configuring software Administrative account, audit log, Keystrokes, mouse clicks, multi-screen configuration
Electronic Entry Control Systems	e.g., setup of device, door groups & schedules, REX, Locks, link graphics	e.g., confirming device configurations, naming conventions, event description and narratives	e.g., enter data from loading sheets; configure components, link events, cameras, and graphics		e.g., setup of device, door groups & schedules, REX, Locks, link graphics	e.g., performing entry testing to confirm correct set-up and configuration	e.g., creating a door, door configuration, adding request to exit, door monitors and relays, door timers, door related events (e.g., access, access denied, forced open, held open), linkages, controlled areas, advanced door monitoring, time zones, sequence of operations
Intrusion Detection Systems	e.g., enter door groups & schedules, link devices - REX, lock, & graphics	e.g., confirming device configurations, naming conventions, event description and narratives	e.g., enter data from loading sheets; configure components, link events, cameras, and graphics		e.g., enter door groups & schedules, link devices - REX, lock, & graphics	e.g., walk test, device position, and masking	e.g., setting up monitoring and control points (e.g., motion sensors, glassbreaks, vibration sensor, strobes, sounders) creating intrusion zones, creating arm/disarm panel, timed sequences, time zones, icon placements on graphic maps, clearance levels, events (e.g., armed, disarmed, zone violation, device alarm activations), LCD reader messages,
CCTV Systems	e.g., programming call-ups recording	e.g., confirming device configurations, naming conventions	e.g., enter data from loading sheets; camera naming convention, sequences, configure components)		e.g., programming call-ups recording	e.g., confirm area of coverage, call-up per event generated and recording rates	e.g., setting up cameras points, recording ratios (e.g., normal, alarm event) timed recording, linkages, maps placements, call-ups
Intercoms Systems	e.g., programming events & call-ups	e.g., confirming device configurations, naming conventions, event description and narratives	e.g., enter data from loading sheets; configure components, link events, cameras, and graphics		e.g., programming events & call-ups	e.g., confirm operation, SMS event generation and camera call-up	e.g., setup linkages, events for activations, device troubles, land devices on graphic maps
Console Monitoring Components	N/A	per monitor	per monitor	per graphic map	N/A	per monitor	N/A

Note: Programming tasks are supported through the contractor’s development of the Technical Data Package Submittals.

Table 1 Contractor Level of Effort

PART 5 - TESTING AND ACCEPTANCE

5.1 PERFORMANCE REQUIREMENTS

A. General:

1. Refer to Project Process Diagram (PPD) in Part 1 of this specification. The PPD shall be utilized by the contractor to develop effective and timely project schedules and submissions to ensure project is substantially complete prior to occupancy.
2. The Contractor shall perform pre-delivery, contract field, performance verification, and endurance testing and make adjustments of the completed security system when permitted. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing. Written notification of planned testing shall be given to the Owner at least 60 calendar days prior to the test and after the Contractor has received written approval of the specific test procedures.
3. The Owner shall witness all testing and system adjustments during testing. Written permission shall be obtained from the Owner before proceeding with the next phase of testing. Original copies of all data produced during performance verification and endurance testing shall be turned over to the Owner at the conclusion of each phase of testing and prior to Owner approval of the test.

- B. Test Procedures and Reports:** The test procedures, compliant w/ OWNER standard test procedures, shall explain in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification. The test reports shall be used to document results of the tests. The reports shall be delivered to the Owner within seven (7) calendar days after completion of each test.

5.2 CONTRACTOR'S FIELD TESTING

- A.** The Contractor shall calibrate and test all equipment, verify DTM operation, place the integrated system in service, and test the integrated system. Ground rods installed by this Contractor within the base of camera poles shall be tested as specified in IEEE STD 142. The Contractor shall test all security systems and equipment, and provide written proof of a 100% operational system before a date is established for the system acceptance test. Documentation package for CFT shall include completed (fully annotated details of test details) for each device and system tested, and annotated loading sheets documenting complete testing to OWNER approval. CFT test documentation package shall conform to submittal requirements outlined in this Section. The Contractor's field testing procedures shall be identical to the Owner's acceptance testing procedures. The Contractor shall provide the Owner with a written listing of all equipment and software indicating all equipment and components have been tested and passed. The Contractor shall deliver a written report to the Owner stating the installed complete system has been calibrated, tested, and is ready to begin performance verification testing; describing the results of the functional tests, diagnostics, and calibrations; and the report shall also include a copy of the approved acceptance test procedure. Performance verification testing shall not take place until

written notice by contractor is received certifying that a contractors field test was successful.

5.3 PERFORMANCE VERIFICATION TEST (PVT)

- A. The Contractor shall demonstrate the completed ESS complies with the contract requirements. In addition, the Contractor shall provide written certification that the system is 100% operational prior to establishing a date for starting PVT. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown. The PVT will be stopped and aborted as soon as 10 technical deficiencies are found requiring correction. The Contractor shall be responsible for all travel and lodging expenses incurred for out-of-town personnel required to be present for resumption of the PVT. If the acceptance test is aborted, the re-test will commence from the beginning with a retest of components previously tested and accepted.
- B. The PVT, as specified, shall not begin until receipt of written certification that the Contractors Field Testing was successful. This shall include certification of successful completion of testing as specified in paragraph "Contractor's Field Testing", and upon successful completion of testing at any time when the system fails to perform as specified. Upon termination of testing by the Owner or Contractor, the Contractor shall commence an assessment period as described for Endurance Testing Phase II.
- C. Upon successful completion of the acceptance test, the Contractor shall deliver test reports and other documentation, as specified, to the Owner prior to commencing the endurance test.
- D. Additional Components of the PVT shall include:
 - 1. System Inventory
 - a. All Device equipment
 - b. All Software
 - c. All Logon and Passwords
 - d. All Cabling System Matrices
 - e. All Cable Testing Documents
 - f. All System and Cabinet Keys
 - 2. Inspection
 - a. Contractor shall record an inspection punch list noting all system deficiencies. The contractor shall prepare an inspection punch list format for Owner's approval.
 - b. As a minimum the punch list shall include a listing of punch list items, punch list item location, description of item problem, date noted, date corrected, and details of how item was corrected.
- E. Partial PVT - At the discretion of Security Consultant, the Performance Verification Test may be performed in part should a 100% compliant CFT be performed. In the event that a partial PVT will be performed instead of a complete PVT; the partial PVT shall be

performed by testing 10% of the system. The contractor shall perform a test of each procedure on select devices or equipment.

5.4 ENDURANCE TEST

- A. The Contractor shall demonstrate the specified probability of detection and false alarm rate requirements of the completed system. The endurance test shall be conducted in phases as specified below. The endurance test shall not be started until the Owner notifies the Contractor, in writing, that the performance verification test is satisfactorily completed, training as specified has been completed, and correction of all outstanding deficiencies has been satisfactorily completed. OWNER shall operate the system 24 hours per day, including weekends and holidays, during Phase I and Phase III endurance testing. OWNER will maintain a log of all system deficiencies. The Owner may terminate testing at any time the system fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period as described for Phase II. During the last day of the test, the Contractor shall verify the appropriate operation of the system. Upon successful completion of the endurance test, the Contractor shall deliver test reports and other documentation as specified to the Owner prior to acceptance of the system.
1. Phase I (Testing): The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized in writing by the Owner. If the system experiences no failures, the Contractor may proceed directly to Phase III testing after receiving written permission from the Owner.
 2. Phase II (Assessment):
 - a. After the conclusion of Phase I, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Owner. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and recommend the point at which testing should be resumed.
 - b. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the Owner. The meeting shall not be scheduled earlier than five (5) business days after the Owner receives the report. As part of this test review meeting, the Contractor shall demonstrate all failures have been corrected by performing appropriate portions of the performance verification test. Based on the Contractor's report and the test review meeting, the Owner will provide a written determine of either the restart date or require Phase I be repeated.
 3. Phase III (Testing): The test shall be conducted 24 hours per day for 15 consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized in writing by the Owner.
 4. Phase IV (Assessment):

- a. After the conclusion of Phase III, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Owner. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and recommend the point at which testing should be resumed.
- b. After delivering the written report, the Contractor shall convene a test review meeting at the job site to present the results and recommendations to the Owner. The meeting shall not be scheduled earlier than five (5) business days after receipt of the report by the Owner. As a part of this test review meeting, the Contractor shall demonstrate that all failures have been corrected by repeating appropriate portions for the performance verification test. Based on the review meeting the test should not be scheduled earlier than five (5) business days after the Owner receives the report. As a part of this test review meeting, the Contractor shall demonstrate all failures have been corrected by repeating appropriate portions of the performance verification test. Based on the Contractor's report and the test review meeting, the Owner will provide a written determine of either the restart date or require Phase III be repeated. After the conclusion of any re-testing which the Owner may require, the Phase IV assessment shall be repeated as if Phase III had just been completed.

5.5 EXCLUSIONS

- A. The Contractor will not be held responsible for failures in system performance resulting from the following:
 1. An outage of the main power in excess of the capability of any backup power source provided the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the ESS performed as specified.
 2. Failure of an Owner furnished equipment or communications link, provided the failure was not due to Contractor furnished equipment, installation, or software.
 3. Failure of existing Owner owned equipment, provided the failure was not due to Contractor furnished equipment, installation, or software.

END OF SECTION

**SECTION 28 23 00
VIDEO SURVEILLANCE SYSTEM**

PART 1 - GENERAL

1.01 SUMMARY

- A. Section provides information for the video surveillance system itself and coordination with Section 280500 "the overarching section for electronic security" and 27 series sections "Communication components".

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Secure all necessary licenses, permits, inspections and final system acceptance from local authority having jurisdiction.
- B. Provide all labor, material and equipment for a complete and functional system.
- C. Provide new material and equipment that conforms to the applicable standards and listed for its intended purpose by a nationally recognized testing laboratory.

1.03 RELATED DOCUMENTS

- A. All contract documents apply to this Section.
- B. References to industry and trade association standards and codes are minimum installation requirement standards. Drawings and other specification sections shall govern in those instances where requirements are greater than those specified in the referenced standards.
- C. This Section (28 23 00) shall be used as a base document for all of Division 28 – SYSTEMS (Video Surveillance Systems). The following sections shall be used in conjunction with the drawings to provide a complete and fully integrated communications system. This section shall be coordinated with the following sections.
 - 1. 26 05 00 - Security Supplement - Electrical
 - 2. 27 05 00 – Common Works Results for Communications
 - 3. 27 05 26 – Grounding and Bonding for Communications Systems
 - 4. 27 05 28 – Pathways for Communications Systems
 - 5. 27 05 44 – Sleeves and Sleeve Seals For Communications
 - 6. 27 11 00 – Communications Equipment Room Fittings
 - 7. 27 13 00 – Communications Backbone Cabling
 - 8. 27 15 00 – Communications Horizontal Cabling
 - 9. 28 05 00.01 - Common Work Results for Electronic Security

1.04 BACKGROUND

- A. This section, and associated security drawings, describes the video surveillance system requirements for the Orange County Transportation Authority (OCTA) project located within the Bus Maintenance facilities in Santa Ana and Garden Grove, CA. The sections set forth detail functions and standards of quality for the systems, their components and the methods of installation and operation. All proposals shall be prepared to reflect the standards of quality specified herein, employing equipment, which meets or exceeds the project requirements.
- B. The Record Documentation and Orange County Transportation Authority general provisions of the contract including general and supplemental terms and conditions and Orange County Transportation Authority sections, apply to the work specified within this section.
- C. The section herein provides an inclusive project scope when combined with all general, supplemental conditions and related project documentation.
- D. Drawings supplied with this section shall be used as a reference for the requirement and location of the system components. Contractor shall acquaint them self with the building drawings, and confirm the required quantities of devices and specific options on location.
- E. Provide and install a complete network based Video Surveillance System (VSS), hereinafter referred to as the VSS system.

1.05 DEFINITIONS

- A. Provide: Shall mean that the Contractor shall furnish, install, connect and make equipment fully configured and operational for a complete functioning system.
- B. Remove: Shall mean that the Contractor shall disconnect, dismantle, and relinquish or remove hardware from site based upon the discretion of the Orange County Transportation Authority.
 - 1. All hardware that is slotted for removal from the site shall be inspected and approved for removal by the Orange County Transportation Authority or their authorized representatives.
- C. SEC: Is defined as the abbreviation for the building or structures remote Security Equipment Closet. These rooms shall provide local centralized junction points for electronic security related control and communication hardware. All security equipment closets shall terminate communications to the building designated security equipment room.
- D. SER: Is defined as the abbreviation for the building or structures primary Security Equipment Room. This room shall provide a centralized interconnection point for each building or structures electronic security related control and communication hardware.
- E. SMS: Is defined as the abbreviation for the Security Management System providing a centralized single software integration solution for the management, control and monitoring of all electronic security countermeasures deployed on site. The SMS includes the VSS.

- F. SOC or SCC: Is defined as the abbreviation for the primary Security Operations Center / Security Control Center located within the Orange County Transportation Authority facility. Any SOC or SCC centers shall provide centralized (primary or redundant) security monitoring and control for all site wide security system operations.
- G. SSN: Is defined as the abbreviation for the fiber based dedicated Security System Network communication infrastructure capable of providing encrypted, high capacity, network based, bi-directional, data communications between all electronic security systems deployed on site and the security operations center.
- H. System: Is defined as the entire set of components, equipment, and subsystems which must be coordinated to work together during normal operation to produce results for which the system is designed.
- I. Turnkey: Shall mean to provide a complete hardware, software, programmed and configured solution to allow the end user, once accepted, shall have a complete and operational system. Turnkey systems include all the hardware, software, programming, and systems integration necessary for the application.
- J. VSS: Is defined as the abbreviation for the complete network based Video Surveillance System server and PC workstation components.

1.06 CODES AND STANDARDS

- A. The publications reference standards shall encompass all amendments, addenda, revisions, supplement, and errata for each applicable extended reference. Publications are referenced in text by the basic designation only. All materials, equipment, devices and installation shall be manufactured, tested, and installed in accordance with codes, publications, and standards (latest editions and revisions). In the absence of specific codes, publications and standards the approved trade practice shall be utilized and subject to the discretionary approval of the Orange County Transportation Authority or their authorized representative.
- B. All work shall be performed in accordance with, but not limited to, the following codes, publications, and standards (latest editions and revisions), which are part of this specification to the extent referenced:
 - 1. Americans with Disabilities Act (ADA)
 - 2. American National Standards Institute (ANSI)
 - 3. Building Industry Consulting Service International (BICSI)
 - 4. Codes of Federal Regulations (CFR)
 - 5. Compliance, ISO/IEC 14496 standard (also known as MPEG-4)
 - 6. Compliance, International Telecommunication Union (ITU) Recommendation G.711, "Pulse Code Modulation (PCM) of Voice Frequencies"
 - 7. Consultive Committee for International Radio (CCIR)
 - 8. EIT/TIA - 568A: Premises Cabling Standard.
 - 9. EIA/TIA – 568: Commercial Building Telecommunications Wiring Standard.

10. EIA/TIA – 569: Commercial Building Standard for Telecommunications Pathways and Spaces.
 11. EIA/TIA – 606: Administrative Standards for the Telecommunications Infrastructure of Commercial Buildings.
 12. Electronic Industry Alliance (EIA)
 13. Federal Communication Commission (FCC)
 14. IEEE 802.3 Digital Data Network Standard.
 15. IEEE, RS 170 Variable Standard.
 16. Institute of Electrical and Electronics Engineers (IEEE)
 17. International Code Council (ICC)
 18. International Standards for Organization/Electrotechnical Commission (ISO/IEC) Joint Technical Committee 1 (JTC1), “Information Technology”
 19. MPEG-4 Industry Forum
 20. National Electrical Safety Code, current edition.
 21. National Fire Protection Association National Fire Codes, current edition.
 22. National Electrical Manufacturers Association (NEMA)
 23. NTSC Standard.
 24. Telecommunication Industry Association (TIA)
 25. Underwriters Laboratories (UL)
 26. Universal Plug and Play (UPnP) Forum
 27. Universal Serial Bus (USB) Implementers Forum
- C. The Contractor shall use and refer to the most current adopted editions of all publications and references unless otherwise noted for the implementation of this project. Where more than one code or regulation is applicable, the more stringent regulation shall apply.
- D. All equipment furnished under this section shall conform to NEMA Standards and bear UL labels.
- E. The Contractor shall install all materials and equipment in strict accordance with the manufacturer's literature and approved shop drawings.

1.07 PRIMARY OBJECTIVE

- A. The video surveillance systems primary objective, shall provide a seamlessly integrated graphical interface that shall permit the site security operation center to control, display, and monitor all digital security related video surveillance devices on the site through a dedicated amalgamated security video surveillance system.
- B. The video surveillance system shall provide a versatile uniform visual assessment tool for operational control and assessment recording of all network based security cameras within the physical confines of this site. All existing and new video surveillance system devices within the bus maintenance facilities shall be integrated

into a security into the existing Milestone video surveillance system to provide visual feedback of current status and operational control of specific field devices and display visual alarm conditions at the security video surveillance system when events are generated by the video surveillance system, alarm sensors, or devices which are controlled and monitored.

- C. The video surveillance system shall reside on an open architecture digital network communication topology. This system topology shall by design permit the deployment of additional remote monitoring points on the dedicated security system network which in turn shall act as force multipliers. The video surveillance system shall provide and reside on a dedicated combination copper (interior) and fiber (exterior) security system network. The VSS shall utilize a dedicated one gigabit or greater security network infrastructure to devices support all security video surveillance system communications. All security systems communications shall terminate to either 1 gigabit or 10 gigabit centralized security network switches that shall distribute command and control to the site security operations center. The primary security operation center, located at the Garden Grove location, shall have full access and control of all networked security related system functions via the provided digital security system solution.
- D. In locations where network compatible security equipment is to be operated outside of any building exterior perimeter shall utilize fiber cabling and Ethernet protocol convertors from the device to the closest buildings security equipment room.
- E. All camera deployments shall provide at a minimum personal identification, action identification, and scene identification. To assist in monitoring all of the camera locations on the site, the video surveillance system shall by design incorporate intelligent video analytics for behavioral based alarming. The video analytics shall automatically alert the security video surveillance system workstation on any violation of analytics alarm behavioral events.

1.08 THEORY OF OPERATION

- A. The intent of this specification is for the Contractor to seamlessly upgrade the existing Milestone XProtect Video Surveillance System (VSS) for Orange County Transportation Authority. The Milestone XProtect System is a client/server design. The Video Surveillance System shall provide multi-level diagnostics of each component in all critical areas. These diagnostics shall be reported to a diagnostic console for processing. In addition, the diagnostic data shall be capable of being scripted into actionable events within the system. The Video Surveillance System shall be able to handle future expansion of an unlimited total capacity from what is shown in the drawings, including but not limited to cameras, monitors, alarm circuits and relay closures.
- B. The Video Surveillance System network is currently arranged so that each area will operate independently and communicates via a 10-gigabit network to the existing Milestone System Manager Server. The System Manager Server provides a user interface and database management of the Video Surveillance System. The Video Surveillance System network shall be arranged so each area will operate independently and shall communicate via a 10-gigabit network at a minimum to the existing Milestone System Manager. The Video Surveillance System shall continue to provide normal and event monitoring of all secured areas as shown in the

specifications and drawings. The Video Surveillance System will continue to provide the same level or better, review capabilities for the digitally recorded video via the secure network specified without interruption to recording capabilities.

- C. The Video Surveillance System will provide continued support for existing IP network digital devices. It is expected that there will be a variety of new IP cameras incorporated into the existing Milestone infrastructure. Cameras such as but not limited to, day/night capable, high resolution, panoramic and pan/tilt/zoom cameras, with the applicable environmentally controlled housing units, mounts, lenses, power supply, wiring, video surveillance system monitors, controllers, and network video recorder equipment. The camera integration shall continue to incorporate the use of video analytics for both the Santa Ana and Garden Grove locations.
- D. All new Video Surveillance System components/devices shall be seamlessly interfaced and integrated to the existing Milestone Video Surveillance System. If any camera begins recording based on motion sensing, the Video Surveillance System management server shall signal the recording network server to increase the event recording speed on all designated cameras within the motion area. The Video Surveillance System will include supporting existing racking equipment for newly installed Video Surveillance System hardware and related rack/console mounted sub system devices. The final type and position of the new equipment into the existing rack/console shall be coordinated with the Orange County Transportation Authority Contracting Officer prior to any installation. Any new rack/consols shall include power sufficient to accommodate all equipment mounted within the system. Where feasible, the Contractor shall utilize existing rack/console if available and coordinate with the Orange County Transportation Authority Contracting Officer prior to the selection of any rack/console units.

1.09 DESCRIPTION OF WORK

- A. The system shall be installed in strict conformance with all applicable Federal, local codes and standards. Provide a turnkey video surveillance system with alarm monitoring capabilities for the site that shall include but not limited to the expansion or incorporation of a site wide dedicated security system network and integration of existing site security subsystems with the primary security video surveillance system monitored at the clients designated Security Operations Center (SOC). The system shall provide local and remote operational control of all electronic video surveillance system devices to be installed within the confines of the Orange County Transportation Authority site.
- B.
 - 1. Due to the environmental conditions of the location all exterior or where determined, devices/conduit shall be designed for unconditioned marine environmental applications.
- C. The work detailed has been specified to meet certain requirements for performance, appearance, and costs. Some information, such as exact locations of field equipment, exact wire routing, and exact conduit requirements have been intentionally omitted. It shall be the responsibility of the Contractor to implement the guidelines and requirements contained in the documents and translate them into a complete design package containing all elements necessary including all

equipment, devices, wire and appurtenances, and materials as required for a complete, operational, and functionally integrated system.

- D. Any reference to a products quantity is to be considered as a reference only. Product quantities shall be taken from the provided security drawings. In any case where there is a discrepancy or an omission the Contractor shall refer in writing to the Orange County Transportation Authority Contracting Officer or their authorized representative for clarification.
- E. The system shall meet or exceed the minimum system performance requirements and operational features are as specified herein.
 - 1. The Contractor shall perform all work, provide all products, systems integration, project coordination, system engineering, and design work required in order to ensure the proper expansion or incorporation of the video surveillance system including Underwriters Laboratories (UL) listed application software and hardware complete and ready for operation within the confines of the site and project scope.
 - 2. The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Orange County Transportation Authority of any discrepancy before performing the work.
 - 3. The Contractor shall submit all calculations and analysis to support design and engineering decisions to provide the specified systems.
 - 4. The Contractor shall provide and pay all labor, materials, equipment, sales, gross receipts and other taxes.
 - 5. The Contractor shall be responsible to schedule and secure all plan checks, permits, and licenses as necessary for the execution of work as applicable for the project. All fees, charges and other associate costs incurred by the foregoing shall be borne by the Contractor.
 - 6. The Contractor shall give the required legal notices; comply with codes, ordinances, regulations, and other legal requirements of public authorities which bear on the performance of this work.
 - a. Should any questions of union jurisdiction arise, the Contractor shall immediately take steps to settle such disputes and shall use such labor as may be determined to have jurisdiction, at no additional cost to the Orange County Transportation Authority. Should the Contractor fail to take expeditious action, they shall be responsible for any time lost because of delays arising from such a dispute.
 - 7. The Contractor shall attend project meetings as scheduled, or when deemed necessary by the Orange County Transportation Authority Contracting Officer.
- F. The system shall be complete and in full operating condition, including all equipment, devices, wire and appurtenances, and materials as required for interfacing with the security video surveillance system and major security/video subsystems.
 - 1. Equipment Interface: The system shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the

- systems with the identified sub-system(s) per the manufacturer, Orange County Transportation Authority, and system requirements.
2. The Video Surveillance System software shall be programmed to change the operational conditions of all security management subsystems as defined by the Orange County Transportation Authority during elevated national threat levels. For integration purposes, the system shall be integrated where appropriate with the following associated security subsystems:
 - a. Existing Video Surveillance System Equipment
 3. Integration with these security subsystems shall be achieved by programming via the Video Surveillance Server Manager or the direct hardwiring of the systems.
 4. For programming purposes refer to the manufacturers requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.
- G. All video surveillance system monitoring devices integration shall be one hundred percent compatible with all of the proposed and existing video surveillance subsystems.
- H. All new components/devices shall be seamlessly interfaced and integrated to the existing Milestone Video Surveillance System.
- I. The security video analytics system shall provide for the capability to simultaneously trigger the video surveillance system local building network video recorder to increase the recording frame rate on all cameras within the viewing ability of the activated alarm.
- J. The Contractor shall ensure that all components, interconnection conduit, cable / wire, appurtenances, and materials are new and provided as required to form a complete coordinated system ready for operation pursuant to the Orange County Transportation Authority directives, Sections with attachments, specifications and the plan drawings.
1. The video surveillance system shall support, control, and monitor all of the site security video sensor devices.
 2. The video surveillance system shall include but not limited to the programming and configuration of client provided network digital video recording equipment with Milestone software and the installation of PoE+ and UPoE+ core switches, behavioral analytics controllers, fixed, panoramic, pan/tilt/zoom cameras, environmentally controlled housing units, lenses, surge protection, battery backup, uninterrupted power supply, enclosures, mounts, power supply, wiring / fiber, network switches, network communications, racking, conduit, cable and appurtenances, and materials as required for a complete system integration to the security management system.
 3. When not present, the Contractor shall provide all Video Surveillance System network interconnect switches/fiber/wire/cabling/conduit infrastructure necessary to provide complete dedicated Video Surveillance

System network and the new Video Surveillance System equipment being integrated into the existing Milestone Video Surveillance System.

4. All security video sensors shall be wired to the video surveillance system controllers as fully supervised alarm inputs.
 5. All camera sensors shall report alarms, troubles, and faults to the Video Surveillance System Management Server.
 6. The Contractor shall install power supplies with backup batteries as required to power all newly installed security hardware.
- K. After installation, the Orange County Transportation Authority shall be able to perform hardware configuration changes as desired without the services of the manufacturer.
- L. Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components.
- M. Provide a dedicated security system network for controller and software client communications. Installation shall include dedicated network communications interface in each controller to communicate to each building via a 1000 Mbps or greater, 128 bit AES encrypted or greater Ethernet switch.
- N. Complete conduit system is to be provided by the Contractor. Non-security system wiring shall not share security conduits.
- O. The system control at the central server location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the facility requirements. Reconfiguration shall be accomplished online through system programming, without hardware changes.
- P. The system shall support both manual and automatic responses to alarms entering the system. Each alarm shall be capable of initiating a number of different actions, such as camera switching, activation of remote devices, email of alarm / event, text page of alarm / event, Threat Level change, and portal control.
- Q. Analytics control functions shall include abnormal behaviors, validation based on time of day, day of week, holiday scheduling, automatic or manual camera operation on specific events.
- R. The system will allow for pre-defined automated and manual control of the system and all related sensors.
- S. The system host server shall be able to assign the security password / codes, unique per user definable performance ability to, but not limited to, be utilized at the associated video surveillance software client application.
- T. The Video Surveillance System management server shall be able to monitor and control all of the newly installed security equipment.
- U. Provide all programming required to identify cameras, alarm points and operations within the expansion or integration of existing systems. All analytics behavioral event alarms shall report in real-time all activity to the security video surveillance system. The Contractor shall verify that all the camera and alarm identification names are obtained from the Orange County Transportation Authority. The Contractor shall provide all the programming required to identify alarm points.

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- V. The Contractor shall connect to and utilize existing video equipment, video and control signal transmission lines, and device. Video equipment and signal lines that are usable in their original configuration without modification may be reused with the Orange County Transportation Authority Contracting Officer approval.
- W. The Contractor shall visit the site and verify that site conditions are in agreement / compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Orange County Transportation Authority Contracting Officer in the form of a written report. The Contractor shall not take any corrective action without written permission received from the Orange County Transportation Authority Contracting Officer.
- Y. The Contractor shall complete performance testing of all existing Video Surveillance System wiring. The Contractor will also be required to visually inspect and verify the serviceability of the existing system wiring infrastructure as well. The Contractor shall provide a detailed report of the said test to the Orange County Transportation Authority Contracting Officer.
- Z. The Contractor shall review all contract drawings and survey existing site conditions and update/modify drawings as needed prior to proceeding with the work.
- AA. Communications
 - 1. Provide dedicated security network connection points for the dedicated security system network via industry standard TCP/IP communication protocol for network connection for each video controller and devices.
 - 2. Provide a static IP address for each device placed upon the dedicated security system network.
 - 3. The system connection provided shall be designed to support advanced distributed network architecture.
 - 4. Provide 1000 MBPS or greater network termination connection points at each control panel, workstation, and control database server as shown on the Record Drawings. The Contractor shall provide fiber cabling, network hubs, routers, and protocol convertors as required creating a dedicated security system network.
 - 6. Provided a protocol conversion whenever a security network device is in excess of the maximum distance to interconnect to the dedicated security system network (i.e. parking lots, entry gates, building to building) this device shall be converted to a fiber transceiver setup that shall in turn transmit the network based device signal directly to a fiber receiver that shall be placed at the nearest security equipment room. Once the fiber signal has been received it shall be converted back to an Ethernet communication for integration to the security dedicated security system network and subsequently the security management system.
 - a. The Contractor shall provide all local area network termination connection points at each controller, workstation, and system control database server as required.
 - b. The Contractor shall provide and utilize fiber and copper cabling, network switches, and protocol convertors as required creating a dedicated security system network for the complete network

communication path from each device location to the security operations center.

