Transbay Transit Center
San Francisco, CA
CM/GC Contract No. 08-04-CMGC-000
Project No. 30100

BID PACKAGE TG10.4
ADDENDUM # 8

DATE: 10/14/2014

TO: All Qualified Bidders

FROM: Webcor/Obayashi Joint Venture

BID DUE DATE: **October 23, 2014 at 2 p.m.**

COMMUNICATION WITH WEBCOR/OBAYASHI JOINT VENTURE

At no time during the bid process (defined as the time between issuance of the IFB until award of Subcontract to Trade Subcontractor) shall Bidders contact any person(s) or staff of the TJPA, TJPA Program Management/Program Controls (PMPC) team, Webcor/Obayashi Joint Venture, CM Oversight (CMO), or other TJPA Consultants regarding the IFB. The only contact is for submission of questions using the contact directions as described in Exhibit A, Section III. "Communication with Webcor Obayashi Joint Venture".

The QBD submission time frame expired on **Friday, September 26, 2014 at 2:00 p.m.**

Bids are due on **Thursday, October 23, 2014 at 2:00 p.m.**

Reference the Project Bidding Manual, Section III.B.1 regarding document availability and how to obtain the documents.

MODIFIED DOCUMENTS PER ADDENDUM # 8

The items listed below make up the TG10.4 – Electrical, Communications, Security and Integrated Networks Bid Package Addendum # 8. This Addendum shall supersede all previously issued Bidding Documents. All other conditions and requirements remain unchanged.

a. Exhibit A – Trade Subcontractor Bid Package Manual and Forms – Subcontracts #301001004, dated 10/14/2014.

    1) Revised Table of Contents

    2) Revised Section IV. "Scope of the Package and Bid Item Information"

    3) Revised Section VII. "Contract Document List"

    4) Revised Attachment 1 "Bid Form and Schedule of Bid Prices"

b. Exhibit F – BIM Requirements, dated 10/14/2014

c. Exhibit I – Schedule, dated 10/14/2014

d. Field Order 29R1 – SFPUC IFB ES Drawings Revision 1 Plans and Specifications prepared for the Transbay Joint Powers Authority, dated 09/16/2014.

e. Questions on Bid Documents (QBD) Responses

    1) The attached IFB Questions and Answers are incorporated into the Bid Documents by this Addendum.

END OF ADDENDUM # 8

TG10.4 – Electrical, Communications, Security and Integrated Networks Construction Services

Questions are numbered in the order received. Numbers missing in the sequence will be answered in a future response set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-003	2/26/2014	TE1-2310		Please provide details for MH01 & MH02 shown on this page.	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access the response by logging into the TJPA's secure website and opening the relevant folder.*
TG10.4-006	2/26/2014		27 05 33	The product requirement for 2.1 C for connectors is compression throated, whereas the execution requirement of 3.1 B 2 is steel set screw with bushing, and further clarified in paragraph 3.1 E 2 using locknuts & bushing with no mention of throated fittings. Please clarify that the "execution" takes precedence for the use of locknuts & bushings.	Specification 27 05 33 paragraph 2.1.C.2 will be revised to read: "Electrical Metallic Tubing (EMT) and Fittings with natural finish for all conduits where exposed to wet conditions shall use compression-type fittings." Specification 27 05 33 will be reissued in a future addendum, targeted for release in April.
TG10.4-007	2/26/2014	SE1-2250		Security documents that are online for view only are not fully readable. The drawing SE1-2250 is not viewable for Take Off. Example: when zoomed in far enough to see details, the orientation cannot be verified. Please provide drawings in a format where details, location, and plan orientation can be determined for Take Off.	Drawing SE1-2250 contains Certain Sensitive Security Information that will not be provided in any other format. Our experience has been that the document is viewable and when zoomed-in the orientation is not changed. The document, when zoomed-in to provide further detail, can be scrolled up and down and left and right to show the gridline references, to determine plan location.
TG10.4-013	2/27/2014		26 05 35 & 27 05 33	Specifications for raceways are provided for Division 26 & 27 work, but none are provided for Division 28 work. Please confirm the following: 1. Spec section 26.05.35 is applicable to Division 26 work. 2. Spec section 27.05.33 is applicable to both Division 27 & 28 work.	1. Specification 26 05 35 shall apply to fire management system raceways and boxes required by Specification 28 30 02. 2. Confirmed, Specification 27 05 33 applies to Division 27 & 28 work.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-014	2/27/2014	TE-0005	27 05 26	General Note #11 on drawing TE-0005 says to "bond all technology system components such as conduits...considering code requirements and industry standards." Specification section 27.05.26 (3.7) explains which situations specifically, that conduits need to be bonded. Please confirm that specification section 27.05.26 supersedes General Note #11 on drawing TE-0005.	There does not appear to be a conflict. Bond all technology system components per the note #11; the specification states all conduits that carry station cables or have a bonding conductor in them. Bond ALL conduits that carry telecom systems.
TG10.4-015	2/27/2014		Project Bid Manual 01/08/14	For temporary toilets & sanitary facilities, we are assuming that with the physical size of the project, there will be numerous facilities located along the project's length, please confirm.	Temporary toilets and hand wash stations will be placed throughout the project and in sufficient quantities for onsite personnel.
TG10.4-016	2/27/2014		01 10 02/APA	Is TG10.4 to provide unit prices for this item?	No. TG10.4 is not involved with any item listed under Specification 01 10 20/APA.
TG10.4-017	2/27/2014		Project Bidding Manual Para. 34.b	Internet based project management paragraph states, "...may be required..." has that been implemented?	Yes. Subcontractors are granted access to Webcor/Obayashi Joint Venture (JV) internet-based CMiC for submittals. Licensing or software purchase for submittals is not required.
TG10.4-019	2/27/2014		Exhibit A	Landscape and irrigation at ground and park level 5 - trade scope delineation: Is the TG10.4 Trade Package responsible for raceway for all the landscape low voltage wiring to valves, controllers, and control outlets? If so, please provide landscape and detail drawings of the locations of the valves, control outlets, and controllers for the purpose of pricing the TG10.4 package.	No. TG10.4 is only responsible for low and line voltage upstream of landscape controllers. See TG10.4 Exhibit A Addendum #1, Section IV. Scope of the Package and Bid Item Information, Part 3. Base Bid Item Scope (page 16) for scope delineation and Addendum #1 (issued on 2/27/2014) for landscape design.
TG10.4-020	2/27/2014		Exhibit A	Utility services 4a) requires TG10.4 Electrical to include design "coordination and installation for power, telecom, and data work, including exterior..." Please provide a document list of all previously released packages for all exterior electrical, telecom, and data utility work.	There are no previously issued electrical, telecom and data utility work documents. This scope of work will be amended in a future addendum, targeted for release in April.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-021	2/27/2014		Project Labor Agreement	Is the intent of this PLA agreement to have all trade work 8 hours per day 40 hours per week, regardless of the existing Local agreement?	No, the Project Labor Agreement (PLA) does not modify current labor agreements. Please review the PLA in specification sections 00 08 06 and 00 08 06/APA found in Volume One (Div 00 and Div 01).
TG10.4-022	2/27/2014		Project Labor Agreement	Is this PLA agreement with Local 6 intent to have 8 hours per day worked and paid at 8 hours regular time, or worked 8 hours but to pay overtime for the 8th hour, per Local 6 agreement?	No, the PLA does not modify current labor agreements. Please review the PLA in specification sections 00 08 06 and 00 08 06/APA found in Volume One (Div 00 and Div 01).
TG10.4-024	2/27/2014		Exhibit A	Clean Agent Fire Protection and Suppression System TG10.5: "All low voltage (24v or less) conduit between panels, detectors...etc. Shall be installed by trade contractor." If TG10.4 Electrical is responsible for the raceway system for all fire suppression controls and devices, please provide detail drawings for this system showing a layout of this system for pricing in the TG10.4 Electrical.	Fire Suppression is a Performance Based scope of work pending engineered detailing by a future TG10.5 Trade Subcontractor. There is no other information beyond that already issued within the bid documents. See the P1 & A1 drawings and specifications for general scope of work.
TG10.4-026	2/27/2014		Project Labor Agreement	Please provide all schedule and labor rates that are applicable to the Transbay project as referenced in the PLA and Schedule A.	It is the contractor's responsibility to determine current local union labor rates applicable under the PLA.
TG10.4-027	2/27/2014	TE1-1000 & TE1-8012		Is the work shown coming off of Beale Street for reference only and being provided in the Concrete Superstructure TG06? If not, what portion of this work is by TG10.4 and what portion will be by others?	Yes. Cast-in-place vaults will be done by others.
TG10.4-028	2/27/2014	E1-4303A Detail 1	01 10 30/APD	Drawing E1-4303A is identified as an Alternate both in the title block and based on the drawing number itself. However, drawing E1-4303A does not appear in the Schedule of Alternates for MEP/TE/SE & VT (Specification section 01.10.30/APD). Please identify which alternate E1-4303A is to be associated with.	There is no alternate work on Sheet E1-4303A. Previous alternate work has been deleted. This sheet should be deleted from the MEP/TE/SE & VT packages (i.e., TG07.5, TG10.2–10.5, and TG14.1) in a future addendum, targeted for release in April.
TG10.4-029	2/27/2014	E1-0062, E1-0063 & E1-4303 Fixture Schedule	26 06 50.16	"Numbered Note" 7 on drawing E1-4303 provides direction to connect the Type "A2" fixtures to dimmer panel DMH-1-A-1 in Electric Room 01324. No Type "A2" fixtures are shown on drawing E1-4303 and no Type "A2" fixtures are listed on the Fixture Schedule (E1-0062 & E1-0063). Please identify the quantity, location, and specs for fixture Type "A2"	Reference drawing E1-4303: 1. See design documents for the quantity of fixtures. 2. A2 fixtures are shown in Shaw Alley Public Lobby 01320 area between gridlines 8-9.9/ C-F.7. 3. Specifications for the fixture type A2 (Art element light fixture) will be provided in a future trade package.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-031	2/27/2014	E1-4304A Detail 1	01 10 30/APD D.1 26 00 00	Drawing E1-4304A is identified as an Alternate both in the title block and based on the drawing number itself. However, drawing E1-4304A does not appear in the Schedule of Alternates for MEP/TE/SE & VT (Specification section 01.10.30/APD). Please identify which alternate E1-4304A is to be associated with. Please identify the difference between E1-4304A & E1-4304.	There is no alternate work on Sheet E1-4304A. Previous alternate work has been deleted. This sheet will be deleted from the MEP/TE/SE & VT packages (i.e., TG07.5, TG10.2–10.5, and TG14.1) in a future addendum, targeted for release in April.
TG10.4-032	2/27/2014	E1-4305A	01 10 30/APD D.1 26 00 00	Drawing E1-4305A is identified as an Alternate both in the title block and based on the drawing number itself. However, drawing E1-4305A does not appear in the Schedule of Alternates for MEP/TE/SE & VT (Specification section 01.10.30/APD). Please identify which alternate E1-4305A is to be associated with. Please identify the difference between E1-4305A & E1-4305.	There is no alternate work on Sheet E1-4305A. Previous alternate work has been deleted. This sheet will be deleted from the MEP/TE/SE & VT packages (i.e., TG07.5, TG10.2–10.5, and TG14.1) in a future addendum, targeted for release in April.
TG10.4-033	2/27/2014	E1-4306A	01 10 30/APD D.1 26 00 00	Drawing E1-4306A is identified as an Alternate both in the title block and based on the drawing number itself. However, drawing E1-4306A does not appear in the Schedule of Alternates for MEP/TE/SE & VT (Specification section 01.10.30/APD). Please identify which alternate E1-4306A is to be associated with. Please identify the difference between E1-4306A & E1-4306.	There is no alternate work on Sheet E1-4306A. Previous alternate work has been deleted. This sheet will be deleted from the MEP/TE/SE & VT packages (i.e., TG07.5, TG10.2–10.5, and TG14.1) in a future addendum, targeted for release in April.
TG10.4-034	3/6/2014	General Notes & Sheet Notes, E-0006, E1-4102 thru E1-4111		Sheet Note A on TG10.4 drawings E1-4102 thru E1-4111 refer us to the General Note on TG06.0 drawing E-0006 to identify scope for future bid packages. On the same TG10.4 drawings, Sheet Note H tells us that "all fixtures are to be installed and completely wired in phase 1 work scope," and then directs us to General Note on TG06.0 drawing E-0006 as backup of this direction. Please confirm all light fixtures shown on TG10.4 drawings E1-4102 thru E1-4111 are to be installed and completely wired in phase 1 work scope of TG05.0. If not, please advise as to which Bid Package these fixtures are to be included in.	All light fixtures shown are furnished and installed by the TG10.4 Trade Subcontractor. The only exception is conduit and electrical junction boxes (EJB) within the Lower Concourse deck for F15 fixtures. All F15 conduit and associated EJBs within the deck are installed under the TG06 package with pull string for future wire installation by the TG10.4 Trade Subcontractor.
TG10.4-036	3/6/2014	E1-0062 Fixture Schedule -	26 05 08 3.4.D	The fixture schedule (E1-0062) indicates that fixture type F11 is to be "furnished as part of the escalator." Furthermore, specification	The F11 fixture is integral to the escalator handrail and will be furnished under the TG14.1 Trade Package. The Exhibit A scope will be revised

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
		Type F11	14 31 00	section 14.31.00(2.9)(G)(2) states that the Escalator Contractor is to provide the handrail LED lighting. Per specification section 26.05.08(3.4)(D) the Electrical Contractor is to provide "circuits and connections" to the escalator handrail lighting. Please confirm fixture type F11 is to be provided by the Escalator Contractor.	to reflect this revision in a future addendum, targeted for release in April.
TG10.4-037	3/6/2014	E1-0062, Fixture Schedule - Type F10, Exhibit A Pg. 15 Int & Ext Ltg (1) C		The fixture schedule (E1-0062) indicates that fixture type F10 is to be "furnished as part of stair handrail." However, page 15 of Exhibit A under Interior and Exterior lighting 1(C), states we are to furnish and install stair handrail lighting assemblies into the Metal Stair Trade Subcontractor's handrails. Subcontractor's handrails. Please confirm the type F10 fixture is to be furnished as part of the F10 fixture that is to be furnished as part of the stair handrail by the Metal Stair Trade Subcontractor.	The F10 fixture is integral to the handrail and will be furnished under the TG07.5 Trade Package. Exhibit A scope will be revised to reflect this revision in a future addendum, targeted for release in April.

TG10.4 – Electrical, Communications, Security and Integrated Networks Construction Services

Questions are numbered in the order received. Numbers missing in the sequence either were answered in a previous response set or will be answered in a future response set.

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TG10.4-002	2/26/2014		TE1-5251 & SE1-3204	The drawings represent Room B1232 but the drawings do not match scope of work or illustrate intent. Please provide room details for TE1-5251 & SE1-3204 depicting the correct scope of work for all low voltage systems.	The requested information is already present within the project drawings. Bidder should refer to SE1-2202, SE1-2250, and SE1-3204 and each sheet's associated Security notes for information on quantities and locations of the security devices for this area. SE-6000 and SE1-6001 show general connectivity information for these devices and systems provided by others as well.
TG10.4-005	2/26/2014		TE1-2310	Please provide pole and pole base details for camera poles on this page.	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such responses by logging into the TJPA's secure website and opening the relevant folder.*
TG10.4-008	2/26/2014	TE1-4205		*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder*.	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such responses by logging into the TJPA's secure website and opening the relevant folder.*
TG10.4-009	2/26/2014		Project Bidding Manual	Paragraph 2 states having to list all subcontractors over $25k, but the "SL" form states that only subcontractors in excess of one half of 1% be listed. Which requirement is to be followed for TG10.4?	Paragraph 2 on page 16 of the Project Bidding Manuel refers to the "CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS" form listed in Specification Section 00 08 13/APA, which applies to lower-tier covered transactions of $25,000 or more. The "Subcontractor List (SL)" shall include information for each subcontractor who shall perform in excess of 1/2 of 1% of the Grand Total Bid Price or $10,000, whichever is greater.
TG10.4-010	2/27/2014		TG10.4 Contract	Are the power and communication utility costs reimbursable? If not, please define scope of the utility company's costs that are to be covered by the TG10.04 contract.	See Specification Section 01 14 10/APA (Volume 1) for utility cost responsibility.

TG10.4-012	2/27/2014		26 05 35	Spec section 26.05.35 (3.4)(A)(1) says that, "All areas of the Train Platform Level and Bus Deck are to be Rigid Steel Conduit." Please confirm it is acceptable to run other conduit types in concealed locations on the Train Platform Level and Bus Deck.	No, it is not acceptable. Installation shall be per the Contract Documents.
TG10.4-018	2/27/2014		Exhibit A	"Vehicle Barriers & Bollards." Please provide all bid documents for this bid package for evaluation and determining design and construction costs for the purpose of bidding the TG10.4 package.	Bollard specifications and details were issued in Addendum 1 on 2/27/2014. Additional information will be issued in a future Addendum. Some documents are part of Sensitive Security Information (SSI); in order to receive SSI documents bidder will need to follow the procedure outlined in Specification Section 01 35 70, Document Control Procedure for Protected Information.
TG10.4-025	2/27/2014		Exhibit A	Please provide access to the complete Plumbing TG10.2, Mechanical TG10.3, and Fire Suppression TG10.5 bid packages for bidding the TG10.4 bid package.	Bidders have complete access to all TG10 Trade Packages through the TJPA website http://transbaycenter.org/tjpa/doing-business-with-the-tjpa/current-contract-opportunities
TG10.4-030	2/27/2014	E1-4303	26 06 50	"Numbered Note" 7 on drawing E1-4303 calls for a connection from fixture Type "A2" to dimming panel DMH-1-A-1. It further specifies that the lighting "in this area" is for the James Carpenter art. "Numbered Note" 7 appears to be situated on drawing E1-4303 in such a way as to be in reference to stairwell 01304. No Type "A2" fixtures are located in the stairwell. Please advise.	Numbered Note #7 reference for James Carpenter art lighting is intended for hatched area in Shaw Alley located between grid lines 8-9.9 and C-F.7 and not for Stairwell 01304.
TG10.4-035	3/6/2014	E1-4303, Detail 1		Drawing E1-4303 shows symbols denoting "Combination Camera/Occupancy Sensor Ceiling Mounted" in 8 locations. These do not show up on the Security drawings (SE1-2303) or the Comm drawings (TE1-4303). Furthermore, these are not addressed in the Sheet Notes, Numbered Notes, or details. Power is provided on the lighting drawings (E1-4303), but no connection to the Security System is shown. Please provide Security and Communication drawings that correspond with these motion-activated cameras.	There is no security drawing required for combination camera/occupancy sensors shown on the lighting plans. These devices are specific for lighting system control use only and not for the security system function.
TG10.4-039	3/6/2014	All SE Drawings		The following drawings are included in the Security Drawings for Bid Package TG10.4 but are NOT listed in the Table of Contents: SE-1100, SE-1102, SE-1103, SE-2000, SE-3000, SE-3001, SE-5000, SE-5001, and SE-8000. What is the scope of work for Bid Package TG10.4 in reference to these drawings?	Drawings are part of the TG18.1 Bus Ramps Package, as referenced in Exhibit A and are to be used to fulfill scope requirements, as described in Exhibit A, Section IV. Scope of the Package and Bid Item Information, item 3. Base Bid Item Scope (see page 12).

TG10.4-040	3/6/2014	SE-0005, SE-1100		The General Notes on drawing SE-0005 doesn't seem to be applicable to what they identify on the plan view drawings. Ex. Vehicle Sensor [#ID-BR-004] on drawing SE-1100 has General Note 6 attached to it. General Note 6 on drawing SE-0005 provides info for a pole mounted camera. No information is provided by General Note 6 for a vehicle sensor. Many notes seem to be inconsistent in this manner. Please advise and provide information applicable for TG10.4.	Drawing SE-0005 is part of the TG18.1 Bus Ramps Package, as referenced in Exhibit A, and all associated notes shall only apply as they relate to completing scope of work described in Exhibit A, Section IV. Scope of the Package and Bid Item Information, item 3. Base Bid Item Scope (see page 12).
TG10.4-041	3/6/2014	SE-1100 Northern Match Line		The Northern match line on drawing SE-1100 refers us to drawing SE-1101. Drawing SE-1101 was not provided with the rest of the security drawings for Bid Package TG10.4. Please provide Security drawing SE-1101 for Bid Package TG10.4.	Drawings SE-1100 and SE-1101 are part of the TG18.1 Bus Ramps Package, as referenced in Exhibit A, and both drawings reflect scope that is not applicable to the scope of work described in Exhibit A, Section IV. Scope of the Package and Bid Item Information, item 3. Base Bid Item Scope (see page 12).
TG10.4-055	3/31/2014	E1-5010, E-0010 Detail 1		Switchboard MS-B1-A-1 shows a symbol that looks like an "M" inside a circle attached with a line to a sideways "W." The symbol list on drawing E-0010 defines this as a "Current Transformer Compartment and KWH Meter." Switchboard MS-B1-A-1 shows another symbol that looks like an "M" inside a square attached with a line to a sideways "W". The symbol list on drawing E-0010 has a symbol similar to this but it's not the same. Please identify the symbol in MS-B1-A-1 that looks like an "M" inside a square attached with a line to a sideways "W," as it is not shown on the symbol list E-0010.	The symbol with “M” inside a square attached to line with sideways “W” is a power monitoring system node.
TG10.4-056	3/31/2014	E1-4602, 02A, 03, 04, 05, 06, & 07, E1-0062 & E1-0063 Fixture Type E2	26 50 00	Fixture type "E2" is shown on the following drawings: E1-4602, E1-4602A, E1-4603, E1-4604, E1-4605, E1-4606, and E1-4607. Fixture type "E2" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	Fixture type "E2," shown on E1-4602, E1-4602A, E1-4603, E1-4604, E1-4605, E1-4606, and E1-4607, is listed in Specification Section 26 50 02, Landscape Light Fixture Schedule. Refer to Addendum 1.

TG10.4 – Electrical, Communications, Security and Integrated Networks

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Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-001	2/26/2014		Exhibit A	States that, "This Trade package includes Performance Based Specifications in which design elements are predetermined and partially engineered but overall design calculations and coordination is incomplete. This Trade Subcontractor shall complete both the design and design coordination as directed within the Contract Documents, particularly as specified in Divisions 25, 26, 27 and 28 (with special emphasis on all other Specifications requiring low and line voltage and/or associated control) and any associated reports and drawings." After review of the Specifications we find that the only Performance Based Specifications and design criteria included is for the L Series fixtures. The balance of the Division 25-28 appear to have no Performance Driven Specifications or design criteria. We believe the drawings to be approximately 70%; is it TJPA's intent for us to provide a price to the content of the existing drawings or to provide a complete price for Division 26, 27, and 28? Is a basis of design and/or design criteria going to be provided?	The language in Exhibit A, Section IV. Scope of the Package and Bid Item Information, is being refined to clarify the intent of "Performance Based Specification" requirements for the TG10.4 scope of work. A revised Exhibit A will be issued in a future addendum.
TG10.4-004	2/26/2014	TE1-2310 & TE1-4210		*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such responses by logging into the TJPA's secure website and opening the relevant folder.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-011	2/27/2014			After downloading and reviewing the bus ramp TG18.1 documents it appears that a number of them are missing. Please provide the file's "Total # of drawings" for TG18.1 so we may be able to determine what drawings actually pertain to the TG18.1 scope.	To determine the interfacing Bus Ramps scope of work, refer to the "E" set of drawings issued in TG18.1 Addendum 3. Specifically, refer to sheets E-5006 and E-5007 to coordinate work scope. The majority of TG18.1 documents do not affect or influence the TG10.4 scope of work. The TG18.1 Addendum 3 documents are available at www.transbaycenter.org/TJPA/Doing Business with the TJPA/Current Contract Opportunities/TG18.1 Bus Ramps).
TG10.4-023	2/27/2014		Exhibit A	Fire Pump and Preaction require the TG10.4 package to provide all conduit for this system. Please provide drawings for location of panels and devices of this system for pricing the TG10.4 Electrical.	The scope requirement will be revised in Exhibit A and will be issued in a future addendum.
TG10.4-038	3/6/2014	E1-4304 Detail 1		Numbered Note 3 on drawing E1-4303 refers us to drawing A1-8148 detail 2 for additional information regarding the type LE211 fixture. Per the Consolidated Drawing List dated 01/23/14, issued with the Bid Documents, this drawing was not issued. Please provide drawing A1-8148, Revision B, dated 10/29/13.	Sheet A1-8148 will be issued in a future addendum.
TG10.4-042	3/24/2014	SE & TE Drawings		Please provide riser diagrams for; Access Control, Intrusion, Paging, Video Surveillance, BMCS and Intercom. There's an extensive large conduit and pullbox system on the TE Drawings, but none of them are identified for use by the above systems. We assume using this raceway network for the above mentioned systems for routing wire and cable to closets and IDF rooms.	Conduits shown on the TE drawings are for backbone cabling, the horizontal conduits to individual device locations are not shown and are to be coordinated and shown on contractor shop drawings. All systems that are to be on the converged network, (i.e. Video Surveillance, Access Control) will be transmitted on the network backbone cabling, no additional conduits are required.
TG10.4-044	3/24/2014		Specification Table of Contents and Collaborative Folder Box	The TJPA Collaborative Box does not contain Specification 28 16 00, 28 23 00, 28 30 02, 28 40 00, and Block Diagram SS-9000 Emergency Communication. Please make these documents available as soon as possible.	The referenced specifications and drawing are Sensitive Security Information that will be issued in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-045	3/24/2014		25 16 00	Chemical Biological Radiological Nuclear Monitoring System is mentioned in Spec Section 25, but there are no specifications, performance or design criteria, and drawings. Please provide.	The Chemical, Biological, Radiological, and Nuclear Monitoring System will be designed in the future. There are no specifications, performance design criteria, or drawings available at this time. The current bid documents indicate the infrastructure (conduit, junction boxes, etc.) required to be provided by the TG10.4 Trade Subcontractor.
TG10.4-046	3/24/2014	E1-4402, E1-4402A Detail 2	26 56 00	Page 33 of Appendix A in Specification section 26 56 00 states that fixture type LE245 is "Not Used." Drawing E1-4402 & E1-4402A both show five (5) type LE245 fixtures in the Public Lobby (Room 02249 at approximate column lines 3/F.3). Please provide information missing in Appendix A so our vendors can price these fixtures.	Please see the attached sketch, SKE-035, for the revised fixture layout.
TG10.4-047	3/24/2014	E1-4402 Detail 2 & A1-4302 Detail 1	26 56 00	Drawing E1-4402 lists a note pointed to column lines 1.4/J that reads, "NOTE: SEE GROUND LEVEL FOR FIXTURE TYPE LE221." Just to the right of this note, is another note which reads, "NOTE: SEE GROUND LEVEL RCP FOR EXTERIOR GLASS CANOPY MOUNTED LIGHT FIXTURE TYPE LE221 CONTROL GROUPS." No glass canopy mounted fixtures appear to be shown on A1-4302. Furthermore, Appendix A in Spec 26 56 66/APA refers us to specification 26 56 26, in lieu of fixture manufacturer data. Spec 26 56 26 does not appear to have been provided in the bid documents. Please provide details showing the layout of these LE221 light fixtures, so we can quantify them. Please also provide the information missing from page 14 of specification section 26 56 00/APA (i.e.: Description, Manufacturer, Lamp, Wattage, Voltage, and Comments) for fixture type LE221.	The fixture LE221 specification, data, and layout will be issued in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-048	3/24/2014	E1-4302 Detail(s) 2 (Fixture Type LE211)		Numbered Note 3 on drawing E1-4302 is attached to fixture type LE211. Numbered Note 3 also says that these fixtures are shown for information only. Please confirm fixture type LE211 is shown for information only, and the provision and installation is not to be included in the scope of the electrical contractor.	Fixture LE211 is provided by the TG10.4 Trade Subcontractor. The "for information only" is in reference to a design/build component of the W-1 Glazing System in which the base contract light LE211 is involved. See Specification Section 26 56 00/APA for LE211 fixture data.
TG10.4-049	3/24/2014	E1-4403 Detail 2	26 51 00	Page 07 of Appendix A in Specification Section 26 51 00 states that fixture type L120 is "Not Used." Drawing E1-4403 show three (3) type L120 fixtures in the Public Lobby (Room 02322 at approximate column lines 11.7/E). Please provide information missing in Appendix A so our vendors can price these fixtures.	See attached sketch, SKE-034, for the updated fixture layout.
TG10.4-050	3/31/2014	E1-4502 - E1-4507A		Fixture type LE221 is shown ONLY on the "Alternate" drawings on the Bus Deck Level (E1-4502A, 3A, 4A, 5A, 6A, and 7A). Fixture type LE221 is not shown on any of the "Non-Alternate" drawings on the Bus Deck Level (E1-4502, 3, 4, 5, 6, and 7). Please specify which alternate those type LE221 fixtures are to be priced under.	The scope of work for LE221 fixtures will be revised in Exhibit A, Section IV. Scope of the Package and Bid Item Information, paragraph 3. Base Bid Scope Items, and issued in a future addendum.
TG10.4-051	3/31/2014	E1-4052A, 3A, 4A, 5A, 6A, & 7A. A1-8125, A1-8140, & A1-8148	25 56 26	Numbered Notes 2 & 3 on drawings E1-4052A, 3A, 4A, 5A, 6A, and 7A indicate that the engine driver/pixel distributor box is furnished and installed by the D/B Glazing System Package, then refers us to drawings A1-8125, A1-8140, A1-8148, and Spec Section 26 56 26 for installation details and LED Dot System Specifications. However, these drawings and specifications were not provided. Please provide drawings A1-8125, A1-8140, A1-8148, Spec Section 26 56 26, and all Glazing Package information for coordination and pricing.	The scope of work for LE221 fixtures will be revised in Exhibit A, Section IV. Scope of the Package and Bid Item Information, paragraph 3. Base Bid Scope Items, and issued in a future addendum.
TG10.4-052	3/31/2014	E1-4502A, 3A, 4A, 5A, 6A, & 7A		Power to the D/B Glazing System furnished and installed LE221 engine driver/pixel distributor boxes and LED Dot System Racks is shown only on the "Alternate" drawings (E1-4502A, 3A, 4A, 5A, 6A, & 7A). Please confirm which alternate this added power should be priced under.	The scope of work for LE221 fixtures will be revised in Exhibit A, Section IV. Scope of the Package and Bid Item Information, paragraph 3. Base Bid Scope Items, and issued in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-054	3/31/2014		Bid Package TG10.4	The drawings and specifications for TG10.4 frequently refer us to drawings and specifications in other Bid Packages that we don't have access to. Please set it up so that we have access to all drawings, specifications, and Bid Packages referred to by Bid Package TG10.4. Also for pricing the TG10.4 package, please provide complete interface documents for power and low voltage and communication systems of these packages.	All reference documents from other bid packages are identified in Exhibit A, Section VIII. Supplementary Documents List for Previously Released Trade Packages, on pages 31 and 32, and are available for download at https://webcor.box.com/s/26i68bqsqrwne3n354ft, as described on page 32.
TG10.4-057	3/31/2014	E1-4602, 02A, 03, 04, 05, 06, & 07, E1-0062 & E1-0063 Fixture Type E2	26 50 00	Fixture type "E3" is shown on drawing E1-4604. Fixture type "E3" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	Refer to Specifications Section 26 50 02, Landscape Light Fixture Schedule, for the specifications of fixture type E3 and all other landscape light fixture types.
TG10.4-058	3/31/2014	E1-4604, E1-0062, & E1-0063 Fixture Type E3B	26 50 00	Fixture type "E3B" is shown on drawing E1-4604. Fixture type "E3B" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	Refer to Specifications Section 26 50 02, Landscape Light Fixture Schedule, for the specifications of fixture type E3 and all other landscape light fixture types.
TG10.4-059	3/31/2014	E1-460e. E1-4606, E1-0062, & E1-0063 Fixture Type E16	26 50 00	Fixture type "E16" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	Refer to Specifications Section 26 50 02, Landscape Light Fixture Schedule, for the specifications of fixture type E3 and all other landscape light fixture types.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-060	3/31/2014	E1-4603, E1-4604, E1-4605, & E1-4606, E1-0062, & E1-0063 Fixture Type E18	26 50 00	Fixture type "E18" is shown on the following drawings: E1-4603, E1-4604, E1-4605, and E1-4606. Fixture type "E18" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	Refer to Specifications Section 26 50 02, Landscape Light Fixture Schedule, for the specifications of fixture type E3 and all other landscape light fixture types.
TG10.4-061	3/31/2014	E1-4403, E1-0062, & E1-0063 Fixture Type A1	26 50 00	Fixture type "A1" is shown on drawing E1-4403. Fixture type "A1" is not listed on the fixture schedule (E1-0062 & E1-0063) or listed in Spec Section 26 50 00 Luminaires and Accessories. Please provide missing fixture specifications (i.e. Description, Manufacturer and Catalog Number, Acceptable Alernate Manufacturer, Lamp Data, Input Watts, Volts, and Remarks) so our vendors can price these fixtures.	The fixture type designation is shown on the drawings as a place holder to ensure that power and controls are provided within the MEP package. Fixture Type A1 is listed in the Level 2 control schedule with appropriate allowances for power and control.
TG10.4-062	3/31/2014	E1-5001 to E1-5010 Detail Missing Feeds to LRCs		Lighting Relay Cabinets (LRC) are shown on all Single Line drawings, but no feeders are shown supplying power to them. An example of this can be seen on E1-5002; On the Bus Deck Level LRC-3-B-12 & LRC-3-B-1 are shown with no feeders. Please provide electrically engineered drawings showing the missing feeder criteria for all the LRCs on this project.	LRCs require 277V AC power. See the E1-3xxx drawing series for circuiting requirements.
TG10.4-063	3/31/2014	E1-4210, & E1-5001 to E1-5010	26 09 33/APA, Detail Lighting control panel LRC-B1-A-2	Drawing E1-4210 shows lighting control panel LRC-B1-A-2. This lighting control panel is NOT shown on the single line drawings (E1-5001 to E1-5010), nor is a panel schedule provided for it in specification section 26 09 33/APA. Please confirm lighting control panel LRC-B1-A-2 is furnished and installed in a future contract and is NOT to be included in Bid Package TG10.4. If not, please provide engineered drawings showing panels as part of the single line and package reference.	LRC-B1-A-2 is no longer required and will be deleted in a future addendum.

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS OF LIGHTING FIXTURES AND SWITCHES WITH TJPA REPRESENTATIVE. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE OVER ENGINEERING DOCUMENTS FOR EXACT LOCATIONS, MOUNTING HEIGHTS, FINISHES AND SUSPENSION LENGTHS OF ALL ELECTRICAL EQUIPMENT AND DEVICES, LIGHT FIXTURES AND SWITCHES.

B. PROVIDE CONDUIT AND WIRE FOR COMPLETE SYSTEM PER CIRCUITING AND SWITCHING SHOWN.

C. FIELD COORDINATE EXACT ROUTING OF ALL FEEDERS AND BRANCH CIRCUITS.

SHEET NOTES CON'T.

D. MOUNT ALL REMOTE TRANSFORMERS, BALLASTS, DRIVERS, ETC. ABOVE CEILING IN ACCESSIBLE LOCATION. REFER TO ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS FOR CEILING ACCESS LOCATIONS. WIRE ALL TRANSFORMERS, BALLASTS, DRIVERS, ETC. PER MANUFACTURER'S RECOMMENDATION.

E. COORDINATE WORK WITH RELATED TRADES TO ALLOW THE WORK OF RELATED TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE CONFLICT OR DELAY.

SHEET NOTES CON'T.

F. WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT THEY HAVE THE INFORMATION NECESSARY SO THAT THEY MAY PROPERLY INSTALL THE NECESSARY CONNECTIONS AND EQUIPMENT.

G. PROVIDE UNSWITCHED "HOT" LEG TO ALL ILLUMINATED EXIT SIGN AND NIGHT LIGHT "NL" FIXTURES. CONNECT TO NEAREST ADJACENT EM CIRCUIT, UON.

H. REFER TO SHEET E1-4001 FOR CIRCUITING ORIENTATION PLAN.

NUMBERED NOTES

1. POWER DISCONNECT TO ESCALATOR LIGHT AND RECEPTACLE. COORDINATE MOUNTING WITH ESCALATOR MANUFACTURER PRIOR TO ROUGH-IN.
2. CEILING MOUNTED JUNCTION BOX WITH TEN DIMMABLE LIGHTING CIRCUITS FOR JAMES CARPENTER ART WORK FIXTURE TYPE "A1".
3. CONNECT ALL ESCALATOR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4303 FOR CONTINUATION OF CIRCUIT.
4. CONNECT ALL STAIR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4303 FOR CONTINUATION OF CIRCUIT.
5. REFER TO SHEET E1-4503 FOR CONTINUATION.
6. COORDINATE WORK WITH DESIGN/BUILD GLAZING SYSTEM SCOPE OF WORK, UON.