- c. The Contractor shall provide a static IP address for each device placed upon the network. The system connection provided shall be designed to support advanced distributed network architecture. The provided network connection at the control panel shall be able to communicate back with the database server through industry standard network switches and routers and shall not be required to reside on the same subnet.
- AB. Where needed, the Contractor shall provide complete racking/cabinet systems in locations as required by the Orange County Transportation Authority that shall include new equipment racking (weatherproof equipment where needed), enclosure/cabinets, and UPS power devices, to support all security equipment installed in the project.
- 1. The primary function of the racking and cabinet / enclosure is to support all of the electronic security system and all subsystem devices.
 - 2. The exact position, type, and size of the racking / cabinet system shall be coordinated with Contracting Officer prior to procurement and installation.
 - 3. The equipment racking, and enclosure / cabinets system shall provide secure lockable locations for all security related equipment.
 - 4. All large equipment racking, and enclosure / cabinets shall incorporate manufacturer approved power distribution to accommodate all equipment mounted within a racking enclosure / cabinet system.
 - 5. All security racking and enclosures/cabinets shall be protected and secured by lock and key.
- AC. Demolition Work Area
- 1. When applicable, the Contractor shall remove and relocate of all security related hardware from designated demo locations as directed by OCTA contracting authority.
 - 2. The Contractor shall then install, connect, and make equipment operational for a complete functional system in the location as determined by the Orange County Transportation Authority or their authorized representative.
 - 3. Modify, connect, and re-establish all communication lines severed by the Contractor during the demo that affect other communication paths to security and non-security related devices and / or components remaining.

1.10 GENERAL ARRANGEMENT OF CONTRACT DOCUMENTS

- A. The plan document supplement to this section indicates approximate locations of equipment. The installation and / or locations of the equipment and devices shall be governed by the intent of the design; sections and documentation, with due regard to actual site conditions, recommendations, ambient factors affecting the equipment and operations in the vicinity.

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- B. The plan documents are diagrammatic and do not reveal all offsets, bends, elbows, components, materials, and other specific elements that may be required for proper installation.
- C. If any departure from the plan documentation is deemed necessary, or in the event of conflicts, the Contractor shall submit details of such departures or conflicts in writing to the Orange County Transportation Authority for written comments and / or approval when practical and before initiating work.
- D. Anything called for by one of the plan documents and not called for by the others shall be of like effect as if required or called by all, except if a provision clearly designed to negate or alter a provision contained in one or more of the other plan documents shall have the intended effect.
- E. In the event of conflicts among the plan documents, the documents shall take precedence in the following order: Orange County Transportation Authority directives, Sections with attachments, specifications and the plan drawings.
- F. Should conflicts arise out of discrepancies between documentation, the most stringent requirement shall always apply.
- G. During construction of a project, Contractor shall maintain an up to date redlined set of construction documents detailing the in-place configuration and location of the project components. The Orange County Transportation Authority or their authorized representative shall always have access to these documents for review and inspection.
 - 1. Any project component or assembly that is not installed in strict accordance with the drawings shall be so noted on the redline drawings.
 - 2. Contractor shall provide the Orange County Transportation Authority a complete set of both magnetic media electronic "Record Drawing" drawings and hardcopy "Record Drawing" bond drawings.
 - 3. The Record Drawings shall include security device number, secure security equipment room or security equipment closet connection location, control panel number and input or output number as applicable.
 - 4. All corrective notations made by the Contractor shall be legible when submitted to the Orange County Transportation Authority. If, in the opinion of the Orange County Transportation Authority or their authorized representative that any redlined notation is not legible, it shall be returned to the Contractor for re-submission at no extra cost to the Orange County Transportation Authority.
 - 5. The Contractor shall organize the Record Drawing sheets into manageable sets, and bound with durable paper cover sheets with suitable titles, dates and other identifications printed on the cover.
 - a. Where feasible, the individual or entity that obtained record data, whether the individual or entity is the Contractor, or similar entity, is required to prepare the mark up on Record Drawings.
 - b. Accurately record the information in a comprehensive drawing technique. Record the data when possible after it has been obtained.
 - c. For concealed installations, record and check the mark up before concealment.

6. At time of substantial completion, submit the Record Construction Documentation to the Orange County Transportation Authority. The Contractor shall organize into sets, bind and label sets for the Orange County Transportation Authority continued usage.
- H. The Contractor shall maintain one (1) copy of the design section, including addenda and modifications issued, for project documentation. The Contractor shall mark the sections to indicate the actual installation where the installation varies substantially from that indicated in the Sections and modifications issued. (Note related drawing information, where applicable).
 1. The Contractor shall pay particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.
 2. Note related Change Orders and mark up of Record Construction Documents, where applicable.
 3. Upon completion of mark ups, the Contractor shall submit documentation to the Orange County Transportation Authority.
- I. The Contractor shall maintain one (1) copy of each Product Data submittal for Project Record Document purposes. The Data shall be marked to indicate the actual product installation where the installation varies substantially from that indicated in the Product Data submitted. Included shall be significant changes in the product delivered to the site and changes in manufacturer instructions and recommendations for installation.
 1. The Contractor shall pay particular attention to information on concealed products and installations that cannot be readily identified or recorded later.
 2. Note related Change Orders and mark up of Record Construction Documents, where applicable.
 3. Upon completion of mark up, submit a complete set of Record Product Data to the Orange County Transportation Authority.
- J. The Contractor shall maintain one (1) copy of Miscellaneous Records for Project Record Document purposes. Refer to other sections for miscellaneous record-keeping requirements and submittals concerning various construction activities. Before substantial completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for use and reference. Categories of requirements resulting in miscellaneous records include, as a minimum, the following:
 1. Miscellaneous records shall include but not limited to the following information
 - a. Certificates received instead of labels on bulk products.
 - b. Testing and qualification of tradesmen.
 - c. Documented qualification of installation firms.
 - d. Load and performance testing.
 - e. Inspections and certifications.
 - f. Final inspection and correction procedures.

2. Miscellaneous Records: The Design Consultant of record shall incorporate the miscellaneous data submittal by the Contractor for Record Documentation. The Designer Consultant shall incorporate the miscellaneous data and submit it to the Orange County Transportation Authority with the "As Built" documentation.
- K. The Contractor is responsible for providing a detailed inventory of all systems components installed on this project. This inventory shall also include all hardware and software manuals. Inventory shall contain the following information for each component listed.
 1. Item Number
 - a. Quantity
 - b. Part Number
 - c. Description
 - d. Manufacturer
 - e. Serial Number
 2. Version Number
- L. Special order equipment shall not be ordered before design, sections and product data sheets have been reviewed by the Orange County Transportation Authority. Written approval must be given from the Orange County Transportation Authority prior to Contractor's authorization to proceed on special order items.
- M. Corrections resulting from any review shall be made promptly at no cost to the Orange County Transportation Authority. Drawings or data that are not approved shall be resubmitted for review and approval.
- N. All security network video servers shall by design be limited to 60 percent of maximum capacity to ensure proper operation.
- O. All security network analytics servers shall by design be limited to 50 percent of maximum capacity to ensure proper operation.
- P. All security network switches shall be limited to 60 percent of maximum capacity to ensure proper operation.
- Q. VSS Documentation Package
 1. Contractor shall provide VSS input and output documentation packages for review at the Shop Drawing submittal stage and also with the Record Drawing documentation package. The documentation packages shall be provided in both printed and native digital and pdf (portable document format) form at both review stages.
 2. The Contractor shall provide input and output documentation package for VSS and associated video inputs and for all VSS controllers associated with the project. Documentation shall be provided in current version Excel spreadsheets. A separate spreadsheet file shall be generated for each VSS controller.
 3. The spreadsheet names shall follow a sequence that shall display the spreadsheets in numerical order according to the VSS, system number and any associated expansion hardware. The spreadsheet shall include the

prefix in the file name that uniquely identifies the building / structure location.

4. The spreadsheet shall detail all connected items such as cameras, monitors, switches, servers, patch panels, and fiber connections. The spreadsheet shall include an individual section (row) for a load factor on each controller, switch, provided. The spreadsheet shall automatically calculate the system numbers for inputs, and outputs based upon data entered in initialization fields.
5. All entries must be verified against the field devices. Copies of the floor plans shall be forwarded under separate cover.
6. The VSS spreadsheets shall include an entry section for the following information:
 - a. Video Surveillance System Controller Server Number.
 - b. VSS Network Switches with capacity
 - c. VSS Camera Number.
 - d. VSS Monitor Point Number.
 - e. VSS Fiber Port Number.
 - f. VSS Network Address.
 - g. VSS Cabinet Tamper Input Number.
 - h. VSS Power Fail Input Number.
 - i. Number of Monitor Points Reserved For Expansion.
 - j. Number of Camera Points Reserved For Expansion.
7. The spreadsheets shall automatically calculate the following information based upon the associated entries in the above fields:
 - a. System Numbers for each type of Controller.
 - b. System Numbers for Monitor Point Inputs.
 - c. System Numbers for Camera Points.
8. The spreadsheet shall provide the following information for hardware associated with each controller and switch device:
 - a. Controller Number.
 - b. Switch Number.
 - c. Cable ID Number.
 - d. Description Field (Room Number).
 - e. Description Field (Device Type i.e.: pan/tilt/zoom, interior, exterior, fixed, etc.).
 - f. Description Field (Area Description i.e.: Lobby front door).
 - g. VSS Input Location.
 - h. Cable Type.

1.11 SITE WORKING REQUIREMENTS

- A. In order to accommodate the continued use of the facilities the Contractor shall contact / schedule / coordinate with the Orange County Transportation Authority Contracting Officer, as necessary to complete the project. A majority of the installation will occur during normal hours during the year however installation may be scheduled during off hours, depending upon scheduled activities and with prior permission of the Orange County Transportation Authority.
- B. Work under another contract may be under construction coincidentally with the work under this contract. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate Contractor. Coordinate with any and all existing construction and other trades as required.
- C. The Contractor shall utilize good housekeeping practice with respect to their work including cleanup of all dirt and debris created by the Contractor during installation operations on a daily basis.
- D. Protect all existing work, and the work of other trades from damage by this work. Equipment shall be kept internally clean and protected against blowing dust, wind, storms, sun, heat, rain and other damaging factors. Cover work likely to be damaged at the end of each day's work.
- E. Any patching of walls, ceilings, or other construction assemblies or replacement of damaged ceiling tile, etc. shall be taken care of by the Contractor.
- F. All existing wire and cable that are abandoned as a result of this project shall be removed and disposed of per requirements of the Orange County Transportation Authority by the Contractor.
- G. All accessible existing conduit and junction boxes, as defined by the Contracting Officer, that are abandoned as a result of any project, shall be removed, disposed of per requirements of the Orange County Transportation Authority.
- H. All equipment not used in the final system shall be removed, and the surface returned to original condition. All removed devices and equipment shall be inventoried, boxed and returned to the Orange County Transportation Authority Contracting Officer.
- I. The Orange County Transportation Authority Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacture numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Orange County Transportation Authority Contracting Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.
- J. Contractor shall prepare a report of "current site conditions" and submit to the Orange County Transportation Authority or their approved representative documenting all changes to the site, or conditions that affect performance of the system to be installed. The Contractor shall provide documentation, and written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions which affect the installation of the system or its performance. The Contractor shall not correct any deficiency without written permission from the Orange County Transportation Authority or their approved representative.

- K. During the course of performing the work specified herein, if the Contractor should encounter any damaged finish in any area where the Contractor's work is to be performed, the Contractor shall notify the Orange County Transportation Authority Contracting Officer in writing prior to performing work in that area. Only after receiving written confirmation that the existing conditions have been documented and that authorization has been given to proceed, shall the Contractor proceed with the work in these areas.

1.12 QUALITY ASSURANCE

- A. An authorized representative of the manufacturer of the system shall be responsible for satisfactory total operation of the system and its certification.
- B. All electrical devices, materials and equipment shall be listed for their intended use by UL.
- C. The equipment manufacturer shall be certified as being compliant with ISO9001.
- D. Repair Service / Replacement Parts:
 - 1. Replacement parts for the system shall be under contract and be made available for a period of five (5) years after the date of final acceptance by the Orange County Transportation Authority.
 - 2. The Contractor shall provide 24-hour telephone support for the software program at no additional charge to the Orange County Transportation Authority. Software support shall include all software updates that occur during the warranty period.
 - 3. The Contractor shall provide documentation details that can demonstrate the ability to provide a complete inventory of repair parts, and a competent staff of local service technicians available on a 24 hour a day, 365 days a year basis.
- E. The Contractor shall provide the services of a competent and qualified Project Manager to supervise the construction of all systems specified herein and coordinate construction activities with other Contractors.
- F. The Contractor shall provide the services of a factory certified competent and qualified representative to render advice regarding the installation, final adjustment and operation of the system. This representative shall also witness the final system test and then certify that all systems are installed in accordance with the contract documents and are operating properly.
- G. The Contractor shall provide the services of a competent, certified, and qualified manufacturer technical representative to render advice regarding the installation, final adjustment and operation of the system. This manufacturer technical representative shall also witness the final system test and then certify that all systems are installed in accordance with the manufacturer requirements and are operating properly.
- H. The Contractor shall provide the services of a competent and qualified manufacturer trainer to conduct on-site training sessions for the Orange County Transportation Authority personnel upon completion of the systems specified herein. The Contractor shall provide system manuals with detailed instructions for operations, maintenance and system programming.

**INSTALLATION OF VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE BUS BASES**

**RFP 7-2138
EXHIBIT A**

- I. The Contractor shall provide the services of a competent and qualified Field Supervisor on-site to ensure the proper installation of all systems specified herein and coordinate construction activities with other Contractors the Orange County Transportation Authority or any appointed authorized representative
- J. The Contractor shall also provide that each system and subsystem device shall adhere to strict compliance with the manufacturer printed instructions except as indicated otherwise.
- K. Contractor shall ensure that the installation of any surge suppression device in or on electrical or electronic systems shall in no way compromise or violate equipment listing, function or warranty of the distribution equipment.
 - 1. Contractor shall disconnect all surge suppressors prior to testing of service entrance distribution equipment and panel boards.
 - 2. Contractor shall re-connect all surge suppressors at the completion of testing.
- L. All surge suppression device and supporting components shall be guaranteed by the installing Contractor to be free of defects in material and workmanship for a period as required by the Orange County Transportation Authority general conditions documentation from the date of completion for the system to which the surge suppression device is attached.
 - 1. Any surge suppression device, which shows evidence of failure or incorrect operation during the warranty, shall be replaced or repaired by the Contractor at no expense to the Orange County Transportation Authority with the exception of fair labor costs. Since Acts of nature or similar statements include the lightning threat to which this surge suppression device shall be exposed, any such general limiting warranty responsibility in the general conditions of this Section shall not apply.
- M. Contractor shall supply manufacturer certified test reports for all surge suppression tested parts, elements and / or systems or where required by the Orange County Transportation Authority to substantiate published ratings of claims.
- N. The Contractor shall consult and abide with the local authority having jurisdiction in all cases pertaining to all hardware, power supplies, and related devices.
- O. The security video system will be installed and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems and the sites security operations center whether the security system is stand-alone, on demand, or a part of a complete dedicated security system network.
- P. The Orange County Transportation Authority shall have the authority at all times, until final completion and acceptance of the work, to inspect and reject work and materials which in its judgment are not in conformity with the Documents, and its decision in regard to character and value of work shall be final and conclusive on both contracting parties. If the Orange County Transportation Authority permits said work or materials to remain, the Orange County Transportation Authority shall be allowed the difference in value or shall at its election have the right to have said work or materials repaired or replaced, as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the entire project, or within such longer period as may be covered by any guaranty; and neither payments made to the Contractor, nor any other acts of the Orange County

Transportation Authority, shall be construed as evidence of acceptance, waiver, or estoppel.

1. Any material, device or equipment furnished determined to be inferior, improper or unsound work or materials, including equipment or work, at variance with that which is specified or damages before or during installation and before acceptance of the completed system by the Orange County Transportation Authority shall be replaced unless repairs can be made that are acceptable to the Orange County Transportation Authority. Any such replacement or repairs, including repairs to the finish, shall be made at no cost to the Orange County Transportation Authority.
2. The Contractor, upon receiving notice from Orange County Transportation Authority that the Contractor has furnished any inferior, improper or unsound work or materials (including equipment), or work or materials at variance with that which is specified, will, within 24 hours, proceed to remove such work or materials and make good all other work or materials damaged thereby, and, at the option of the Orange County Transportation Authority, the Contractor shall immediately replace such work or materials with work or materials as specified. The removal, replacement, and repair shall be performed at such times and with manpower sufficient, in the judgment of the Orange County Transportation Authority, so as to avoid disturbance to occupants, or other ongoing work for the Project.
3. If the Contractor does not remove such unsound work within a reasonable time, the Orange County Transportation Authority may remove it and may store the material at the expense of the Contractor. If the Contractor does not pay the expenses of such removal within ten (10) days' time thereafter, the Orange County Transportation Authority may, upon written notice, sell such materials at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs and expenses that should have been borne by the Contractor and all expenses of the sale.
4. Any expense incurred by the Orange County Transportation Authority in connection with the foregoing, shall be borne by the Contractor, and the Orange County Transportation Authority may withhold money due to the Contractor or recover money already paid to the Contractor, to the extent of such expense.

1.13 CONTRACTOR QUALIFICATIONS

- A. All Contractors shall meet all national, state and local licensing requirements and be licensed (actual or reciprocal) in the state where the work is to be performed. The Contractor shall provide the Orange County Transportation Authority a copy of license documentation.
- B. The primary Contractor shall be factory certified by the VSS manufacturer and have at least five (5) years of experience installing and servicing products under this project. Primary contractor must be certified. No subcontractor substitution.
- C. The Contractor shall provide current references from clients with systems of similar scope and complexity that is in successful operation for five (5) or more years. The references must include a current point of contact, company or agency name, address, telephone number, complete system description, date of completion and

approximate cost of the project. The Orange County Transportation Authority or their authorized representative reserves the option to visit the reference sites, with the Orange County Transportation Authority permission and representative, to verify the quality of installation and the references level of satisfaction with the system.

- D. The Contractor shall provide factory-trained and state licensed technicians as field supervisors to perform the field supervision on site to guide the final check-out and to ensure the systems integrity. The Contractor shall provide written proof that the technicians who will be performing the field supervision are certified. The technicians performing field supervision shall have a minimum of five (5) continuous years of technical experience in electronic security systems.
- E. The Contractor shall provide copies of technician certification by the system manufacturer. The Contractor shall only utilize factory-trained technicians to service and install the system. The technicians shall have a minimum of five (5) continuous years of technical experience in electronic security systems.
- F. The Contractor shall have a local service facility. The facility shall be located within one hundred (100) miles of installation project. The local facility shall include reasonable sufficient spare parts inventory to support the service requirements associated with this contract. The facility shall also include appropriate diagnostic equipment to perform diagnostic procedures. The Orange County Transportation Authority or their authorized representative reserves the option of surveying the security Contractor facility to verify the service inventory and presence of a local service organization.
- G. All security employees at the discretion of the Orange County Transportation Authority must pass criminal and / or security clearance background checks when mandated by the Orange County Transportation Authority.

1.14 SUPPLEMENTAL CONTRACTOR QUALITY CONTROL

- A. Integration with Video Surveillance System subsystems shall be achieved by computer programming and the direct hardwiring of the systems. Determination of methodology should be addressed and outlined in advance with the Contracting Officer prior to the systems is / are being designed and engineered.
- B. For programming purposes, the Contractor shall refer to the manufacturer's requirements for correct system operations. Ensure computers being utilized for system integration meet or exceed the minimum system requirements outlined on the systems software packages.
 - 1. The following requirements supplement the Contractor quality control requirements specified elsewhere in the contract:
 - a. The Contractor shall provide the services of technical representatives who are familiar with all components and installation procedures of the installed Video Surveillance System and security console; and are approved by the Contracting Officer in advance.
 - b. The Contractor representatives will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.

- c. The Contractor representatives shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
- d. The Contractor technical representatives shall participate in the testing and validation of the system and shall provide certification that their respective system portions meet its contractual requirements.

1.15 SUBMITTALS

- A. Submit below items in conjunction with Existing Conditions Report, Shop Drawings, Product Data, and Samples, Test Procedures, and Project Close out Documentation
- B. Provide certificates of compliance with Contractor qualifications.
- C. Provide a pre-installation and As-Built design package in both electronic format and on paper, minimum size 30 x 42 inches (76 cm x 107 cm); drawing submittals shall be per the established project schedule.
- D. Pre-installation design and as-built packages shall include, but not be limited to:
 - 1. Index Sheet that shall:
 - a. Define each page of the design package to include facility name, building name, floor, and sheet number.
 - b. Provide a list of all security abbreviations and symbols.
 - c. Reference all general notes that are utilized within the design package.
 - d. Section and scope of work pages for all Video Surveillance System and subsystems, that are applicable to the design package that will:
 - 1) Outline all general and job specific work required within the design package.
 - 2) Provide a device identification table outlining device Identification (ID) and use for all security systems equipment utilized in the design package.
 - 2. Drawing sheets that will be plotted on the individual floor plans or site plans shall:
 - a. Include a title block.
 - b. Define the drawings scale in both standard and metric measurements.
 - c. Provide device identification and location.
 - d. Address all signal and power conduit runs and sizes that are associated with the design of the electronic security system and other security elements (e.g., barriers, etc.).
 - e. Identify all pull box and conduit locations, sizes, and fill capacities.

- f. Address all general and drawing specific notes for a particular drawing sheet.
- 3. A riser drawing for each applicable security subsystem shall:
 - a. Indicate the sequence of operation.
 - b. Relationship of integrated components on one diagram.
 - c. Include the number, size, identification, and maximum lengths of interconnecting wires.
 - d. Wire / cable types shall be defined by a wire and cable schedule. The schedule shall utilize a lettering system that will correspond to the wire / cable it represents (example: A = 18 AWG/1 Pair Twisted, Unshielded). This schedule shall also provide the manufacturer name and part number for the wire / cable being installed.
- 4. A system drawing for each applicable Video Surveillance System and subsystems, shall:
 - a. Identify how all equipment within the system, from main panel to device, shall be laid out and connected.
 - b. Provide full detail of all system components wiring from point-to-point.
 - c. Identify wire types utilized for connection, interconnection with the associated Video Surveillance System and subsystems.
 - d. Show device locations that correspond to the floor plans.
 - e. All general and drawing specific notes shall be included with the system drawings.
- 5. A schedule for all of the applicable Video Surveillance System and subsystems, shall be included. All schedules shall provide the following information:
 - a. Device ID.
 - b. Device Location (e.g. site, building, floor, room number, location, and description).
 - c. Mounting type (e.g. flush, wall, surface, etc.).
 - d. Power supply or circuit breaker, power panel power consumption, and back-up battery calculations.
 - e. Transient voltage surge suppression devices.
- 6. Detail and elevation drawings for all devices that define how they are to be installed and mounted.
- E. Pre-installation design packages shall be reviewed by the Contractor along with an Orange County Transportation Authority representative to ensure all work submitted has been clearly defined and completed. All reviews shall be conducted in accordance with the project schedule.
- F. Provide manufacturer Video Surveillance System product cut-sheets. Submit for approval at least thirty (30) days prior to commencement of formal testing, a Video

Surveillance Security System Operational Test Plan. Include procedures for operational testing of each component and subsystem(s), to include performance of an integrated system test.

- G. Submit manufacturer certification of Underwriters Laboratories, Inc. (UL) listing as specified. Provide all maintenance and operating manuals per the Orange County Transportation Authority General Requirements.
- H. Provide shop drawings and product data of related systems, components, products, and accessories to form a single submittal. Partial and incomplete submittals shall not be accepted. Each package shall be submitted one (1) time for review.
- I. Identify variations from requirements of Contract Documents. State the product and system limitations that may be detrimental to successful performance of the completed work.
- J. If the Contractor subsequently deems departures from the technical data drawings necessary, details of such departures and the reasons therefore, shall be submitted in writing to the Orange County Transportation Authority for approval before the initiation of work.
- K. Manual and binder packaging configurations shall be considered and applied as a standard for the entire project.
- L. Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
 - 1. Binders: For each manual, provide heavy duty, commercial quality, durable three (3) ring vinyl covered loose leaf binders, in thickness necessary to accommodate contents, sized to receive 8.5 inch by 11-inch paper. Provide a clear plastic sleeve on the spine, to hold labels describing the contents. Provide pockets in the covers to receive folded sheets.
 - 2. Where two (2) or more binders are necessary to accommodate data, correlate data in each binder into related groupings according to the Project Manual table of contents. Cross-reference other binders where necessary to provide essential information for proper operation and / or maintenance of the component or system.
 - 3. Identify each binder on the front and spine with typed Project title or name, and subject matter covered. Indicate the volume number for multiple volume sets of manuals.
- M. Dividers: Provide heavy paper dividers with celluloid tabs for each section. Mark each tab to indicate contents.
 - 1. Protective Plastic Jackets: Provide protective transparent plastic jackets designed to enclose diagnostic software for computerized electronic equipment.
 - 2. Text Material: Where written material is required as part of the manual use the manufacturer standard printed material, or if not available, specially prepared data, neatly typewritten on 8.5 inch by 11-inch white bond paper.
- N. Manual Content: In each manual include information specified in the individual section, and the following information for each major component of building equipment and its controls:

1. General system equipment description.
 2. Detailed design factors and all assumptions.
 3. Copies of applicable shop drawings and product data sheets.
 4. System or equipment identification, including; name of manufacturer, model numbers, operating instructions, emergency instructions, wiring diagrams, inspection and test procedures, maintenance procedures and schedules, precautions against improper use and maintenance, repair instructions, sources of required maintenance materials and related services, and a manual index.
 5. Detailed explanation of the integration theory of operation. Provide details on how the system shall interface with other systems such as fire alarm systems.
- O. Organization: Organize each manual into separate sections for each piece of related equipment. As a minimum, each manual shall contain a title page, table of contents, copies of product data, supplemented by drawings and written text, certification, copies of each warranty, bond and service contract issued.
1. Provide a title page as the first sheet of each manual to include the following information; name and address, subject matter covered by the manual, name and address of the Project, date of the submittal, name, address, and telephone number of the Contractor.
 2. After the title page, include a type written table of contents for each volume, arranged systematically according to the project manual format. Provide a list of each product included, identified by product name or other appropriate identifying symbols and indexed to the content of the volume. Where more than one (1) volume is required to hold data for a particular system, provide a comprehensive table of contents for all volumes in each volume set.
- P. Provide a general information section immediately following the table of contents, listing each product included in the manual, identified by product name. Under each product, list the name, address, telephone number of the installer, and the maintenance Contractor.
- Q. Where manufacturer standard printed data is included in the manuals, include only those sheets that are pertinent to the part or product installed. Mark each sheet to identify each part or product included in the installation. Where more than one (1) item in tabular format is included, identify each item, using appropriate references from the contract documents. Identify data that is applicable to the installation and delete reference to information that is not applicable.
- R. Where manufacturer standard printed data is not available, and the information is necessary for proper operation and maintenance of equipment or systems, or necessary to provide additional information to supplement the data included in the manual, prepare written text to provide the necessary information. Organize the text in a consistent format under a separate heading for different procedures. Where necessary, provide a logical sequence of instruction for each operating or maintenance procedure.
- S. Provide specially prepared drawings where necessary to supplement the manufacturers printed data to illustrate the relationship of component parts of

equipment or systems, or provide control or flow diagrams. Coordinate these drawings with information contained in the Record Drawings to assure correct illustration of the completed installation.

- T. Contractor Review: The Contractor shall review submittals prior to transmittal. Determine and verify field measurements and field construction criteria. Verify manufacturer catalog numbers and conformance of submittal with requirements of contract documents. Return non-conforming or incomplete submittals with requirements of the work and contract documents. Apply Contractor's stamp with signature certifying that the submittal review, verification of products required, field dimensions, adjacent construction, and coordination of information is in accordance with the requirements of the contract documents.
- U. Submittal shall provide detailed pricing sheets for each discipline submitted. These sheets shall consist of equipment descriptions, conduit, wire, equipment quantities, per unit price, and total extended price. The submittal shall provide a separate line item with installation labor rate for the project. The submittal shall allow for miscellaneous line item in the submittal. The miscellaneous line item shall not exceed 7 percent of the total cost submitted.
- V. The submittal shall provide itemized cost for the warranty that includes all parts and labor.
- W. Resubmission: Revise and resubmit submittals as required within fifteen (15) days of return of submittal. Make re-submissions under procedures specified for initial submittals. Identify all changes in "red" since the previous submittal.
- X. The Contractor shall submit a point-by-point statement of compliance with each paragraph of the section. The statement of compliance shall list each paragraph by number and indicate "comply" opposite the number for each paragraph where the Contractor fully complies with the requirements. Where the proposed system cannot meet the requirements of the paragraph, and does not offer an equal solution, the offers shall indicate "does not comply" opposite the paragraph number. Where the proposed system does not comply with the paragraph as written, but the proposer feels it shall accomplish the intent of the paragraph in a manner different from that described, the offers shall indicate "comparable". The offers shall include a statement fully describing the "comparable" method of satisfying the requirement. Where a full and concise description is not provided, the offered system shall be considered as not complying with the requirements. Any submission that does not include a point-by-point statement of compliance, as described above, shall be disqualified. Submittals for products shall be in precise order with the product section of the section. Submittals not in proper sequence shall be rejected.
- Y. Existing Conditions Report
 - 1. The Contractor shall prepare a report of "Current Site Conditions" and submit a report to the Owner documenting changes to the site, particularly those conditions that affect performance of the system to be installed. The Contractor shall provide specification sheets, or written functional requirements to support the findings, and a cost estimate to correct those site changes or conditions which affect the installation of the system or its performance. The Contractor shall not correct any deficiency without written permission from the Owner.