SHEET E1-4403

CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-A-1.

CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-A-1.

CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-A-EMG. LOCATED IN ROOM 01243 IN GROUND LEVEL, UON.

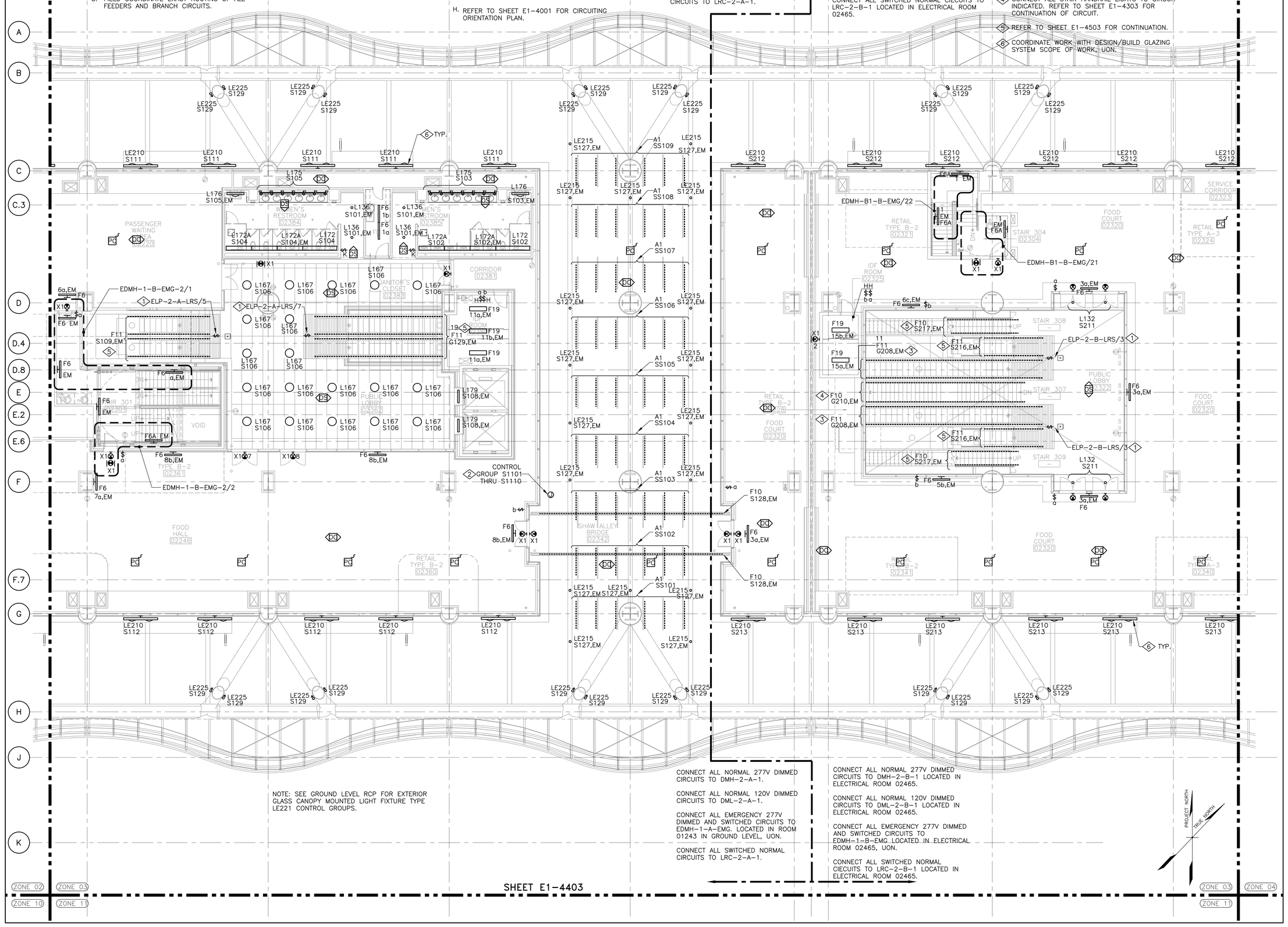
CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-A-1.

CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.

CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.

CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-B-EMG LOCATED IN ELECTRICAL ROOM 02465, UON.

CONNECT ALL SWITCHED NORMAL CIECUITS TO LRC-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.



CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-A-1.

CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-A-1.

CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-A-EMG. LOCATED IN ROOM 01243 IN GROUND LEVEL, UON.

CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-A-1.

CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.

CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.

CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-B-EMG LOCATED IN ELECTRICAL ROOM 02465, UON.

CONNECT ALL SWITCHED NORMAL CIECUITS TO LRC-2-B-1 LOCATED IN ELECTRICAL ROOM 02465.

SHEET E1-4403

2 SECOND LEVEL ZONE 03 LIGHTING PLAN

E1-2001

SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

XREFS: XAGRID.dwg\ XAGRID-96.dwg\ XAZONES.dwg\ XAFLR02PH1.dwg\ XERCP02PH1.dwg\ XARCP02PH1.dwg\ TJPA-TB 34x44E.dwg\ CFH-STAMP.dwg

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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San Francisco, CA 94105
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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: SECOND LEVEL
ZONE 03 LIGHTING PLAN

ARCHITECT/ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
CARLINE FENLON-HARDING
No. E-9849
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: L. SERRANO	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 04/04/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: A
SHEET NUMBER: SKE-034	SEQUENCE NUMBER: __ of __

ISSUED FOR BID

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS OF LIGHTING FIXTURES AND SWITCHES WITH TJPA REPRESENTATIVE. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE OVER ENGINEERING DOCUMENTS FOR EXACT LOCATIONS, MOUNTING HEIGHTS, FINISHES AND SUSPENSION LENGTHS OF ALL ELECTRICAL EQUIPMENT AND DEVICES, LIGHT FIXTURES AND SWITCHES.

B. PROVIDE CONDUIT AND WIRE FOR COMPLETE SYSTEM PER CIRCUITING AND SWITCHING SHOWN.

C. FIELD COORDINATE EXACT ROUTING OF ALL FEEDERS AND BRANCH CIRCUITS.

D. MOUNT ALL REMOTE TRANSFORMERS, BALLASTS, DRIVERS, ETC. ABOVE CEILING IN ACCESSIBLE LOCATION. REFER TO ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS FOR CEILING ACCESS LOCATIONS. WIRE ALL TRANSFORMERS, BALLASTS, DRIVERS, ETC. PER MANUFACTURER'S RECOMMENDATION.

E. COORDINATE WORK WITH RELATED TRADES TO ALLOW THE WORK OF RELATED TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE CONFLICT OR DELAY.

F. WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT THEY HAVE THE INFORMATION NECESSARY SO THAT THEY MAY PROPERLY INSTALL THE NECESSARY CONNECTIONS AND EQUIPMENT.

G. CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-A-1.

H. CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-A-1, UON.

I. CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-A-1, UON.

J. CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-A-EMG. LOCATED IN ELEC RM 01243 IN GROUND LEVEL, UON.

K. PROVIDE UNSWITCHED "HOT" LEG TO ALL ILLUMINATED EXIT SIGN AND NIGHT LIGHT "NL" FIXTURES. CONNECT TO NEAREST ADJACENT EM CIRCUIT, UON.

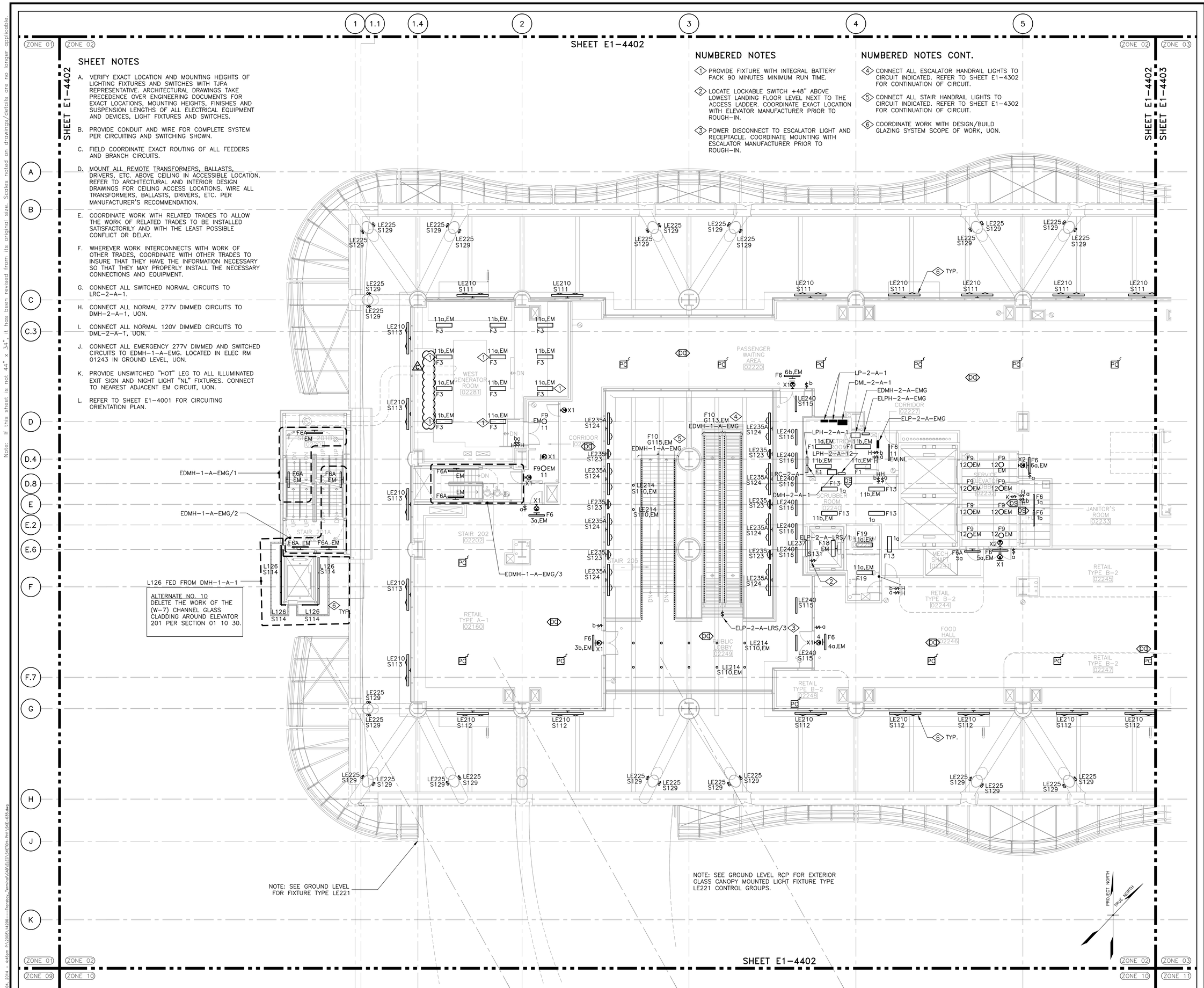
L. REFER TO SHEET E1-4001 FOR CIRCUITING ORIENTATION PLAN.

NUMBERED NOTES

1. PROVIDE FIXTURE WITH INTEGRAL BATTERY PACK 90 MINUTES MINIMUM RUN TIME.
2. LOCATE LOCKABLE SWITCH +48" ABOVE LOWEST LANDING FLOOR LEVEL NEXT TO THE ACCESS LADDER. COORDINATE EXACT LOCATION WITH ELEVATOR MANUFACTURER PRIOR TO ROUGH-IN.
3. POWER DISCONNECT TO ESCALATOR LIGHT AND RECEPTACLE. COORDINATE MOUNTING WITH ESCALATOR MANUFACTURER PRIOR TO ROUGH-IN.

NUMBERED NOTES CONT.

4. CONNECT ALL ESCALATOR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4302 FOR CONTINUATION OF CIRCUIT.
5. CONNECT ALL STAIR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4302 FOR CONTINUATION OF CIRCUIT.
6. COORDINATE WORK WITH DESIGN/BUILD GLAZING SYSTEM SCOPE OF WORK, UON.



2 E1-2001 SECOND LEVEL ZONE 02 LIGHTING PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
SECOND LEVEL
ZONE 02 LIGHTING PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CARLINE FENLON HARDING
No. E-18810
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: L. SERRANO	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 04/04/2014
SCALE: 1/8" = 1'-0	SIZE E · FACILITY NO. 140 · REVISION C
SHEET NUMBER SKE-035	SEQUENCE NUMBER __ of __

ISSUED FOR BID

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-053	3/31/2014	E1-5010	26 24 12	MS-B1-A-2 is shown on the single line drawing and specification but the bus and MCB do not match. One of the two ways this main switchboard is spelled out will have a significantly higher cost than the other. This incidence repeats several times where the drawing and switchgear specification do not match. Which of the two will take precedence for these differences; drawings or specs?	For the main switchboards, the bus and circuit breaker ampacity ratings listed on the drawings shall take precedence over the bus and circuit breaker ampacity ratings listed in the switchboard schedules in Specification Section 26 24 12/APA. These ratings are minimum ratings; actual nominal equipment ratings may exceed the ratings indicated.
TG10.4-064	4/16/2014	E1-4102 to E1-4111	QBD#TG10. 4-034	Transbay QBD #TG10.4-034 states that all light fixtures shown are furnished and installed by the TG10.4 subcontractor. This QBD response goes on to clarify that the ONLY exception to Sheet Note H is that the conduit for the F15 fixtures has no wire in it and that this wiring is to be installed by the TG10.4 subcontractor. Please confirm that all fixtures on E1-4102 to E1-4111 are furnished and installed by the TG10.4 subcontractor and are completely wired in Phase 1 (TG06.0) with the exception of the conduit system for the F15s which only has a pullstring for wiring by the TG10.4 subcontractor's install.	Correct. All light fixtures and associated rough-in are by the TG10.4 Trade Subcontractor with the sole exception of fixture F15 poured-in-placed j-boxes and conduit. All light fixtures shown on E1-4102 thru E1-4111 including F15 fixtures will be wired, energized and commissioned in Phase 1 by the TG10.4 Trade Subcontractor.
TG10.4-066	4/16/2014	TE1-2104 & SE1-2104		Are the cameras and speakers shown on the concrete columns roughed in the concrete by an earlier contract? If not, is the TG10.4 package to install the conduit for cameras and speakers on the surface.	The cameras and speakers shown on the concrete columns are not roughed in the concrete by an earlier contract. All Train Platform Level cameras and associated rough-in at columns will be surface mounted by the TG10.4 Trade Subcontractor.
TG10.4-067	NOT USED				
TG10.4-070	4/16/2014	E1-4203 & E1-5302 Detail 1	Location of DMH-B1-B-1	The Riser Diagram on drawing E1-5302 shows Dimming Panel DMH-B1-B-1 on the Train Platform Level. Plan view drawing E1-4203 shows Dimming Panel DMH-B1-B-1 located on the Lower Concourse Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-071	4/16/2014	E1-4203 & E1-5302 Detail 1	Location of LRC-B1-B-1	The Riser Diagram on drawing E1-5302 shows Lighting Relay Cabinet LRC-B1-B-1 on the Train Platform Level. Plan view drawing E1-4203 shows Lighting Relay Cabinet LRC-B1-B-1 located on the lower concourse level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-072	4/16/2014	E1-4303 & E1-5302 Detail 1	Location of DMH-1-B-1	The Riser Diagram on drawing E1-5302 shows Dimming Panel DMH-1-B-1 on the Lower Concourse Level. Plan view drawing E1-4303 shows Dimming Panel DMH-1-B-1 located on the Ground Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-073	4/16/2014	E1-4303 & E1-5302 Detail 1	Location of LRC-1-B-1	The Riser Diagram on drawing E1-5302 shows Lighting Relay Cabinet LRC-1-B-1 on the Lower Concourse Level. Plan view drawing E1-4303 shows Lighting Relay Cabinet LRC-1-B-1 located on the Ground Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-074	4/16/2014	E1-4303 & E1-5302 Detail 1	Location of EDMH-1-B-EMG	The Riser Diagram on drawing E1-5302 shows Emergency Dimming Panel EDMH-1-B-EMG on the Lower Concourse Level. Plan view drawing E1-4303 shows Emergency Dimming Panel EDMH-1-B-EMG located on the Ground Level. Please confirm the riser diagram on drawing E1-5302 is incorrect	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-075	4/16/2014	E1-4404 & E1-5302 Detail 1	Location of DMH-2-B-1	The Riser Diagram on drawing E1-5302 shows Dimming Panel DMH-2-B-1 on the Ground Level. Plan view drawing E1-4404 shows Dimming Panel DMH-2-B-1 located on the Second Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-076	4/16/2014	E1-4404 & E1-5302 Detail 1	Location of LRC-2-B-1	The Riser Diagram on drawing E1-5302 shows Lighting Relay Cabinet LRC-2-B-1 on the Ground Level. Plan view drawing E1-4404 shows Lighting Relay Cabinet LRC-2-B-1 located on the Second Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-077	4/16/2014	E1-4404 & E1-5302 Detail 1	Location of EDMH-2-B-EMG	The Riser Diagram on drawing E1-5302 shows Emergency Dimming Panel EDMH-2-B-EMG on the Ground Level. Plan view drawing E1-4404 shows Emergency Dimming Panel EDMH-2-B-1 located on the Second Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-078	4/16/2014	E1-4503 & E1-5302 Detail 1	Location of DMH-3-B-12	The Riser Diagram on drawing E1-5302 shows Dimming Panel DMH-3-B-12 on the Second Level. Plan view drawing E1-4503 shows Dimming Panel DMH-3-B-12 located on the Bus Deck Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-079	4/16/2014	E1-4503 & E1-5302 Detail 1	Location of LRC-3-B-12	The Riser Diagram on drawing E1-5302 shows Lighting Relay Cabinet LRC-3-B-12 on the Second Level. Plan view drawing E1-4503 shows Lighting Relay Cabinet LRC-3-B-12 located on the Bus Deck Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-080	4/16/2014	E1-4503 & E1-5302 Detail 1	Location of EDMH-3-B-EMG-2	The Riser Diagram on drawing E1-5302 shows Emergency Dimming Panel EDMH-3-B-EMG-2 on the Second Level. Plan view drawing E1-4503 shows Emergency Dimming Panel EDMH-3-B-EMG-2 located on the Bus Deck Level. Please confirm the Riser Diagram on drawing E1-5302 is incorrect.	Confirmed, riser diagram on E1-5302 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-081	4/16/2014	E1-4304 & E1-5303 Detail 1		The Riser Diagram on drawing E1-5303 shows Emergency Dimming Panel EDMH-1-C-EMG on the Lower Concourse Level. Plan view drawing E1-4304 shows Emergency Dimming Panel EDMH-1-C-EMG located on the Ground Level. Please confirm the Riser Diagram on drawing E1-5303 is incorrect.	Confirmed, riser diagram on E1-5303 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-082	4/16/2014	E1-4304 & E1-5303 Detail 1	Location of DML-1-C-1	The Riser Diagram on drawing E1-5303 shows Dimming Panel DML-1-C-1 on the Lower Concourse Level. Plan view drawing E1-4304 shows Dimming Panel DML-1-C-1 located on the Ground Level. Please confirm the Riser Diagram on drawing E1-5303 is incorrect.	Confirmed, riser diagram on E1-5303 is incorrect. Riser diagram will be revised in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-083	4/16/2014	E1-4206 & E1-5303 Detail 1	Location of LRC-B1-D-1	The Riser Diagram on drawing E1-5303 shows Lighting Relay Cabinet LRC-B1-D-1 on the Lower Concourse Level in Area C AND in Area D. Plan view drawing E1-4206 shows Lighting Relay Cabinet LRC-B1-D-1 located on the Lower Concourse Level, in Area D ONLY. Please confirm the Riser Diagram on drawing E1-5303 is incorrect.	Confirmed, riser diagram on E1-5303 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-084	4/16/2014	E1-4106 & E1-5303 Detail 1	Location of DML-B2-D-1	The Riser Diagram on drawing E1-5303 shows Dimming Panel DML-B2-D-1 on the Train Platform Level in Area C AND in Area D. Plan view drawing E1-4106 shows Dimming Panel DML-B2-D-1 located on the Train Platform Level, in Area D ONLY. Please confirm the Riser Diagram on drawing E1-5303 is incorrect.	Confirmed, riser diagram on E1-5303 is incorrect. Riser diagram will be revised in a future addendum.
TG10.4-086	4/16/2014	26 09 33-1.13(c)(4, 5 & 6), paragraph Arch. Lighting Control Sequence of Operation		Please confirm that the sequence of operation listed under Spec Section 26 09 33-1.13(c)(4, 5, & 6) pertains to all areas, not just color changing fixtures as noted.	See the attached page from Specification Section 26 09 33, Revision B, dated February 21, 2014, which was issued in Addendum #1. Public restrooms are covered by Specification Section 26 09 33, paragraph 1.13.D. Back-of-house areas are covered by Specification Section 26 09 33, paragraph 1.13.E. The color changing fixtures at the Light Column, Fremont and First Street Pass-Through, and LED nodes on the W-1 Awning are covered by Specification Section 26 09 33, paragraph 1.13.C.
TG10.4-087	4/21/2014		NDA	Some of larger corporate vendors and manufacturers have policies that create issues with auditing and indemnification. The first issue is in section 4 about auditing a corporations compliance. The other is Section 7 is concerning indemnification and legal fees beyond the NDA. We request that these two areas be stricken from the NDA for the Vendors and Manufacturers. See attached NDA with highlighted areas.	If a vendor or manufacturer refuses to execute the NDA (Specification Section 01 35 70/AT1) based on the TJPA's audit right under Paragraph 4, Representations And Warranties, or the indemnity obligation and/or the prevailing party provision under Paragraph 7, Violations And Remedies, please notify the TJPA immediately. A waiver of such provision(s) will be considered on a case-by-case basis.

2. ***B . . .*** Occupancy/vacancy sensors will be activated for all presets. When the space is vacant, the light level will be significantly reduced to low levels that are just enough to provide a visual cue that the space is open to the public and transit service is in operation. **Light will be gradually increased to target levels in 2 seconds after detection of occupancy. . . . *B***
3. In areas that are closed off from the public late at night, most of the lighting will be turned off.
4. Photo sensors will monitor daylighting levels. When daylighting is above pre-determined thresholds, the sensor will activate special presets for a reduction in electric lighting levels.

C. Color changing fixtures:

1. Daily regular base scheme for base design

   a. At the light column, Fremont and First street pass-through, color will change very slowly once every hour to express change of time.
   b. Colors will be non-saturated colors.
   c. ***B . . .*** Intensity of the colors will be adjusted to the levels that are visually comfortable to look at ~~at~~ **during** different times of the day and night. **. . . *B***
   d. One color will be used to illuminate the entire light column from top to bottom.
   e. One color will be used to illuminate all 5 coves at the pass-through at a time.

2. Daily regular base scheme for add alternate

   a. Pre-selected movie file content will be scanned across the grid of color changing LED nodes on the awning surface. Patterns of light and shadow in subtle colors will move across the exterior of the building to animate the building and to express the undulating and organic shape.

3. Special event or seasonal scheme

   a. Colors at the light column, Fremont and First street pass-through and/or awning LED nodes (add alternate) will be selected and programmed by TJPA for celebration of special events such as sports events, cultural events or holidays, etc. The setting will be used only during the event and when the event is over, the setting will go back to the regular base scheme.

D. Public rest rooms:

1. ***B . . .*** The occupancy/vacancy sensor will turn off or dim the lighting **15 minutes after** vacan**cy**. **Fixture type L136** will be always on and kept at low light levels even during vacancy **unless the area is closed off from the public**. **All light will gradually increase to target levels in 2 seconds after detection of occupancy. . . . *B***

E. Back of House:

1. Light will be controlled manually on and automatically off by the vacancy sensors except plant rooms. Light in the plant rooms will be manually on and automatically off by timers.
2. ***B . . .*** In circulation areas the astronomical time clock will activate low light level presets that are specific to different times of day. When activated by people triggering occupancy sensors, lighting will **gradually** increase to target levels **in 2 seconds**. When once again unoccupied, vacancy sensors will activate the prior low level preset **in 15 minutes**. **. . . *B***

TG10.4 – Electrical, Communications, Security, and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-043	3/24/2014		Division 25	Is there an existing point list for the BMS? If not, are we to assume using only the monitoring points that are addressed in Division 25?	No. This is a new project so there is no existing point list. The Field Termination Schedules shown on the drawings reflect all of the new points required.
TG10.4-065	4/16/2014	E Drawings	26 00 00	There are a number of electrical panels in the specification or on the single line or on the lighting control riser; that are missing panels schedules, have no power connection on the single line or are not shown the lighting riser; Please see the attached list of panels and provide details required for pricing TG10.4 (See Page 2 list)	The following are clarifications. All related drawings and panel schedules will be revised to reflect these changes in a future addendum: ELPH-B1-A-EMG will be clarified on E1-5004. It is incorrectly labeled as ELPH-B1-A-2. It appears correctly in Specification Section 26 24 16/APA, Panelboards, page 19. LPH-3-B-13 appears on sheet E1-5002 and in Specification Section 26 24 16/APA, Panelboards, page 70. UDPL-B1-C-OPT appears on sheet E1-5006 and in Specification Section 26 24 16/APA, Panelboards, page 200. **UPL**-B1-B-OPT does not exist. **ULP**-B1-B-OPT appears on sheet E1-5005 and in Specification Section 26 24 16/APA, Panelboards, page 202. MS-FP-B1 will be clarified on sheet E1-5001. It is incorrectly labeled as MS-B1-A-FP. It appears correctly in Specification Section 26 24 12/APA, Main Switchgear, page 3. EDSH-CTR-GEN appears on sheet E1-5005 and in Specification Section 26 24 13/APA, Switchboards, page 2. EDSH-B2-A appears on sheet E1-5004 and in Specification Section 26 24 13/APA, Switchboards, page 3.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
					For EDPH-B1-A-SOC, provide 225A, 480V, 3-phase, 3-wire, 150A MCB distribution panel. EDSH-B1-A does not exist. UPS-B1-B does not require a panel schedule. Refer to riser. ELP-1-C-LRS appears on sheet E1-5006 and in Specification Section 26 24 16/APA, Panelboards, page 150. ELP-B2-C-EMG appears on sheet E1-5006 and in Specification Section 26 24 16/APA, Panelboards, page 145. UPS-B1-D does not require a panel schedule. Refer to riser. UPS-B1-A-SOC does not require a panel schedule. Refer to riser. Panel EDML-B2-B-EMG will be renamed to EDML-B2-B-1-EMG on power riser sheet E1-5005 to match panel schedule and lighting riser. Panel EDML-B2-A-EMG will be renamed to EDML-B2-A-1-EMG on power riser sheet E1-5004 to match panel schedule and lighting riser. One instance of panel EDMH-3-B-EMG-1 is incorrectly labeled on sheet E1-5302; it is EDMH-3-B-EMG-2. There are two EDMH panels in sector B on the bus deck level as shown on sheet E1-5005. Panel schedules for EDMH-3-B-EMG-1 and EDMH-3-B-EMG-2 are shown on pages 43-44 of Specification Section 26 09 33/APA, Architectural Lighting Control. There is only one instance of panel EDMH-2-B-EMG on sheet E1-5302, located on the Second Level.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
					There is only one instance of panel EDMH-1-B-EMG on sheet E1-5302, located on the Ground Level. There is only one instance of panel EDMH-B1-B-EMG on sheet E1-5302, located on the Lower Concourse Level. There is only one instance of panel EDMH-B2-B-EMG on sheet E1-5302, located on the Train Platform Level. There is only one instance of panel DML-1-C-1 on sheet E1-5303, located on the Ground Level. Panel DMH-B1-C does not exist. Panel DMH-B1-C-1 is shown on sheet E1-5003, sheet E1-5303 and in Specification Section 26 09 33/APA, Architectural Lighting Control, page 12. Panel DMH-B1-D does not exist. Panel EDMH-1-D does not exist. Panel LRC-B1-A-2 does not exist; it was deleted in TG10.4 Addendum #2 issued 04/23/14. DML-B1-D-1, LRC-B2-C-1, DML-B2-D-1, DML-B2-B-1, and DMH-B2-C-1 are to be furnished under a future contract. Feeder conduit and cable are to be furnished under this Trade Subcontract. For panel LP-3-C-2, provide 225A, 120/208V, 3-phase, 4-wire, MLO, 42 circuit panel with 42 20A, 1-pole circuit breakers. For panel LP-3-C-3 (ALT), provide 225A, 120/208V, 3-phase, 4-wire, MLO, 42 circuit panel with 42 20A, 1-pole circuit breakers.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-069	4/16/2014	SE1-3100, E1-3103, TE1-5101 Detail #2 & 4, Detail #1, & Detail #2		The drawings pf lack consistency and conflicting layouts make it difficult to determine which room detail example is correct for pricing ie.(IDF Room B228.) This occurs for most IDF Room Details. For pricing purposes please provide system coordinated detail drawings for these rooms.	The referenced security drawings shall govern for the location of security power in the IDF. Coordinated location will be shown on drawing E1-3103, which will be reissued in a future addendum.
TG10.4-085	4/16/2014	E1-4202	EMG & Normal Lighting Intended Switchings	Drawing E1-4202 shows light fixtures with a switchleg "b" designation in Rooms B1225 and B1228 at approx. grid lines "D" & "3." There is no wall switch shown for those lights in either of those rooms. Please confirm the means of switching for switchleg "b" in Room B1225 and switchlegs "a" and "b" in Room B1228. Please also confirm the intended function of the Occupancy Sensor in this multiple switchleg rooms. This instance reoccurs at several locations in the documents.	In room B1225, switchleg "b" shall be controlled by a keyed switch located on the wall next to the keyed switch controlling switchleg "a." In room B1228, each switchleg shall be controlled by a separate keyed switch located in a similar manner to the keyed switches in room B1225. There shall be a total of two (2) keyed switches in room B1228, one (1) for switchleg "a" and one (1) for switchleg "b". It is the design intent for occupancy sensors in multiple switchleg rooms to control all switchlegs in said room. This intent is typical for all such occupancy sensors. Drawing E1-4202 will be issued in a future addendum.
TG10.4-088	4/29/2014		43.1.I 26 05 19	This specification states for the EC to provide a separate neutral for dimmer branch circuits; does this mean that every circuit being provided from the dimming panels requires a separate neutral per each circuit coming from the dimming panel? Can multiply dimming circuits from the same dimming panel share a neutral?	Yes. A separate neutral is required for each dimming circuit. Sharing neutral conductors is not permitted.
TG10.4-089	4/29/2014		1.4.C 25 00 00	The statement below is taken from the Div 25 spec; how is a contractor to evaluate in a proposal replacing at no cost devices and equipment damaged by another trade? Any material furnished by the BMCS subcontractor which is defective, any workmanship of the BMCS subcontractor which is defective and any resulting damage to work of other trades shall be remedied immediately by the BMCS subcontractor at no cost to the TJPA during the period prior to	The language in the specification does not imply the BMCS Trade Subcontractor is responsible to replace damaged materials or installations caused by other trades. The language clearly states the BMCS Trade Subcontractor is responsible to replace "...damage to work of other trades…" meaning damages caused by, but not to, the BMCS Trade Subcontractor.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				the issue of the certificate of substantial completion and during the warranty period. The BMCS subcontractor shall comply with the General Conditions in all respects with regard to responsibility during the warranty period	
TG10.4-091	4/29/2014		25 90 00 25 16 00	Div 25 16 states to provide BMS interfaces to several of the mechanical/electrical systems but Div 25 90 sequence of operation does not explain how these various systems are to interact. Are the mechanical/electrical systems supposed to be a part of the BMS sequence of operation? If so provide details.	No. The BMCS only monitors the electrical equipment. There is no sequence of operation required.
TG10.4-093	4/29/2014	Se1-3100 Detail 4		Detail 4 on Security drawing SE1-3100 shows various Low Voltage Power Supplies and Control Cabinets mounted on 3/4" Fire Treated Plywood Backboards. Please confirm the plywood backboard is not furnished and installed by the electrical contractor.	Confirmed, plywood as shown is provided by others.
TG10.4-094	4/29/2014		25 16 00	Div 25 16 states to provide BMS interfaces to several of the electrical and mechanical systems; is the intent to monitor and control these systems on one of the specified vendor's platforms or should the all the systems run under a FMCS (Facility Managment and Control System) platform such as Navigator or Tridium?	The intent is to monitor all systems only from the selected FMCS platform (FMCS is referred to as BMCS in these documents).
TG10.4-095	4/29/2014	E1-3103, E1-3104	26 25 01	Per the train platform level enlarged plan drawings, the sheet note states, "Refer to track busways schedule sheets for plug-in units types and quantities required for each busway." The "numbered notes" to describe which schedule to use is missing. (i.e. DWG E1-0053 "Typical Track Busway Schedule - Train Platform - UPS Power") Provide updated drawings with numbered notes for track busways as shown on enlarged plan drawings.	Track busways supplied by utility power (non-ECS power) shall be eliminated in a future addendum. Track busways supplied by UPS (ECS) power shall remain. Trade Subcontractor may assume that track busways without numbered notes will be provided by UPS power.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-096	4/29/2014	E1-3403	26 25 01	Per the second level enlarged plan drawings, the sheet note states, "Refer to track busways schedule sheets for plug-in units types and quantities required for each busway." The numbered notes 2 and 3 reference power track busway for ECS and NON-ECS equipment. What track busway schedule should be followed for these equipment? Please provide updated enlarged plan drawings.	Track busways supplied by utility power (non-ECS power) shall be eliminated in future addendum. Track busways supplied by UPS (ECS) power shall remain. Refer to the track busway schedule on sheet E1-0059: Typical Track Busway Schedule - Level 2 - UPS Power, for ECS equipment.
TG10.4-097	4/29/2014	E1-3403	26 25 01	Per the second level enlarged plan drawings, the sheet note states, "Refer to track busways schedule sheets for plug-in units types and quantities required for each busway." The "numbered notes" to describe which track busway schedule to use is missing for IDF room 02639 and IDF room 02641. Please provide updated enlarged plan drawings with numbered notes for IDF rooms 02639 and 02641 track busways.	Track busways supplied by utility power (non-ECS power) shall be eliminated in a future addendum. Track busways supplied by UPS (ECS) power shall remain. Trade Subcontractor may assume that one track busway within each mentioned IDF room will be provided by UPS power.
TG10.4-099	4/29/2014	E1-3302	26 25 01	Per the ground level enlarged plan drawings, the sheet note states, "Refer to track busways schedule sheets for plug-in units types and quantities required for each busway." The numbered notes 2 and 3 reference power track busway for ECS and NON-ECS equipment. What track busway schedule should be followed for these equipment? Please provide updated enlarged plan drawings.	Track busways supplied by utility power (non-ECS power) shall be eliminated in future addendum. Track busways supplied by UPS (ECS) power shall remain. Refer to track busway schedule on sheet E1-0058: Typical Track Busway Schedule - Ground - UPS Power, for ECS equipment.
TG10.4-100	4/29/2014	E1-2302, E1-2303	26 05 19, 26 05 35, 26 24 16	Per the ground level electrical plans, it shows a junction box for communication lights with no additional information on drawing E1-2302 (grid line 5/D.4) and E1-2303 (grid line 6/D.4).Please clarify the electrical requirements for these lights.	Connect both lights to panel LP-1-A-1/27. They will be controlled via a combination control panel. An updated drawing will be issued in a future addendum.
TG10.4-102	4/29/2014	E1-2303	26 05 19, 26 05 35, 26 24 16	Per ground level, zone 3 electrical plan drawing, a compactor is shown for the loading dock area at grid line 6/D.4. The panel and circuit designation is missing. What is the panel and circuit designation for this compactor?	Compactor shall be connected to panel LPH-2-A-12/ 2, 4, 6. An updated drawing will be issued in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-103	4/29/2014			Please confirm all in-wall backing is to be furnished and installed by the framing contractor.	Only in-wall backing as shown in contract documents will be provided by others. If not shown, the TG10.4 Trade Subcontractor shall include provisions for in-wall backing for any device or equipment requiring it.
TG10.4-104	4/29/2014	TG10.4-040		If Drawing SE-0005, 1100, and 1101 are to be part of TG18.1; are we to assume that all cabling and devices on the bus ramp are in TG18.1 scope of work? If not, please provide drawings showing how the Bus Ramp (TG18.1) scope of work interfaces to Electrical package (TG10.4)	Refer to the responses to QBDs TG10.4-011, 040, and 041 (in answer sets #2 and #3) and the scope as described in page 13 of TG10.4 Exhibit A. The scope interface between the TG18.1 and TG10.4 packages is only connecting power and data as described in TG10.4 Exhibit A from the main Transit Center building to the ramps and associated guard booth, including joint participation between the packages in overall project commissioning.
TG10.4-105	4/29/2014	TG10.4-005 and TG10.4-008		The answers to these 2 QBD's refer us to the TJPA secure website for the responses; we have reviewed the TJPA secure drop box where the SSI documents are located but did not see the QBD responses. Site viewed; https://app.box.com/files#/files/0/f/0/All%20Files?&_572894580660441suid=1398098707514010, Please direct us to correct location if it is not the above mentioned SSI site.	QBD responses are located on the TJPA secure website in the folders of the original documents upon which the QBD is based. If there have been multiple QBD response postings, there will be multiple QBD sub-folders in the original documents folder.
TG10.4-107	4/30/2014	A1-8478 Detail 2	Pg. 13 Fixture Type L128 26 51 00/APA	Detail 2 of addenda 2 drawing A1-8478, shows a cross-section view of fixture type L128 mounted to a glass floor with electrical conductors being run through the glass using the mullion as an electrical chase. 1. Who is to install this fixture, the electrical or glazing contractor? 2. Who is responsible to be running the wiring inside the mullion? 3. Since the "Lighting Sculpture" is not part of the manuf/model number provided in spec section 26 51 00/APA (Pg 13), who is to provide that?	The light fixture itself and associated wiring is provided and installed by the TG10.4 Trade Subcontractor. Running wire within mullions is by the TG10.4 Trade Subcontractor and is coordinated between the TG08.7 and TG10.4 Trade Subcontractors. The lighting sculpture itself is by others.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-108	4/30/2014		12 93 10	This specification refers to a custom pylon; is this specification for the E2 fixture in the roof park? If not; what other areas is this specification relative too? The specification in paragraph 2.2 states to reference the drawings for quantity and size but the E1, TE1 and SE1 drawings do not contain pylon details for sizes and the plan view drawings do not show pylon types; please provide details of sizes and types along with references as to the details on the plan drawings.	The E2 fixture is located on the Roof Park Level. The custom fabricated pole is reflected in the landscape (L1) drawings.
TG10.4-109	5/6/2014	E-0010 Raceway Legend		Drawing E-0010 Raceway Legend indicates "Proposed Embedded Feeder Route" and these Proposed Embedded Feeders are shown on Drawings E1-2202 through E1-2206 – on the Lower Concourse Level. Will this area be available for this in-slab work when this contract is executed? If not, we will be required to surface mount the rigid steel conduit feeders vs. the in-slab PVC conduit feeders. Can you clarify the schedule associated with the current slab work so we can provide the appropriate installation method for this electrical work?	The Lower Concourse decks will be nearly complete by the time the TG10.4 Trade Subcontract is awarded. Therefore, proposed embedded feeder routes are not possible. Feeder routes will require surface mounting to the underside of Lower Concourse decking.