Z. Shop Drawings:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and sections.
2. Include sensor area coverage calculations, taking into consideration the room obstructions, fixtures and equipment shown on the Architectural Drawings.
3. Drawings shall clearly and completely indicate the function of each component. Indicate termination points of devices and indicate interconnections required for operation of the system. In addition, provide a layout drawing which shows spacing of components, location, and details of mounting and positioning.
4. Overall system schematic shall indicate the sequence of operation, the relationship of integrated components on one diagram, and show power source, system controls, plus number, size, identification, and maximum lengths of interconnecting wires.
5. Submittals shall also be marked to show section reference including the section and paragraph number.
6. Concurrent review: An additional three copies of the submittal shall simultaneously be submitted.
7. Sufficient information, (detailed schematics of subsystems, assemblies and subassemblies to component level) clearly presented, shall be included to determine compliance with drawings and sections.
8. Wiring and connection diagrams shall be certified by the product manufacturer.
9. Provide verification in writing that the type wire / cable being furnished and installed is recommended by the product manufacturer and will provide a total system free of undesirable effects.
10. Include information indicating who will certify the system and who will perform the guarantee period services.
11. Furnish a typewritten document (including illustrations), which, utilizing the test equipment specified by the manufacturer of the products provided. Provide a detailed system testing plan for the system. The test plan will be evaluated and approved by the Orange County Transportation Authority or their authorize representative prior to pre-testing of the system.
12. Provide a detailed training lesson plan for evaluation and approval by the Orange County Transportation Authority or their authorize representative.
13. Equipment installations, point-to-point interconnection with console equipment, including control block diagrams, and point-to-point wiring diagrams.
14. Surge protection device installation.
 - a. Submittals shall include, but are not limited to, the following data:

- 1) Complete data for each surge suppressor type indicating conductor sizes, types, connection configuration lead lengths and all appropriate dimensions.
- 2) Dimensions for each surge suppressor type indicating mounting dimensions and required accessory hardware.
- 3) Certified test data from an independent testing laboratory indicating the ability of the product to meet or exceed all requirements of this section.
- 4) Drawings shall be provided indicating surge suppressor mounting and lead length configuration.
- b. Submit installation details for the alarm control electric switch suppression electrical connections to equipment being surge protected.
- c. Submitted surge suppressors shall be equal to or better than the performance characteristics specified herein.
- d. Surge protection devices submitted shall wherever feasible be provided with automatic thermal resetting fuse function.
15. Details of all wiring conductor, type, gauge, and jackets.
16. The data package shall include system descriptions, analysis, and calculations used in sizing equipment required by these sections. Descriptions and calculations shall show how the equipment shall operate as a system to meet the performance requirements of this section.
17. The data package shall provide system block diagram; client software installation, and wiring diagrams; typical block and wiring diagrams; local physical layout and schematics; and all devices wiring and installation point-to-point plan drawings; wire type and conduit sizes and routing location plan drawings for the complete system design, details of connections to power supplies and grounding; details of surge protection device installation; details of point-to-point interconnections with integrated systems.

AA. Manuals:

1. Submit, simultaneously with shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets schematics, wiring diagrams, and information for ordering replacement parts.
 - a. Wiring diagrams shall have their terminals identified to facilitate installation, operation and maintenance.
 - b. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.

- c. Provide a clear and concise description of the operation which gives, in detail the information required to properly operate the equipment and system.
 - d. Lesson plans and training manuals for the training phases, including type of training to be provided, and a list of reference material, shall be delivered for approval.
- 2. Two weeks prior to the final inspection, submit four copies of the final data package to the Contracting Officer.
 - a. Update the manual to include any information necessitated by shop drawing approval.
 - b. Include complete "As built" wiring and schematic diagrams which shows all items of equipment and their interconnecting wiring.
 - c. Show all terminal identifications.
 - d. Include information for testing, repair, troubleshooting, assembly, disassembly and recommended maintenance intervals.
 - e. Provide a replacement parts list with current prices. Include list of recommended spare parts, tools, and instruments for testing and maintenance purposes.
- 3. Final copies of the manuals as specified bound in hardback binders and shall be delivered to the Orange County Transportation Authority as part of the final acceptance test. The draft copy used during site testing shall be updated with any changes required prior to final delivery of the manuals. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of each Sub-Contractor installing equipment and systems, and nearest service representatives for each item of equipment for each system. The manuals shall have a table of contents and tab sheets. Tab sheets shall be placed at the beginning of each chapter or section and at the beginning of each appendix. The final copies delivered after completion of the endurance test shall include all modifications made during installation, checkout, and acceptance. Three (3) copies of each manual shall be delivered for approval. The final manuals shall include but are not limited to the sections as listed herein:
 - a. Functional Design:
 - 1) The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included for all system operating modes.
 - b. Hardware:
 - 1) Description of all equipment furnished including general description and sections; installation and checkout procedures; equipment electrical schematics and layout drawings; system schematics and layout drawings;

alignment and calibration procedures; manufacturer repair list indicating sources of supply; and interface definition.

c. Software:

- 1) The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include definition of terms and functions; use of system and applications software; procedures for system initialization, start-up and shutdown; alarm reports; reports generation, database format and data entry requirements; directory of all disk files; and description of all communications protocols, including data formats, command characters, and a sample of each type of data transfer.

d. Operator's:

- 1) The operator's manual shall fully explain all procedures and instructions for the operation of the system, including as applicable computers and peripherals; system start-up and shutdown procedures; use of system, command, and applications software, recovery and restart procedures; graphic alarm presentation; use of report generator and generation of reports; data entry; operator commands' alarm messages and printing formats; and system access requirements.

e. Maintenance:

- 1) The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.
- 2) Spare Parts & Components Data: At the conclusion of the Contractor's work, the Contractor shall submit to the Orange County Transportation Authority a complete list of the manufacturer recommended spare parts and components required to satisfactorily maintain and service the systems, as well as; unit pricing for these parts and components.

f. Equipment and Systems Maintenance, the Contractor shall provide the following descriptive information for each piece of equipment, operating system, and electronic system:

- 1) Equipment and / or system function.
- 2) Operating characteristics.
- 3) Limiting conditions.

- 4) Performance curves.
- 5) Engineering data and test.
- 6) Complete nomenclature and number of replacement parts.
- 7) Provide operating and maintenance instructions including assembly drawings and diagrams required for maintenance and a list of items recommended to stock as spare parts.
- 8) Provide information detailing essential maintenance procedures including the following; routine operations, troubleshooting Graphical User Interface (GUI), disassembly, repair, and re-assembly, alignment, adjusting, and checking.
- 9) Provide information on equipment and system operating procedures, including the following; start-up procedures, routine and normal operating instructions, regulation and control procedures, instructions on stopping, shut-down and emergency instructions, required sequences for electric and electronic systems, and special operating instructions.
- 10) Provide a schedule of routine servicing and lubrication requirements, to include a list of required lubricants for equipment with moving parts.

AB. Test Procedures and Equipment

1. Development of Test Procedures: The Contractor will prepare performance test procedures and reports for the performance test. The performance test procedures shall follow the format of the manufacturer's best practices and be customized to the contract requirements. The Contractor will deliver the test procedures to the owner for approval at least sixty (60) calendar days prior to the requested test date.
2. Perform Testing: The Contractor will perform the performance test only after receiving written approval of the test procedures. The contractor shall deliver a final contractor field test report within 15 calendar days from completion of the test and request to initiate formal performance testing.
3. Test Equipment List: The Contractor is responsible for furnishing all test equipment required to test the system in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the system. The Contractor shall furnish test equipment of accuracy better than the parameters to be tested. The test equipment

list shall be furnished as a part of the submittal, to include the make and model number.

- AC. Certifications: Two weeks prior to final inspection, submit (4) four copies of a certificate by the authorized representative of the manufacturer of the major equipment that the system has been properly installed, adjusted and pre-tested to the Contracting Officer:
1. Together with the shop drawing(s) submittal, submit a written certification that the materials are in accordance with the drawings and sections.
 2. Together with the shop drawing(s) submittal, submit a written certification, by the Contractor, that the complete installation has been properly installed, tested and adjusted.
 3. Together with the shop drawing(s) submittal, submit a written certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of the guarantee period services is an authorized representative of the major equipment manufacturer. Include name and address in the certification.
 4. Together with the shop drawing(s) submittal, submit a written certification from the major equipment manufacturer that the proposed wiring installation and connection diagrams meet this section, the UL requirements and the requirements set forth by the major equipment manufacturer for proper performance of the system. The Orange County Transportation Authority will not approve any submittal without this certification.

1.16 PERFORMANCE REQUIREMENTS

- A. The Contractor shall perform pre-delivery testing, site testing, and adjustment of the completed video surveillance security system. The Contractor shall provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.
- B. Written notification of planned testing shall be given to the Orange County Transportation Authority at least fourteen (14) days prior to the test and in no case shall notice be given until after the Contractor has received written approval of the specific test procedures.
1. The Orange County Transportation Authority shall witness all testing.
 2. Written permission shall be obtained from the Orange County Transportation Authority before proceeding with the next phase of testing.
 3. Original copies of all data produced during acceptance and endurance testing shall be turned over to the Orange County Transportation Authority at the conclusion of each phase of testing prior to Orange County Transportation Authority approval of the test.
- C. Test Procedures and Reports procedures shall explain in detail, step-by-step actions and expected results demonstrating compliance with the requirements of the specification.
1. The test reports shall be used to document results of the tests.

2. The reports shall be delivered to the Orange County Transportation Authority within seven (7) days after completion of each test.
- D. The Contractor shall perform field testing. The Contractor shall calibrate and test all equipment, verify data transmission media (DTM) operation, place the integrated video system in service, and test the integrated system.
- E. The Contractor shall demonstrate that the completed system complies with the contract requirements. In addition, the Contractor shall provide written certification that the system is 100% operational prior to establishing date for starting acceptance testing. Using approved test procedures, all physical and functional requirements of the project shall be demonstrated and shown.
- F. The endurance test(s) shall be conducted in phases as specified. The endurance test shall not be started until the Orange County Transportation Authority notifies the Contractor, in writing, that the performance verification test is satisfactorily completed, training as specified has been completed, and correction of all outstanding deficiencies has been satisfactorily completed.
 1. Phase I (Testing): The test shall be conducted 24 hours per day for fifteen (15) consecutive calendar days, including holidays, and the system shall operate as specified.
 2. Phase II (Assessment): After the conclusion of Phase I, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Orange County Transportation Authority. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed, and shall recommend the point at which testing should be resumed.
 3. Phase III (Testing): The test shall be conducted 24 hours per day for fifteen (15) consecutive calendar days, including holidays, and the system shall operate as specified. The Contractor shall make no repairs during this phase of testing unless authorized by the Orange County Transportation Authority in writing.
 4. Phase IV (Assessment): After the conclusion of Phase III, the Contractor shall identify all failures, determine causes of all failures, repair all failures, and deliver a written report to the Orange County Transportation Authority. The report shall explain in detail the nature of each failure, corrective action taken, results of tests performed and shall recommend the point at which testing should be resumed. As a part of this test review meeting, the Contractor shall demonstrate that all failures have been corrected by repeating appropriate portions for the performance verification test. Based on the Contractor's report and the test review meeting, the Orange County Transportation Authority will determine the restart date, and may require that Phase III be repeated.
- G. Exclusions: The Contractor will not be held responsible for failures in system performance resulting from the following:
 1. An outage of the main power in excess of the capability of any backup power source, provided that the automatic initiation of all backup sources was accomplished and that automatic shutdown and restart of the VSS System performed as specified.

2. Failure of an Orange County Transportation Authority furnished equipment or communications link, provided that the failure was not due to Contractor furnished equipment, installation, or software.

1.17 SUBSTITUTE MATERIALS AND EQUIPMENT

- A. In addition to this section the Contractor is also encouraged to reference section 2.0 Products. Acceptable manufacturers of products included in this specification are indicated in part 2.8 Acceptable Manufacturers or approved equal. The Contractor shall list and identify those materials or devices and equipment for which he intends a substitution. The substituted items shall be identified by manufacturer, catalog and/or model number and the manufacturer's product name. The Orange County Transportation Authority shall have final authority on the authorization or refusal of substitutions. If there are no proposed substitutions, a statement in writing from the Contractor shall be submitted to the Orange County Transportation Authority stating same. In the preparation of a list of substitutions, the following information shall be included, as a minimum:
 1. Identity of the material or devices specified for which there is a proposed substitution.
 2. Description of the segment of the specification where the material or devices are referenced.
 3. Identity of the proposed substitute by manufacturer, brand name, catalog or model number.
 4. A technical statement of all operational characteristic expressing equivalence to items to be substituted and comparison, feature-by-feature, between specification requirements and the material or devices called for in the specification.
 5. Price differential.

1.18 WARRANTY

- A. Furnish as a condition precedent to the final payment, execute a written guarantee (warranty) to the Orange County Transportation Authority certifying that all the contract requirements have been completed according to the project scope. The warranty shall provide for factory trained authorized representatives of the manufacturer of the equipment to provided service for a period as required per the project general conditions after acceptance of the installation by the Orange County Transportation Authority.
- B. The purpose of this warranty is to ensure the newly installed cameras and devices continually protect the facility and that they are maintained to a level that shall allow only minimal down time as a result of failures.
- C. The warrantee provider shall maintain the system in an operational state as specified for the period. Impact on normal facility operation shall be minimized when performing schedule maintenance or other non-scheduled work.

- D. Repair services and replacement parts for the system furnished under this contract shall be available for a period of ten (10) years after the date of final acceptance by the Orange County Transportation Authority.
- E. The warrantee provider shall keep records and logs of each task and shall organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log contains all initial settings, calibration, repair, and programming data. Complete logs shall be kept and shall be available for inspection on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the system.
 - 1. The Contractor shall provide written documentation to Orange County Transportation Authority on conditions and findings of the system and device(s).
 - 2. In addition, the Contractor shall provide written documentation stating what was done to correct any deficiencies and test results.
- F. The warrantee provider shall separately record each service call request, as received. The form shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials to be used, the time and date of commencement and completion. The Contractor shall deliver a record of the work performed within five (5) days after the work was completed.
- G. The warrantee provider shall make any recommendations for system modification in writing to the Orange County Transportation Authority. No system modifications including operating parameters and control settings shall be made without prior approval from the Orange County Transportation Authority. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and other documentation affected.
- H. The warrantee provider shall provide all software updates by the manufacturer during the installation warranty period and verify operation of the system. These updates shall be accomplished in a timely manner, and fully coordinated with the system operators and shall be incorporated into the operations and maintenance manuals, and software documentation. There shall be at least one (1) scheduled update near the end of the warranty period, at which time the Contractor shall install and validate the latest released version of the Manufacturer software.
- I. In the event that any manufacturer customarily provides a warranty period greater than for the period as required per the project general conditions, the warrantee provider warranty shall be for the same period of time.
- J. Warranty of all work and installed products shall be according to the Contract General Provisions.

1.19 GENERAL

- A. The Video Surveillance System characteristics listed in this section will serve as a guide in selection of equipment and materials. If updated or more suitable versions

are available, then the Orange County Transportation Authority Contracting Officer will be provided detailed information for review and potential approval of these devices prior to installation.

- B. All equipment associated within the system shall be rated for continuous operation. Environmental conditions (i.e. temperature, humidity, wind, and seismic activity) shall be taken under consideration at each facility and site location prior to installation of the equipment.
 - 1. Due to the environmental conditions of the location all areas of the project work and all devices/conduit shall be designed for unconditioned environmental close proximity marine applications.
- C. All materials, devices and equipment shall be unused, of current manufacturer, and meet or exceed the latest published specifications of the manufacturer. Devices and equipment shall be the latest model of the manufacturer unless otherwise indicated, or unless such model fails to meet the requirements of this project. All electronic components shall be standard, unmodified production models except as noted with the latest firmware / bios offered by manufacturer at the time of the final test. For each item of equipment offered, manufacturer shall maintain:
 - 1. A factory production line.
 - 2. A stock of replacement parts.
 - 3. Engineering drawings, specifications, operating manuals and maintenance manuals.
- D. Manufacturer shall have published and distributed descriptive literature and equipment specifications on each item of equipment offered.
- E. Unless otherwise specifically provided under this contract, all equipment, material and articles to be incorporated in the work shall be new and of the most suitable grade for the purposes intended.
- F. All materials, devices and equipment provided as part of the system specified within the documentation shall meet or exceed the following basic requirements:
 - 1. Meet the mission requirements of the Orange County Transportation Authority.
 - 2. When any substantial existing security infrastructure is present on-site the security solution provided shall be comprised of components for like functions and applications and shall be from the same manufacturer wherever feasibly possible and shall be one hundred (100) percent compatible with the existing and proposed system unless authorized by the Orange County Transportation Authority.
 - 3. Solutions shall be designed by the product manufacture to integrate seamlessly into the site wide security management system monitoring infrastructure.
- G. All materials, devices and equipment provided as part of the system specified shall meet or exceed the following basic requirements as stated within this specification:
 - 1. Support for Orange County Transportation Authority network approved protocols.

2. Underwriters Laboratories listed hardware.
 3. On-board stand-alone processing intelligence.
 4. Input / output controls.
 5. Input voltage - 120 VAC 60Hz, or associated power supply.
 6. Be continuously monitored by the system general processor. Failure of any component to respond to an interrogation shall be automatically annunciated at the security video surveillance system workstation.
 8. Incorporate video behavioral analytics integration; rules based analytics shall not be permitted.
 9. Video controllers shall provide capability for no less than 64 network cameras and shall be loaded no higher than 48 cameras per server.
 10. The system software shall provide a complete graphic GUI from the manufacturer that shall be capable of graphically symbolizing operations on common AutoCAD™ site background drawings as provided by the Orange County Transportation Authority.
- H. The Contractor shall furnish to the Orange County Transportation Authority for approval, the name of the manufacturer, model number, and other identifying data and information that reflects the performance, capacity, nature and rating of the electrical, mechanical, and other equipment that the Contractor contemplates incorporating in the work.
1. The provider of equipment shall be factory trained and certified.
- I. The system shall be designed, installed, and programmed in a manner that will allow for ease of operation, programming, servicing, maintenance, testing, and upgrading of the system.
1. All systems shall be designed to provide continuous electrical supervision of the complete and entire system.
 2. All alarm and initiating and signaling circuits shall be supervised for open circuits, short circuits, and system grounds.
- J. All low voltage power supplies shall be UL listed for their intended purpose. All low voltage power supply circuits shall conform to Class 2 requirements of NFPA 70 - National Electric Code.
- K. When required by contract or when called for by Orange County Transportation Authority or their authorized representative, the Contractor shall furnish to the Orange County Transportation Authority for approval of full information concerning the material or articles that they contemplate incorporating in the project.
1. When so directed, the Contractor shall submit samples for approval; at the Contractor's expense, with all shipping charges prepaid.
 2. Equipment, materials and articles installed or used without the Orange County Transportation Authority required approval process shall be at the Contractor's risk of rejection.
- L. All electronic components of the system shall be of the solid-state type, mounted on printed circuit boards conforming to UL 796. Boards shall be plug-in, quick-disconnect type.

1. Light duty relays and similar switching devices shall be solid-state type or electromechanical.
- M. Circuitry shall not be so densely placed as to impede maintenance. All power-dissipating components shall incorporate safety margins of not less than twenty-five percent (25 percent) with respect to dissipation ratings, maximum voltages and current-carrying capacity.
- N. Standards and Testing: All supplies, materials or equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to conform to UL Standards where such standards have been established for the industry supplies, materials or equipment.
- O. Consoles, enclosures, power supply enclosures, sensor control, terminal cabinets, control units, wiring gutters and other component housings, collectively referred to as enclosures, shall be so formed and assembled as to be sturdy and rigid support. The mount shall be seismically secure to support three times the maximum weight of the device to be supported.
 1. Thickness of metal in-cast and sheet metal enclosures of all types shall not be less than those in Tables I and II, UL 611. Sheet steel used in fabrication of enclosures shall be not less than 14 gauge. Consoles shall be a minimum of 16 gauge.
 2. Doors and covers shall be flanged. Enclosures shall not have pre-punched knockouts.
 3. All enclosures over twelve (12) inches square shall be hinged with an enclosure lock and 24/7 monitored tamper or tampers to ensure access is detected upon prying of the enclosure at any point.
 4. Where doors are mounted on hinges with exposed pins, the hinges shall be of the tight pin type or the ends of hinge pins shall be tack welded to prevent removal.
 5. Doors having a latch edge length of less than 24 inches shall be provided with a single lock. Where the latch edge of a hinged door is 24 inches or more in length, the door shall be provided with a three-point latching device with lock; or alternatively with two locks, one located near each end with monitored 24/7 tamper switches.
 6. Any ventilator openings in enclosures and cabinets shall conform to the requirements of UL.
 7. Unless otherwise indicated, sheet metal enclosures shall be designed for wall mounting with top holes slotted. Mounting holes shall be in positions that remain accessible when all major operating components are in place and the door is open, but shall be inaccessible when the door is closed.
 8. Covers of pull and junction boxes provided to facilitate initial installation of the system shall be held in place by one-way screws. Stenciled or painted labels shall be affixed to such boxes indicating they contain no connections. These labels shall not indicate that the box is part of the Security Management System.
 9. Junction Box Covers: All junction boxes and small device enclosures above the finished ceiling level and not readily accessible to employees and / or

the public shall be covered with a suitable painted cover plate that adheres to the identification scheme as prescribed by the Orange County Transportation Authority. All junction boxes and small device enclosures shall be consistently color coded. Unless otherwise authorized by the Orange County Transportation Authority.

10. All junctions shall be placed on the secured side building structure, monitored, and controlled areas to whichever it the most stringent protection level obtainable.
 11. All security screws shall be Torx-Post Security Screws.
 - a. The Contractor shall provide the Orange County Transportation Authority with three (3) Torx-post screwdrivers.
 12. System Key Lock Requirement: All security related system panels or components requiring keys, shall be keyed alike, unless otherwise specified, so that one key can open all panels. There shall be one key supplied for every lock, plus three (3) additional spare keys. All security enclosure keys provided shall be only released to the designated credential controller for the Orange County Transportation Authority.
- P. System Balancing:
1. Where required resistors, terminators, filters, and similar devices shall be installed for minimizing interference of the system.
- R. Compliance with manufacturer recommendations, fiber optics or Category 6 or greater communication cabling shall be utilized for the data signal transmission unless otherwise authorized in writing by the Orange County Transportation Authority.
1. For network based transmissions lengths greater than 295 feet, the security Contractor shall make provisions to guarantee the signal's transmission strength to include anticipated wire degradation.
 2. Provide network drops where required for dedicated security system network interconnection via industry standard TCP/IP communication protocol. Program a static IP address for each device placed upon the dedicated security system network. The system connections provided shall be designed to support advanced distributed network architecture. The provided network connection at the control panel shall be able to communicate back with the security management database servers through industry standard network switches and routers.
 3. Provide TCP/IP paths for full communication from each network workstation, controller, device, and database server to allow for system communication, function, and control via the dedicated security system network.
- S. The Contractor shall install the appurtenances as specified by the manufacturer; provide mounting hardware sized appropriately to secure the mount, device with maximum wind and ice loading encountered at the site. The mount shall be seismically secure to support three times the maximum weight of the device to be supported.

- T. The Contractor shall provide electrical and signal transmission cabling to the equipment location; connect control wiring, signal lines and AC power to devices to the security video surveillance system interface.
- U. All consoles and vertical equipment racks shall include a forced air-cooling system.
 - 1. Vertical Equipment Racks: The forced air blowers shall be installed in the vented top of each cabinet and shall not occupy usable rack space.
 - a. The forced air fan shall consist of one fan rated at 105 CFM per rack bay and noise level shall not exceed 55 decibels.
 - b. Vertical equipment racks are to be provided with full sized clear plastic locking doors and vented top panels as shown on contract drawings.
 - 2. Console racks: Forced air fans shall be installed in the top rear of each console bay.
 - a. The forced air fan shall consist of one fan rated at 105 CFM mounted to a 5.25 inch vented blank panel the noise level of each fan shall not exceed 55 decibels.
 - b. The fans shall be installed so that air is pulled from the bottom of the rack or cabinet and exhausted out the top.
 - c. Console racks are to be provided with flush mounted hinged rear doors with recessed locking latch on the bottom and middle sections of the consoles.
 - d. Provide materials to support wiring for devices located on the work surfaces.
 - 3. All racks and / or consoles shall be provided with ventilation cooling fan(s), which shall provide a minimum of 150 CFM capacity for each 200 watts of power to be dissipated.
 - 4. All racks shall provide a digital temperature meter that shall be visible from the front of the rack enclosure.
- V. Coordinate the selection of the camera / lenses with the Department of Orange County Transportation Authority to provide the view required. The Contractor will be required to demonstrate to the Orange County Transportation Authority the typical scene covered prior to final selection.
- W. The Contractor shall take into consideration, at a minimum, the following conditions for the selection of system components:
 - 1. The environmental conditions and physical location requirements for the controller, hardware, and communication devices.
 - 2. The scene and its ambient lighting level including the potential for back-lighting.
 - a. Aim fixed mount cameras installed outdoors, facing the rising or setting sun, sufficiently below the horizon to preclude the camera looking directly at the sun.
 - 3. The camera housing, drive, and / or mounting requirements.

- 4. The video and data transmission system.
- 5. Peripheral devices for camera switching and activation, picture recording and picture production.
- X. Exterior cameras shall be equipped with a clear dome. All interior cameras shall be equipped with a smoked dome.

1.20 ENVIRONMENTAL CONDITIONS - GENERAL

- A. Interior, Controlled Environment: All system components, except the console equipment, installed in interior locations having controlled environments shall be rated for continuous operation under ambient environmental condition of 32 to 120 degrees Fahrenheit dry bulb and 5 to 100 percent relative humidity, non-condensing.
- B. Interior, Uncontrolled Environment: All system components installed in interior locations having uncontrolled environments shall be rated for continuous operation under ambient environmental condition of 0 to 120 degrees Fahrenheit dry bulb and 5 to 100 percent relative humidity, non-condensing.
- C. Exterior Environment: All system components that are installed in locations exposed to weather shall be rated for continuous operation under ambient environmental conditions of minus 30 to 120 degrees Fahrenheit dry bulb and 5 to 100 percent relative humidity, condensing. In addition, the system components shall be rated for continuous operation as specified in UL 294 for outdoor use equipment. In exterior environmental locations equipment shall utilize integrated automatic heating and cooling systems.
- D. Hazardous Environment: All system components located in areas where fire or explosion hazards could occur due to the presence of natural gases or vapors, flammable liquids, combustible residue, or ignitable fibers or debris, shall be rated Class II, Division I, Group F, and installed in accordance with NFPA 70, Chapter 5
- E. Console: All console equipment shall, unless noted otherwise, be rated for continuous operation under ambient environmental conditions of 60 to 85 degrees Fahrenheit and a relative humidity of 20 to 80 percent.
- F. Environmental Limitations: Do not deliver or install equipment frames until spaces are enclosed and weather tight, wet work in spaces is complete and dry, and work above ceilings is complete.

1.21 ENVIRONMENTAL CONDITIONS - SURGE SUPPRESSION

- A. Storage temperature
 - 1. Storage temperature range shall operate within -40 to +185 degrees Fahrenheit.
- B. Operating temperature
 - 1. Operating temperature range shall operate within -40 to +140 degrees Fahrenheit.
- C. Relative humidity

1. Unit shall operate within 0 to 95 percent non-condensing relative humidity.
- D. Operating altitude
 1. The unit shall operate within altitudes up to 12,000 feet above sea level.
- E. Audible noise
 1. The unit shall not generate any human detectable audible noise while in operation.
- F. Magnetic fields
 1. No appreciable magnetic fields shall be generated. Unit shall be capable of use directly in computer rooms in any location without danger to data storage systems or devices.