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-101	4/29/2014	E1-2305	26 05 03	Per drawing E1-2305 numbered note 5 states, "Provide 120V power connection to operable window transformer. Refer to Architectural drawings A1-8207 and A1-8213 for additional information." Please provide access to drawing A1-8207 and A1-8213. Please provide access to all Architectural drawings.	A1-8207 and A1-8213 are in the Main Bid Package 03-31-2014, which was issued as part of TG10.4 IFB Addendum #2 and is available on Planwell. For the Addendum #2 narrative and link to Planwell, refer to the TG10.4 contract page on the TJPA's website: http://www.transbaycenter.org/rfp/electrical
TG10.4-106	4/30/2014	TE1-5100 Detail 4 and 6		This detail serves as an example for other IDF rooms; on the elevation details 4 & 6 there are conduit penetrations up on the wall above the horizontal cable tray; is it correct to assume the cables will string directly out to the conduit dropping into the horizontal cable tray below? If not provide a solution and requirements.	TE1-5100 is a typical enlarged plan for IDFs; refer to detail 6 on TE1-5101 for an illustration of a vertical cable runway to route and secure cables from the conduits to the cable runway below.
TG10.4-110	5/8/2014	E1-6009 Detail 2 & 3		Who is providing the bollards as shown on drawing E1-6009 detail 2 and 3? Is there a specification or any additional detail drawings? If so, please provide additional information for complete install.	Bollard provision and installation as shown on E1-6009 is by others. The TG10.4 Trade Subcontractor is responsible for line and low voltage installation to bollard controllers as expressed in Exhibit A. Drawings with additional information can be secured through the non-disclosure agreement process for access to Sensitive Security Information.
TG10.4-111	5/8/2014	E1-6009 Detail 6	26 05 03	Who is providing the retractable power dispenser as shown on drawing E1-6009 detail 6? Is there a specification section or additional wiring detail? If so, please provide additional information.	The TG10.4 Trade Subcontractor is responsible for furnishing and installing retractable power dispensers as noted on detail 6 on E1-6009. Detailed information will be provided in a future addendum.
TG10.4-113	5/8/2014	E1-6009 Detail 6		A detail 6 for a retractable power dispenser is shown on drawing E1-6009. There is no reference to this detail on any plan drawings. On the ground level drawings, a typical numbered note states, "Provide connection to receptacle within retractable dispenser." Should detail 6 apply to the ground level plan drawings notes?	No, this detail applies only to retractable bollards and phalanx barriers. This detail reference will be clarified in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-116	5/8/2014	E1-2302		Who will provide the signs shown throughout the plans, i.e "PS1 Sign"? For example, there is a sign "PS1" shown on drawing E1-2302 with a note that states to make 120V connection to pylon signage and install receptacle. Are there any details or specification regarding mounting, elevation, etc? If so, please provide additional information for a complete install.	All exterior/interior signage will be provided in future bid packages. Refer to the electrical (E), telecommunication (TE) and signage and wayfinding (SG) drawings for scope. Include provisions for any signage indicating additional outlets, lighting, etc., beyond the connections shown on the E or TE drawings.
TG10.4-118	5/8/2014	E1-2506		On drawing E1-2506 grid line (29,D.8), two UV System junction boxes are shown without any circuit designation. Are there any power requirements for these junction boxes? Please advise.	The UV system junction boxes will be deleted from the electrical drawings in a future addendum. All power associated with the fountains shall come from either FCP-1 or FCP-2.
TG10.4-119	5/8/2014	E1-2407		On drawing E1-2407 grid line (32,E.6), a BS1 Sign is shown in the elevator shaft. A circuit designation is not shown as well. Please provide location and circuit designation for this sign.	Type BS1 sign shall be deleted in this location. This revision will be issued in a future addendum.
TG10.4-122	5/8/2014			Per the electrical plan drawings, the numbered note states "Provide 120V connection to electric hand dryer". Who will be providing the hand dryers? Please advise.	Hand dryers are to be provided and installed by others, but the TG10.4 Trade Subcontractor is to coordinate and provide power connection for hand dryers.

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-092	4/29/2014		SE-21 Series to SE-26 Series	On the 2100 Series to the 2600 Series of the SE1 Security drawings, the sheet notes direct us to price the VSS Camera and Infrastructure as an additive alternate. Neither Exhibit A (pgs 22-23); Specifications Vol. 1, Section 01 10 30 (dated Jan 2, 2014); or Specifications Vol. 1, MEP/TE/SE/VT, Section 01 10 30/APD (dated Jan 23, 2014) list VSS Cameras and Infrastructure as an Alternate. Unless the drawing alternates are defined in the aforementioned documents we are assuming work described as alternates in the drawings will be part of the base bid.	VSS Camera and Infrastructure is to be bid as an alternate, as shown on SE 2100 through 2600. Specification Section 01 10 30/APD will be updated to reflect this in a future addendum.
TG10.4-114	5/8/2014		Exhibit A - Page 16, 12 93 10 Add. 2 Lighting and security pylons 12 93 10	The 'Lighting and Security Pylons' section of Exhibit A states we are to "design, coordinate, furnish, and install all elements of Specification Section 12 93 10 - no exceptions." Spec section 12 93 10(1.1)(A)(1-6)(Add2) identifies six different types of Lighting & Security Pylons. We see no Lighting & Security Pylons with Beacons on the Lighting, Security, or Power drawings. Please confirm there are no Lighting & Security Pylons with Beacons required for Bid Package TG10.4. If there are, please provide electrically engineered drawings showing their location(s) and the intended power & comm/signal requirements.	Lighting & Security Pylons with Beacons are required for Bid Package TG10.4. Refer to the landscape (L) and telecommunication (TE) drawings for pylon locations and sheets L1-9632 thru L1-9634 and TE1-8102 for additional pylon detail. The referenced landscape drawings are in the Main Bid Package dated 03-31-2014, which is available on Planwell. Telecommunication drawings contain protected information and are available on the TJPA's secure website to bidders who have signed a non-disclosure agreement. Refer to the TG10.4 contract page on the TJPA's website for links and instructions: http://www.transbaycenter.org/rfp/electrical
TG10.4-115	5/8/2014	E1-2403, E1-6009 Detail 2		The Shaw Alley Bridge powered doors on drawing E1-2403 refer us to detail 2 on drawing E1-6009. This detail does not show the connection from the "ADC" to the bollards. What is required for this installation, i.e wiring, conduit, etc? Please provide a detail for this type of application.	Provide ½" conduits from ADC to each powered door actuator. The low voltage fire alarm connection is to be provided from the ADC to the door actuator for door release upon activation of the fire alarm.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-117	5/8/2014	E1-2502		What is the circuit designation for the surface raceway in room 03260 on drawing E1-2502?	Information regarding circuiting in room 03260 will be provided in a future addendum.
TG10.4-123	5/8/2014	E1-2302, E1-2304, E1-6009	26 05 19, 26 05 35, 26 24 16	Per the ground level electrical plans, it shows a rolling door for the loading docks with reference to detail 4/E1-6009. This hinged door detail shows a push-button for door open operation. In addition to the detail drawing reference, a motor with a disconnect and push button control device is shown on the plans. Please clarify the power and connections required for the loading dock rolling doors. Provide additional information for a complete install.	Hinged door connections and referenced details will be deleted from loading dock areas in a future addendum. This detail is still applicable to other hinged doors as noted on the drawings. The rolling door connection is shown in loading dock area on sheet E1-2303. No additional detail for this connection is required.
TG10.4-129	5/22/2014		26 50 01 Paragraph 1.9 (A & B)	Specification section 26 50 01(1.9)(A & B) deals with "Extra Stock" and directs the TG10.4 contractor to provide "extra stock of each type of lighting fixture type and lamp type installed in the Project in quantities as required by Owner." See below. Please provide the quantity of each fixture & lamp type the TG10.4 contractor provide so we can include these in the counts we provide to our vendors for pricing.	No extra stock is required. Specification Section 26 50 01 paragraph 1.9 will be revised and reissued in a future addendum.

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-090	4/29/2014		2.1.A 25 11 00	It appears that the project intent is to have the Communications provide the backbone for all systems such as Security, Video, PA etc. In Div. 25 they are requiring the BMS provide its own network. Is the intent to have Div 27 provide the backbone network for Div 25 or is Div 25 to reside on a completely separate network provided by Div 25?	The intent is not to have Division 27 provide the backbone network for Division 25. Division 25 will provide its own network. Ultimately, the Building Management and Controls System (BMCS) shall reside on the converged IT network. Division 27 will provide network drops (for the converged IT network—shown as "Owner's Network" on drawing M1-6002) for the BMCS. However, there will be BMCS network cabling (identified as "MLAN" on drawing M1-6002) required between some of the BMCS devices, which are also indicated on drawing M1-6002. The BMCS network requirements are found in Specification Section 25 11 00.
TG10.4-098	4/29/2014		25 30 10, 26 24 12, 26 43 13, 26 33 53, 26 33 54	Are devices described in Div 25 30 10 an intentional duplication of the description of operational devices prescribed in the Div 26 sections mentioned above? If so is the BMS to monitor the Div 26 equipment separately from the power monitoring system defined in Div 26? Or is the interface between Div 25 and 26 to be totally through a Modbus connection as stated in Div 26?	Devices described in Division 25 30 10 are not a duplication of devices described in Division 26 sections. The devices in 25 30 10 are specific devices required for the BMCS, as referenced on the BMCS drawings. Specification Section 25 16 00 describes interfacing to the following Division 26 equipment: Electrical Switchgear Variable Frequency Drives Emergency Generator Automatic Transfer Switches Electrical Panelboards Uninterruptable Power Supply Battery Monitoring System

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
					Each piece of equipment listed above shall have the capability of communicating to the BMCS via Modbus communication protocol. Each piece of equipment listed above will have a connection point for the BMCS. The equipment can be connected either by daisy chain (for example VFD to VFD to BMCS) or through separate communication trunks (for example one switchgear to the BMCS). Typically, there is no single point of connection for all equipment.
TG10.4-112	5/8/2014	E1-6009 Detail 5		The retractable bollard/barrier detail 5 on drawing E1-6009 is not shown on any electrical plan drawings. Per the electrical plan drawings, the typical numbered note states to route two 1"C from HPU to phalanx barrier for power and control wiring. Should detail 5 on drawing E1-6009 apply to devices shown on the electrical plan drawings? If so, is the electrical contractor responsible for any additional conduit and wiring as shown on detail 5 on drawing E1-6009? Please provide specification requirements as stated on detail 5 on drawing E1-6009 note "D" and any additional documents for complete install.	1. Yes, HPU devices on detail 5/E1-6009 are also reflected on electrical drawings. Example: See E1-2207 Grid 33.2/between G and H. 2. TG10.4 Trade Subcontractor is only responsible for specified power/data to the HPUs. Everything downstream of the HPU is by others. 3. See Specification Sections 28 16 44 and 28 16 44/APA. These documents contain SSI and are available on the TJPA's secure website. Access instructions are available at http://www.transbaycenter.org/rfp/electrical
TG10.4-120	5/8/2014	E1-2502		What is the circuit designation for the fountain pump disconnect switch on drawing E1-2502 between grid line (5,D.4)?	Refer to the landscape water feature drawings, which show the required circuiting and connections for these pumps. The circuits and disconnect switches will be deleted from the E series drawings and transferred onto the landscape drawings and issued in a future addendum. The circuits and disconnects will not be deleted.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-121	5/8/2014	E1-2506		What is the circuit designation for the fountain pump disconnect switch on drawing E1-2506 between grid line (29,E.6)?	Refer to the response to TG10.4-120.
TG10.4-124	5/13/2014	A1-9820, TE1-5902		Detail 2/TE1-5901 requires 28 flat panel display wall mounts on the same furred wall. Will assemblies require any gauged strapping or other backing type within the wall for panel mount support? If so, please provide required backing details. This question also applies to any other wall partitions requiring flat wall mounts.	Backing for wall mounting support of the flat panel displays has been incorporated within the wall assembly. Please refer to the wall type tags on the architectural plans and A-0020 and A-0021 for information on partition assembly.
TG10.4-125	5/16/2014	2/E1-3601		Electrical drawing detail 2/E1-3601 addressed electrical requirements for room PK224 but 'TE' & 'SE' drawings are largely silent with the exception of notes and speaker references in the 'TE' drawings for future coordination. Are there any low voltage or security requirements under the TG10.4 IFB scope for PK224 not currently identified within the contract documents?	PK224 is incorrectly identified on enlarged E1-3601, as the room did not exist. Please refer to the Roof Park Restaurant IFC package to be issued in a future addendum.
TG10.4-127	5/22/2014	SE drawings SE 0010	28 16 00	The SE drawing states Barrier Controls (by others). If the TG10.4 contractor is to provide the retractable barriers and controls, please provide details showing type of installation, controller and equipment locations (hydraulic pumps) and comm. and raceway requirements. If the TG10.4 contractor is not responsible for this scope of work, what is this contract responsible for as it pertains to Spec Sections 28 16 44 and 28 16 44APA?	Bollards and Wedge Barrier assemblies are provided and installed by others. TG10.4 Trade Subcontractor will provide low and line voltage to HPUs for complete, operable systems. Refer to the response to TG10.4-112 for a more detailed scope description.
TG10.4-128	5/22/2014	E1-2604 & E1-2607		On drawing E1-2604 and E1-2607, a ceiling mount junction box for future detectors is shown at grid line (16.9,F)on E1-2604 and (31.7,E) on E1-2607. There is no place shown on these drawings to mount this overhead. Please advise.	These boxes and circuiting are for future devices that will be ground mounted at the paving slab. The scope of the conduit and circuiting to these devices will be revised in a future addendum.
TG10.4-130	5/22/2014	E1-4402 & E1-4402A	Type LE281 (Comments) 26 56 00/APA	Deductive Alternate 10, deducts the L126 fixtures and adds fixture type LE281 at the entrance to the elevator on drawing E1-	LE281 is used for Alternate 10. Specification Section 26 56 00/APA will be revised in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				4402A just South of Stairwell 201A. However, the fixture schedule for LE281 (ref. Spec Sect. 265600/APA (Add2) - pg 40), calls for these fixtures to be included with Alternate 12. Please advise which takes precedence.	
TG10.4-138	5/29/2014	E1-2207 & E1-3207	8/E1-3207 26 05 03	Per addendum #2 drawing E1-2207, the reference detail 8/E1-3207 was revised to show it as the detail for IDF room B1760. The plan drawing and the detail for this room do not match. Please provide an updated detail drawing to reflect changes made on E1-2207.	A revised IDF room layout will be issued in a future addendum.
TG10.4-140	5/29/2014		28 08 00	Reference Specification 28 08 00 Commissioning of Fire Alarm Systems To complete the extent of the Commissioning of Fire Alarm System, we need to perform integrated tests which will be limited without the IP Infrastructure in place. Can we assume it will be available or just Perform the tests/commissioning activities that are available at the time of the completed Fire Alarm Systems? This is a similar situation for the PA system and others. Please advise/clarify.	For bidding purposes, assume that testing and commissioning will be conducted for only those systems available at the time of the completed fire alarm system. This also applies to any other systems that may be integrated with future IP infrastructure revisions.