1.22 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to the job site in manufacturer original unopened containers, clearly labeled with the manufacturer name and equipment model identification number.
- B. Storage and Handling: Equipment and materials shall be properly stored, adequately protected and carefully handled to prevent damage before and during installation.
 1. Equipment and materials shall be handled, stored and protected according to the manufacturers' recommendations.
 2. Store products in manufacturer unopened packaging until ready for installation
 3. Equipment provided with a factory finish shall be maintained free of dust, dirt and foreign matter.
 4. Dents, marred finishes and other damage shall be repaired to its original condition or shall be replaced, at no additional cost to the Orange County Transportation Authority.
 5. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
 6. Any material, device or equipment damages before or during installation and before acceptance of the completed system by the Orange County Transportation Authority shall be replaced unless repairs can be made that are acceptable to the Orange County Transportation Authority. Any such replacement or repairs, including repairs to the finish, shall be made at no cost to the Orange County Transportation Authority.
- C. Equipment stored on the premises is at the Contractor's own risk. The Orange County Transportation Authority is not the caretaker of uninstalled or staging of equipment and hardware on-site unless previously authorized in writing by the Contracting Officer or their authorized representative to accept custodianship of the hardware.

- D. The Contractor shall examine the site and the Documents and review with the Orange County Transportation Authority the designated areas of access, delivery, and storage for the Contractor's use.
- E. The Contractor agrees that such areas are satisfactory and sufficient for their needs in the completion of their work and in conformance with the terms of this Contract.

1.23 EQUIPMENT COMPATIBILITY REQUIREMENTS

- A. While individual items of equipment may meet the equipment performance specifications, and in fact, meet the system section when electrically associated with other equipment, the total system shall be designed so that the combination of equipment actually employed does not produce effects such as signal distortions, noise pulses, data noise, transients, phantom calls or other interferences.
- B. Where two or more items of equipment performing the same function are required, they shall be exact duplicates produced by one manufacturer.
- C. All hardware used shall be substantially the same as items of manufacturer, which, on the date of receipt of proposals, have been in successful commercial use and operation for not less than one year in projects, and units of comparable size.
- D. All references and other pertinent information herein are intended to establish minimum standards of performance, function and quality. For equipment that is specified, the Contractor shall supply proof that such equipment does in fact equal or exceed the features, functions, performance and quality of the specified equipment.
- E. Components for like functions and applications shall be from the same manufacturer where possible and shall be one hundred percent (100 percent) compatible with the existing and proposed video surveillance systems. Manufacturers shall be so established in the industry that prompt and continuing service and delivery of spare parts may be assured and software updates procured.
- F. Acceptable manufacturers of products included in this section are indicated or approved equal. The Contractor shall list and identify those materials or devices and equipment for which he intends a substitution. The substituted items shall be identified by manufacturer, catalog and / or model number and the manufacturer product name. The Orange County Transportation Authority or their authorized representative shall have final authority on the authorization or refusal of substitutions. If there are no proposed substitutions, a statement in writing from the Contractor shall be submitted to the Orange County Transportation Authority stating same. In the preparation of a list of substitutions, the following information shall be included, as a minimum:
 - 1. Identity of the material or devices specified for which there is a proposed substitution.
 - 2. Description of the segment of the section where the material or devices are referenced.
 - 3. Identity of the proposed substitute by manufacturer, brand name, catalog or model number.

4. A technical statement of all operational characteristic expressing equivalence to items to be substituted and comparison, feature-by-feature, between requirements and the material or devices called for in the section.
5. Price differential.
- G. If at any time, in the opinion of the Orange County Transportation Authority or their authorized representative the equipment provided fails to meet the requirements of the section, the Contractor shall furnish the specified equipment at his own expense.
- H. Any components found that are not specifically engineered for the devices to which they are attached shall be exchanged before the installation, when discovered or after the proof of performance test, at no cost to the Orange County Transportation Authority.

1.24 MATERIALS NOT LISTED

- A. Furnish all necessary hardware, software, programming materials and supporting equipment required to place in full operation the specified major subsystems.
 1. Note that some supporting equipment, materials and hardware may not be described herein.
- B. Depending on the manufacturers selected by the Orange County Transportation Authority, some equipment, materials and hardware may not be contained in either the Contract Documents or these written sections, but are required by the manufacturer for complete operation according to the intent of the master plan design and the sections.
 1. In such cases, the Orange County Transportation Authority shall be given the opportunity to approve the additional equipment, hardware and materials that shall be fully identified in the proposal and in the equipment list submittal.
- C. The Orange County Transportation Authority or their authorized representative shall be consulted in the event there is any question about which supporting equipment, materials or hardware is intended to be included.
- D. The Contractor shall produce verification, in writing to the Orange County Transportation Authority Contracting Officer at time of installation, that the type of wire / cable actually being provided is recommended and approved by the OEM and will provide a total system free of undesirable effects. The Contractor is responsible for providing the correct protection cable duct and / or conduit and wiring even though the actual installation may be by another Sub-Contractor.
- E. A sufficient quantity of hardware shall be provided to accommodate all security related field devices plus an additional 40 percent spare capacity for all functions for future expansion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. The following are acceptable manufacturers of Video Surveillance System products as reflected in this specification. Any proposed product from a different manufacturer is subject to a detailed review procedure.
- B. All equipment provided as part of the system specified within the documentation shall meet or exceed these basic requirements:
 - 1. Meet the mission requirements of the Orange County Transportation Authority.
 - 2. Provide make, model, function, and / or manufacturer hardware solution where specified in the master plan security matrix.
 - 3. When any substantial existing security infrastructure is present on-site the security solution provided shall be comprised of components for like functions and applications and shall be from the same manufacturer wherever feasibly possible and shall be one hundred percent (100 percent) compatible with the existing and proposed system unless authorized by the Orange County Transportation Authority.
 - 4. Solutions shall have been specifically designed by the product manufacturer to integrate seamlessly into the site wide security management system monitoring infrastructure.
- C. The following are acceptable manufacturers of electronic video surveillance system products as specified in this specification section. Any proposed product from a different manufacturer is subject to the review procedures in Section 1 & 2 in this specification.
 - 1. Existing Equipment & Software
 - a. Network Digital Video Recorder (NVR) servers with local long term retention video storage systems. Manufacturer: Milestone (Existing – OCTA provided - Contractor responsible for programming and configuring)
 - b. Digital video intelligent content analytics systems. Manufacturer: Milestone (Existing – OCTA provided – Contractor responsible for programming and configuring)
 - c. Digital network video surveillance system. Manufacturer: Milestone (Existing – OCTA provided – Contractor responsible for programming PC Workstations, Application and Database Servers.
 - 2. Cameras:
 - a. Axis
 - b. Pelco
 - c. Approved Equal
 - 3. Ethernet Network Equipment
 - a. Cisco

- b. Comnet
 - c. Approved Equal
- 4. Enclosure Power Supplies
 - a. Phoenix Contact
 - b. Comnet
 - c. Approved Equal
- 5. Transient Voltage Surge Suppression
 - a. DITEK
 - b. Approved Equal
- 6. Uninterruptible Power Supply
 - a. APC
 - b. Approved Equal

2.02 CAMERAS

A. Type I – 180 Degree Megapixel Sensor IP Dome (Indoor/Outdoor):

- 1. The IP Panoramic indoor/outdoor multi-sensor camera system shall transparently integrate video across all sensor's in the camera presenting a seamless fully stitched and blended total resolution of 12 megapixel (MPx), 2048 x 1536 x 4.
- 2. The IP Panoramic indoor/outdoor multi-sensor camera system technology shall include options for 180° camera functionality as well as provide pan and tilt adjustment of the camera module for 180° degree models.
- 3. In conjunction with a Video Management System "VMS" that integrates the Panomersive Toolkit, the camera shall be able to support seamless panoramic views and simultaneous Immersive Views that allow for the pan, tilt and zoom in, across the entire field of view.
- 4. The IP Panoramic indoor/outdoor multi-sensor camera system housing technology shall meet the IK10 impact specification as well as standard mounting hardware capabilities that would include but not be limited to Pendant, Surface, and Ceiling mount hardware.
- 5. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide SureVision™ 2.0 technology that seamlessly delivers extended True Wide Dynamic Range (WDR), low-light performance, and anti-bloom technology, operating in a simultaneous mode of operation.
- 6. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide a slot for a removable, local storage medium (not provided by camera manufacturer) (Micro SD) to capture video clips of varying lengths in accordance with the ONVIF G Profile. Any Video Management System "VMS" that is conformant to this standard can initiate storage and retrieval of video, for instance to safeguard against network failure.

7. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide a service video stream in addition to and independent of the video streams.
8. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide advanced low-light capabilities for day/night models with sensitivity down to 0.03 lux for the 180°.
9. The IP Panoramic indoor/outdoor multi-sensor camera system shall support industry standard Power over Ethernet Plus (PoE+) IEEE 802.3at, Class4 to supply power to the camera over the network.
10. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide options for clear and smoked lower domes.
11. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide Wide Dynamic Range (WDR) up to 120 dB with dynamic adjustments through the User Interface across the cameras field of view.
12. The IP Panoramic indoor/outdoor multi-sensor camera system shall have a mechanical IR cut filter mechanism for increased sensitivity in low-light installations. Set points for the IR cut filter feature shall be configurable through an embedded Web browser.
13. The IP Panoramic indoor/outdoor multi-sensor camera system shall support H.264 High, Main or Base profiles, using constrained variable bit rate (CVBR) as the default, variable bit rate (VBR), or constant bit rate (CBR) with target range.
14. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide 802.1x port security to establish point-to-point access through a wired or wireless port using Extensible Authentication Protocol (EAP).
15. The IP Panoramic indoor/outdoor multi-sensor camera system shall conform to the ONVIF Profile S and Profile G, and support open architecture best practices with a published API available to third-party network video recording and management systems. A “Panomersive” SDK that would enable Video Management Systems to d-warp the streams from this camera into panoramic and Immersive Views shall be made available.
16. The IP Panoramic indoor/outdoor multi-sensor camera system shall support SNMP v2c and v3.
17. The IP Panoramic indoor/outdoor multi-sensor camera system shall support IPv6 configurations in conjunction with IPv4.
18. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide Auto or Manual exposure settings for adjusting the amount of light detected by the camera sensor.
19. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide user-selectable configurations for day/night auto mode. Transitional levels shall be used to set the desired light level for transitioning to night mode. Transition detect time shall control the length of time that the camera is exposed to a light level before changing to color or monochrome mode.
20. The IP Panoramic indoor/outdoor multi-sensor camera system shall be factory focused, requiring no manual adjustment of focus in the field.

21. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide User and Group settings to assign permissions and access levels to the camera.
22. The IP Panoramic indoor/outdoor multi-sensor camera system shall be based on a 1/3.2-inch high resolution CMOS sensor and includes four of them in the cameras standard configuration.
23. The IP Panoramic indoor / outdoor network camera system shall include a camera module, back box, and lower dome.
24. The IP Panoramic indoor/outdoor multi-sensor camera system shall support standard IT protocols.
25. The IP Panoramic indoor/outdoor multi-sensor camera dome system shall provide a 1000Base-T network interface.
26. The IP Panoramic indoor/outdoor multi-sensor camera system shall be plenum-rated per 2008 NEC article 300.22(C)(2).
27. The IP Panoramic indoor/outdoor multi-sensor camera system shall be vandal and tamper resistant with an impact resistance of IK10 (20 Joules).
28. The IP Panoramic indoor/outdoor multi-sensor camera system shall be NEMA-4X, IP66 rated.
29. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide a 3/4-inch NPT conduit attachment on the side and top of the back box for in-ceiling and surface mounted applications.
30. The IP Panoramic indoor/outdoor multi-sensor camera system shall attach to a standard (1900) 4-inch square box or standard 2-gang electrical box for surface mounted applications.
31. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide a 1.5-inch NPT conduit attachment for pendant mounted applications.
32. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide for a standards based HTML interface.
33. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide Window Blanking Technology for user defined privacy areas.
34. The IP Panoramic indoor/outdoor multi-sensor camera system shall feature open architecture connectivity for third-party software recording solutions allowing integration into virtually any IP-based system. It is also compatible with Pelco VideoXpert and Digital Sentry® video management systems.
35. The IP Panoramic indoor/outdoor multi-sensor camera system shall provide integrated video analytics with the ability to provide hardware and software alarms based on the analytic behaviors presented.
36. Pelco Analytics for the IP Panoramic indoor/outdoor multi-sensor camera system shall include:
 - a. Abandoned Object: Detects objects placed in a defined zone and triggers an alarm if the object remains in the zone longer than the user-defined time allows. An airport terminal is a typical installation for this

behavior. This behavior can also detect objects left behind at an ATM, signaling possible card skimming.

- b. Adaptive Motion: Detects and tracks objects that enter a scene and then triggers an alarm when the objects enter a user-defined zone. This behavior is primarily used in outdoor environments with light traffic to reduce the number of false alarms caused by environmental changes.
 - c. Camera Sabotage: Detects contrast changes in the field of view. An alarm is triggered if the lens is obstructed with spray paint, a cloth, or a lens cap. Any unauthorized repositioning of the camera also triggers an alarm.
 - d. Directional Motion: Generates an alarm in a high traffic area when a person or object moves in a specified direction. Typical installations for this behavior include an airport gate or tunnel where cameras can detect objects moving in the opposite direction of the normal flow of traffic or an individual entering through an exit door.
 - e. Loitering Detection: Identifies when people or vehicles remain in a defined zone longer than the user-defined time allows. This behavior is effective in real-time notification of suspicious behavior around ATMs, stairwells, and school grounds.
 - f. Object Counting: Counts the number of objects that enter a defined zone or cross a tripwire. This behavior might be used to count the number of people at a store entrance/exit or inside a store where the traffic is light. This behavior is based on tracking and does not count people in a crowded setting.
 - g. Object Removal: Triggers an alarm if an object is removed from a defined zone. This behavior is ideal for customers who want to detect the removal of high value objects, such as a painting from a wall or a statue from a pedestal.
 - h. Stopped Vehicle: Detects vehicles stopped near a sensitive area longer than the user-defined time allows. This behavior is ideal for airport curbside drop-offs, parking enforcement, suspicious parking, traffic lane breakdowns, and vehicles waiting at gates.
37. The IP Panoramic indoor/outdoor multi-sensor camera system shall meet or exceed the following design and performance specifications.
- a. Camera Specifications
 - 1. Imaging Device 1/3.2-inch
 - 2. Imager Type CMOS
 - 3. Imager Readout Progressive scan
 - 4. Highest Resolution 12 MP, 2048 x 1536 x 4
 - 5. Signal-to-Noise Ratio >50 dB
 - 6. Sensitivity

INSTALLATION OF VIDEO SURVEILLANCE SYSTEM AT SANTA ANA AND GARDEN GROVE BUS BASES

**RFP 7-2138
EXHIBIT A**

	180° Model	f/2.0, 0.3 lux color (33 ms), 0.14 lux mono (33 ms)
7.	Day/Night Capabilities	Yes
8.	Mechanical IR Cut Filter	Yes, (ON/OFF/AUTO selectable) with different set points
9.	Wide Dynamic Range	120 dB
b.	Lens Specifications	
1.	Length	
	180° Model	f/2.0 ~ 4.8 mm
2.	Field of View	
	180° Model	180° horizontal, 41° vertical
c.	Video Specifications	
1.	Video Streams	Set of streams to deliver full resolution views; secondary stream that comprises a lower resolution mosaic of above streams
2.	Frame Rate(s) frames	User selectable up to 12.5 per second (fps)
3.	Video Encoding	H.264 High, Main, or Base profiles; MJPEG (mosaic stream only)
4.	Bit Rate Control	Default maximum for Constrained Variable Rate (CVBR) at maximum resolution and frame rate
5.	180° Model	28 Mbps Note: Actual bit rates are lower depending on scene complexity
d.	Network	
1.	Supported Protocols	TCP/IP, UDP/IP (Unicast, Multicast IGMP), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, IPv6, SNMP v2c/v3, QoS, HTTP, HTTPS, SSH, SSL, SMTP, FTP, ARP, ICMP, and+ 802.1x(EAP) Note: IPv6 supports mixed IPv4 and IPv6 installations,

	but not IPv6-only deployments
e. Users	
1. Unicast	Up to 20 simultaneous depending on The resolution settings, and frame rate
2. Multicast	Unlimited H.264
f. Security Access	Password protected
g. Software Interface	Web browser view and setup
h. Pelco System Integration	Pelco VideoXpert, Digital Sentry
i. Open API Integration	Pelco API, Panomersive SDK, ONVIF Profile S and G
j. Minimum System Requirements	
1. Processor	Intel® Core™ i3 processor, 2.4 GHz
2. Operating System	Microsoft Windows® 10, Windows® 7 (32- and 64-bit), or Windows Vista ®; or Mac® OS X 10.9 (or later)
3. Memory	4 GB RAM
4. Network Interface	100 Mbit (or greater)
5. Monitor	Minimum of 1024 x 768 resolution, 16- or 32-bit pixel color resolution
6. Web Browser	Internet Explorer® 8.0 (or later); Mozilla® Firefox® 35 (or later); Google® Chrome 40 (or later)
k. Analytics	
1. Open API	The Pelco API can transmit behavior alarm data to third-party applications, Go to <i>pdn.pelco.com</i>
l. Electrical Specifications	
1. Network Port	RJ-45 connector for 1000Base-T 1 Gigabit/sec Auto MDI/MDI-X PoE+; Class 4
2. Cabling Type	Category 5 or better
3. Input Power	PoE+ (IEEE 802.3at, Class 4)
4. Power Consumption	
Without Heater	17 watts

	With Heater	23 watts
5.	Local Storage	Micro SD, SDHC
6.	Alarm	
	Unsupervised	Detects open or closed alarm state
	Supervised with external detect alarm tampering	Detects open and short alarm state 1-kohm resistor to
	Input maximum	3.5 VDC maximum, 3.5 mA
7.	Relay Output maximum	±32 VDC maximum, 150 mA
8.	Audio	
9.	Streaming	Bidirectional: full or half duplex
10.	Input/Output signal level	600 ohm differential, 1Vp-p max.
	Compression kbit/s	G.711 PCM 8 bit, 8 kHz mono at 64

m. Back box and lower dome specifications

1.	Indoor Vandal, In-Ceiling	
	Installation hard ceiling	Single back box for suspended or applications
	Back Box	Plenum rated
	Cable Entry attachments on back box	0.75-inch NPT or 25 mm conduit side and top of
	Operating Temperatures	−10° to 50°C (14° to 122°F)
	Operating Humidity	15 to 85%, RH non-condensing
	Impact Resistance	IK10
	Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
	Construction	Alodine aluminum
2.	Indoor Vandal, Surface Mount	
	Installation outlet box box; 0.75-inch NTP or	Attaches to standard 4-inch square and 2-gang electrical 25 mm conduit

attachments on side back box; wire entry through grommet on top of back box	
Operating Temperatures	–10° to 50°C (14° to 122°F)
Operating Humidity	15 to 85%, RH non-condensing
Impact Resistance	IK10
Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
Construction	Alodine aluminum

3. Indoor Vandal, Pendant

Installation attachment	1.5-inch NPT conduit/pipe
Operating Temperatures	–10° to 50°C (14° to 122°F)
Operating Humidity	15 to 85%, RH non-condensing
Impact Resistance	IK10
Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
Construction	Alodine aluminum

4. Environmental Vandal, In-Ceiling

Installation hard ceiling	Single back box for suspended or applications
Back Box	Plenum rated
Cable Entry attachments on back box	0.75-inch NPT or 25 mm conduit side and top of
Operating Temperatures	–40° to 50°C (–40° to 122°F)
Operating Humidity	10 to 95%, RH non-condensing
Impact Resistance	IK10
Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
Construction	Alodine aluminum
Ingress protection	IP66

5. Environmental Vandal, Surface Mount

Installation outlet box box	Attaches to standard 4-inch square and 2-gang electrical box
Cable Entry attachments on back box. Wire entry through grommet on top of back box	0.75-inch NPT or 25 mm conduit side and top of
Operating Temperatures	−40° to 50°C (−40° to 122°F)
Operating Humidity	10 to 95%, RH condensing
Impact Resistance	IK10
Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
Construction	Alodine aluminum
Ingress protection	IP66

6. Environmental Vandal, Pendant

Installation Pelco wall	1.5-inch NPT thread for use with mounts
Operating Temperatures	−40° to 50°C (−40° to 122°F)
Operating Humidity	10 to 95%, RH condensing
Impact Resistance	IK10
Shock and Vibration 60068:2-6 Sequence 5, MIL810G	EN50155 Category 1, Class B; IEC and 2-27, ISTA-2A,
Construction	Alodine aluminum
Ingress protection	IP66

n. Dome System Specifications

1. Indoor Vandal, In-Ceiling 5.90 cm (2.32 in) above ceiling, lower dome 9.85 cm (3.88 in) below ceiling, 16.15 cm (6.36 in) diameter
2. Indoor Vandal, Surface Mount 14.65 cm (5.76 in) overall length (including dome) by 15.93 cm (6.27 in) diameter
3. Indoor Vandal, Pendant 17.80 cm (7.00 in) overall length

(including dome) by 15.75 cm (6.20
in) diameter

4. Environmental Vandal, In-Ceiling 5.90 cm (2.32 in) above
ceiling, lower dome 9.85 cm (3.88 in)
below ceiling, 16.15 cm (6.36 in)
diameter
5. Environmental Vandal, Surface 14.65 cm (5.76 in) overall length
(including dome) by 15.93 cm (6.27
in) diameter Environmental Vandal,
Pendant 17.80 cm (7.00 in) overall
length (including dome) by 15.75 cm
(6.20 in) diameter

o. Mechanical Specifications

1. Dome Attenuation
Clear f/0.0 light loss
Smoked f/1.0 light loss
2. Pan Adjustable (All Models) 370°
3. Tilt Adjustable (180 Model) 0° - 180°

p. General Specifications

1. Unit Weight
In-Ceiling 1.5 kg (3.3 lb)
Surface Mount 1.7 kg (3.9 lb)
Pendant Mount 1.7 kg (3.9 lb)

q. Warranty

1. 36-months, parts and labor

r. Certifications/Ratings

1. CE, Class A
2. FCC, Class A
3. UL/cUL Listed
4. ICES, Class A
5. KCC

6. C-Tick
7. CB Scheme ITE
8. NEMA Type 4X, and IP66 rating (Environmental Vandal)
9. RoHS, Lead Free, REACH
10. MTBF \geq 200,000 POH (Reporting standard is RELEX Modeling)

38. Pelco Model Numbers

- a. IMM12018-xxx Series 180° indoor/outdoor panoramic IP camera, 12 MPx

B. Type II – Varifocal Megapixel IP Dome Camera:

1. The network camera system shall offer two simultaneous video streams with up to 3 MPx, 2048 x 1536 resolution, 1/2.8-inch sensor, auto iris, and varifocal lens capabilities.
2. The network camera system shall possess the following primary characteristics:
 - a. H.264 High, Main or Base profiles; and MJPEG compression
 - b. up to 3 megapixels
 - c. dual streaming (two independent IP video streams)
 - d. day/night operation with IR cut filter
 - e. Wide Dynamic Range (WDR): 130 dB
 - f. PoE, 24 VAC, 12 VDC
 - g. multicast and unicast capable with unlimited H.264 viewers
 - h. unicast capable with up to 20 simultaneous viewers
 - i. local storage via SD/SDHC/SDXC
 - j. audio input and output
 - k. alarm input and output
 - l. IP66 and IK10
 - m. Type 4X (indoor/environmental models with IMEEBAP adapter plate accessory)
3. The megapixel dome camera shall possess the following primary characteristics:
 - a) Imaging Device: 3MPx model, 1/2.8-inch sensor with 2048 x 1536 maximum resolution
 - b. Imager Type: CMOS
 - c. Electronic Shutter Range: 1/20,000 second (or faster) to 2 seconds

- d. Minimum illumination: Color mode: 0.050 lux with 3-9mm lens. Black & white mode: 0.010 lux (33 ms, f/1.3) with 3-9mm lens. Black and white mode with IR on: 0.000 lux with 3-9mm lens.
- e. Scanning: Progressive
- f. Image Control Settings:
 - a) White balance range: 2,000° to 10,000°K
 - b) Adaptive IR Illumination up to 30 meters (100 feet)
 - c) Day and night settings
 - d) Privacy zone definition: Up to 16 zones of window blanking
 - e) 3D noise reduction
- g. Lens:
 - a) Built-in, varifocal
 - b) Focal Length: F1.3, 3 ~ 9 mm, F1.6, 9 ~ 22 mm
 - c) Zoom: Remote
 - d) Auto Iris: P-iris lens
 - e) Auto Focus: Four user-selectable modes of automatic focus during runtime operation
 - f) Every 10 degrees in Celsius temperature change
 - g) Day/night transition
 - h) Every 24 hours
 - i) Manual trigger
- h. Video:
 - a) The network camera system shall support up to 2 simultaneous streams; the secondary stream is variable based on the setup of the primary stream.
 - b) Compression type: H.264 High, Main, or Base profiles; and MJPEG
 - c) Corridor Mode: Image rotate 90°, 180°, 270°. Image mirror.
 - d) Service Stream: 640 x 480 or 640 x 352; 2 ips, JPEG
 - e) Available resolutions equal to or better than:

MPx	Width x Height	Aspect Ratio
3.0	2048 x 1536	4:3
 - f) Constrained variable bit rate (CVBR) and constant bit rate.
 - g) Frame rate: Images per second (IPS) vary from 1~60 depending upon coding, resolution, stream and WDR configuration.
 - h) Video streams shall support ONVIF profile S.
 - i) Low resolution JPEG stream for configuration of camera settings

- i. Storage and Recording
 - a) The network camera system control shall have onboard SD card storage.
 - 1. Card type: SD
 - 2. Capacity: up to 128GB
 - b).The local SD storage shall have the ability to be backed up to alternate media without removal of the SD card from the camera.
 - c).Local recording on the SD card shall commence upon loss of network connectivity, based on a pre-programmed schedule. Note: The camera will record if it still has power during a network outage.
 - d).The network camera system shall record video continuously in the case of network outage. Note: The camera will record if it still has power during a network outage.
 - e).Alarm recording: The network camera system shall capture selectable 1, 5, 10 15, 30 and 30 second video clips on camera sabotage, motion detection, or alarm input.
 - f). Video recording and storage shall support ONVIF profile G.
- j. Manual Pan Tilt
 - a). Pan Range: 355°
 - b). Tilt Range: 75°
 - c). Rotate Range: 340°
- k. Suite of eight built-in analytics.
 - a). Abandoned Object
 - b). Intrusion Detection
 - c). Camera Sabotage
 - d). Wrong Direction
 - e). Loitering
 - f). Object Counting
 - g). Object Removal
 - h). Stopped Vehicle
- l. Suite of eight built-in analytics.
 - a) Abandoned Object
 - b) Intrusion Detection
 - c) Camera Sabotage
 - d) Wrong Direction
 - e) Loitering Detection
 - f) Object Counting

- g) Object Removal
- h) Stopped Vehicle
- m. Additional Features:
 - a) Alarm – The network camera system shall have one alarm/sensor inputs and a relay output for alarm or control.
 - 1. The alarm input shall be able to detect an open or closed alarm state function in unsupervised mode.
 - 2. Relay Output: ± 350 VDC maximum, ± 130 mA maximum
 - b) Audio – The network camera system shall have bi-directional audio capability.
 - 1. Input/Output
 - 2. Encoding: G.711 PCM 8 bit, 8 kHz mono at 64 kbit/s
 - c) Discovery - Manufacturer shall offer a discovery program to identify all devices of his manufacture on the network.
 - d) System Information
 - 1. The system settings of the network camera system shall be exportable as a separate file.
 - 2. The network camera system shall maintain an accessible log of system and motion-triggered events.