TG10.4 – Electrical, Communications, Security and Integrated Networks

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Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-132	5/29/2014		28 31 76	Specification Section 28 31 76 is performance based, The ECS/MNS it describes interfaces with multiple elements of the overall transit center project and across multiple subsystems. How is it possible to a prepare a bid for a performance based specification for a system which relies on IP-based network connectivity when there are no details of the core IP infrastructure upon which the systems performance is reliant? Further, how is it possible to integrate such a system and how is the Subcontractor to bid this? Perhaps making the ECS/MNS an allowance item will yield a cost effective solution to the TJPA.	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-133	5/29/2014		spec 26 05 33 and 26 05 35 paragraphs 2.2 and 3.4; 2.2 and 3.4	Spec section 26 05 33 does not allow the use of non-metallic (PVC) conduit on the project. Specification section 26 05 35 allows the use of non-metallic (PVC) conduit on the projects below slab on grade or embedded in floor slabs. Section 26 05 35 – 3.1.P.8 does not allow non-metallic (PVC) conduit within the building. Since the application of the specs have not been cleared and are contradictory, we would like to confirm that the only non-metallic (PVC) conduit to be used within the TG10.4 package is on the park level (E1-2602 – E1-2607) where it states PVC can be used outside the pull boxes. Please confirm this understanding.	Rigid nonmetallic conduit (PVC) is allowed where embedded in floor slabs and where raceways are installed outside the building (at the Roof Park exterior). The two specification sections that are referenced apply to different portions of the work and bid packages. Specification Section 26 05 33 applies to the design-build glazing package, which has neither embedded or exterior conduit applications. Specification Section 26 05 35 applies to the Phase 1 building package (TG10.4), which allows PVC raceways embedded in floor slabs and at the Roof Park exterior. No specification revisions are required.
TG10.4-134	5/29/2014		26 05 33 and 26 05 35	Both spec section 26 05 33 and 26 05 35 are for Raceways and Boxes without separating where they apply (i.e. Raceway and Boxes - Below Grade Package is 26 05 34). Why are two differing specification sections provided for this? Will one be deleted? If one will not be deleted, how and to what work will they be applied?	Specification Section 26 05 33 refers to the TG08 Design-Build Glazing Package. Specification Section 26 05 34 refers to the TG06 Below Grade Package. Specification Section 26 05 35 refers to the TG10.4 Package.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-135	5/29/2014		26 05 01 and 26 05 03	Both spec section 26 05 01 and 26 05 03 are for Electrical General Provisions without separating where they apply (i.e. Electrical General Provisions – Below Grade Package is 26 05 02). Why are two differing specification sections provided for this? Will one be deleted? If one will not be deleted, how and to what work will they be applied?	Refer to the response to TG10.4-134.
TG10.4-136	5/29/2014		Exhibit I	In interpreting the project schedule shown in Exhibit I, we'd like to obtain clarification that up front time for shop drawings and BIM is provided within the TG10.4 Subcontract. The provided schedule shows an activity for start of construction / mobilization from 10/30/14 – 11/5/14. The first MEP rough in activity within the decks appears to start the following day 11/6/14. How is the TG10.4 Subcontractor supposed to have any time to do coordination with the MEP Subcontractors, let alone prepare shop drawings and BIM models? These steps are critical to the success of the project and there is no amount of resources as described in Exhibit A that can make up for having no time at all. We request that an activity be added to allow some reasonable time to begin and execute preparations on these important steps.	Exhibit I project schedule is currently being updated and will be reissued in a future addendum.
TG10.4-137	5/29/2014	E1-4053A	paragraph: Traxon Shop Drawing (last page) fixture type LE221 26 56 26	Drawing E1-4053A [and the rest of the alternate ltg dwgs on the Bus Deck level] show the LE221 fixtures as solid black dots connected to a driver. The last page of spec section 26 56 26, issued with Addenda 2, included a shop dwg from Traxon showing 3 strings of 9 type LE221s each. Please confirm whether the blackdots shown on the plan view drawings are indicative of type LE221 fixtures as shown, or are they indicative of "strings of LE221". If they are to represent strings of LE221, please confirm the quantity of LE221 required in each string.	Lighting fixture type LE221 and associated operation system have been deleted, and the change will be issued in a future addendum.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-139	5/29/2014		28 08 00, 28 30 02, 27 31 76, 28 31 76/APA	Notifier manufactures an Integrated Mass Notification System. Would we be allowed to provide an Integrated Fire Life Safety System/ Mass Notification System? There could be a sizable cost savings on conduit, equipment, and labor	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-145	6/3/2014		Paragraph 1.6 - A.2 28 05 13	Specification Section 28 05 13 1.6.A.2 requires the Subcontractor to provide a fully staffed service center for emergency services 24 hours per day. However, this provision does not include a sunset and it is not clear whether or not the service is to be fully paid for within the TG10.4 package, either indefinitely or within a sunset period, or if it's a fee based service provision for TJPA for anything beyond warranty requirements. Please clarify intent of this specification.	The intent of Specification Section 28 05 13 paragraph 1.6.A.2 is to maintain a fully staffed service center until the project's final completion.

TG10.4 – Electrical, Communications, Security and Integrated Networks

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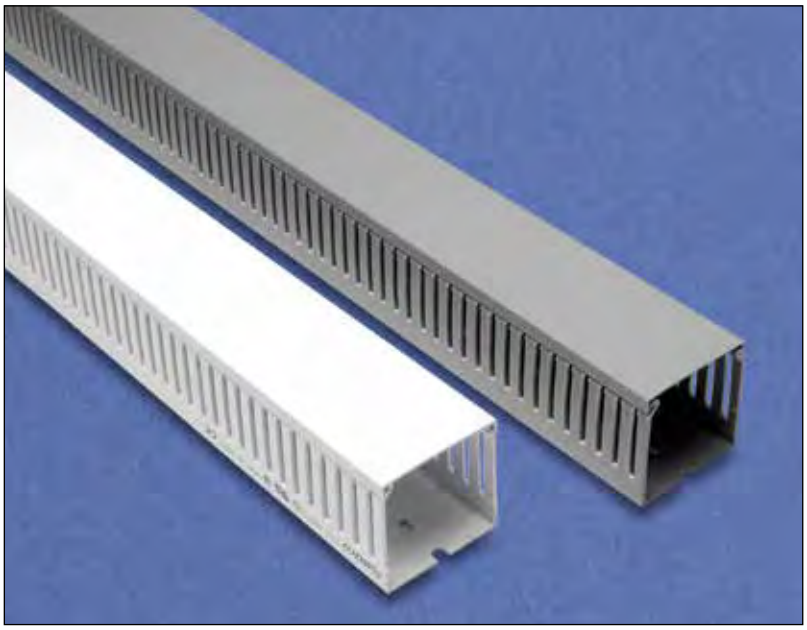
Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-068	4/16/2014	SE-3100 - 3600		Please provide the following information for the IDF Room pricing the TG10.4 project: 1. Note 3 - What is the intended size of the wire trough (4x4, 6x6, etc.)? 2. Note 4 - Please confirm these are the same 20A power connections shown on E1-3302 [Numbered Note 1]. 3. Note 11 - Is there any power that needs to be provided for the Class "E" Fire Relay? If so, from which panel is power to be supplied? Is there any Security connection needed for this relay? These questions related to this elevation detail are applicable to ALL IDF Rooms.	See the attached for Note 3 Wire Trough (Typical of 2). 1. 4" x 4" x 48". 2. Yes, these are the same connections shown on E1-3302. 3. No power is required for the Class “E” Fire Relay. The TG10.4 Trade Subcontractor connects the security equipment from the fire relay.
TG10.4-131	5/28/2014	E1-2302 and E-0010	Grid line 2 & B	E1-2302 shows a junction box for a future detector on the electrical floor plan, but Sheet E-0010 describes this symbol as a “junction box for a future detector, to be mounted at ceiling.” Is this detector to be mounted at the floor or ceiling and what is this detector for?	Locate electrical junction box on the underside of second level slab inside the building for future extension to the detector sensing device that will be mounted in the fascia of the W-2 system. Refer to Sheet A1-2302 and detail 4 on Sheet A1-8188. The detector is for a system to be designated later.
TG10.4-141	6/3/2014		Paragraph 1.4 27 15 43	Specification Section 27 15 43 Paragraph 1.4 does not provide required mock-up quantities unless, per subparagraph b, Subcontractor is to supply one outlet mock-up per each outlet type. Please clarify mock-up requirements. Additionally, subparagraph c states “If applicable,…”. Confirm if the mock-up is required or is not required.	The mock-up is required if the Trade Subcontractor is planning to install a system that includes a consolidation point (CP). If they are not planning to install a system that includes a CP then no mock-up is required. If it is required, provide a mock-up of each condition.
TG10.4-142	6/3/2014		Paragraph 1.6 27 41 16	Specification Section 27 41 16 Paragraph 1.6 does not specify required mock-up quantities. Provide required quantities.	A single mock-up of a particular configuration is all that is required.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-143	6/3/2014		Paragraph 1.6 27 41 17	Specification Section 27 41 17 Paragraph 1.6 does not specify required mock-up quantities. Provide required quantities.	Refer to the response to TG10.4-142.
TG10.4-144	6/3/2014		Paragraph 1.6 27 51 16	Specification Section 27 51 16 Paragraph 1.6 does not specify required mock-up quantities. Provide required quantities.	Refer to the response to TG10.4-142.

Wiring Duct – T1E Thin Finger Series



UL file E123572

Overview

The T1E series of thin-finger wiring duct is made of rigid PVC and carries a UL 94V-0 flammability rating. All our wiring duct comes complete with cover. Replacement duct covers can be purchased separately.

Features

- Thin finger design for compact wiring configurations
- Provided with standard mounting holes
- Rounded, burr-free edges will not cut nstallers' hands or wiring insulation
- Non-slip cover
- Narrow thin finger design is compatible with thinner screwless terminal blocks
- Flush cover design holds 10 - 12 percent more wires than traditional designs
- Restricted slot design retains wires in slot for fast, easy wire installation or removal
- Two predetermined break lines, one for breaking off and removal of sidewall finger segments only, and another for removal of sidewall finger and base segments
- Patented recess boss for rapid mounting of components

Gray Open Slot Rigid PVC (including cover)

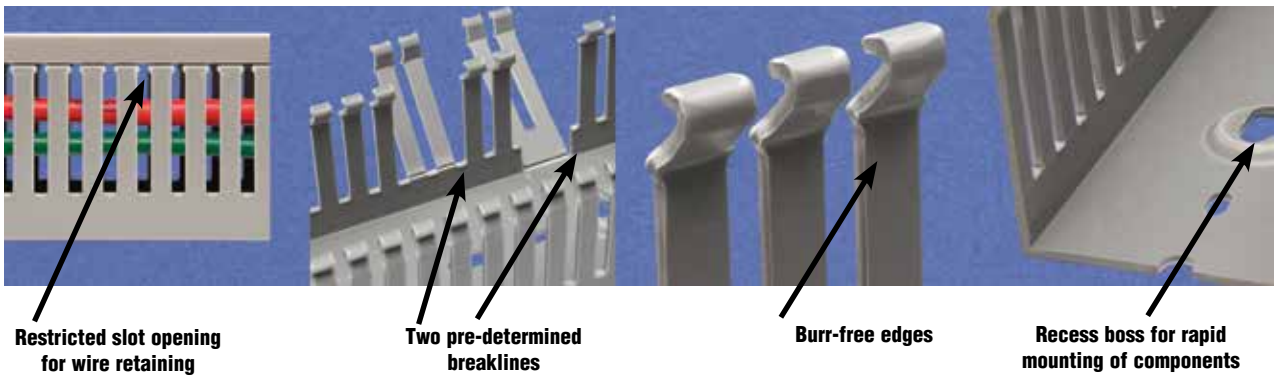
Catalog Number Standard Carton	Package Quantity	Price	Catalog Number Single Piece Pkg	Package Quantity	Price
T1E-1015G	18	<--->	T1E-1015G-1	1	<--->
T1E-1022G	24	<--->	T1E-1022G-1	1	<--->
T1E-1030G	24	<--->	T1E-1030G-1	1	<--->
T1E-1515G	20	<--->	T1E-1515G-1	1	<--->
T1E-1522G	18	<--->	T1E-1522G-1	1	<--->
T1E-1530G	16	<--->	T1E-1530G-1	1	<--->
T1E-1540G	8	<--->	T1E-1540G-1	1	<--->
T1E-2215G	12	<--->	T1E-2215G-1	1	<--->
T1E-2222G	12	<--->	T1E-2222G-1	1	<--->
T1E-2230G	12	<--->	T1E-2230G-1	1	<--->
T1E-2240G	4	<--->	T1E-2240G-1	1	<--->
T1E-3015G	12	<--->	T1E-3015G-1	1	<--->
T1E-3022G	12	<--->	T1E-3022G-1	1	<--->
T1E-3030G	12	<--->	T1E-3030G-1	1	<--->
T1E-3040G	4	<--->	T1E-3040G-1	1	<--->
T1E-4015G	8	<--->	T1E-4015G-1	1	<--->
T1E-4022G	8	<--->	T1E-4022G-1	1	<--->
T1E-4030G	8	<--->	T1E-4030G-1	1	<--->
T1E-4040G	4	<--->	T1E-4040G-1	1	<--->

Note: All T1E duct comes in 6.56 feet (2m) lengths.

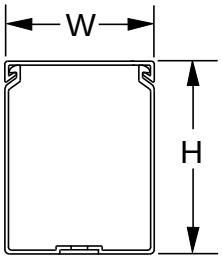
White Open Slot Rigid PVC (including cover)

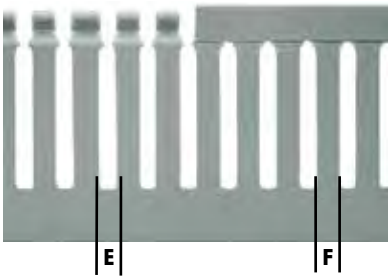
Catalog Number Standard Carton	Package Quantity	Price	Catalog Number Single Piece Pkg	Package Quantity	Price
T1E-1015W	18	<--->	T1E-1015W-1	1	<--->
T1E-1022W	24	<--->	T1E-1022W-1	1	<--->
T1E-1030W	24	<--->	T1E-1030W-1	1	<--->
T1E-1515W	20	<--->	T1E-1515W-1	1	<--->
T1E-1522W	18	<--->	T1E-1522W-1	1	<--->
T1E-1530W	16	<--->	T1E-1530W-1	1	<--->
T1E-1540W	8	<--->	T1E-1540W-1	1	<--->
T1E-2222W	12	<--->	T1E-2222W-1	1	<--->
T1E-2230W	12	<--->	T1E-2230W-1	1	<--->
T1E-2240W	4	<--->	T1E-2240W-1	1	<--->
T1E-3022W	12	<--->	T1E-3022W-1	1	<--->
T1E-3030W	12	<--->	T1E-3030W-1	1	<--->
T1E-3040W	4	<--->	T1E-3040W-1	1	<--->
T1E-4030W	8	<--->	T1E-4030W-1	1	<--->
T1E-4040W	4	<--->	T1E-4040W-1	1	<--->

Wiring Duct – T1E Thin Finger Series



Dimensions





Open Slot Rigid PVC (including cover) Dimensions				
Nominal Size (WxH) inches (mm)	***Catalog Part Number***	***Actual Size (WxH) inches (mm)***	***Dimension E inches (mm)***	***Dimension F inches (mm)***
1.00 x 1.50 (25.4 x 38.1)	***T1E-1015****	1.00 x 1.57 (25 x 40)	0.16 (4.06)	0.24 (6.10)
1.00 x 2.25 (25.4 x 57.15)	***T1E-1022****	1.00 x 2.36 (25 x 60)	0.16 (4.06)	0.24 (6.10)
1.00 x 3.00 (25.4 x 76.2)	***T1E-1030****	1.00 x 3.15 (25 x 80)	0.16 (4.06)	0.24 (6.10)
1.50 x 1.50 (38.1 x 38.1)	***T1E-1515****	1.57 x 1.57 (40 x 40)	0.16 (4.06)	0.24 (6.10)
1.50 x 2.25 (38.1 x 57.15)	***T1E-1522****	1.57 x 2.36 (40 x 60)	0.16 (4.06)	0.24 (6.10)
1.50 x 3.00 (38.1 x 76.2)	***T1E-1530****	1.57 x 3.15 (40 x 80)	0.16 (4.06)	0.24 (6.10)
1.50 x 4.00 (38.1 x 101.6)	***T1E-1540****	1.57 x 3.94 (40 x 100)	0.31 (7.87)	0.47 (11.94)
2.25 x 1.50 (57.15 x 38.1)	***T1E-2215G***	2.36 x 1.57(60 x 40)	0.16 (4.06)	0.24 (6.10)
2.25 x 2.25 (57.15 x 57.15)	***T1E-2222****	2.36 x 2.36 (60 x 60)	0.16 (4.06)	0.24 (6.10)
2.25 x 3.00 (57.15 x 76.2)	***T1E-2230****	2.36 x 3.15 (60 x 80)	0.16 (4.06)	0.24 (6.10)
2.25 x 4.00 (57.15 x 101.6)	***T1E-2240****	2.36 x 3.94 (60 x 100)	0.31 (7.87)	0.47 (11.94)
3.00 x 1.50 (76.2 x 38.1)	***T1E-3015G***	3.15 x 1.57 (80 x 40)	0.16 (4.06)	0.24 (6.10)
3.00 x 2.25 (76.2 x 57.15)	***T1E-3022****	3.15 x 2.36 (80 x 60)	0.16 (4.06)	0.24 (6.10)
3.00 x 3.00 (76.2 x 76.2)	***T1E-3030****	3.15 x 3.15 (80 x 80)	0.16 (4.06)	0.24 (6.10)
3.00 x 4.00 (76.2 x 101.6)	***T1E-3040****	3.15 x 3.94 (80 x 100)	0.31 (7.87)	0.47 (11.94)
4.00 x 1.50 (101.6 x 38.1)	***T1E-4015G***	3.94 x 1.57 (100 x 40)	0.16 (4.06)	0.24 (6.10)
4.00 x 2.25 (101.6 x 57.15)	***T1E-4022G***	3.94 x 2.36 (100 x 60)	0.16 (4.06)	0.24 (6.10)
4.00 x 3.00 (101.6 x 76.2)	***T1E-4030****	3.94 x 3.15 (100 x 80)	0.16 (4.06)	0.24 (6.10)
4.00 x 4.00 (101.6 x 101.6)	***T1E-4040****	3.94 x 3.94 (100 x 100)	0.16 (4.06)	0.24 (6.10)

***Color: add suffix "G" for light Gray**
***add suffix "W" for White**
Package: add "-1" for single piece package

Note: All T1E duct comes in 6.56 feet (2m) lengths.

Wiring Duct – T1E Thin Finger Series
Wire Fill Capacity

Wire Fill Capacity						
Nominal Duct Size (in inches)	12 AWG	14 AWG		16AWG	18 AWG	22 AWG
	Insulation Thickness (in inches)					
	1/32	3/64	1/32	1/32	1/32	1/64
	OD-0.158	OD-0.165	OD-0.139	OD-0.125	OD-0.113	OD-0.065
	Recommended Maximum Number of Wires per Wiring Duct (based on 50% fill capacity)					
1 x 1 1/2	31	28	39	48	59	180
1 x 2 1/4	45	40	57	71	85	261
1 x 3	59	53	75	92	113	341
1 1/2 x 1 1/2	51	46	65	81	99	299
1 1/2 x 2 1/4	77	70	98	121	148	449
1 1/2 x 3	102	92	130	160	196	593
1 1/2 x 4	125	113	159	197	241	729
2 1/4 x 1 1/2	78	70	99	123	150	453
2 1/4 x 2 1/4	114	103	146	180	221	667
2 1/4 x 3	156	141	199	246	302	912
2 1/4 x 4	194	176	247	306	375	1132
3 x 1 1/2	105	95	134	165	203	612
3 x 2 1/4	159	144	203	251	307	928
3 x 3	214	193	272	337	412	1246
3 x 4	267	242	341	421	515	1558
4 x 1 1/2	132	120	169	208	255	771
4 x 2 1/4	201	182	256	316	387	1171
4 x 3	270	244	344	425	520	1573
4 x 4	336	305	429	531	650	1963

Overview

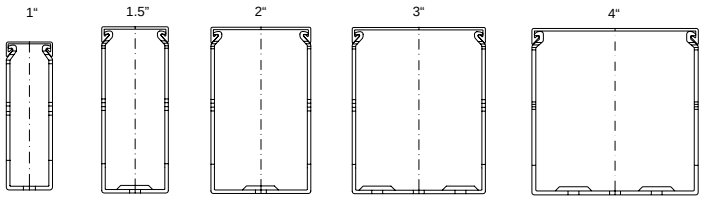
The base perforation of the T1E wiring duct series allows mounting on the panel with rivets (R6 or R4), or on DIN rail.

The recess bosses in the base permit rapid mounting of wire retainers (CL series), inserts (ZP2), and separators (SEP series) inside the wiring duct.

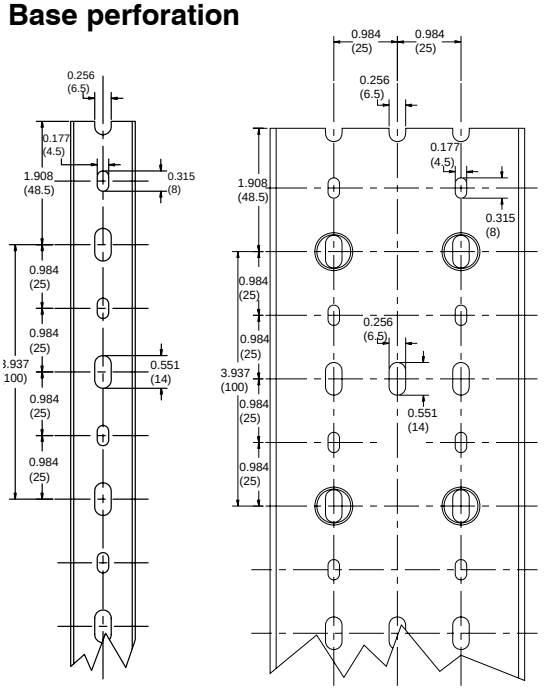
Note: Duct base perforation according to DIN 43659 and DIN VDE 0660 TEIL 506.

Dimensions

front section

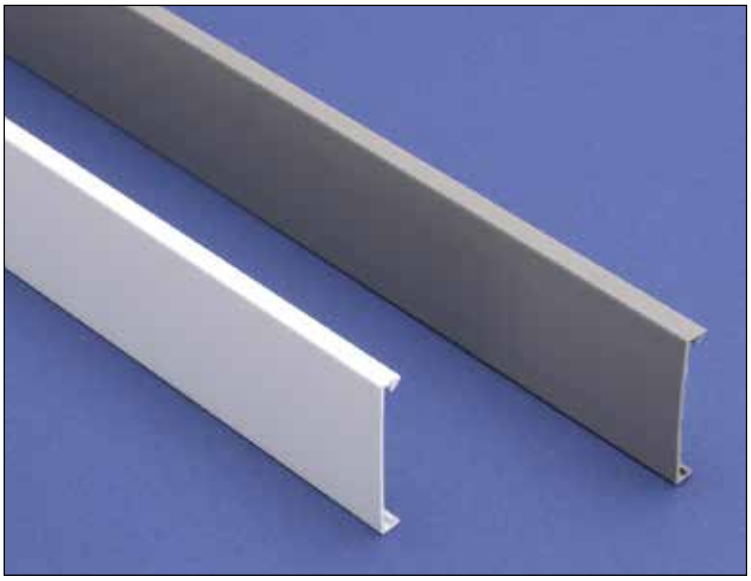


Base perforation



1", 1.5", 2" wide **3" and 4" wide**

Wiring Duct Cover



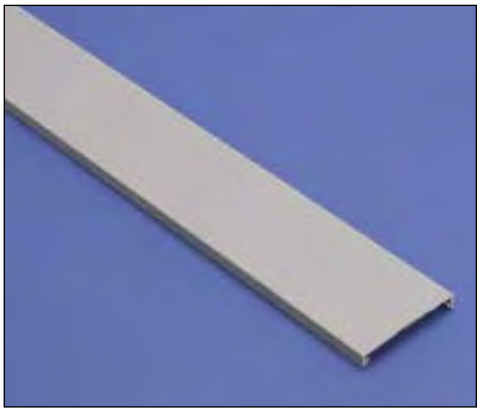
Duct Cover

Our standard wire duct products are supplied complete with covers. These replacement covers are manufactured from the same rigid self-extinguishing PVC material.

UL file E123572

Duct Cover Specifications					
Part Number	***Price***	***Description***	***Color***	***Standard Carton***	
				Pcs/Pkg	***Actual Total Length ft (m)***
COV-05G	<--->	Cover for 0.5” wide duct	Gray	25	164 (50)
COV-05G-1	<--->	Cover for 0.5” wide duct	Gray	1	6.56 (2)
COV-10G	<--->	Cover for 1.0” wide duct	Gray	25	164 (50)
COV-10G-1	<--->	Cover for 1.0” wide duct	Gray	1	6.56 (2)
COV-10W	<--->	Cover for 1.0” wide duct	White	25	164 (50)
COV-10W-1	<--->	Cover for 1.0” wide duct	White	1	6.56 (2)
COV-15G	<--->	Cover for 1.5” wide duct	Gray	25	164 (50)
COV-15G-1	<--->	Cover for 1.5” wide duct	Gray	1	6.56 (2)
COV-15W	<--->	Cover for 1.5” wide duct	White	25	164 (50)
COV-15W-1	<--->	Cover for 1.5” wide duct	White	1	6.56 (2)
COV-22G	<--->	Cover for 2.25” wide duct	Gray	25	164 (50)
COV-22G-1	<--->	Cover for 2.25” wide duct	Gray	1	6.56 (2)
COV-22W	<--->	Cover for 2.25” wide duct	White	25	164 (50)
COV-22W-1	<--->	Cover for 2.25” wide duct	White	1	6.56 (2)
COV-30G	<--->	Cover for 3.0” wide duct	Gray	25	164 (50)
COV-30G-1	<--->	Cover for 3.0” wide duct	Gray	1	6.56 (2)
COV-30W	<--->	Cover for 3.0” wide duct	White	25	164 (50)
COV-30W-1	<--->	Cover for 3.0” wide duct	White	1	6.56 (2)
COV-40G	<--->	Cover for 4.0” wide duct	Gray	20	131.2 (40)
COV-40G-1	<--->	Cover for 4.0” wide duct	Gray	1	6.56 (2)
COV-40W	<--->	Cover for 4.0” wide duct	White	20	131.2 (40)
COV-40W-1	<--->	Cover for 4.0” wide duct	White	1	6.56 (2)
COV-60G	<--->	Cover for 6.0” wide duct	Gray	20	131.2 (40)
COV-60G-1	<--->	Cover for 6.0” wide duct	Gray	1	6.56 (2)
COV-60W	<--->	Cover for 6.0” wide duct	White	20	131.2 (40)
COV-60W-1	<--->	Cover for 6.0” wide duct	White	1	6.56 (2)

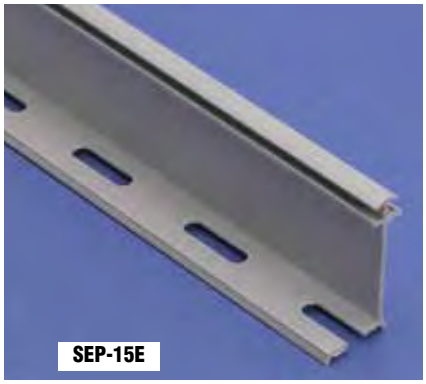
Note: Standard length of covers is 6.56 feet (2m) to fit T1, T1E and TSH duct.



Wiring Duct – Accessories

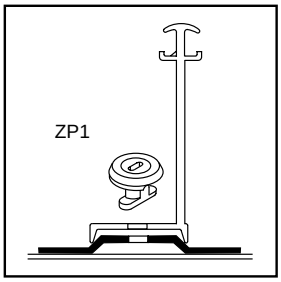
Duct Separators

Duct separators allow the physical separation of circuits within a single piece of duct. The various mounting arrangements allow alternate compartmentalization of duct and differing ratios of usable sections.



Duct Separators					
Part Number	Price	Description	Color	Standard Carton	
				Pcs/Pkg	Total Actual Length ft (m)
SEP-15E	<--->	Separator for 1.5" high duct, bulk pack	Gray	32	209.92 (64)
SEP-15E-1	<--->	Separator for 1.5" high duct	Gray	1	6.56 (2)
SEP-22E	<--->	Separator for 2.25" high duct, bulk pack	Gray	20	131.20 (40)
SEP-22E-1	<--->	Separator for 2.25" high duct	Gray	1	6.56 (2)
SEP-30E	<--->	Separator for 3.0" high duct, bulk pack	Gray	12	78.72 (24)
SEP-30E-1	<--->	Separator for 3.0" high duct	Gray	1	6.56 (2)

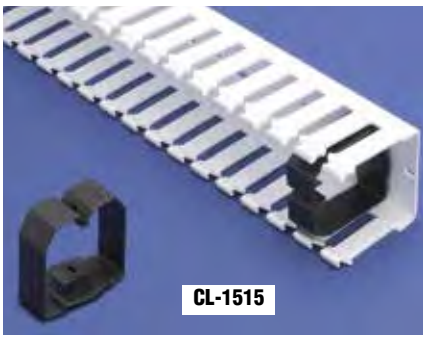
Note: Length of separators is 6.56 ' (2m).



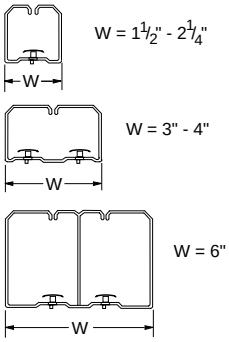
SEP-E Mounting detail
Order ZP1 mount separately

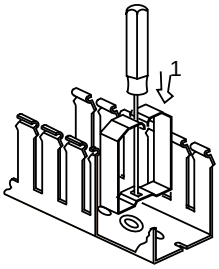
Wire Retainers

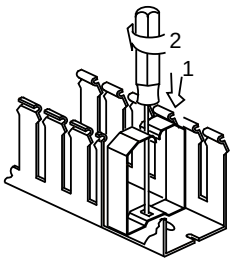
For holding wires during wiring operations, these retainers are essential. They allow easy access to the interior of the wiring duct during maintenance or alterations, while assuring that wiring bundles will not fall out when the duct cover is removed. Installed with a simple rotating movement, they anchor firmly in the recess boss in the duct base.

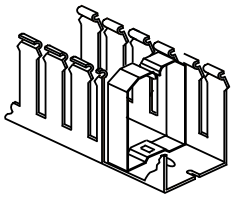


Wire Retainers				
Part Number	Price	Description	Color	Pcs/Pkg
CL-1515	<--->	Wire retainer fastener for 1.5" x 1.5" duct	Gray	40
CL-1522	<--->	Wire retainer fastener for 1.5" x 2.25" duct	Gray	40
CL-1530	<--->	Wire retainer fastener for 1.5" x 3.0" duct	Gray	20
CL-2215	<--->	Wire retainer fastener for 2.25" x 1.5" duct	Gray	40
CL-2222	<--->	Wire retainer fastener for 2.25" x 2.25" duct	Gray	20
CL-2230	<--->	Wire retainer fastener for 2.25" x 3.0" duct	Gray	20
CL-2240	<--->	Wire retainer fastener for 2.25" x 4.0" duct	Gray	20
CL-3022	<--->	Wire retainer fastener for 3.0" x 2.25" duct	Gray	10
CL-3030	<--->	Wire retainer fastener for 3.0" x 3.0" duct	Gray	10
CL-3040	<--->	Wire retainer fastener for 3.0" x 4.0" duct	Gray	10
CL-4015	<--->	Wire retainer fastener for 4.0" x 1.5" duct	Gray	10
CL-4022	<--->	Wire retainer fastener for 4.0" x 2.25" duct	Gray	10
CL-4030	<--->	Wire retainer fastener for 4.0" x 3.0" duct	Gray	10
CL-4040	<--->	Wire retainer fastener for 4.0" x 4.0" duct	Gray	5
CL-6040	<--->	Wire retainer fastener for 6.0" x 4.0" duct	Gray	5







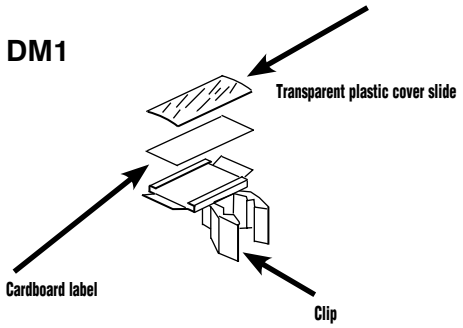


Wiring Duct – Accessories

Duct Marking Tags			
Part Number	**Price**	**Description**	**Pcs/Pkg**
DM1	<--->	Single-width white cardboard identification label for wiring duct. Supplied with black plastic mounting clip and transparent plastic cover slide	50

Note: DM1 marking tags can only be used with T1 series wire duct.

DM1



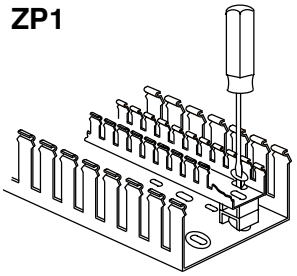
Identification Tags

Allowing easy identification of control gear and switchgear, these tags are mounted by snapping the clip onto the sidewall finger segments of the duct. No gluing - no drilling! After installation, they need not be removed during maintenance or any work which involves the removal of the covers.

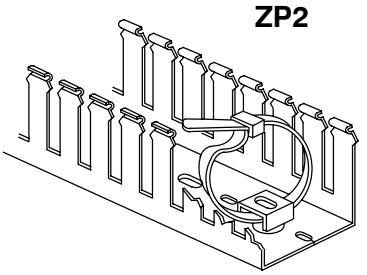
Note: Take care that clip is installed above the wires coming out to the sidewall slots.

Mounting Devices			
Part Number	**Price**	**Description**	**Pcs/Pkg**
ZP1	<--->	Round, white polyamide 'button' used to mount components and separators inside duct.	100
ZP2	<--->	Square white polyamide cable tie mount used to tighten a wire bundle inside duct.	50

ZP1



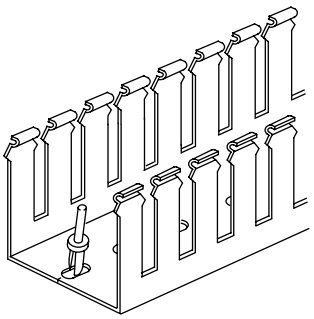
ZP2



Mounting Inserts

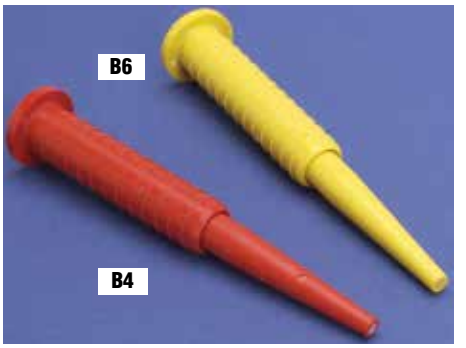
We carry mounts in two styles: ZP1 for mounting components and SEP-E separators inside duct, or for mounting small sizes of duct inside larger sizes (for separation of circuits with different functions); and ZP2, which is used with a cable tie to secure a wire bundle inside the duct.

Wiring Duct Rivets and Rivet Tools			
Part Number	**Price**	**Description**	**Pcs/Pkg**
R4	<--->	Blue polyamide rivet used to install all types of wiring duct with standard 4.5 mm [0.17 in] mounting holes.	250
B4	<--->	Red polyamide rivet tool used to install R4 rivets.	1
R6	<--->	Natural polyamide rivet used to install all types of wiring duct with standard 6.5 mm [0.26 in] mounting holes.	250
B6	<--->	Yellow polyamide rivet tool used to install R6 rivets.	1



Rivets and Rivet Tools

Wiring duct rivets install quickly and easily with the companion rivet tool, offering good temperature resistance and excellent mechanical properties. They can be used to install all types of wiring duct with standard mounting holes.



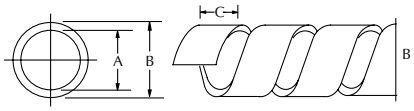
Wiring Duct – Accessories

Spiral Wrap

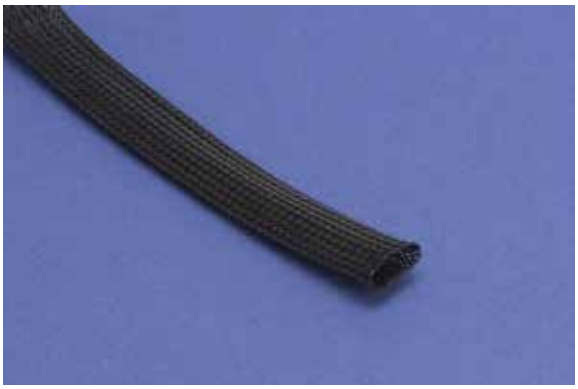
For neatly grouping wire bundles simply and economically, spiral wrap has no equal. Strong, yet easy to install, it protects the wire bundle, keeping it flexible though tightly contained. It is easily removed and reusable for temporary wiring.