C. Type III – Pan-Tilt-Zoom, Megapixel Sensor IP Dome Camera:

- 1. The High Definition Outdoor PTZ Dome Camera (“PTZ Dome camera”) shall provide video performance capable of providing selectable resolutions up to 1920 x 1080 pixels at up to 60 frames per second (fps).
- 2. The PTZ dome camera shall possess the following primary characteristics:
 - a. Variable speed/high speed pan/tilt drive unit with continuous 360° rotation up to 450°/sec
 - b. H.264 and MJPEG compression
 - c. 2.1 megapixels
 - d. dual streaming (two independent IP video streams)
 - e. day/night operation with IR cut filter
 - f. 12 x digital zoom, 30X optical zoom
 - g. Automatic gain Control: 41 dB maximum
 - h. Wide Dynamic Range (WDR): 130 dB minimum
 - i. integral video analytics with nine user configurable behaviors
 - j. electronic image stabilization

- k. PoE+ and High PoE capable
 - l. Pelco H.264 Smart Compression Technology
 - m. multicast or unicast capable with unlimited H.264 viewers
 - n. unicast capable with up to 20 simultaneous viewers
 - o. local storage via SD card
 - p. audio input and output
 - q. alarm input and output
 - r. IP66 rated housing
3. Video
- a. Imager
 - b. Sensor: 1/2.8" Sony Exmor CMOS Minimum illumination
Color mode: .20 lux (33 ms, F1.6), .025 lux (250 ms, F1.6)
Color mode (low light).03 lux (33 ms, F1.6), .008 lux (250 ms, F1.6)
Black & white mode: .06 lux (33 ms, F1.6), .008 lux (250 ms, F1.6)
Black & White mode (low light) .004 lux (33 ms, F1.6), .001 lux (250 ms, F1.6)
 - c. Scanning: Progressive
 - d. Image Control Settings
Automatic white balance (AWB)
 - e. Selectable for:
 - 1) Normal (7,500K to 2,500K)
 - 2) Extended (7,500K to 2,000K)
 - 3) Auto Tracking White (10,000K to 2,000K)
 - 4) Cool White – fixed mode for scenes with bluer light sources Manual mode - provide ability to configure red and blue values for color adjustment
 - 5) Lighting modes: WDR, visibility enhancement, backlight compensation, normal
 - 6) Defog mode (enhanced clarity in the presence of fog)
 - 7) Exposure modes: automatic or manual
 - 8) Day and night settings
 - 9) Frequency
 - 10) Image sharpness
 - 11) Chroma
 - 12) Image mirror or flip
 - 13) Digital noise reduction

- 14) Privacy zone definition: up to 32 zones of window blanking
- f. Additional capabilities:
 - 1) 130 dB WDR
 - 2) Backlight compensation
 - 3) Automatic gain control (AGC)
 - 4) Active noise filtering
 - 5) Electronic image stabilization
- 4. Lens: 4.7- 94 mm variable, F1.6 – F3.5, remote auto-focus
 - a. Horizontal angle of view: <55.4o (wide) – 2.9o (tele)> <59.5o (wide) – 2.1o (tele)>
 - b. Focus settings
 - 1) Auto Focus: Automatically focuses during runtime operation.
 - 2) Sure Focus: Camera auto focuses when pan, tilt, and zoom operations are complete or if the IR cut filter changes state.
 - a) When auto focus lock is achieved, auto focus shall turn off, fixing the focal position until the next PTZ operation.
 - b) If 30 seconds pass without an auto focus lock, the camera shall retain its focal position until the next PTZ action.
 - c. Focus Trace: Enables camera to use a focus trace curve when zooming based on the distance to ground-level targets in the scene
 - d. Install Height: Determines the distance between the camera and ground-level targets for focus trace operations
- 5. Video Streams
 - a. The PTZ dome camera shall support the transmission of two configurable video streams, each of which may have the following properties:
 - b. Compression type:
 - 1) H.264 (High, main, or Base profiles), available in Stream 1 and Stream 2
 - 2) MJPEG, available in Stream 2
 - c. Resolution:
 - 1) 1920 x 1080 (16:9) (1080p)
 - d. Bit rate: 1.8 Mbps – 8 Mbps
 - e. Frame rate: 0 – 60 fps
 - f. Video streams shall be support ONVIF profile S.
 - g. The PTZ dome camera shall have the following additional streams available:
 - 1) Low resolution JPEG stream for configuration of camera settings.

- 2) Event stream displaying a list of alerts triggered by an active analytic behavior.
 - h. Pelco's H.264 Smart Compression Technology lowers bandwidth and storage requirements by up to 70%, while reducing storage requirements.
- 6. Storage and Recording
 - a. The PTZ dome control shall have onboard SD card storage.
 - 1) Card type: SD
 - 2) Size: 32 GB
 - b. The local SD storage shall have the ability to be backed up to alternate media without removal of the SD card from the camera.
 - c. Local recording on the SD card shall commence upon loss of network connectivity, based on a pre-programmed schedule.
 - d. Video shall be recorded continuously in the case of network outage.
 - e. Alarm recording: The PTZ dome camera shall capture selectable 1, 5, or 10 second video clips on camera sabotage, motion detection, or alarm input.
 - f. Video recording and storage shall support ONVIF profile G.
- 7. Pan Tilt
 - a. Pan Range: 360o
 - b. Tilt Range: +10 - 90o
 - c. Presets: up to 256
 - 1) accuracy $\pm .10$
 - d. Tours: up to 16
 - e. Pan Speed:
 - 1) manual: .10 - 80o per second
 - 2) maximum: 450o per second
 - f. Tilt Speed:
 - 1) manual: .10 - 45o per second
 - 2) maximum: 450o per second
 - g. Limit stops: configurable through web browser
- 8. Analytics
 - a. Analytics shall be pre-loaded in the PTZ dome camera.
 - b. The PTZ dome camera shall have the ability to detect motion within user defined areas of the video image.
 - c. Number of simultaneous running analytic behaviors: 3
 - d. Configurable behaviors:

- 1) Abandoned Object - Detection of objects placed in a defined zone and triggers an alarm if the object remains in the zone longer than the user-defined time allows.
 - 2) Adaptive Motion - Detection and tracking of objects that enter a scene and triggering of an alarm when the objects enter a user-defined zone
 - 3) Auto Tracker - Detection and tracking of movement in the camera's field of view, with automatic pan and tilt to follow the moving object until the object stops or disappears from the monitored area
 - 4) Camera Sabotage - Detection of contrast changes in the field of view, suitable to detect lens obstruction or unauthorized repositioning of the camera
 - 5) Directional Motion - Detection of person or object moving in a specified direction
 - 6) Loitering Detection – Identification of people or vehicles remaining in a defined zone longer than a user-defined time
 - 7) Object Counting - Counting the number of objects that enter a defined zone or cross a tripwire
 - 8) Object Removal – Detection of object is removed from a defined zone
 - 9) Stopped Vehicle – Detection of vehicles stopped near a sensitive area longer than a user-defined time
8. Additional Features
- a. Alarm – The PTZ dome camera shall have four alarm/sensor inputs and a relay output for alarm or control.
 - 1) The alarm input shall be able to detect an open or closed alarm state function in unsupervised or supervised modes.
 - 2) Input: 3.5 VDC maximum, 3.5mA maximum
 - 3) Relay Output: ± 32 VDC maximum, 150mA maximum
 - b. Audio – The PTZ dome camera shall have bi-directional audio capability.
 - 1) Input/Output: Line level/external microphone input; 600-ohm differential, 1 V p-p maximum
 - 2) Encoding: G711 - Alaw / mlaw
 - c. Discovery - Manufacturer shall offer a discovery program to identify all devices of his manufacture on the network.
 - d. System Information
 - 3) The system settings of the PTZ dome camera shall be exportable as a separate file.

- 4) The PTZ dome camera shall maintain an accessible log of system and motion-triggered events.
 - 5) The log shall be exportable to an Excel spreadsheet file.
 9. NETWORK
 - a. Connectivity: 100 BASE-TX Ethernet with RJ-45 connector
 - b. Protocols supported
 - 1) Transmission Control Protocol (TCP), Internet Protocol (IP) v4 and v6, User Datagram Protocol (UDP)
 - 2) Configuration: Dynamic Host Configuration Protocol (DHCP)
 - 3) Web services: Hypertext Transfer Protocol (HTTP), Secure HTTP (HTTPS)
 - 4) Network services: Domain Name System (DNS), Network Time Protocol (NTP), Internet Control Message Protocol (ICMP), Simple Network Management Protocol (SNMP) v2c/v3, Universal Plug and Play (UPnP)
 - 5) Media: Real-Time Transport Protocol (RTP), Real-Time Streaming Protocol (RTSP)
 - 6) Multicast: Internet Group Management Protocol (IGMP)
 - 7) Notifications: File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP)
 - 8) Remote Access: Secure Shell (SSH)
 - 9) Security: Secure Sockets Layer (SSL), IEEE 802.1x (EAP-MD5, EAP-TLS, EAP-TTLS, EAP-PEAP and EAP-FAST)
 - 10) Quality of Service: IEEE 802.1p Layer 3 Differentiated Services Code Point (DSCP)
 - c. DDNS – The PTZ dome camera shall support DDNS services offered by the Manufacturer and other publicly available service offerings.
 - d. Security
 - e. The PTZ dome camera shall support IP address filtering whereby users can enter a list of allowed or blocked IP addresses for viewing video and configuring camera settings
 - 1) The PTZ dome camera shall provide three levels of user access with password protection.
 - 2) User authentication shall be available through a Lightweight Directory Access Protocol (LDAP) server.
10. CAMERA SOFTWARE
 - a. The PTZ dome camera shall have a built in web server which supports browser-based configuration.
 - b. The camera's web server shall allow access to camera information and all primary software functions.

- c. The Manufacturer shall offer video viewer and configuration to implement the following actions:
 - 1) Camera discovery
 - 2) Live Video
 - Video stream selection
 - Video stream configuration
 - Use preset video setting configurations
 - Configure custom video setting configurations
 - compression type
 - resolution
 - image rate
 - I-frame interval
 - H.264 profile
 - Quality of Service (QoS)
 - Bit rate control
 - 3) Multicast
 - 4) Unicast
 - 5) JPEG frame rate
- d. Maximize view area of video to full size of browser
- e. Revert to normal view
- f. Open stream in new window
- g. Capture and save image as .jpg file
- h. Center camera field of view
- i. Configure PTZ functions
 - 1) control type:
 - 2) linear
 - 3) exponential
 - 4) proportional (to zoom)
 - 5) auto flip allowing 180o rotation when camera is pointing straight down
 - 6) resume last PTZ action requested before power loss
 - 7) set pan center point
 - 8) pan and tilt limit stops
- j. Engage PTZ functions
 - 1) pan

- 2) tilt
- 3) zoom
- 4) focus
- 5) iris open/close
- k. Resize viewing area
 - 1) Image Settings
 - 2) image quality
 - 3) exposure
 - 4) focus
 - 5) white balance
 - 6) window blanking
 - 7) preset configuration
 - 8) preset tours
 - 9) positioning
 - 10) digital zoom
 - 11) freeze frames during preset calls
 - 12) image stabilization
 - 13) lighting mode
 - 14) defog mode
 - 15) video noise reduction
 - 16) digital processing (color and detail adjustment)
 - 17) image enhancement
 - 18) quick setup preset modes
 - 19) sharpness
 - 20) saturation
 - 21) contrast
 - 22) brightness
 - 23) exposure modes
 - 24) window blanking calibration
- l. Recording
 - 1) Initiate instant record and playback
 - 2) Manage SD card storage
- m. Events
 - 1) configure event sources:
 - 2) external alarm events

- 3) analytic events
 - 4) e-mail setup
 - 5) define web addresses for notifications
 - n. Camera network settings
 - o. System
 - 1) firmware upgrade
 - 2) reset to factory default
 - 3) set date, time, and NTP server synchronization
 - 4) user access control
 - 5) view and export camera settings
 - 6) view system logs
- 11. Minimum System Requirements
 - a. Processor: Intel® Core™ i3 Processor, 2.4 GHz
 - b. Acceptable Operating Systems:
 - c. Windows® 7 (32-bit and 64-bit) with DirectX® 11
 - d. Mac OS X 10.4 (or later)
 - e. Memory: 4 GB RAM
 - f. Network Interface Card: 100 megabits (or greater)
 - g. Monitor: Minimum 1024 x 768 resolution, 16- or 32-bit pixel color
 - h. Acceptable Web Browsers:
 - i. Internet Explorer® 8.0(or later)
 - j. Firefox 3.5 (or later)
 - k. Acceptable Media Players:
 - l. Pelco Media Player
 - m. QuickTime 7.6.5 for Windows 7
 - n. QuickTime 7.6.4 for Mac OS X 10.4 (or later)
 - o. The Manufacturer shall offer a mobile application with the capability to access live video from up to 500 cameras.
 - p. The Manufacturer shall offer an open API.
- 12. ELECTRICAL
 - a. Power
 - b. Source Options
 - 1) 24 VAC/VDC
 - 2) PoE+ (802.3at, Class 4)
 - 3) High PoE

- c. Power Consumption:
 - 1) with heater/blower
 - 24 VAC: 81 VA
 - 24 VDC: 3 A nominal
 - 2) with heater only
 - PoE+: 18 W with High PoE injector
 - High PoE: 60 W
- d. without heater or blower
 - 1) 24 VAC: 24 VA
 - 2) 24 VDC: 1 A nominal
 - 3) PoE+: 15 W
 - 4) High PoE: 15 W
- e. Connectors:
 - 1) Ethernet: RJ-45 connector
 - 2) External power (24 VAC/VDC): 2-conductor power to terminal block

13. MECHANICAL AND ENVIRONMENTAL

- a. Housing Material:
 - 1) Back box, lower dome: <aluminum> <316 stainless steel>
 - 2) Dome bubble: <clear acrylic> <smoked acrylic>
- b. Configuration: PTZ dome
- c. Conduit attachments:
 - 1) Pendant mounted: 1.5-inch NPT
 - 2) In-ceiling: 3/4-inch NPT
- d. Temperature:
 - 1) Operating:
 - 24 VAC/VDC: -45° C to 50° C (-49° F to 122° F)
 - PoE+: -20° C to 50° C (-4° F to 122° F)
 - High Poe: -45° C to 50° C (-49° F to 122° F)
 - 2) Storage: 60° C (140° F) maximum
- e. Relative Humidity: 10 - 100%, non-condensing
- f. Environmental Rating: IP66

D. Types IV & V – Varifocal Megapixel Single Sensor IP Dome Camera:

- 1.a. Type IV - NextGen Sarix Enhanced Outdoor Environmental Mini Dome Cameras:

- | | | |
|--|------------|----------------|
| | <u>MPx</u> | <u>Model #</u> |
| | 3 MPx | IME329-1ES |
| | 3 MPx | IME322-1ES |
- 1.b. Type V - NextGen Sarix Enhanced Outdoor Environmental Mini Domes Cameras with IR Illumination:
- | | | |
|--|------------|----------------|
| | <u>MPx</u> | <u>Model #</u> |
| | 3 MPx | IME329-1RS |
| | 3 MPx | IME322-1RS |
2. General Description:
- a. The network camera system shall offer two simultaneous video streams with up to 3 MPx, 2048 x 1536 resolution, auto iris, and varifocal lens capabilities.
 - b. The network camera system shall possess the following primary characteristics:
 - 1) H.264 High, Main or Base profiles; and MJPEG compression
 - 2) up to 3 megapixels
 - 3) dual streaming (two independent IP video streams)
 - 4) day/night operation with IR cut filter
 - 5) Wide Dynamic Range (WDR): 130 dB
 - 6) PoE (IEEE 802.3af, Class 3), 24 VAC, 12 VDC
 - 7) multicast and unicast capable with unlimited H.264 viewers
 - 8) unicast capable with up to 20 simultaneous viewers
 - 9) local storage via SD/SDHC/SDXC
 - 10) audio input and output
 - 11) alarm input and output
 - 12) IP66 and IK10
 - 13) Type 4X (indoor/environmental models with IMEEBAP adapter plate accessory)
3. Video/Camera
- c. Imaging Device:

<u>Model</u>	<u>Sensor</u>	<u>Resolution</u>
3 MPx	1/2.8-inch	2048 x 1536
4. Imager Type: CMOS
5. Electronic Shutter Range:
- | | |
|--------------|-----------------------------------|
| <u>Model</u> | <u>Range</u> |
| 3 MPx | 1/20,000 sec (or faster) to 2 sec |

6. Minimum illumination:
 - a. Color

<u>Model</u>	<u>Sensitivity</u>	<u>Lens</u>
1, 2, and 3 MPx	0.005 lux (500 ms, f/1.3)	3-9 mm
1, 2, and 3 MPx	0.010 lux (500 ms, f/1.6)	9-22 mm
 - b. Black & White mode

<u>Model</u>	<u>Sensitivity</u>	<u>Lens</u>
1, 2, and 3 MPx	0.001 lux (500 ms, f/1.3)	3-9 mm
1, 2, and 3 MPx	0.0025 lux (500 ms, f/1.6)	9-22 mm
 - c. Black & white mode with IR on:

<u>Model</u>	<u>Sensitivity</u>	<u>Lens</u>
1, 2, and 3 MPx	0.000 lux	3-9 mm
1, 2, and 3 MPx	0.000 lux	9-22 mm
7. Scanning: Progressive
8. Image Control Settings
 - a. White balance range: 2,000° to 10,000°K
 - b. Adaptive IR Illumination up to 30 meters (100 feet)
 - c. Day and night settings
 - d. Privacy zone definition: Up to 16 zones of window blanking
 - e. 3D noise reduction
9. Lens:
 - f. Built-in, varifocal
 - g. Focal Length: F1.3, 3 ~ 9 mm, F1.6, 9 ~ 22 mm
 - h. Zoom: Remote
 - i. Auto Iris: P-iris lens
10. Auto Focus: Four user-selectable modes of automatic focus during runtime operation
 - a. Every 10 degrees in Celsius temperature change
 - b. Day/night transition
 - c. Every 24 hours
 - d. Manual trigger
11. Field of view:

<u>Lens</u>	<u>Focal Length</u>	<u>Horizontal</u>	<u>Vertical</u>	<u>Mode</u>
3 ~ 9 mm	Wide	100°	74°	4:3
3 ~ 9 mm	Tele	39°	29°	4:3
3 ~ 9 mm	Wide	93°	52°	16:9
3 ~ 9 mm	Tele	37°	21°	16:9
9 ~ 22 mm	Wide	33°	24°	4:3
9 ~ 22 mm	Tele	14°	10°	4:3
9 ~ 22 mm	Wide	30°	14°	16:9

9 ~ 22 mm Tele 13° 7° 16:9

12. Video:

- a. The network camera system shall support up to 2 simultaneous streams; the secondary stream is variable based on the setup of the primary stream.
- b. Compression type: H.264 High, Main, or Base profiles; and MJPEG
- c. Corridor Mode: Image rotate 90°, 180°, 270°. Image mirror.
- d. Service Stream: 640 x 480 or 640 x 352; 2 ips, JPEG

e. Available resolutions:

<u>MPx</u>	<u>Width x Height</u>	<u>Aspect Ratio</u>
3.0	2048 x 1536	4:3
2.95	1984 x 1488	4:3
1.8	1600 x 1200	4:3 (3 MPx camera only)
1.2	1280 x 960	4:3
0.5	800 x 600	4:3
0.3 (480p)	640 x 480	4:3
0.08	320 x 240	4:3
2.0 (1080p)	1920 x 1080	16:9
0.9 (720p)	1280 x 720	16:9
0.6	1024 x 576	16:9
0.5	800 x 448	16:9
0.3	640 x 360	16:9
0.2	640 x 360	16:9
0.06	320 x 192	16:9

- f. Constrained variable bit rate (CVBR) and constant bit rate.
- g. Frame rate: Images per Second (ips) (depending on the coding, resolution, stream, and WDR configuration) Up to 60, 50, 30, 25, 20, 16, 15, 12, 10, 7, 6, 5, 4, 3, 2, 1
- h. Video streams shall support ONVIF profile S.
- i. Low resolution JPEG stream for configuration of camera settings.

13. Storage and Recording

- a. The network camera system control shall have onboard SD card storage.
 - 1) Card type: SD
 - 2) Capacity: up to 128 GB
- b. The local SD storage shall have the ability to be backed up to alternate media without removal of the SD card from the camera.
- c. Local recording on the SD card shall commence upon loss of network connectivity, based on a pre-programmed schedule. Note: The camera will record if it still has power during a network outage.

- d. The network camera system shall record video continuously in the case of network outage. Note: The camera will record if it still has power during a network outage.
 - e. Alarm recording: The network camera system shall capture selectable 1, 5, 10 15, 30 and 30 second video clips on camera sabotage, motion detection, or alarm input.
 - f. Video recording and storage shall support ONVIF profile G.
14. Manual Pan Tilt
- a. Pan Range: 355o
 - b. Tilt Range: 75o
 - c. Rotate Range: 340°
15. Suite of eight built-in analytics.
- a. Abandoned Object
 - b. Intrusion Detection
 - c. Camera Sabotage
 - d. Wrong Direction
 - e. Loitering Detection
 - f. Object Counting
 - g. Object Removal
 - h. Stopped Vehicle
16. Additional Features
- a. Alarm – The network camera system shall have one alarm/sensor inputs and a relay output for alarm or control.
 - 1) The alarm input shall be able to detect an open or closed alarm state function in unsupervised modes.
 - 2) Relay Output: ±350 VDC maximum, ±130 mA maximum
 - b. Audio – The network camera system shall have bi-directional audio capability.
 - 1) Input/output
 - 2) Encoding: G.711 PCM 8 bit, 8 kHz mono at 64 kbit/s
 - c. Discovery - Manufacturer shall offer a discovery program to identify all devices of his manufacture on the network.
 - d. System Information
 - 1) The system settings of the network camera system shall be exportable as a separate file.
 - 2) The network camera system shall maintain an accessible log of system and motion-triggered events.

17. Network
 - a. Connectivity: 100 BASE-TX Ethernet with RJ-45 connector
 - b. Protocols supported
 - 1) Transmission Control Protocol (TCP), Internet Protocol (IP) v4 and v6, User Datagram Protocol (UDP)
 - 2) Configuration: Dynamic Host Configuration Protocol (DHCP)
 - 3) Web services: Hypertext Transfer Protocol (HTTP), Secure HTTP (HTTPS)
 - 4) Network services: Domain Name System (DNS), Network Time Protocol (NTP), Internet Control Message Protocol (ICMP), Simple Network Management Protocol (SNMP) v2c/v3, Universal Plug and Play (UPnP)
 - 5) Media: Real-Time Transport Protocol (RTP), Real-Time Streaming Protocol (RTSP)
 - 6) Multicast: Internet Group Management Protocol (IGMP)
 - 7) Notifications: File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP)
 - 8) Remote Access: Secure Shell (SSH)
 - 9) Security: Secure Sockets Layer (SSL), IEEE 802.1x (EAP-MD5, EAP-TLS, EAP-TTLS, EAP-PEAP and EAP-FAST)
 - 10) Quality of Service: IEEE 802.1p Layer 3 Differentiated Services Code Point (DSCP)
 - 11) DDNS – The network camera system shall support DDNS services offered by the Manufacturer and other publicly available service offerings. (DNS)
 - c. Security
 - 1) The network camera system shall support IP address filtering whereby users can enter a list of allowed or blocked IP addresses for viewing video and configuring camera settings
 - 2) The network camera system shall provide three levels of user access with password protection.
18. Camera Software
 - a. The network camera system shall have a built in web server which supports browser-based configuration.
 - b. The camera's web server shall allow access to camera information and all primary software functions.
 - c. The Manufacturer shall offer video viewer and configuration to implement the following actions:
 - d. Camera discovery
 - 1) Live Video

- 2) Video stream selection
- 3) Video stream configuration
- 4) Use preset video setting configurations
- 5) Configure custom video setting configurations
 - a) compression type
 - b) resolution
 - c) image rate
 - d) I-frame interval
 - e) H.264 profile
 - f) Image quality
 - g) Bit rate control
- 6) Multicast
- 7) Unicast
- 8) JPEG frame rate
- e. Maximize view area of video to full size of browser
 - 1) Revert to normal view
- f. Open stream in new window
- g. Capture and save image as .jpg file
- h. Resize viewing area
- 19. Image Settings
 - a. image quality
 - b. exposure
 - c. focus
 - d. white balance
 - e. window blanking
 - f. digital zoom
 - g. lighting mode
 - h. video noise reduction
 - i. digital processing (color and detail adjustment)
 - 1) image enhancement
 - 2) quick setup preset modes
 - 3) sharpness
 - 4) saturation
 - 5) contrast
 - 6) brightness

- j. exposure modes
- 20. Recording
 - a. Initiate instant record and playback
 - b. Manage SD card storage
- 21. Events
 - a. configure event sources:
 - 1) external alarm events
 - 2) analytic events
 - b. e-mail setup
 - c. define web addresses for notifications
- 22. Camera network settings
 - a. System
 - 1) firmware upgrade
 - 2) reset to factory default
 - 3) set date, time, and NTP server synchronization
 - 4) user access control
 - 5) view and export camera settings
 - 6) view system logs
- 23. Acceptable Web Browsers:
 - a. Microsoft® Internet Explorer® 8.0 (or later)
 - b. Google® Chrome™ 51 and later
 - c. Apple® Safari® 7.0.6
 - d. Mozilla® Firefox® 3.5.9 (or later)
 - e. The Manufacturer shall offer a mobile application with the capability to access live video from up to 500 cameras.
 - f. The Manufacturer shall support integrations as follows:
 - 1) Video Management: VideoXpert™; Endura® 2.0 (or later); Digital Sentry® 7.3 (or later); Third-party system through Pelco API/SDK, ONVIF Profile S, ONVIF Profile G, and ONVIF Profile Q
 - 2) Mobile Application Pelco Mobile
 - 3) Camera Discovery and Firmware: Discover cameras upgrade firmware upgrade using Pelco Device Utility 2 (version 2.2 or later) or Pelco Utilities
- 24. Electrical
 - a. Power
 - 1) Source Options

- a) 24 VAC and PoE+
 - b) PoE+ Class 4
 - c) 18 to 32 VAC range, 12 VDC
- 2) Power Consumption: <16 W (with heater ring)
- b. Connectors:
 - 1) Ethernet: RJ-45 connector
 - 2) External power: 2-conductor power to terminal block
- 25. Mechanical and Environmental
 - a. Construction Material: Aluminum base and plastic trim ring, polycarbonate bubble (indoor models), aluminum construction, polycarbonate bubble (outdoor models)
 - b. Finish: RAL 9003 (indoor models), RAL 7047 (outdoor models)
 - c. Impact Resistance: IK10 (20J)
 - d. Dimensions (D x H): 13.38 cm (5.27 in) x 11.74 cm (4.62 in)
 - e. Temperature:
 - g. Operating: -10°C to 55°C (14°F to 131°F) (indoor models)
 - 40°C to 55°C (-40°F to 131°F) (outdoor models)
 - h. Storage: -40°C to 60°C (-40°F to 140°F) (indoor and outdoor models)
 - i. Ingress Protection: IP66 (indoor/outdoor models)
 - j. NEMA Type 4X (outdoor models with IMEEBAP adapter plate accessory)
- 36. Certifications
 - a. CE – EN 55022 (Class A), EN 50130-4, EN 60950-1
 - b. FCC (Class A) – 47 CFR Part 15
 - c. UL and cUL Listed – UL 60950-1, CAN/CSA-C22.2 No. 60950-1-07
 - d. ICES-003 (Class A)
 - e. RCM
 - f. KC
 - g. ONVIF Profile S, Profile G, and Profile Q conformant

2.03 ETHERNET SWITCHES

- A. Cisco SG550XG-8F8T 16 Port 10G Switch with Matching Quantity of Compatible SFP+ Modules

1. Meet Model/Part Number specifications:
http://www.cisco.com/c/en/us/products/collateral/switches/small-business-500-series-stackable-managed-switches/c78-695646_data_sheet.html
- B. Cisco Catalyst WS-C3850-48U with one (1) C3850-NM-4-10G and matching quantity of compatible Cisco SFP Modules
 1. Meet Model/Part Number Specifications:
http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-3850-series-switches/data_sheet_c78-720918.html
- C. Cisco Catalyst WS-C3850-24UX with one (1) C3850-NM-4-10G and matching quantity of compatible Cisco SFP Modules
 1. Meet Model/Part Number Specifications:
http://www.cisco.com/c/en/us/products/collateral/switches/catalyst-3850-series-switches/data_sheet_c78-720918.html
- D. Cisco Catalyst WS-C3560CX-12PD-S with a matching quantity of compatible Cisco SFP Modules
 4. Meet Model/Part Number Specifications:
<http://www.cisco.com/c/en/us/support/switches/catalyst-3560cx-12pd-switch/model.html>
- B. Enclosure 1 & 2 – COMNET Ethernet 2 Port Switch CNGE22+2SMSPOEHO with Compatible 1GB SFP/SFP+ Modules
 1. The ComNet CNGE2+2SMS[POE][HO] is a four-port intelligent switch with light management functionality. It provides two 10/100/1000Base-T(X) copper ports and two 100/1000Base-FX SFP* ports. The CNGE2+2SMS[POE][HO] provides exclusive functionality for easy field deployment including DIP switch based operation of RSTP for creating redundant network topologies as well as preventing network video flooding of multicast traffic when used in a linear or star topology. Ports 1 and 2 can optionally supply up to thirty (30) watts of power per port based on the IEEE 802.3at standard. An optional High Output (HO) version is also available that can supply up to sixty (60) watts of PoE from ports 1 and 2. This product is fully compatible with the ComNet exclusive CopperLine® SFP modules for operation over extended distance UTP or Coax cable.
 2. Specifications
 - a. Data

Data Interface	Ethernet
Data Rate	10/100/1000 Mbps
	IEEE 802.3 Compliant
	Full Duplex or Half Duplex Electrical
	Ports/Full
	Duplex Optical Port
Electrical	CNGE2+2SMSPOEHO Ports 1 & 2: 60 W

Max

- b. Connectors
 - Optical¹ Requires selection of sold-separately SFP modules. Contractor to select modules based on design requirements. See ComNet data sheet for number and description of SFP modules.
 - Serial Mini USB
 - I/O Terminal Block (PoE Models Only)
 - Power Terminal Block
 - Data RJ45
- c. Network Redundancy STP / RSTP
- d. Management
 - SNMP SNMP V1/2c
 - HTTP Web GUI Configuration Interface
 - CLI Serial Command Line Interface
- e. Switch Properties
 - Switching Latency 7 μ s
 - Switching Bandwidth 8 Gbps
 - MAC Table 1K
 - Processing Store-and-Forward
- f. Contacts (PoE Models Only)
 - Response Time 25ms typical (network dependent)
 - Input/Output Channels 2
 - Inputs 2 \times Dry Closure
 - Outputs 2 \times Form A contacts (Rated 1A @ 24 VDC, non-resistive loads)
- g. Power
 - Operating Voltage Dual 48 to 56 VDC PoE, 9 to 36 VDC or 24 VAC non PoE
 - Current Draw 126W max with PoE, 6W max w/out PoE
 - Current Protection Automatic Resettable Solid-State Current Limiter
- h. PoE Pin Assignment RJ45 port supports IEEE802.3at End-point Positive (VCC+): RJ45 pin 1, 2

(RJ45 pin 1,2 and 4,5 on 60W ports)

Negative (VCC-): RJ45 pin 3, 6 (RJ45 pin
3,6 and 7,8 on 60W ports)

i. Electrical & Mechanical

Indicating LEDs	Optical Link/Data Activity Electrical Link/Data Activity Power PoE Status
Circuit Board	Meets IPC Standard
Size	4.1 × 3.7 × 1.46 in (10.4 × 9.4 × 3.7 cm)
Surface Mount	Wall or Flat Surface Screw Attachment
Shipping Weight	<2 lb / 0.9 kg

j. Environmental

MTBF	>100,000 hours
Operating Temp	-40° C to +75° C
Storage Temp	-40° C to +85° C
Relative Humidity	0% to 95% (non-condensing) ²

k. Software Features

RSTP (IEEE 802.1D/w)
Port Configuration, Status, Statistics
PoE Configuration, Status, Health Check
SNMP
Enable/Disable Ports

l. Ethernet Standards

IEEE 802.3 for 10BASE-T
IEEE 802.3u for 100BASE-TX and 100BASE-FX
IEEE 802.3z for 1000BASE-X
IEEE 802.3ab for 1000BASE-T
IEEE 802.1w for RSTP (Rapid Spanning Tree Protocol)
IEEE 802.1AB for LLDP (Link Layer Discovery Protocol)
IEEE 802.3at for Power Sourcing Equipment (PSE) and PoE (≤ 30 W per port)
IEEE 802.3x Flow Control and Back Pressure

2.04 UNINTERRUPTABLE POWER SUPPLY

- A. The Contractor shall provide uninterruptible power supply (UPS) units to sustain the operation on the Video Surveillance System. The UPS shall be provided to sustain the operation of all equipment located in the equipment racks for a period of not less than thirty (30) minutes.
- B. The Contractor shall provide a (UPS) that shall sustain the VSS system for not less than a thirty-minute period. In any event that the primary AC is lost or interrupted, the new (UPS) shall provide power to all the VSS system devices and maintain a fully functional VSS system. This specification of the uninterrupted power supply is intended to establish minimum standards of performance, function and quality.
- C. The Contractor shall ensure that any additional batteries required for this application are included and rack mounted.
- D. The (UPS) shall be rack mounted on a 19" standard 4 post rack.
- E. The UPS shall provide continuous, no-break power during complete or momentary loss of supply power.
- F. In the normal operating mode the UPS shall condition line power protecting against environmental conditions, power surge, power sag, under-voltage, over-voltage, line noise, frequency (variation of the waveform), transients and harmonic distortion.
- G. An external bypass switch shall be provided to allow the UPS to be removed from the incoming power line for service.
- H. Provided with relay interface card that provides isolated dry contact Form-C relay outputs for "utility failure," "low battery," "UPS alarm/OK," or "on bypass".
- I. Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the uninterruptible power supply (UPS) shall be manufactured by American Power Conversion (APC).

2.05 Enclosure Power Supplies

- A. 240 Watt @ 48 Volt Power Supply
 - 1. The ComNet PS-DRA Series offer a complete range of high quality, low noise switching mode power supplies of various output sizes ideally suited to the entire ComNet industrial product range that require 48VDC power input. These rugged units are DIN rail mountable, providing an ideal mounting configuration to a mating ComNet industrial switch or any product using our range of DIN rail mounting adapters. The wide ambient operating temperature range permits installation in most out of plant and unconditioned environments, such as those found in intelligent transportation systems or factory automation/industrial control applications. Unconditional line and load protection is provided.
 - a. Power Input
 - Rated Input Voltage: 115 / 230 VAC (auto select)
 - Supported Input Range: 90-264 VAC or 210-375 VDC
 - Input Current: 115 / 230 VAC, 4.0/1.55A

**INSTALLATION OF VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE BUS BASES**

**RFP 7-2138
EXHIBIT A**

- | | |
|-----------------------------|---|
| Line Frequency: | 47 to 63 Hz |
| Inrush current: | 115 / 230 VAC, 30/60 A |
| Power Dissipation: | 230 VAC, 32 W |
| b. Power Output | |
| Voltage Accuracy: | +1% |
| Minimum Load: | 0% |
| Line Regulation: | ±0.5% |
| Voltage Trim Range: | 47 to 56 VDC |
| Hold up time: | 115 / 230 VAC, 25 / 30 ms |
| DC indicator threshold: | 37 to 43 VDC |
| Output Wattage: | 240 W |
| Output Voltage: | + 48 VDC |
| Output Current: | 5 A @ 48 VDC |
| Effective: | 88 % min., 90% typ. |
| c. Control and Protection | |
| Input fuse: | T6.3A, 250 VAC internal |
| Internal Surge Protection: | IEC 61000-4-5 |
| Rated Over Load Protection: | 120 - 145 % |
| Over voltage protection: | Auto Recovery, 125 - 140 % |
| Degree of protection: | IP20 |
| d. Connector: | |
| Screw Terminal: | AWG24-10 (0.2 - 4mm ²) flexible / solid cable |
| Indicating LEDs: | |
| DC ON: | At Start Up (Green): |
| DC LOW | After Start Up (Red) |
| e. Electrical & Mechanical | |
| Case Construction | Metal |
| Size | 4.9 × 3.29 × 4.87 in (12.45 × 8.35 × 12.36 cm) |
| Weight | 3.04 lb / 1380 g |
| f. Environmental | |
| MTBF | >435,000 hours @ 40°C |
| Operating Temp | -40° C to +71° C, -40° C Start-up |
| Storage Temp | -40° C to +85° C |

Relative Humidity	20% to 95% (non-condensing)
g. Approvals & EMC Compliance	
UL / cUL	UL 508 Listed, UL 60950-I Recognized ISA 12.12.01 (Class I, Div 2, Groups A, B, C, & D)
TUV	EN 60950-I, CB scheme EN 61558-1, EN 61558-2-17 (meet EN 60204-1)
CE	EN 61000-6-3, EN 55022 Class B, EN 61000-3-2, Class D, EN 61000-3-3, EN 61000-6-2, EN 55024, EN 61000-4-2 Level 4, EN 61000-4-3 Level 3, EN 61000-4-4 Level 4, EN 61000-4-5 L- N Level 3, L/N-FG Level 4, EN 61000-4-6 Level 3, EN 61000-4-8 Level 4, EN 61000-4-11, ENV 50204 Level 2, EN 61204-3
Vibration	Meets IEC 60068-2-6
Rail Mount:	10 - 500 Hz, 2G, 60 min for each Axis
Shock	Meets IEC 60068-2-27 15G, 11ms, 3 Axis, 6 Faces, 3 times for each Face
h. PS-DRA240-48A Power	48 VDC 240 W (5A) DIN Rail High Temp Supply for PoE applications

B. 30 Watt @ 48 Volts Power supply

1. The ComNet™ PS-DRA Series offer a complete range of high quality, low noise switching mode power supplies of various output sizes ideally suited to the entire ComNet industrial product range that require 48VDC power input. These rugged units are DIN rail mountable, providing an ideal mounting configuration to a mating ComNet industrial switch or any product using our range of DIN rail mounting adapters. The wide ambient operating temperature range permits installation in most out of plant and unconditioned environments, such as those found in intelligent transportation systems or factory automation/industrial control applications. Unconditional line and load protection is provide.

a. Power Input

Rated Input Voltage:	115 / 230 VAC (auto select)
Supported Input Range:	85-264 VAC or 210-375 VDC
Input Current:	115 / 230 VAC, 4.0/1.55A

- | | |
|--------------------|------------------------|
| Line Frequency: | 47 to 63 Hz |
| Inrush current: | 115 / 230 VAC, 30/60 A |
| Power Dissipation: | 230 VAC, 4.9 W |
- b. Power Output
- | | |
|-------------------------|---------------------------|
| Voltage Accuracy: | +1% |
| Minimum Load: | 0% |
| Line Regulation: | ±0.5% |
| Voltage Trim Range: | 47 to 56 VDC |
| Hold up time: | 115 / 230 VAC, 25 / 30 ms |
| DC indicator threshold: | 37 to 43 VDC |
| Output Wattage: | 30 W |
| Output Voltage: | + 48 VDC |
| Output Current: | 625 mA @ 48 VDC |
| Effective: | 83 % min., 86% typ. |
- c. Control and Protection
- | | |
|-----------------------------|----------------------------|
| Input fuse: | T2A, 250 VAC internal |
| Internal Surge Protection: | IEC 61000-4-5 |
| Rated Over Load Protection: | 110 - 140 % |
| Over voltage protection: | Auto Recovery, 60 - 66 VDC |
| Degree of protection: | IP20 |
- d. Connector:
- | | |
|------------------|---|
| Screw Terminal: | AWG24-14 (0.2 - 4mm ²) flexible / solid cable |
| Indicating LEDs: | |
| DC ON: | At Start Up (Green): |
- e. Electrical & Mechanical
- | | |
|-------------------|---|
| Case Construction | Metal |
| Size | 3.6 × 1.59 × 4.49 in (9 × 4.05 × 11.4 cm) |
| Weight | .6 lb / 270 g |
- f. Environmental
- | | |
|-------------------|-----------------------------------|
| MTBF | >600,000 hours @ 40°C |
| Operating Temp | -40° C to +71° C, -40° C Start-up |
| Storage Temp | -40° C to +85° C |
| Relative Humidity | 20% to 95% (non-condensing) |
- g. Approvals & EMC Compliance

UL / cUL	UL 508 Listed, UL 60950-I Recognized ISA 12.12.01 (Class I, Div 2, Groups A, B, C, & D)
TUV	EN 60950-I, CB scheme EN 61558-1, EN 61558-2-17 (meet EN 60204-1)
CE	EN 61000-6-3, EN 55022 Class B, EN 61000-3-2, Class D, EN 61000-3-3, EN 61000-6-2, EN 55024, EN 61000-4-2 Level 4, EN 61000-4-3 Level 3, EN 61000-4-4 Level 4, EN 61000-4-5 L- N Level 3, L/N-FG Level 4, EN 61000-4-6 Level 3, EN 61000-4-8 Level 4, EN 61000-4-11, ENV 50204 Level 2, EN 61204-3
Vibration	Meets IEC 60068-2-6
Rail Mount:	10 - 500 Hz, 2G, 60 min for each Axis
Shock	Meets IEC 60068-2-27 15G, 11ms, 3 Axis, 6 Faces, 3 times for each Face
h. PS-DRA30-48A	48 VDC 30 W (625 mA) DIN Rail High Temp Power Supply for PoE applications
C. 12 or 24VDC @ Varying Voltages Power Supply	
1.	The ComNet™ PS-AMR Series offer a complete range of high quality, low noise switching mode power supplies of various output sizes ideally suited to the entire ComNet industrial product range that require either 12 or 24VDC power input. These rugged units are DIN rail mountable, providing an ideal mounting configuration to a mating ComNet industrial switch or any product using our range of DIN rail mounting adapters. The wide ambient operating temperature range permits installation in most out of plant and unconditioned environments, such as those found in intelligent transportation systems or factory automation/industrial control applications. Unconditional line and load protection is provided.
a. Power Input	
Rated Input Voltage	90 to 264 VAC or 120 to 375 VDC
Input Current	115 / 230 VAC PS-AMR1-12: 200 / 135 mA PS-AMR2-12: 450 / 270 mA PS-AMR3-12: 680 / 410 mA PS-AMR4-12: 1.1 / 0.6 A

		PS-AMR5-12: 1.35 / 0.72 A
		PS-AMR1-24: 1.35 / 0.72 A
		PS-AMR2-24: 450 / 270 mA
		PS-AMR3-24: 680 / 410 mA
		PS-AMR5-24: 1.8 / 0.9 A
		PS-AMR4-24: 1.1 / 0.6 A
Line Frequency		47 to 63 Hz
Inrush current		115 / 230 VAC
		PS-AMR1: 15 / 30 A
		PS-AMR2: 20 / 40 A
		PS-AMR3: 25 / 50 A
		PS-AMR4/5: 30 / 60 A
Power Dissipation		230 VAC
		PS-AMR1-12: 2.3 W
		PS-AMR2-12: 4.3 W
		PS-AMR3-12: 7.3 W
		PS-AMR4-12: 10.2 W
		PS-AMR5-12: 12. 9 W
		PS-AMR1-24: 2.3 W
		PS-AMR2-24: 4.0 W
		PS-AMR3-24: 7.1 W
		PS-AMR424: 9.9 W
		PS-AMR5-24: 12. 2 W
b.	Power Input	
	Voltage Accuracy	+1%
	Minimum Load	0%
	Line Regulation	±1%
	Voltage Trim Range	For all except the PS-AMR1 models
		12 V: 12 to 14 VDC
		24 V: 24 to 28 VDC
	Hold up time	115 / 230 VAC
		PS-AMR1: 10 / 30 ms
		PS-AMR2: 20 / 80 ms
		PS-AMR3: 20 / 100 ms
		PS-AMR4-12: 16 / 60 ms

		PS-AMR5-12: 16 / 60 ms
		PS-AMR4-24: 12 / 60 ms
		PS-AMR5-24: 10 / 60 ms
	DC ON / LOW indicator threshold	
		12 V: 9 to 10.8 VDC
		24 V: 19.2 to 21.6 VDC
c.	General	
	Isolation Resistance Derating	Input-Output, @ 500VDC, 100 MΩ
		PS-AMR1/2/5: +61° to 71°C, max 2.5% / °C
		PS-AMR3/4: +56° to 71°C, max 2.5% / °C
	Cooling Normal convection	(Recommend all sides 25mm free space)
d.	Control and Protection	
	Input fuse	250 VAC internal PS-AMR1: T1A PS-AMR2/3/4: T2A PS-AMR5: T3.15A
	Internal Surge Protection	IEC 61000-4-5
	Rated Over Load Protection	
		PS-AMR1: 110 - 165 %
		PS-AMR2: 120 - 160 %
		PS-AMR3/4/5: 110 - 150 %
	Over voltage protection	Auto Recovery 12 V: 15 to 16.5 VDC 24 V: 30 to 33 VDC
	Degree of protection	IP20
e.	Connector	
	AWG24-12 (0.2 - 2.5mm²) flexible / solid cable	
f.	Indicating LEDs	
	DC ON	At Start Up (Green)
	DC LOW	After Start Up (Red)

- g. Electrical & Mechanical
- Size PS-AMR1 3.58 × 0.71 × 2.22 in (9.1 × 1.8 × 5.65 cm)
 PS-AMR2 3.58 × 1.38 × 2.22 in (9.1 × 3.5 × 5.65 cm)
 PS-AMR3 3.58 × 2.09 × 2.22 in (9.1 × 5.3 × 5.65 cm)
 PS-AMR4 3.58 × 2.8 × 2.22 in (9.1 × 7.1 × 5.65 cm)
 PS-AMR5 3.58 × 3.54 × 2.24 in (9.1 × 9.0 × 5.7 cm)
- Weight
- PS-AMR1 0.14 lb / 65 g
 PS-AMR2 0.29 lb / 130 g
 PS-AMR3 0.42 lb / 190 g
 PS-AMR4 0.55 lb / 250 g
 PS-AMR5 0.84 lb / 380 g
- h. Environmental
- MTBF >500,000 hours @ 40°C
 Operating Temp -40° C to +71° C
 Storage Temp -40° C to +85° C
 Relative Humidity 20% to 90% (non-condensing)
- i. Approvals & EMC Compliance
- UL / cUL UL 508 Listed
 UL 60950-I, UL 1310 Class 2 Power (24LS
 model only) recognized
 ISA 12.12.01 (Class I, Div 2, Groups A, B,
 C, & D)
- TUV
- EN 60950-I, CB scheme CE
 EN 61000-6-3, EN 55022 Class B, EN
 61000-3-2, EN 61000-3-3, EN 61000-6-2,
 EN 55024, EN 61000-4-2 Level 4, EN
 61000-4-3 Level 3, EN 61000-4-4-4 Level 4,
 EN 61000-4-5 L-N Level 3, EN 61000-4-6
 Level 3, EN 61000-4-8 Level 4, EN 61000-
 4-11, ENV 50204 Level 2, EN 61204-3
- j. Vibration
- Meets IEC 60068-2-6
 Rail Mount: 10 - 500 Hz, 2G, 60 min for each
 Axis

- k. Shock Meets IEC 60068-2-27
15G, 11ms, 3 Axis, 6 Faces, 3 times for
each Face

l. Part Numbers

Part Number	Input Voltage	Output Wattage	Output Voltage	Output Current
PS-AMR1-12	90 to 264 VAC	10 Watts	+ 12 VDC	830 mA
PS-AMR2-12	90 to 264 VAC	24 Watts	+ 12 VDC	2000 mA
PS-AMR3-12	90 to 264 VAC	33 Watts	+ 12 VDC	2750 mA
PS-AMR4-12	90 to 264 VAC	54 Watts	+ 12 VDC	4500 mA
PS-AMR5-12	90 to 264 VAC	72 Watts	+ 12 VDC	6000 mA
PS-AMR1-24	90 to 264 VAC	10 Watts	+ 24 VDC	420 mA
PS-AMR2-24	90 to 264 VAC	24 Watts	+ 24 VDC	1000 mA
PS-AMR3-24	90 to 264 VAC	36 Watts	+ 24 VDC	1500 mA
PS-AMR4-24	90 to 264 VAC	60 Watts	+ 24 VDC	2500 mA
PS-AMR5-24	90 to 264 VAC	100 Watts	+ 24 VDC	4200 mA

2.18 RACK MOUNT CHASSIS

- A. The rack mount chassis shall contain redundant, hot swappable power supplies and appropriate cooling for 12 modules.
- B. The rack shall require 5 rack units (RU) in height with an additional 1 RU spacer underneath for airflow. The rack shall mount in a standard 19-inch rack.
- C. The rack mount shall provide a built-in alarm system for power failure monitoring on the redundant power supplies.
- D. The rack mount chassis shall accommodate video encoders, fiber transceivers, or UTP transceivers.
- E. The rack mount chassis shall meet or exceed the following design and performance specifications.
 - 1. Mechanical Specifications
 - a. Number of Modules 12
 - b. Module Orientation Vertical
 - c. Rack Units 5 (includes thermal management)
 - d. Construction Aluminum
 - 2. Electrical Specifications (with Power Supply)
 - a. Input Voltage 100 to 240 VAC
 - b. Output Voltage 12 VDC

- c. Redundant Capability Yes, by default
- 3. Environmental Specifications
 - a. Operating Temperature 32° to 95°F (0° to 35°C)
 - b. Operating Humidity 20% to 80% noncondensing
 - c. Maximum Humidity Gradient 10% per hour
 - d. Operating Altitude –50 to 10,000 ft (–16 to 3,048 m)
 - e. Operating Vibration 0.25 G at 3 to 200 Hz at a sweep rate of 0.5 octaves/minute
- 4. Mounting Fits 19-inch, EIA-standard rack
- 5. Certifications
 - a. CE, Class A
 - b. FCC, Class A
 - c. UL/cUL Listed
- F. Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the Pelco RK5200 series chassis racks.

2.06 MIDSPAN POWER OVER ETHERNET (PoE+) UNIT

- A. The Contractor shall provide Midspan Power over Ethernet Plus (PoE+) devices, where required, that will sustain the (VSS) system IP-based cameras as needed.
- B. The Midspan (PoE+) device shall be capable of ensuring continuous and reliable power to network video products up to 328 ft (100m) by utilizing existing Ethernet or fast Ethernet (category 6A unshielded or shielded twisted-pair cabling) for power transfer.
 - 1. Power is to be provided only over unused Ethernet pairs 4/5 and 7/8
- C. The Midspan (PoE+) device shall act as a normal patch panel for Ethernet connections, directly transferring data transmissions originating from Ethernet terminals over existing Ethernet or fast Ethernet (category 6A unshielded or shielded twisted-pair cabling) utilizing pairs 1/2 and 3/6.
 - 1. 10/100/1000 Mbps capable
- D. The Midspan (PoE+) device shall be compliant for:
 - 1. IEEE802.3 standards (when no inline power is supplied)
 - 2. IEEE802.3af DTE Power via Media Dependent Interface (MDI) standard for auto-sensing algorithm.
 - a. The per-port mechanism shall automatically detect all power over LAN ready Ethernet Terminals and supply inline power.
 - b. The per-port mechanism shall ensure continuous proper operation of devices (e.g. Network Interface Cards (NICs) that do not expect power on their Ethernet connection.

3. The device shall be capable of backward compatibility to the pre-standard algorithm.
- E. The Midspan (PoE+) device shall be capable of Plug-and-play installation.
- F. The Midspan (PoE+) device shall be available in multiple port configurations, as required.
- G. All port interfaces shall be located on the front panel for easy access and network monitoring.
- H. All port interfaces shall have Bi-color LED, per port, for visual indication of normal, overload or short circuit conditions.
- I. The Midspan (PoE+) device shall meet the following minimum requirements:
 1. AC power indicator LED.
 2. User Indicator – Channel power LED
 3. Self-test monitoring LED
 4. DC power indicator LED (6 and 12 port only)
 5. Output power voltage: -48 V
 6. Per port power: 30 W minimum
 7. 1 shielded RJ-45 Data connector and 1 shielded RJ-45 output connector for the combined data and power per port.
 - a. Single port Midspan - TIA/EIA 568 Category 5 compliant.
 - b. Multiport Midspans - EIA 568A and EIA 568B compliant
 8. Mounting: Wall or Shelf mounting, 19" standard rack mount – 1U

2.07 POWER SURGES AND GROUNDING

A. Transient Voltage Surge Suppression

All cables and conductors extending beyond building perimeter, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage surges and have Transient Voltage surge suppression protection (TVSS) UL listed in accordance with Standard 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 915 mm (36 in) of the building cable entrance. Fuses shall not be used for surge protection. The inputs and outputs shall be tested in both normal mode and common mode using the following waveforms:

1. A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes.
2. An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes.

3. Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equivalent.
4. Operating Temperature and Humidity: -40 to + 85 deg C (-40 to 185 deg F), and 0 to 95 percent relative humidity, non-condensing.

B. Video Surveillance System (VSS)

Protectors shall be installed on coaxial cable systems on points of entry and exit from separate buildings. Suppressors shall be installed at each exterior camera location and include protection for 12 and/or 24 volt power, data signal and motor controls (for Pan, Tilt and Zoom systems). SPDs shall protect all modes herein mentioned and contain all modes in a single unit system. Protection for all systems mentioned above shall be incorporated at the head end equipment. Additionally a minimum 450VA battery back up shall be used to protect the DVR or VCR and monitor. Protectors shall meet the following criteria:

1. Camera Power
 - Minimum Surge Current Capacity: 1,000 Amps (8X20µsec); 240 Amps for IP Video/PoE cameras
 - Screw Terminal Connection
 - All protection modes L-G (all Lines)
 - MCOV <40VAC
 - Ten Year Limited Warranty
 - Acceptable Manufacturer: DITEK CORP., or approved equivalent.
 - DTK-RM12POE (12 port, 2U rack mount Power over Ethernet)
 - DTK-MRJPOE (Single camera Power Over Ethernet)
2. Video And Data
 - Surge Current Capacity 1,000 Amps per conductor
 - Protection modes: L-G (Data)
 - Band Pass 0-2GHz
 - Insertion Loss <0.3dB
 - Ten Year Limited Warranty
 - Acceptable Manufacturer: DITEK CORP., or approved equivalent
 - DTK-RM12POE (12 port, 2U rack mount Power over Ethernet)
 - DTK-MRJPOE (Single camera Power Over Ethernet)
3. Grounding and Bonding
 - The Security Contractor shall provide grounding and surge suppression to stabilize the voltage under normal operating conditions. This is to ensure the operation of over current devices, such as fuses, circuit breakers, and relays, under ground-fault conditions.
 - The Contractor shall engineer, provide, and install proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards, referenced in this document.
 - Principal grounding components and features shall include: main grounding buses, grounding, and bonding connections to service equipment.
 - The Contractor shall provide detail drawings of interconnection with other grounding systems including lightning protection systems.
 - The Contractor shall provide details of locations and sizes of grounding conductors and grounding buses in electrical, data, and communication equipment rooms and closets.
 - AC power receptacles are not to be used as a ground reference point.

Any cable that is shielded shall require a ground in accordance with applicable codes, the best practices of the trade, and all manufactures' installation instructions.

- C. 120 VAC Surge Suppression
1. Shall be Ditek HW Series, or approved equivalent.
 2. Continuous Current: Unlimited (parallel connection)
 3. Max Surge Current: 13,500 Amps
 4. Protection Modes: L - N, L - G, N - G
 5. Warranty: Ten Year Limited Warranty
 6. Dimension: 73.7 x 41.1 x 52.1 mm (2.90 x 1.62 x 2.05 in)
 7. Weight: 2.88 g (0.18 lbs)
 8. Housing: ABS
 9. Other Specifications:
 - DTK-120HW
 - Agency Approvals: UL1449, cUL
 - Connection: 110-120VAC
 - MCOV: 130VAC
 - Max Surge Current: 22,500A
 - DTK-240HW
 - Agency Approvals: N/A
 - Connection: 120/240VAC
 - MCOV: 130/260VAC
 - Max Surge Current: 27,000A

PART 3 - EXECUTION

3.01 INSTALLATION

- A. System installation shall be in accordance with manufacturer and related documents and references, for each type of security subsystem designed, engineered and installed.
 - 1. The Contractor shall provide all wire, cables, conduit, fittings, and connectors necessary to result in a complete and fully operational system.
- B. Due to the environmental conditions of the location all areas of the project work and all devices/conduit shall be designed for unconditioned environmental close proximity marine applications unless otherwise directed by the Orange County Transportation Authority Contracting Officer or representative.
 - 1. Provide all stainless steel or hot-dipped galvanized fasteners and hardware unless otherwise pre-approved.
 - 2. The Contractor shall ensure the application of rust, corrosion, and anti-seize protection at all threaded assemblies by coating the mating surfaces with an approved compound.
- C. The Contractor shall install equipment in a manner which complies with accepted industry codes, standards, and good trade practices.
- D. Components shall be configured with appropriate "service points" to pinpoint system trouble in less than 30 minutes.
- E. The Contractor shall install all system components including Orange County Transportation Authority furnished equipment, and appurtenances in accordance with the manufacturer instructions, documentation and shall furnish all necessary connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.
- F. The system will be designed, engineered, installed, and tested to ensure all components are fully compatible as a system and can be integrated with all associated security subsystems. Integration with these security subsystems shall be achieved by computer programming and / or the direct hardwiring of the systems.
- G. All work on location shall adhere to the requirements of this specification and shall be installed in such a manner as which shall not constitute a safety hazard.
- H. The Contractor shall insure that all installation personnel understand all the requirements of this specification.
- I. Back-up power supplies (e.g. batteries) shall be installed in the central equipment cabinet or in a metal box adjacent to the central equipment cabinet. The front cover of the metal box shall have a hinge and be equipped with a snap lock, or equal.
- J. At the final inspection by a factory certificated representative of the manufacturer of the equipment shall perform the tests in section 3.10 Field Quality Assurance.

**INSTALLATION OF VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE BUS BASES**

**RFP 7-2138
EXHIBIT A**

- K. The representative shall demonstrate that the system functions properly in every respect in the presence of an Orange County Transportation Authority representative.
- L. The Contractor shall provide all equipment specified in this document and illustrated in the related drawings in strict compliance with the manufacturers published instructions, approved shop drawings and as specified herein.
- M. The Contractor shall provide all required electrical and signal communication cabling to each field device location; connect device applicable control wiring, signal lines and power to device interfaces; connect wiring harness to device.
- N. The Contractor shall review all contract drawings and survey existing site conditions prior to ordering the equipment and proceeding with the work.
- O. The Contractor shall visit the site and verify that site conditions are in agreement / compliance with the design package. The Contractor shall report all changes to the site or conditions that will affect performance of the system to the Orange County Transportation Authority Contracting Officer in the form of a written report. The Contractor shall not take any corrective action without written permission received from the Orange County Transportation Authority Contracting Officer.
- P. The Contractor shall connect to and utilize existing video equipment, video and control signal transmission lines, and devices as outlined in the design package. Video equipment and signal lines that are usable in their original configuration without modification may be reused with the Orange County Transportation Authority Contracting Officer approval.
- Q. The Contractor shall perform a field survey, including testing and inspection of all existing video equipment and signal lines intended to be incorporated into the new VSS System, and furnish a report to the Orange County Transportation Authority Contracting Officer as part of the site survey report.
 - 1. For those items considered nonfunctioning, provide (with the report) specification sheets, or written functional requirements to support the findings and the estimated cost to correct the deficiency.
 - 2. As part of the report, the Contractor shall include a schedule for connection to all existing equipment.
- R. The Contractor shall make written requests and obtain approval prior to disconnecting any signal lines and equipment, and creating equipment downtime. Such work shall proceed only after receiving the Orange County Transportation Authority Contracting Officer approval of these requests. If any device fails after the Contractor has commenced work on that device, signal or control line, the Contractor shall diagnose the failure and perform any necessary corrections to the equipment.
- S. The Contractor shall be held responsible for repair costs due to Contractor negligence, abuse, or incorrect installation of equipment.
- T. The Orange County Transportation Authority Contracting Officer shall be provided a full list of all equipment that is to be removed or replaced by the Contractor, to include description and serial/manufacturer numbers where possible. The Contractor shall dispose of all equipment that has been removed or replaced based upon approval of the Orange County Transportation Authority Contracting

Officer after reviewing the equipment removal list. In all areas where equipment is removed or replaced the Contractor shall repair those areas to match the current existing conditions.

- U. The Contractor shall coordinate the locations of all equipment specified on the contract drawings with other trades, and shall be based on existing site conditions prior to the installation of the equipment.
- V. The Contractor shall provide all system set up and programming including the directives issued by the Orange County Transportation Authority or their authorized representative resulting in a complete and operational system ready for use.
- W. Any operator controls installed that require user intervention at a height and location to accommodate wheelchair and other ADA type handicap access requirements.
- X. When interfacing with other communications or security subsystems the Contractor shall utilize interfacing methods that are approved by the Orange County Transportation Authority or their authorized representative. At a minimum, an acceptable interfacing method requires not only a physical, electronic, and mechanical connection; but also a matching of item such as signal, voltage, and processing levels with regard to signal quality and impedance. The interface point must adhere to all standards and meet the sites requirements.
- Y. The system solution provided shall be scalable and allow expansion as required.
- Z. The use of wireless transmission technologies such as infrared, laser, Mesh network, Microwave, Wi-Fi, Wi-Max and other common media linked data transmission distributed topologies for transmitters and receiver systems shall not be permitted unless specifically authorized in writing by Orange County Transportation Authority Contracting Officer.

3.02 ENCLOSURES

- A. Custom consoles or cabinets (hereinafter referred to as "enclosure) shall be custom designed from standard OEM components. It shall be constructed of heavy 16-gauge cold rolled steel. It shall have baked-on iron phosphate primer and baked enamel paint finish in a color to be selected by the Orange County Transportation Authority Contracting Officer.
- B. Each enclosure shall have OEM produced top, bottom and side panels; except, enclosures mounted sided by side, where only two outside panels shall be provided Each enclosure shall contain integral and adjustable predrilled rack mounting rails or frame that allows front panel equipment mounting and access. Each enclosure shall be provided with standard knockout holes for conduit connection or cable entrance; provide for ventilation of the equipment; power outlet strip(s) and bulkhead connector panel(s).
- C. When all equipment and blank panels are installed, snap-in-place chrome trim strip covers are required that will cover all front panel screw fasteners. It shall incorporate all security video surveillance system controllers.
- D. Enclosure Penetrations:

**INSTALLATION OF VIDEO SURVEILLANCE SYSTEM
AT SANTA ANA AND GARDEN GROVE BUS BASES**

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1. All enclosure penetrations shall be from the bottom unless the system design requires penetrations from other directions.
 2. Penetrations of interior enclosures involving transitions of conduit from interior to exterior, and all penetrations on exterior enclosures shall be sealed with rubber silicone sealant to preclude the entry of water.
 3. The conduit riser shall terminate in a hot-dipped galvanized metal cable terminator. The terminator shall be filled with an approved sealant as recommended by the cable manufacturer and in such a manner that the cable is not damaged.
- E. Enclosures, cabinets, housings, boxes and fittings or every product description having hinged doors or removable covers and which contain circuits, or the integrated security video surveillance system and its power supplies shall be provided with cover operated, corrosion-resistant tamper switches.
- F. Rack mounted equipment shall be installed in the enclosure where equipment normally requiring adjustment or observation is mounted so operational adjustment(s) can be conveniently made. Heavy equipment shall be mounted with rack slides allowing servicing from the front of the enclosure. Heavy equipment shall not depend only upon front or rear panel mounting screws for support. Equipment shall be provided with sufficient cable slack to permit servicing by removal of the installed equipment from the front of the enclosure. A blank panel (spacer) of 1.75 inches high shall be installed above and below each piece of active equipment to insure adequate air circulation. The enclosure shall be designed for efficient equipment cooling and air ventilation. Each enclosure that contains active electronic equipment shall be equipped with a quiet fan (or blower) and non-disposable air filter.
- G. Enclosures shall be installed plumb and square. Each enclosure shall be permanently attached to the building structure and held firmly in place. Care must be exercised to insure proper top, back, side and front enclosure clearance that allows direct access and doors to properly function without interference. Fifteen inches of front vertical space opening shall be provided for additional equipment with appropriate blank panels installed to cover unused enclosure openings.
- H. Signal patch and/or bulkhead connector panels (i.e.: data, control and Video) shall be provided so that output for from each source, device or system component shall enter the panel at the top row of jacks or connectors, beginning left to right as viewed from the front, which will be called "input". Each connection to a load, device or system component shall exit the panel at the bottom row of jacks, beginning left to right as viewed from the front, which will be called "output".
- I. Circuits, transmission lines and signal extensions shall have continuity, correct connection and polarity. Polarity shall be maintained between all points in the system.
- J. Racking Equipment Labeling:
1. Amplifying, control, switching and routing equipment inputs and outputs shall be permanently labeled with contrasting plastic laminate or Bakelite material. System equipment shall be permanently labeled on the face of the unit corresponding to its source. Remote control equipment shall be labeled according to the unit or system being controlled. Equipment labels

shall be permanently affixed to the equipment with metal screws, permanent mounting devices or cement.

3.03 CONDUIT - RACEWAYS

- A. All system cabling provided, as part of this system shall be installed in dedicated enclosed conduit raceways, which are not used for any other purpose, function or system. No system cabling shall be left exposed and accessible to tampering or the harsh elements of the environment.
- B. Install all wiring and devices in a full enclosed conduit system, utilizing electric metallic tubing to include the equivalent in flexible metal, rigid galvanized steel to include the equivalent of liquid tight, polyvinylchloride schedule 40 or 80 or greater.
- C. All conduits will be sized and installed per the national electrical codes. All security video surveillance system signal and power cables that traverse or originate in a high security office space will contained in either electric metallic tubing or rigid galvanized steel conduit.
- D. Provide complete empty low voltage conduit and fiber cabling conduit systems for underground, aerial, interconnection, and pull junction boxes to provide a complete conduit system between the security video surveillance system and related discipline devices as required. The Contractor shall provide all conduit materials as required to provide full and complete conduit systems.
 - 1. The Contractor shall ensure that any runs of exposed conduit shall be where required, parallel or at right angles to the building lines. The Contractor shall avoid conduit runs parallel to all AC electrical power. The Contractor shall maintain a minimum of a six (6) inch distance between all parallel runs of AC electrical power and low voltage conduit or low voltage wiring.
 - 2. The Contractor shall ensure that any low voltage conduit that crosses over AC electrical power shall be at a 90-degree angle.
 - 3. Contractor shall take all other precautions in accordance with manufacturer recommendations to prevent electromagnetic interferences with data transmissions.
 - 4. The Contractor shall provide conduit from all security equipment device locations to the nearest secure security equipment room or security equipment closet. No conduit shall be less than 3/4 inch. A pull string shall be included in each individual conduit run to assist in future installations.
 - 5. Conduit fills shall not exceed forty 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
 - 6. Design all conduit paths to ensure that all low voltage wire and conduit maintain the separation from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors.
 - 7. All conduit, pull boxes, and junction boxes shall be clearly marked with colored permanent tape or paint that will allow it to be distinguished from all other conduit and infrastructure. The marking scheme provided shall not identify any security conduit system with alpha nomenclatures.

8. Cold Galvanizing: All field welds and brazing on factory galvanized boxes, enclosures, and conduits shall be coated with a cold galvanized paint containing at least 95 percent zinc by weight.
9. The Contractor shall ensure that all provided junction boxes installed outdoors, or in areas of unconditioned air shall be of the gasket, weatherproof type.
- E. Conduit shall not enter racking, or any other remotely mounted control panel equipment or back boxes, except where the manufacturer specifies entry.
- F. All back boxes provided for recessed ceiling installation shall include adequate access and shall be rated for use in plenum ceilings and shall meet or exceed all applicable state, national, and local electrical codes.
- G. Terminal Boxes, Junction Boxes and Cabinets:
 1. All boxes and cabinets shall be UL listed for their use and purpose.
 2. Screws extending outside any cabinets shall be cut off and filed smooth to prevent any injury.

3.04 SYSTEM WIRING

- A. The Contractor shall employ the latest NFPA 70 installation practices and materials. Wiring and cables shall comply with all sections.
- B. All wire and cable shall be in strict compliance with the manufacturers published specifications for the actual equipment provided.
 1. All wire and cable shall be UL listed for its intended purpose.
 2. All wiring shall meet or exceed manufacturers recommended wire specifications and be listed for intended operation.
 3. All IP transmission shall be of CAT 6 with matching RJ-45 crimp type connectors, and shall be installed with a control crimp tool, specified by the connectors' manufacturer.
 4. All wire and cable components shall be able to withstand the conditions under which the wire or cable is installed in for a minimum of twenty (20) years without degradation.
 5. All power wire and cable shall be solid or stranded copper conductors Type CL2 or CL2P.
 6. Minimum conductor size shall be No. 23 AWG – PVC insulated unless otherwise specified. Multi-conductor cables (more than two conductors) may use smaller conductor size depending upon manufacturer's specifications and subject to approval by the Engineer.
- C. Cables serving interconnects of digital data shall comply with manufacturer requirements and shall be standard copper wire for each conductor.
 1. The hardwire cable shall contain a one hundred percent (100 percent) shielding.
 2. Wires with a single overall shield shall have a tinned copper shield drain wire.

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3. Ground shields at the connecting panel end only and in accordance with manufacturer recommendations.
- D. AC power shall be run separately from the communications signal cables.
- E. Grommets/bushings shall be provided to protect cabling penetrating through counter or wall openings.
- F. All cable provided as part of this system shall be installed free of unnecessary cuts and splices wherever possible. If splicing is required on long cable runs, this splicing shall take place in termination cabinets only. Cable splices in conduit raceways and junction boxes are not permitted.
 1. Splices: No splices shall be permitted unless the length of the cable being installed exceeds the maximum cable length available from the manufacturer.
- G. Splices: No splices shall be permitted unless the length of the cable being installed exceeds the maximum cable length available from the manufacturer. All splices shall conform per the following:
 1. All wire points and connections shall be made with rosin core solder or with mechanical connectors approved by the manufacturers of the equipment.
 2. Wire splices shall be made up on binding screw captive mechanical compression terminal strips.
 3. Soldered and crimped connections are allowed and shall be accomplished with crimping Lug Manufacturers Calibrated Tool.
 4. Wire ends shall be neatly formed and where insulation has been cut, heat shrink tubing shall be employed to secure the insulation on each wire.
 5. Wire ends shall be neatly formed and where insulation has been cut, heat shrink tubing shall be employed to secure the insulation on each wire.
 - a. Tape of any type is not acceptable.
 6. No "Twist On" connectors shall be allowed.
 7. The use of wire nuts is prohibited.
 8. All copper conductor splices shall be accomplished in the following method:
 - a. Strip insulation from wires to be spliced using caution not to score or strip away the actual conductor.
 - b. Twist together the stripped conductors for a minimum of four rotations.
 - c. Solder the twisted conductors using rosin core solder.
 - d. Trim the twisted and soldered conductors to a length accommodated by the vinyl insulated closed end splice or butt splices in the next step. Trimmed bare conductors shall not extend beyond the insulated closed end splice (or equal).
 - e. Crimp insulated closed end splice utilizing a full cycle ratchet crimp tool approved by the splice manufacturer. The crimped connections

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- shall be free of any movement between the wire and crimp splice device.
- f. Alternately utilizing appropriately sized heat shrink tube shall protect the soldered splice.
- g. Splices shall be housed in a splice enclosure and shall be encapsulated with an epoxy or ultraviolet light cured splice encapsulate.
- H. If stranded cable is used in the construction of this system, the stranded conductors shall be tinned with rosin core solder prior to termination.
- I. The Contractor shall conduct electrical tests of all cable and conductors to ensure that all cable and conductors are free of shorts, foreign grounds, open circuits, excessive resistance and other faults prior to termination. The Contractor shall replace all cable, which has been damaged during the installation process. Submit test report prior to terminating cables to equipment.
- J. Neatly strap, dress and adequately support all inter-rack and panel cabling.
 - 1. Terminal blocks, boards, strips or connectors and nylon tie wraps shall be furnished for all cables at their interface within racks, cabinets, consoles and equipment modules.
- K. Cable installations shall conform to industrial standards and good engineering practice.
 - 1. All wiring within the cabinet shall be permanently attached using spiral wrap tubing and nylon wire ties with mechanical (i.e.: screws, rivets) fasteners.
 - a. The use of self-adhesive fasteners is specifically prohibited.
 - 2. All provided wiring within cabinets shall be installed perpendicular or parallel with or at right angles to the sides and back of the enclosure or floor plane, with all bends made at neat right angles.
 - 3. Wiring shall be neatly routed in horizontal and vertical channels parallel to the cabinet's sides and the interior terminal strips
 - 4. As a general practice, run all power cables, control cables, and high-level cables on one side of an equipment cabinet. Run all other cables on the opposite side of an equipment cabinet.
 - 5. Wiring shall not be routed over circuit boards, transformers, and terminal strips.
 - 6. The Contractor shall maintain a minimum of a six (6) inch distance between all parallel runs of AC electrical power and low voltage conduit or low voltage wiring.
 - 7. All conductors that are terminated, spliced, or otherwise interrupted in any enclosure associated with the security system shall be connected to terminal blocks.
 - a. Mark each terminal in accordance with the wiring diagrams of the system.

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- b. Make all connections with either crimp-on terminal spade lugs or with approved pressure type terminal blocks.
 - c. Terminal blocks shall be secured in each junction box; either to the junction box or plate.
- L. Cables installed in plenums shall meet UL 910, and cables to be installed in risers shall meet UL 1666.
 - 1. It is the responsibility of the Contractor to verify plenum conditions as defined by NEC and with architectural drawings.
 - 2. When any wiring enters a plenum rated area, return air for the ventilation system the Contractor shall only allow plenum wire in this area and the Contractor shall adhere to all local and national codes that refer to plenum areas.
- M. Installation in Ducts or Conduits:
 - 1. A cable lubricant compatible with the cable sheathing material shall be used on all cables pulled.
 - 2. Pulling fixtures shall be attached to the cable strength members. If indirect attachments are used, the grip diameter and length shall be matched to the cable diameter and characteristics. If indirect attachment is used on cables having only central strength members, the pulling forces shall be reduced to ensure that the fibers are not damaged from forces being transmitted to the strength member.
 - 3. During pulling the cable pull line tension shall be continuously monitored, and shall not exceed the maximum tension as given by the cable manufacturer. The mechanical stress placed upon a cable during installation shall be such that the cable is not twisted or stretched.
 - 4. A cable feeder guide shall be used between the cable reel and the face of the duct or conduit to protect the cable and guide it into the duct or conduit as it is played off the reel. As the cable is played off the reel, it shall be carefully inspected for jacket defects.
 - 5. Precautions shall be taken during installation to prevent the cable from being kinked or crushed and that the minimum bend radius of the cable is not exceeded at any time.
 - 6. Cable shall be hand fed and guided through each manhole and additional lubricant shall be applied at all intermediate manholes.
 - 7. When practicable, the center pulling techniques shall be used to lower pulling tension. That is, the cable shall be pulled from the center point of the cable run towards the end termination points. The method may require the cable to be pulled in successive pulls.
 - 8. Cable that is pulled out of a junction box or manhole shall be protected from dirt and moisture by laying the cable on a ground covering.
- N. Vertically Run Cable:
 - 1. When possible, use gravity to assist in cable pulling. Pull cable from top of run to bottom of run.

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2. Hand pull if possible. If machine assistance is required, Contractor shall monitor tension and shall not exceed specific cable tension limits.
 3. After installation, the vertical tension on the cable shall be relieved at maximum intervals of 30.48 m using a split support grip.
- O. Cable Taps:
1. The Contractor shall provide a terminal cabinet where any circuit tap is made.
- P. Color Coding:
1. Provide distinct color coding system for all wiring. Each cable shall be numbered at each end with permanent UV protective labels.
 2. All labels shall be created and printed from an industry approved electrical wire label printer.
 3. The Contractor shall distinctively color code all wiring differently from the normal building wiring.
 4. Identify conductors by plastic-coated, self-sticking, printed markers or by heat-shrink type sleeves labels.
 5. Each conductor used for the same specific function shall be distinctively color-coded. Each circuit color code wire shall remain uniform throughout circuit.
- Q. Properly and permanently identify all conductors and cables at all terminations, corresponding to the designations on record drawings. The method to be used for cable identification shall be approved by the Orange County Transportation Authority.
1. The Contractor shall supply identification tags or labels for each cable.
 2. Cable shall be labeled at both end points and at intermediate hand holes, manholes, and junction boxes.
 3. The labeling format shall be identified and a complete record shall be provided to the Orange County Transportation Authority with the final documentation.
 4. Each cable shall be identified with type of signal being carried and termination points.
- R. Care shall be exercised in wiring so as to avoid damage to the cables and to the equipment.
- S. Low voltage control and signal cables shall be installed without conduit above accessible ceilings even if the cable meets national electrical code requirements for the application.
1. Whenever possible, primary cable routing paths shall follow the logical structure of the building. All cable servicing an area shall be routed parallel and perpendicular to the building structure, following corridors and hallways. Diagonal runs are not acceptable.

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2. For locations where cables transition from a conduit system, the Contractor shall install a bushing, sleeve, or grommet in all transcend locations to prevent damage to the cables.
 3. For those locations where cables pass through metal studs, the Contractor shall install a bushing or grommet in all metal studs to prevent damage to the cables.
 4. Cable that is run above a suspended ceiling shall be supported by either channel or hangers as accepted. Do not lay low voltage wire cables in the joist or on ductwork, piping and plumbing systems or on top of the lay-in ceiling tiles.
 5. Cable shall be routed above the bottom of all metal framing such as floor joists or trusses for the next floor or roof above.
 6. All low voltage wiring exposed below the bottom of the joist line shall be enclosed in full conduit or other Orange County Transportation Authority approved raceway system.
 7. Cables shall not be supported from ductwork, piping, plumbing systems, ceiling tile and lighting fixture suspension wires.
 8. Low voltage open wiring shall not be routed in or through data / telecommunication or other cabling raceways, conduits, cable trays, sleeves, etc. The Contractor shall provide a dedicated raceway system for this system installation unless noted otherwise.
 9. All cables must be free of tension at both ends as well as over the entire length of the run.
- T. Contractor shall assure that during and upon completion of the installation, all cables are free of kinks, sharp bends, twists, gouges, cuts or any other physical damage.
- U. Cables and wiring routed through open ceiling commercial / industrial spaces shall be routed in conduits, enclosed wire way or cable tray, unless noted otherwise.
- V. Cables routed above non-accessible ceiling areas, or in open areas subject to abuse, shall be enclosed in full conduit or other Orange County Transportation Authority approved raceway system.
- W. Each fiber optic cable shall have service loops of not less than three meters in length at each end.
1. The service loops shall be housed in a service loop enclosure.
 2. Service loops of at least 1 meter in length shall be provided for each fiber optic cable at all hand holes, and manholes.
- X. Each fiber optic cable shall have terminating connectors shall be as specified.
1. All fibers at each end of the cable shall have jumpers or pigtails installed of not less than 1 meter in length.
 2. All fibers at both ends of the cable shall have connectors installed on the jumpers.

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3. The mated pair loss, without rotational optimization shall not exceed 1.5 dB.
 4. The pull strength between the connector and the attached fiber shall not be less than 25 pounds.
- Y. Fiber optic equipment shall be located throughout the site as needed to communicate between the field equipment and the site wide network switch and subsequently to the security operation center – security video surveillance system. The fiber optic systems provided shall transmit analog and digital signals as required by the equipment producing the signals.
1. Electronic signals from the receivers shall meet applicable signal standards and shall be the same as the electronic signals applied to the transmitters.
- Z. Provide and perform all testing and adjustment of the completed fiber optic system. Provide all personnel, equipment, instrumentation, and supplies necessary to perform all testing.
1. Written notification of planned testing shall be provided to the Orange County Transportation Authority at least 14 days prior to the test, and in no case shall the proceed begin until the Contractor has received written approval from the Orange County Transportation Authority in respect to the submitted test procedures.
 2. The Orange County Transportation Authority must witness all site testing. Written permission shall be submitted and obtained from the Orange County Transportation Authority before proceeding with the next phase of testing. Original copies of all data produced during performance verification and endurance testing shall be turned over to the Orange County Transportation Authority at the conclusion of each phase of testing prior to Orange County Transportation Authority issuing an approval of the test procedure witnessed.
 3. Pre-delivery Testing: Prior to shipment of the given optic cable, 100 percent of the fibers shall be tested with an optical time domain reflectometer within the required nanometer wavelength band.
 - a. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum.
 - b. Copies of the original trace logs and a summary shall be furnished to the Orange County Transportation Authority.
- AA. The Contractor shall verify the complete operation of the data transmission system during the Contractor field testing. Tests shall be performed on 100 percent of the fibers of each circuit and repeated from the opposite end of each circuit. Field tests shall include as a minimum:
1. An optical time domain reflectometer test within the required nanometer wavelength band, of the fiber optic cable on the reel prior to installation.
 - a. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum.
 - b. Photographs of the traces shall be furnished to the Orange County Transportation Authority for each circuit upon request.

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2. An optical time domain reflectometer test within the required nanometers wavelength band shall be performed on the fiber optic cable after it is installed.
 - a. The optical time domain reflectometer shall be calibrated to show anomalies of 0.2 dB as a minimum.
 - b. Photographs of the traces shall be furnished to the Orange County Transportation Authority for each circuit upon request.
3. If the optical time domain reflectometer test results are unsatisfactory, unsatisfactory segments of cable shall be replaced with a new segment of cable at no cost to the Orange County Transportation Authority. The new segment of cable shall then be tested to demonstrate acceptability.
4. Power attenuation test shall be performed at the light wavelength of the transmitter to be used on the circuit being tested.
 - a. The flux shall be measured at the fiber optic receiver end and shall be compared to the flux injected at the transmitter end.
 - b. There shall be a jumper added at each end of the circuit under test so that end connector loss shall be validated.
 - c. Rotational optimization of the connectors shall not be permitted.
 - d. The circuit loss shall not exceed the calculated circuit loss by more than 2 dB.
 - e. If the test is unsatisfactory, the circuit shall be examined to determine the problem. The Orange County Transportation Authority shall be notified of the problem and what procedures the Contractor proposes to eliminate the problem.
 - f. The Contractor shall prepare a report documenting the results of the test.
5. The Contractor shall perform a continuous 24-hour bit error rate test on all digital circuits.
 - a. The bit error rate shall be not exceed 1 bit in error out of each 1,000,000 bits sent for the test period.
 - b. Analog data circuits shall be tested using a signal conforming to EIA-170.
 - c. The signal at the fiber optic analog receiver output shall be analyzed on a waveform monitor or automated test set, shall be stable, and shall be as described in EIA-170.
 - d. If the test is unsatisfactory, the circuit shall be examined to determine the problem. The Orange County Transportation Authority shall be notified of the problem and what procedures the Contractor proposes to eliminate the problem.
6. The fiber optic system shall be subjected to a performance verification test and endurance test. The following tests will be performed to ensure that the cable is installed correctly:

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- a. Wire Map
 - b. Length
 - c. Insertion loss (Attenuation)
 - d. NEXT loss (Near-End Crosstalk)
 - e. PSNEXT loss (Power Sum Near-End Crosstalk)
 - f. ELFEXT loss
 - g. PSELFEXT loss (Power Sum Equal Level Far-End Crosstalk)
 - h. Return loss
 - i. ACR (Attenuation to Crosstalk Ratio)
 - j. PSACR (Power Sum Version of ACR)
 - k. 1Propagation Delay
 - l. Delay Skew
 7. The Contractor shall prepare a report documenting the results of the tests.
- AB. The fiber optic cable shall have all glass and fiber optic waveguides as conductors.
1. The cable shall contain fiber optic conductors as needed for each fiber optic circuit.
 2. Fiber conductors shall be color coded.
 3. Optical fiber shall be coated with a cladding material which is concentric with the core.
 4. Each fiber shall be protected by a protective tube, a jacketed, nonmetallic strength member, and an exterior jacket.
 5. Fiber Cable shall be from the same manufacturer, or the same type, and of the same size.
 6. Each fiber shall be continuous with no splices.
 7. Fiber optic cable shall be certified to meet all of EIA-455 and comply with the NEC.
 - a. Cable installed in plenums or air handling spaces shall meet UL 910 and shall be marked OFNP in accordance with the NEC.
 8. Riser cable shall meet UL 1666 and be marked OFNR in accordance with the NEC.
 9. Cable components shall be able to withstand the environment the cable is installed in for a minimum of twenty (20) years.
 10. Mechanical stress present in the cable shall not be transmitted to the optical fibers.
 11. Fiber optic cable shall use loose tube construction and/or tight tube construction unless otherwise specified.
 - a. Loose Tube construction shall:

- 1) Optical fibers shall be surrounded by a tube buffer, be contained in a channel, or otherwise loosely packaged to provide clearance between the fibers and the inside of the container to allow for thermal expansion without constraining the conductor.
 - 2) The protective container shall be extruded from a material having a coefficient of friction sufficiently low to allow the fiber free movement.
 - 3) Loose tube cable may have multiple conductors in a single tube buffer.
- b. Tight Tube Construction shall:
 - 1) Optical fibers shall be covered in near contact with an extrusion tube and shall have an intermediate soft buffer to allow for thermal expansion and minor pressures.
12. All protective coverings in a single length of cable shall be continuous and of the same material.
 - a. Protective coverings shall be free from holes, splits, blisters, and other imperfections.
 - b. Covering shall be flame retardant, moisture resistant, non-nutrient to fungus, ultraviolet light resistant, nontoxic, and electrically nonconductive.
13. Electrically nonconductive flooding compound shall be applied into the interior of the fiber tubes, into the interstitial spaces between the tubes, to the core covering, over the core covering, and between any un-bonded surfaces of the armor and jacket of cable to be installed aerially, underground, and in locations susceptible to moisture unless otherwise specified.
14. Strength members shall be an integral part of the cable construction.
 - a. Combined strength of all the strength members shall be sufficient to support the stress of installation and to protect the cable in service.
 - b. Strength member shall be nonmetallic.
15. The cable outer jacket shall be continuous, smooth, and free from holes, splits, blisters, and other imperfections.
 - a. Jacket shall be flame retardant, moisture resistant, non-nutrient to fungus, ultraviolet light resistant, nontoxic, and electrically nonconductive.
16. Tensile Strength:
 - a. Cables of Twelve (12) fibers or less shall withstand an installation tensile load of not less than 1300 Newtons and not less than 300 Newtons continuous tensile load.

- b. Cables with more than twelve (12) fibers shall withstand an installation load of not less than 2700 Newtons and a long term tensile load of not less than 600 Newtons.
- 17. The cable shall withstand an impact of 3 Newton-meters as a minimum, and shall have a crush resistance of 220 Newtons per square centimeter as a minimum.
- 18. Underground cable, including cable installed in conduits or duct banks, shall contain an additional moisture barrier in the form of a flooding compound.
- 19. The fiber optic cable shall be shipped on reels in lengths as specified with a minimum coverage of 10 percent.
 - a. The radius of the reel drum shall not be smaller than the minimum bend radius of the cable.
 - b. The cable shall be wound on the reel so that unwinding can be done without kinking the cable.
 - c. Two (2) meters of cable at both ends of the cable shall be accessible for testing.
 - d. Each reel shall have a permanent label attached showing length, cable identification number, cable size, cable type, attenuation, bandwidth, and date of manufacture.
 - e. Labels shall be water resistant and the writing on the labels shall be indelible.
- AC. Fiber Optic Connectors:
 - 1. All optical fiber cables shall be properly installed and terminated with the appropriate mating connectors.
 - a. Connector shall have strain relief boot.
 - 2. The optical fiber and associated hardware supplied shall be matched for operational requirements of the hardware.
 - 3. All optical connectors must be cleaned in accordance with the optical connector manufacturer instructions and shall be covered with dust caps until the cable connectors are installed.
 - 4. The fiber optical link shall be tested to ensure the link budget (+3 dB safety margin) does not exceed the optical power budget.
- AD. Splice Enclosures:
 - 1. Splice enclosures shall protect the spliced fibers from moisture and physical damage. The splice closure shall provide strain relief for the cable and the fibers at the splice points.

3.05 FIRE STOP SYSTEMS

- A. All penetrations through fire rated building structures, walls and floors shall be sealed with an appropriate fire stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one

side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire stopped.

- B. Fire stop systems shall be UL Classified to ASTM E8 14 (UL 1479). A drawing showing the proposed fire stopped system shall be provided to the Contracting Officer prior to installing the fire stop system(s).
- C. All fire stop systems shall be installed in accordance with the manufacturer recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.06 ELECTRICAL AC POWER

- A. Contractor shall supply and provide dedicated 20 Amp, 120 VAC power at security locations for connection as required.
- B. All VSS components require a clean, centralized and independent power circuit of 120 VAC. Supply circuit shall be indicated in the breaker panel.
 - 1. The power outlets shall be provided with a clean and independent power circuit with an isolated ground circuit. The circuit breakers for these outlets will be in a secure location in a locked electrical panel.
 - 2. All source voltage shall be conditioned to protect from environmental conditions, power surge, power sag, under-voltage, over-voltage, line noise, frequency (variation of the waveform), transients and harmonic distortion.
 - 3. Surge Protection will be required for each circuit to the VSS system. The circuit breakers adequate for the system load shall not draw over 80% of the rated capacity under normal operating conditions.
 - 4. Power quality shall be measured using a power quality analyzer.
- C. The Contractor shall furnish and install one AC power panel with a single switch to control all AC power distribution throughout the central equipment cabinets. The central equipment enclosure AC power distribution system shall provide electrical outlets, appropriately spaced, to accommodate the AC power cords of each mounted item of equipment.
 - 1. A minimum of four spare AC outlets shall be provided in each equipment enclosure.
 - 2. "Cube-tap" adapters to combine component AC cords into a single outlet, is not allowed.
- D. The system 120 VAC power supplies shall be connected to a separate dedicated branch circuit, maximum 20 amperes.
 - 1. This circuit shall be labeled at the main power distribution panel as the associated security sub system.
 - 2. Security 120 VAC primary power wiring shall be a minimum of 12 AWG.
 - 3. The control panel cabinet shall be grounded securely to a suitable ground.

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- E. All 120 VAC electrical circuits shall conform to the requirements of the national electrical code except the circuits shall be a minimum of 12 AWG Copper, 600 VAC, THHN / THWN insulated conductors. Provide separate 12 AWG copper equipment ground conductor for each circuit.
 - 1. The Contractor shall provide system grounds that shall be made of 12 AWG green copper conductors (THHN / THWN or an approved equivalent), which shall be connected to an approved ground. All grounding circuits shall have a total resistance no greater than 0.12 ohms.
 - 2. Ensure positive grounding throughout the system to include all conduit, mounting boxes, junction boxes, panels, etc.
- F. Contractor shall provide all the interconnections between powered junction boxes and the equipment.
- G. The Contractor shall furnish and install a separate AC power branch circuit in conduit to each equipment enclosure from any available designated Orange County Transportation Authority Emergency AC Power Panel in accordance with the national electrical code. The Contractor shall furnish and install all circuit breakers, conduit and outlet boxes. AC power wires shall be run separate from signal wires and cables.
- H. Requirements for additional AC power or AC locations shall be included in the project as required to support equipment and systems provided.
- I. The Contractor shall be responsible for providing all low voltage power supplies required for powering the security video surveillance system and all associated devices.
- J. In the event of power interruption or loss, all security video panels, power supplies, system equipment and devices shall be continuously provided with backup power through internally charged and monitored batteries and / or connections to a dedicated / uninterruptible power supply system. If the location has available emergency generator support the Contractor shall provide at a minimum a one (1) hour switchover local uninterruptible power supplies to ensure uniformed power transition between the primary and generator power switchover process.
- K. Primary power for the system shall be configured to switch to emergency backup sources automatically if interrupted without degradation of any critical system function. All equipment shall be connected to the Orange County Transportation Authority emergency AC power distribution system.
- L. Failure of any on-line battery shall be detected and reported as a fault condition. Provide an interface (dry contact closure) between security system and the uninterruptible power system to ensure that any uninterruptible power system trouble signals and main power failures appear at the security operations center monitoring workstations as a service alarm event.
- M. All equipment shall have a battery back-up source of power that will provide a minimum of 24 hours of run time in the event of a loss of primary power to the security systems until a backup generator comes on-line.

3.07 LIGHTNING, POWER SURGES AND GROUNDING

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- A. The Contractor shall observe all system and component grounding requirements as specified by the equipment manufacturers. Grounding requirements shall be as follows:
 - 1. The Contractor shall ground all provided equipment in accordance with the NEC and manufacturer's minimum requirements to eliminate all shock hazards and to minimize all ground loops, common mode returns, noise pickup, crosstalk, or other interferences.
 - 2. All systems grounds shall be made of 12 AWG green solid copper conductors (THHN / THWN or equivalent), which shall be connected to an approved ground clamp.
 - 3. Grounding circuits shall have a total resistance no greater than 0.12 ohms.
- B. All cables and conductors extending beyond building perimeter, except fiber optic cables, which serve as communication, control, or signal lines shall be protected against Transient Voltage Surges and shall have transient voltage surge suppression protection that is UL listed in accordance with Standard 497B installed at each end.
- C. The Contractor shall install and use surge suppression, grounding and bonding that shall effectively protect within tested limits, the systems to which applied against lightning transients, internal and external switching transients, and other surge transients throughout the useful life of the system.
 - 1. Lightning and surge suppression shall be a multi-strike variety and include a fault indicator.
 - 2. Protection shall be furnished at the equipment and additional solid state surge protectors, rated for the application, on each wire line circuit shall be installed within three (3) feet of the building cable entrance. The inputs and outputs shall be tested in both normal and common mode using the following wave forms:
 - a. A 10 microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and peak current of 60 amperes.
 - b. An 8 microsecond rise time by 20 microsecond pulse width waveform with a peak voltage of 1000 volts and peak current of 500 amperes.
 - 3. The surge suppression device shall not attenuate or reduce the signal or sync signal under normal conditions.
 - 4. Glass fuses and relays shall not be used as a means of surge protection.
- D. The Contractor shall provide proper grounding and surge suppression as required by local jurisdiction and prevailing codes and standards, referenced in this document.
 - 1. The Contractor shall provide requirements for grounding locations and sizes of grounding conductors and grounding buses in components, electrical, data, and communication equipment as required.
 - 2. All head end controller equipment and power supplies shall be connected to earth ground via internal building wiring.

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3. AC power receptacles shall not to be used as a ground reference point.
4. Any cable that is shielded shall require a ground in accordance with the best practices of the trade and manufactures installation instructions.
5. Complete data for each suppressor type indicating conductor sizes, types, connection configuration lead lengths and all appropriate dimensions.
6. Dimensions for each suppressor type indicating mounting dimensions and required accessory hardware.
7. Certified test data from an independent testing laboratory indicating the ability of the product to meet or exceed all requirements of this specification.
8. Drawings shall be provided indicating suppressor mounting and lead length configuration.
9. Grounding shall include, but is not limited to:
 - a. Communications Cable Shields
 - b. Control Cable Shields
 - c. Data Cable Shields
 - d. Equipment Racks
 - e. Equipment Cabinets / Enclosures / Consoles
 - f. Conduits / Cable Trays / Raceways
 - g. Cable Duct blocks
 - h. Power Panels
 - i. Connector Panels
- E. Due to the large number of variations possible in grounding systems, it shall be the responsibility of the Contractor to follow good engineering practices and the specifications outlined by each of the component manufacturers.
- F. Lightning protection shall be provided for all devices. Either surge protectors or a lightning grid may be utilized. The use of fuses and circuit breakers as a means of lightning protection shall not be allowed.
- G. Transient voltage surge suppression:
 1. Main service and distribution equipment transient voltage surge suppressors: AC voltage surge protective devices shall be high speed, high current devices designed to protect electrical systems and electronic equipment from transient over-voltage events. Surge protective devices shall provide continuous protection, and automatically reset. The surge protective devices shall utilize metal oxide varistor or greater technology. Surge protective devices shall suppress at a minimum of 125% of the nominal operating voltage of the protected circuit. The surge protective devices shall be installed in parallel with the service main disconnect, distribution or branch panel main lugs as applicable. Surge protective devices shall be connected to over current protection sized as indicated in installation instructions, with an AIC rating equal to panel rating. The suppressor shall have a status indicator light and a dry contact output relay (Form C, SPDT) for remote

failure monitoring capabilities. Suppressors may be assembled as modular units for service entrance panels to permit quick, easy replacement of failed components. Distribution and branch panel suppressors may be of modular or non-modular design. Main service suppressors shall be provided with an integral fused disconnect switch or dedicated circuit breaker as shown or required by UL. Breakers and suppressors shall have an AIC fault withstand rating equal or greater than the AIC rating of the equipment to which it is connected. Wiring lengths to the surge protective devices from the tap at the service conductors shall be the minimum length possible for the location, to maintain the surge protective devices maximum voltage protection level. Suppressors may be installed within switchgear or panel boards where UL label or listing is not affected, suppressors are accessible, indicator lights are visible and monitoring contacts can be accessed.

- a. Maximum Surge Current
 - 1) AC service entrance greater than 200,000 Amps / Phase
 - 2) AC distribution and sub panels greater than 50,000 Amps / Phase
 - 3) Low voltage system controllers greater than 18.6 Amps
 - b. Response less than 5 nanoseconds
 - c. Maximum Continuous Overvoltage: 125 percent minimum
 - d. Limited Lifetime Warranty
2. Communication Lines: The following standard for separately mounted telephone and signal line suppressors shall apply. All protectors shall be securely mounted at protected equipment location. All suppressors shall provide common L-G mode protection on all lines. Suppressors shall be tested in accordance with IEEE C62.36-1994 as a minimum. Protective interfacing with the telephone wire pairs shall be listed to UL 497A.
- a. Multi stage protection design
 - b. Surge Current capacity: minimum of 9,000 Amps
 - c. Clamp voltage: 130 Vrms
 - d. Auto reset current protection not to exceed 150mA
 - e. fail-short / fail safe mode
3. Network Data Protection: Solid state, silicon avalanche diode components shall be the main protection technology utilized. Interfaces shall be RJ-45, or 110 punch block connectors. The surge protective devices shall have a verified data transmission rate, without attenuation, of CAT6 or greater speed minimum. The maximum clamp voltage of the surge protective devices shall be no greater than 6.8 Volts on a 5-volt circuit.
- a. Multi stage protection design
 - b. Surge Current capacity: minimum of 268 Amps per port
 - c. Clamp voltage: 130 Vrms
 - d. Support Gigabit Ethernet

- e. Insertion loss: no greater than .05dB
- 4. Power Over Ethernet (PoE) / Mid Span: Solid state, silicon avalanche diode components shall be the main protection technology utilized. RJ45 modular jacks shall be the connection method used. Connector pinouts shall conform to a minimum IEEE 802.3at for power distribution pairs and data transmission pairs. The maximum clamp voltage of the surge protective devices on the power transmission pairs shall be no higher than 72 Volts. The maximum clamp voltage of the data transmission pairs shall be no higher than 28.4 Volts. The surge protective devices shall have a verified data transmission rate, without attenuation, of CAT6 or greater speed minimum.
- 5. Data Line Protection: Solid state, silicon avalanche diode circuitry for protection from over voltages shall be provided on long cable runs employing standard RS-232, RS422, or RS485 data.
- 6. Signal Line Protection: Solid state, silicon avalanche diode, metal oxide varistor, and / or gas discharge tube technologies may be used. Hybrid circuitry for protection from over voltages on 2 or 4 wire signal lines such as balanced pair telephone, metallic pair telephone, buried and overhead field cable, remote radio equipment, and control systems.
- 7. Modular, Twisted Pair Protection: Solid state, silicon avalanche diode or metal oxide varistor circuitry for protection from over voltages on twisted pair data or audio lines. Protectors shall clip mount on 66 punch down blocks furnished with grounding bar or studs and shall be totally enclosed. Units shall be securely mounted at terminal locations where shown and shall be grounded to the main building ground with a minimum No.12 stranded copper green insulated ground conductor kept as short as possible. Ground terminals shall be screw insertion lug type. No crimp, fork or ring type shall be permitted.
- 8. "Self-Sacrifice" Suppressors shall be installed on control panel relays. These capture transients shall protect the control panel form C relays from any surge damage and shall meet the following criteria:
 - a. Maximum Energy Dissipation: 1500 Watts
 - b. Maximum Surge Current 18.6 Amps
 - c. Continuous Current: Unlimited (parallel connection)
 - d. MCOV: 45VDC
 - e. Service Voltage: 24VAC
 - f. Limited Lifetime Warranty
- 9. Coaxial Cable Protectors: Solid state, silicon avalanche diode, metal oxide varistor and / or gas tube circuitry for non-interrupting over voltage protection of coaxial cable. Unit shall be provided with one female input connector and one female output connector. Securely mount adjacent to protection equipment and ground to equipment or local building ground.

3.08 PROJECT RECORD DOCUMENTS

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- A. The Contractor shall provide complete systems documentation at acceptance time, as specified herein. The Contractor shall acknowledge that any and all of the sections of security management system is sensitive unclassified and proprietary to the Orange County Transportation Authority. The Contractor agrees to use more than reasonable efforts to protect the information from unauthorized disclosure, use or release. The Contractor shall not, without prior written consent from the authorized representative of the Orange County Transportation Authority, disclose or otherwise make available the information, in any form, to any person, except to the appointed representative of the Orange County Transportation Authority and only to authorized list of employees and / or appointed agents. The Orange County Transportation Authority reserves the right to have the Contractor release all the original documentation and destroy all copies of any and all of the security management system to include all sections or sub sections related in any aspect to this project and its location.
- B. Recognizing the confidential nature of the information associated with this work, the Contractor is forbidden to take any photographs on this property without prior written consent from the Orange County Transportation Authority or their authorized representative.
- C. All transmissions of information related to the projects floor plans, or any details pertaining to the system shall be delivered in person or exclusively sent via registered mail, FedEx, UPS, or similar controlled courier service.
- D. All Contractors shall acknowledge that work performed on this project location may require escorted access. The Orange County Transportation Authority or their authorized representatives, at their sole choice and discretion, may require escorted access for any portions of this project.
- E. The Contractor shall provide complete systems documentation at acceptance time, as specified herein. Documentation shall be provided in two sets (2) unless specified otherwise by the Orange County Transportation Authority or their authorized representatives. Documentation provided shall include the following minimum items:
 - 1. Record Drawings interconnection wiring diagrams, or wire lists, of the complete field installed system with complete, properly identified, ordering number of each system component and device.
 - 2. Upon completion of installation, the Contractor shall prepare "As-Built" drawings of the system. These "As-Built" shall be 30 in. x 42 in. (76 cm x 107 cm) format Mylar reproducible drawings of each floor plan indicating exact device locations, panel terminations, cable routes and wire numbers as tagged and color-coded on the cable tag. Additionally, final point-to-point wiring diagrams of each type of device (30 in. x 42 in. format) shall be included in the "As-Built."
 - 3. "As-Built" shall be submitted to the Orange County Transportation Authority for approval prior to the system acceptance walk-through.
 - 4. Quantity of two (2) electronic master maintenance & operation technical reference library.
 - a. The electronic compact recordable CD-R (read only) media shall be 1.2 mm thick and made of polycarbonate with an outside diameter of 4.75" (120mm) that shall have a storage capacity minimum of 650

MB of data. The polycarbonate CD-R disc shall contain a spiral groove to guide the laser beam upon writing and reading information. The CD-R disc shall be coated on the side with the spiral groove with a very thin layer of organic dye and subsequently with a thin, reflecting layer of silver, a silver alloy or gold. Finally, a protective coating of a photo-polymerizable lacquer shall be present on the top of the metal reflector and provided UV-light protection.

- 1) The CD-R provided shall adhere to the International Standard (ISO/IEC 10149).
 - b. Provided all system documentation and datasheets in a universal Microsoft™ operating system platform. The programs shall utilized shall be supported on a standard IBM software based format such as Microsoft Word™, Excel™, Access™, BIM™, Revit™, Adobe™, and AutoCAD™.
 - c. CD-R including the system schematics drawings in AutoCAD™ 2004 or greater format.
 - d. The Contractor shall remove all forms of documentation passwords and electronic protection measures.
5. At the discretion of the Orange County Transportation Authority the Contractor can be required in conjunction with AutoCAD™ to provide BIM and / or Revit version of the submitted drawings.
 6. All system software shall be installed, programmed and tested for the complete and proper operation of systems involved. All software licenses shall be assigned and released to the designated authorized agent as dictated by Orange County Transportation Authority. Any release of security related software, user codes, PIN's, card information, programming codes, installer codes, or other similar sensitive security information shall require written proof of transference prior to the final acceptance inspection. The Contractor shall request in a written form to Orange County Transportation Authority to request for the authorized agents that are appointed to accept and receive sensitive security information.
- F. Provide Operation Manuals for use by operating personnel which shall fully explains all procedures and instructions for the operation of each system provided.
1. Provide a Title Page, followed by a typewritten Table of Contents. The manual shall be arranged systematically and include an alpha title of each system included.
 2. Separate systems with alpha description tab separators, for each system, clearly explaining the function of the system described, including any drawings as required to plainly show the location of devices within the system.
 3. Standard manufacturer instruction or operation manuals are acceptable; however, any specific changes to any aspect of the system to conform to the project requirements shall be clearly identified.
 4. Include clear operating instructions for all features and functions of the system described.

5. Manual shall include a listing of any special comments.
- G. Provide Maintenance Manuals for use by service personnel which shall fully explains all procedures and instructions for the maintenance and service requirements of each system provided.
 1. Provide a Title Page, followed by a typewritten Table of Contents. The manual shall be arranged systematically and include an alpha title of each system included.
 2. Separate systems with alpha description tab separators, for each system, clearly explaining the function of the system described, including any drawings as required to plainly showing the location of devices within the system.
 3. Provide detailed information on maintenance procedures for all hardware provided.
 4. Provide detailed information on all software systems included with start-up procedures and system configuration, data base maintenance and reinstallation.
 5. Manual shall include a listing of any special comments.
 6. Standard manufacturer instruction or operation manuals are acceptable; however, any specific changes to any aspect of the system to conform to the project requirements shall be clearly identified.
 7. Include clear operating instructions for all features and functions of the system described.
- H. Publish Quality Bond Color Graphical Map: Based on final As-Built CAD Record Drawings develop a full sized (30" x 42" or greater) framed color map set with legends showing locations of all alarms and field devices. The graphical map of all alarm points installed are required to be reflected on the provided maps and delivered with the completed system documentation. The graphic map shall have sufficient level of detail for the system operator to assess the location of the alarm devices. The Contractor shall supply hard copy, color examples, of each type of graphic to be used for the completed security management system. The graphics examples shall be delivered to the Orange County Transportation Authority for review and approval at least 30 days prior to the scheduled need date.

3.09 TRAINING

- A. Furnish the services of a factory certified training instructor for a minimum of two (2) eight (8) hour periods of onsite training to instruct the Orange County Transportation Authority maintenance personnel. Instruction shall include corrective and preventive maintenance of the equipment. Training will be scheduled at the convenience of the Orange County Transportation Authority Contracting Officer at any time during the guarantee period services.
- B. Furnish with the factory certified training instructor a representative of the manufacturer, familiar with the functions and operation of the equipment, for a minimum of two (2) eight (8) hour periods to train personnel. Instructions shall be provided for staff personnel in each area where the new system is installed under

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this contract. When multiple areas are involved, classes will be grouped. Periods of training shall be coordinated with the Orange County Transportation Authority to ensure all shifts receive the required training. Each session shall include instructions utilizing "hands-on" operation of the equipment.

- C. All training shall be scheduled and the Orange County Transportation Authority shall be notified of this schedule on a timely basis.
- D. The maintenance and operational training shall take place in a formal classroom agreed upon by the Orange County Transportation Authority.
- E. Instruction material shall be provided by the Contractor, which shall allow the Orange County Transportation Authority operating personnel to train additional personnel at a later date.
- F. During the regular workweek, and prior to the equipment being accepted and turned over to the Orange County Transportation Authority for regular operation, the Orange County Transportation Authority shall designate personnel to receive instruction in the operation and use of the systems listed above.
- G. Training sessions shall be provided to train personnel in all aspects of operation of these systems.
 - 1. Operator level - provides training at the operator level and covers system configuration and general operating procedures.
 - 2. All operators training shall be scheduled in coordination with the installation work and prior to the equipment being accepted and turned over to the Orange County Transportation Authority for regular operation.
 - 3. The operator training shall cover all of the systems.
- H. Training sessions shall be provided for the maintenance and basic repair of the provided systems.
 - 1. Maintenance Training provides training for day-to-day maintenance of the provided systems and basic repairs.
 - 2. All maintenance training shall be scheduled in coordination with the installation work.
 - 3. The maintenance training shall cover all of the systems.
- I. Factory certified training instructors shall be employed wherever feasible and available.
- J. During the course of installation, additional persons may be designated by the Orange County Transportation Authority for receiving basic systems maintenance training. The Contractor shall train these persons on the proper maintenance of all systems.
- K. All references herein to any training in these sections are to be considered an accumulative total of hours required to train personnel in all systems.
- L. Where significant changes or modifications are made under the terms of the warranty, additional instructions shall be provided, as may be necessary, to acquaint the operating personnel of the changes or modifications.

- M. All testing and training shall be compliant with the Orange County Transportation Authority requirements.

3.10 FIELD QUALITY ASSURANCE

- A. System Pretest:
1. The Contractor shall not apply power to the system until the following items have been completed:
 - a. System equipment has been set up in accordance with each manufacturer and Orange County Transportation Authority instructions.
 - b. A visual inspection of the system has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
 - c. System wiring has been tested and verified as correctly connected as indicated.
 - d. All system grounding and transient protection systems have been verified as properly installed and connected as indicated.
 - e. Power supplies to be connected to the system have been verified as the correct voltage, phasing, and frequency as indicated.
 2. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as a result of Contractor work / equipment.
 3. Upon completing installation of the entire system the Contractor shall align and balance the system and perform complete system pre-testing.
 - a. After pre-testing and only after pre-testing, the system shall be formally tested in the presence of an Orange County Transportation Authority representative.
 4. During the system pretest, the Contractor shall verify that the system is installed properly, is fully operational and meets all the system performance requirements of the section.
 5. The Contractor shall program configurations, shifts, schedules, exceptions, dwells and delays into the security system database.
 - a. The Contractor is responsible for participating in all meetings with the Orange County Transportation Authority or their authorized representative to compile the information needed for data entry and is responsible for programming input, output, and points.
 - b. The Contractor shall enter all data needed to make the system operational. The Contractor shall deliver the data to the Orange County Transportation Authority on data entry forms, utilizing data from the contract documents. Contractor's possession required for complete installation of the database. The Contractor shall identify and request from the Orange County Transportation Authority any

additional data needed to provide a complete and operational system.

- c. The completed forms shall be delivered to the Orange County Transportation Authority for review and approval at least thirty (30) days prior to the Contractor's scheduled needed date.
- B. Acceptance Testing: The Contractor shall notify the Contracting Officer in writing seven (7) calendar days after the pretest has been completed and thirty (30) calendar days prior to the date final acceptance testing is expected to begin. The system shall be tested in the presence of a Orange County Transportation Authority Representative. The Contractor shall verify that the total system meets all of the requirements of the manufacturer specification and complies with all appropriate standards listed in this section.
- C. Adjustment / Alignment / Synchronization / Cleaning: Subsequent to installation, clean each system component of dust, dirt, grease, or oil incurred during installation or accrued subsequent to installation from other project activities. Prepare for system activation by following manufacturer recommended procedures for adjustment, alignment, or synchronization. Prepare each component in accordance with appropriate provisions of the component's installation, operations, and maintenance manuals.
- D. Supplemental Factory Certified Quality Control:
 1. The Contractor shall provide the services of factory certified technical engineer representative who is familiar with all components and installation procedures of the installed security system and are approved by the Orange County Transportation Authority Contracting Officer.
 2. The Contractor and the factory certified technical engineer representative will be present on the job site during the preparatory and initial phases of quality control to provide technical assistance.
 3. The Contractor and the factory certified technical engineer representative shall also be available on an as needed basis to provide assistance with follow-up phases of quality control.
 4. The Contractor and the factory certified technical engineer representative shall participate in the testing and validation of the system and shall provide certification that the system installed is fully operational as all construction document requirements have been fulfilled.

3.11 FINAL ACCEPTANCE TESTING

- A. The Contractor shall perform all tests and adjustments, furnish all test equipment necessary, and perform any work necessary to establish performance levels for the systems in accordance with the applicable Sections.
 1. A minimum of two (2) copies of all pretest results shall be furnished to the Orange County Transportation Authority for review prior to final acceptance testing.
- B. Upon successful completion of the installation and prior to the pretest, the Contractor shall conduct the minimum following tests to assure that the systems

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are correctly installed and fully operational prior to requesting a Final Acceptance Test. The scope of this work shall include, but not be limited to, the following:

1. The Contractor shall program English text descriptions for all input / output and points.
 2. The Contractor shall check all devices for proper operation.
 3. Adjust, balance and tune all equipment as required for optimum quality to meet manufacturer published performance specifications
 4. Proper documentation of the test shall show date, time and results.
- C. Upon successful completion of the pre-test verification requirements, and all the system adjustments have been completed and the system is fully operational, to include the Operation / Maintenance Manuals are ready for review. The scope of this work shall include, but not be limited to, the following:
1. The Contractor shall submit a proposed testing plan prior to scheduling of the final acceptance test. The plan must include methods and provisions for validating all functions.
 2. The Final Acceptance Test shall not be preformed or scheduled no sooner than after five (5) business days after the initial written notification.
 3. The Contractor shall provide all test equipment and technicians to assist in the Final Acceptance Test.
 4. The test equipment required shall consist of but not limited to:
 - a. Ladders and lifts as required
 - b. Flashlight
 - c. Digital voltage meter 12 VDC - 120 VAC, 20 Amp and Ohms
 - d. Battery load tester
 - e. Non-contact AC voltage detector (AC stick)
 - f. Keys to all panels
 - g. Standard trade tool set
 - h. Probe and tone tester
 - i. Telescopic Inspection Mirror
 - j. Optical Time Domain Reflectometer
 - k. Network copper and fiber certification testers / analyzer that comply with TIA/ISO standards with exportable statistic verification reports
 - l. Portable Video Test Monitor
 - m. Camera Master II™ video tester
 - n. IP Video Sniffer™
 - o. Line resolution / video bandwidth camera target
 - p. Small level indicator tool
 - q. Real-time two-way voice communication devices (RF Radio's)

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- r. Provide specific tester as identified by each the product manufacturer and / or governed by the associated industry trade practices. The testing hardware utilized shall be at the discretion of the Orange County Transportation Authority or their authorized representative performing the inspection.
- D. The Contractor shall test the entire system prior to scheduling the Orange County Transportation Authority acceptance test and shall confirm in writing to the Orange County Transportation Authority or their authorized representative that all aspects of the system have been tested by the Contractor and found to be fully operational and ready for final testing.
- E. The Final Acceptance Test shall consist of the following:
 - 1. Acceptance shall be given after successful demonstration of all system operations and the receipt of approved record documentation and manuals.
 - 2. The operation of each system and related equipment shall be demonstrated to the Orange County Transportation Authority by the Contractor.
 - 3. All systems shall be inspected for operation, placement, conformance, identification, installation, and code compliance.
 - 4. All systems shall be tested for performance, operation, function, and descriptions.
 - 5. All software and firmware programming shall be reviewed, tested and inspected.
 - 6. All Redline drawings shall be present during the onsite physical inspection phase.
 - 7. Any systems integration or interconnections shall be reviewed, tested and inspected.
 - 8. All systems or devices that provide any notification output shall have additional testing for response time, audibility, output message, clarity, and related instructions.
- F. In the event further adjustment is required or defective equipment is to be repaired or replaced, tests shall be suspended or continued at the option of the Orange County Transportation Authority or their authorized representative. The Contractor shall have personnel available at the job site to make adjustments and repairs during the Final Acceptance Tests.
- G. The Final Acceptance Test shall be preformed concurrent for all security management systems and shall be performed during a single site visit.
 - 1. Any independent Contractor of sub systems of the security management systems shall be inspected concurrently with the Final Acceptance Testing procedures.
- H. In the event more than one Final Acceptance Test is required and at the discretion of the Orange County Transportation Authority the Contractor shall reimburse the Orange County Transportation Authority for all expenses and labor incurred in conducting additional Final Acceptance Tests.

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- I. A Final Acceptance Test shall not be re-scheduled until the Contractor has made payment for the expenses and labor incurred for the additional testing process.
- J. The final payment or compensation shall not be authorized by the Orange County Transportation Authority or their authorized representative until the Contractor has successfully completed the Final Acceptance Test.
- K. The Orange County Transportation Authority or their authorized representative shall, on behalf of the Orange County Transportation Authority, shall make a determination if the Contractors system fulfills the project requirements and has completed all system operations, and has provided the appropriate record documentation and manuals.

3.12 SPARE PARTS

- A. The Contractor shall provide, as part of the contract, a reasonable supply of quantity of replacement parts as determined by the Orange County Transportation Authority for the installed system components. All the replacement (spare) parts shall be unopened and in their original packaging with all instructions and presented to the Orange County Transportation Authority representative prior to Final Acceptance Inspection.

END OF SECTION