Spiral Wrap				
Part Number	***Price***	***Description***	***Color***	***Length***
P-1	<--->	0.125" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/16 to 1/2 inch diameter.	Natural	160 ft./pack
PA1	<--->	0.125" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/16 to 1/2 inch diameter.	White	160 ft./pack
P-2	<--->	0.25" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/4 to 2 inch diameter.	Natural	80 ft./pack
PA2	<--->	0.25" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/4 to 2 inch diameter.	White	80 ft./pack
P-3	<--->	0.375" nominal o.d. Polyethylene spiral wrap used for wire bundles from 3/8 to 3 inch diameter.	Natural	80 ft./pack
PA3	<--->	0.375" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 3/8 to 3 inch diameter.	White	80 ft./pack
P-4	<--->	0.5" nominal o.d. Polyethylene spiral wrap used for wire bundles from 1/2 to 4 inch diameter.	Natural	65 ft./pack
PA4	<--->	0.5" nominal o.d. self-extinguishing Polyethylene spiral wrap used for wire bundles from 1/2 to 4 inch diameter.	White	65 ft./pack

Dimensions



Catalog Number		Dimensions in Inches			Wire Bundle Size in Inches	Feet per Carton
Polyethylene	***Flame-Retardant Polyethylene***	**A**	**B**	**C**		
P-1	***PA1***	.06	.12	.20	1/16 to 1/2	160
P-2	***PA2***	.16	.24	.31	¼ to 2	80
P-3	***PA3***	.31	.39	.47	3/8 to 3	80
P-4	***PA4***	.35	.47	.47	½ to 4	65



Braided Sleeving

This lightweight, expandable, self-extinguishing polyester sleeving has an open weave to allow maximum diameter expansion. It is super-flexible and easy to install, gripping objects of various shapes and sizes reliably. Abrasion-resistant, it provides extra protection against chemicals and flame.

Braided Expandable Sleeving Material Specifications	
Operating Temp	-50°C to +150°C (-58°F to +302°F)
Physical Properties	Self-extinguishing for UL 94V-2
Maximum Elongation	42%
Diameter Expansion	100%
Other	Halogen-free

Expandable Sleeving				
Part Number	***Price***	***Description***	***Color***	***Length***
TY-5	<--->	Braided expandable polyester sleeving, 0.197"(5mm) nominal i.d., 0.157"(4mm) to 0.472"(12mm) nominal range	Black	325 ft./pack
TY-10	<--->	Braided expandable polyester sleeving, 0.375"(10mm) nominal i.d., 0.315"(8mm) to 0.866"(22mm) nominal range	Black	325 ft./pack
TY-20	<--->	Braided expandable polyester sleeving, 0.750"(20mm) nominal i.d., 0.630"(16mm) to 1.378"(35mm) nominal range	Black	164 ft./pack
TY-30	<--->	Braided expandable polyester sleeving, 1.125"(30mm)nominal i.d., 0.984"(25mm) to 1.890"(48mm) nominal range	Black	164 ft./pack
TY-50	<--->	Braided expandable polyester sleeving, 2.0"(50mm) nominal i.d., 1.575"(40mm) to 2.825"(72mm) nominal range	Black	164 ft./pack

Wiring Duct – Material Specifications

Material Specifications								
Materials / ***Technical Characteristics***	***Test Standard***	***Unit of Measure***	***Rigid PVC***	***Polypropylene***	***PVC Molded Components***	***Polyamide 6***	***Polyethylene***	***Flame Retardant Polyethylene***
Chemical/Physical Properties								
Specific Gravity	ASTM D792	g/cm^3	1.55	1.01	1.32	1.14	0.92	0.97
H_2O 73.4°F Absorption	ISO 62	%	<0.1	0.02	<0.1	2.5	<0.1	<0.1
Formaldehyde	–	ppm	absent	absent	absent	absent	absent	absent
Cadmium	–	ppm	absent	absent	absent	absent	absent	absent
Mechanical Properties								
Tensile Stress at Break	ASTM D638	MPa	39	28	30	45	17	15
Traction Strength	ASTM D638	MPa	44	27	27	55	9.5	9
Elongation at Break	ASTM D638	%	130	200	97	250	400	600
Modulus of Elasticity at Traction	ASTM D638	MPa	4400	n/a	–	950	–	240
Modulus of Elasticity at Flexion	ASTM D790	MPa	3200	2100	–	1100	210	130
Thermal Properties								
Temperature VICAT	ASTM D1525	°C	84	95	70	198	89	–
HDT	ASTM D648	°C	72	60	60	185	–	–
Coefficient of Expansion	ASTM D696	K^{-1}	$6\ 10^{-5}$	10^{-5}	$8\ 10^{-5}$	$8\text{-}10\ 10^{-5}$	$22\ 10^{-5}$	10^{-5}
Specific Heat	ASTM C351	kJ/kgK	0.94	n/a	1.24	1.7	–	–
Thermal Conductivity	ASTM C177	W/mK	0.14	0.21	0.14	0.29	0.32	0.32
Electrical Properties								
Dielectric Constant	ASTM D150	–	3.2 - 4.0	2.5	3.2	5.0	2.4	2.3
Dielectric Strength	IEC 243	kV/mm	70	25	60	35	90	90
Surface Resistance	IEC 93	Ω	10^{13}	10^{13}	10^{13}	$5\ 10^{11}$	10^{13}	10^{13}
Self-Extinguishing								
Self-Extinguishing UL 94 1.6 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Self-Extinguishing UL 94 3.2 mm	UL 94	–	V-0	V-0	V-0	V-2	HB	V-2
Hot Wire Test (2 mm)	IEC 695-2-1	°C	960	960	960	650	650	850
Oxygen Number	ASTM D2863	%	43	30	34	25	–	25

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-126	5/22/2014		Spec 13 12 00 & 13 12 15 section 1.3	When reviewing Water Feature specifications 13 12 00 & 13 12 15, Section 1.3 of both specifications specifically list acceptable contractors severely limiting Bidders choice. Is the intent to only use noted contractors or are Bidders free to choose a qualified Water Feature contractor?	Listed contractors have been removed from the specifications and replaced with contractor qualification requirements. The revised sections were issued with ASI 118/Addendum #4.
TG10.4-148	6/25/2014	TE1-2102		Elevator Shaft B2260 is missing a telecom outlet for the door contact shown on SE1-2102. Is a telecom outlet needed? If so please provide direction.	The referenced TE-series drawing is accurate. Door contacts do not receive IP connectivity at the door.
TG10.4-149	6/25/2014	TE1-2105		Door B2521A is missing a telecom outlet for the door contact shown on SE1-2105. Is a telecom outlet needed? If so please provide direction.	SE and TE series drawings are complete and accurate. Door contacts do not require IP outlets.
TG10.4-150	6/25/2014	TE1-2106		Door B2521B is missing a telecom outlet for the door contact shown on SE1-2106. Is a telecom outlet needed? If so please provide direction.	Refer to the response to TG10.4-149.
TG10.4-151	6/25/2014	SE1-2202		Doors B1283A, B1222A, B1222B, B1258, B1236 do not show access control on SE1-2202 but TE1-2202 shows a IP Door Controller Outlet for each door. Please clarify.	SE and TE series drawings are correct and accurate. As indicated on SE1-2202, security devices for the area in question are depicted on SE1-2250. (Sheet SE1-2250 is Certain SSI (sensitive security information) and is available only on TJPA's secure website. Please refer to the NDA instructions on the TG10.4 contract page of TJPA's website.)
TG10.4-152	6/25/2014	TE1-2202		Doors B1229A, B1281A are missing a IP door controller outlet for the door's access control device as shown on SE1-2202. Is a IP door controller outlet needed? if so please provide direction.	At door B1229A, a telecom outlet will be added. A revised drawing will be issued in a future ASI/addendum. An outlet at door B1281A is not required for the door contact.

TG10.4-153	6/25/2014	TE1-2202		The metal security screen in IDF Room B1234 is missing a telecom outlet for the door contact shown on SE1-2202. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-149.
TG10.4-156	6/25/2014	TE1-2202		The overhead door at grid line H between grid lines 4 &5 is missing a telecom outlet for the door contact shown on SE1-2202. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-149.
TG10.4-157	6/25/2014	TE1-2202		The overhead door at grid line G between grid lines 3 &4 is missing a telecom outlet for the door contact shown on SE1-2202. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-149.
TG10.4-158	6/26/2014	TE1-2202		Doors B1288B, B1288C are missing a telecom outlet for the door contact shown on SE1-2250. Is a telecom outlet required? If so please provide direction.	The information in the referenced TE-series drawing is accurate. Drawings TE1-2202, SE1-2202, and SE1-2250 all match and are correct. (Sheet SE1-2250 is Certain SSI and is available only on TJPA's secure website. Please refer to the NDA instructions on the TG10.4 contract page of TJPA's website.)
TG10.4-159	6/26/2014	TE1-2202		Camera Type 5 in Room B1268 as shown on SE1-2250 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series drawings are correct and complete. Yes, a telecom outlet is required and can be found on drawing TE1-2201.
TG10.4-160	6/26/2014	TE1-2202		Camera Type 5 in Room B1269 as shown on SE1-2250 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-159.
TG10.4-162	6/26/2014	TE1-2202		Camera Type 5 in Room B1251 as shown on SE1-2250 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-159.
TG10.4-163	6/26/2014	TE1-2202		A gate door contact in Room B1233, as shown on SE1-2202, is missing a telecom outlet for the door contact. Is a telecom outlet required? If so please provide direction.	The information in the referenced TE-series drawing is accurate. Door contacts do not receive IP connectivity at the door, but the access control units shown on SE1-2250 do have corresponding IP outlets, as shown on TE1-2202. (Sheet SE1-2250 is Certain SSI and is available only on TJPA's secure website. Please refer to the NDA instructions on the TG10.4 contract page of TJPA's website.)

TG10.4-164	6/26/2014	SE1-2250		Access Control Device AC-LC-105 is shown in Room B1233 but it is unclear what the device is controlling. Please clarify.	The information in the referenced SE-series drawing is accurate. Access control device AC-LC-105 is not attached to room B1233; it is attached to room B1258 and indicates AC2 as the type of device for the door to that room.
TG10.4-165	6/26/2014	TE1-2202		Overhead Doors B1246B and B1246C, as shown on SE1-2250, are missing telecom outlets for the door contacts and overhead door interfaces. Is a telecom outlet required? If so please provide direction.	The information in the referenced TE-series drawing is accurate. No IP connectivity is required for these overhead doors. Armored door contacts are not IP-based at the door.
TG10.4-166	6/26/2014	TE1-5250		Camera Type 5 in Room B1232, as shown on SE1-2250, is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	Refer to the response to TG10.4-159.
TG10.4-167	6/26/2014	TE1-2203		Camera Type 5 at grid lines 6 and C as shown on SE1-2203 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series drawings are correct and complete. Yes, a telecom outlet is required and can be found on TE1-2203.
TG10.4-172	6/27/2014	TE1-2604		Camera Type 5 at the top of Escalator E407/408 (grid lines 17.2 & E) is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series drawings are correct and complete. Yes, a telecom outlet is required and can be found on TE1-2604.
TG10.4-173	6/27/2014	TE1-2607		Camera Type 3 at Grid Lines D and 32 as shown on SE1-2607 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series drawings are correct and complete. Yes, a telecom outlet is required and can be found on TE1-2607.
TG10.4-174	6/27/2014	TE1-2302		At grid lines 1 / B a pylon is indicated on the telecom drawings but the signage indicates that this sign type "PS1" is only to receive power. Clarification needed.	The outlet shown is for a weather sensor and not related to the actual sign. Please see the legend on TE-0010 for outlet types.
TG10.4-175	6/27/2014	A1-4302		(1) F25 Light Fixture shown on E1-4302 on the soffit at grid lines C.3 and 5 is not shown on architectural RCP A1-4302. Clarification needed.	Provide the light fixture as shown on drawing E1-4302. Drawing A1-4302 will be updated to show the light fixture and issued in a future ASI/addendum.

TG10.4-178	6/27/2014	E1-4505 & E1-3503	L119 Light Fixtures on Bus Deck for Glass Floor Above	The maximum distance allowed between the LED drivers and the L119 fixtures they serve is 71' according to the manufacturer's specs. Please confirm that the method of supplying power to the fixtures from the drivers will be the manufacturer's supplied cord of appropriate length supported free air securely attached to joints or seams on the glass. If not, please provide alternate details.	The L119 fixtures at the Roof Park glass floors have been deleted. Refer to the markups to architectural W-12 System drawings issued with MEP-TE-SE-VT IFB Addendum 4 (SKA-3478, SKA-3479, SKA-3480 & SKA-3481).
TG10.4-179	6/27/2014		QBD Response Set 5 TG10.4-93	The response to question number TG10.4-093 states that the 3/4" fire treated plywood shown on the security drawing is provided by others. Does this statement also apply to the electrical rooms? Please advise.	Yes. Plywood in electrical rooms is provided by others.
TG10.4-181	6/27/2014	E1-2403, E1-3403		The (4) duplex receptacles shown in IDF room 02380 are missing the circuit designations. Please advise.	These receptacles will be deleted in a future ASI/addendum.
TG10.4-182	6/27/2014	IFC Sheet A1-8531 dated 3/31/14		Provide confirmation that lateral bracing sleeve for fan assemblies are a standard manufacturer supplied product that eliminates the need for guy wires or other lateral bracing methods. If not, provide alternate confirmation and direction that lateral bracing sleeves are custom fabrications requiring engineering, custom fabrications and finished to match specified requirements including the grommet/trim finish for adjacent diffuser panels.	The pipe sleeve is not a standard manufacturer supplied product. The fan supplier shall design, detail and fabricate the lateral bracing to meet the design intent in drawings A1-8531 and A1-8536 and to comply with the seismic design criteria for non-structural components provided in Specification Section 01 80 50. A future ASI/addendum will clarify that lateral bracing sleeves are metal fabrications required to meet the design intent specified in Specification Section 09 51 23 and will expand on the requirements of light diffuser panels and lightbox.
TG10.4-184	7.11.2014	SE1-6000	Section 2.13 E & D	Will the Access Control Primary Server and the Secondary Access Control Server reside on separate network subnets?	Servers are intended to reside on a VLAN (virtual local area network) on the same subnet; however, it should be noted that the network has yet to be designed. Details will be finalized during network design.

TG10.4-185	7.11.2014	SE1-4000, Detail 1,2,3,4 and 6	28 13 00	Details 1,2 and 6 indicates only one IP connection provided by the Telecom contractor. With just one POE IP Connection, the owner would be sacrificing network terminal communication to either the reader or the IP Controller. Details 3 and 4 indicates two IP connections provided by telecom contractor. Three POE connections will be required in Detail 3 and 4 for door controller, intercom and for the reader. Please confirm that one more network connection will be added to detail 1,2,3,4 and 6.	SE-series drawings and specifications are accurate and correct. Card readers connect to IP controllers and do not require direct IP connections.
TG10.4-186	7.11.2014	SE1-4000, Detail 1,2,3,4 and 6	28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-187	7.11.2014	SE1-6002	28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-188	7.14.2014		28 13 00	The work station specification indicates serial, parallel and internal modem I/O. What specific video display port/ports are required for these work stations.	Workstation minimum requirements shall be per the access control system manufacturer's recommendation. Mobile workstation video display port/ports shall support the XGA display specified in Specification Section 28 13 00.
TG10.4-194	7.14.2014	SE1-6001	28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question contains Sensitive Security Information and is available only to bidders who have been granted access to the TJPA's secure website.*

TG10.4-196	7.14.2014	SE1-6001	28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-200	7.15.2014		25 16 00	VFD communication protocol specification indicates the use of Modbus. Please consider the use of Bacnet in lieu of Modbus.	BACnet in lieu of Modbus is acceptable.
TG10.4-204	7.15.2014		28 31 76	ECS/MNS Network is IP-based network, (implying ethernet) while Fire Management System Network is Proprietary RS485. Please describe whether these two systems will be on their own network conductors, a shared VLAN, or other method. Also please describe the network switches they will be routed through.	The ECS/MNS system is to be designed to operate on a shared VLAN network (refer to ECS/MNS Network Architecture Diagram No. 2 shown on drawing SS-9000). The autonomous control units (ACUs) are to communicate via the IP-based network infrastructure utilizing the communication protocols outlined in Specification Section 28 31 76 paragraph 2.1.G. As outlined in Specification Section 28 31 76/APA, communication from the ACUs to the fire alarm control unit is to be through the IP-based network infrastructure utilizing a network-to-dry contact interface. Switches for the shared VLAN are not addressed under the ECS/MNS Specification Section 28 31 76. The fire alarm system network is also a separate dedicated proprietary network; refer to Specification Section 28 30 02. The fire alarm system is expected to interface with the ECS/MNS ACUs (primary and back-up) through a fire alarm control TCP/IP interface unit that complies with NFPA 72—the national fire alarm and signaling code (refer to drawing sheet SS-9000).
TG10.4-205	7.15.2014		28 31 76	Does each ACU have a back up ACU installed?	No. Specification Section 28 31 76 requires that an ACU and a local operating console (LOC) be located in the primary security operations center (SOC) and also requires a separate ACU and LOC in the designated secondary SOC.

TG10.4-206	7.15.2014		28 31 76	How many hours of Supervisory back up and how many minutes of Alarm at the end of it?	As outlined in Specification Section 28 31 76 paragraph 2.3, all portions of the mass notification system are to be capable of operating on standby (rechargeable) battery power via UL 1481-compliant fire alarm-rated uninterruptable power supply (UPS). The standby battery capacity is to maintain the system in a non-alarm condition for 24 hours, followed by 15 minutes in full load alarm condition. Standby mode is defined under Specification Section 28 31 76 paragraph 2.2.D as follows: Standby mode shall be the normal mode when the mass notification system supervises the connections and internal components to maintain proper operation. Alert mode occurs when an emergency signal is initiated by the communication network interface or by an LOC. The power supply calculation method is outlined in paragraph 2.3.D of Specification Section 28 31 76. Each sub-system (e.g., public address system, fire alarm visual notification system, security system, message board display system) that is part of the ECS/MNS system capabilities is to provide its own standby power capabilities to meet the above criteria as part of the Transbay Transit Center ECS/MNS program. To comply with Specification Section 28 31 76 requirements, standby battery (UPS) power is to be capable of operating the ECS/MNS head-end control equipment as described in 28 31 76, including: 1. Primary autonomous control unit and associated user interface console 2. Backup ACU and associated user interface console 3. Interface modules 4. UPS battery chargers 5. Up to six local operator consoles to be located at designated locations (as determined by TJPA).

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Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-147	6/25/2014	TE1-2102		Door B2280A is missing an IP door controller outlet for the door's access control device as shown on SE1-2202. Is an IP door controller outlet needed if so please provide direction?	An IP controller outlet for door B2280A on drawing TE1-2102 at GL B.2 will be added.
TG10.4-154	6/25/2014	TE1-2202		Camera Type 5 at Grid Lines C and 5 as shown on SE1-2202 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series are correct and complete. A telecommunication outlet is required and can be found on TE1-4202.
TG10.4-155	6/25/2014	TE1-2202		Camera Type 5 at Grid Lines C.3 and 5.5 as shown on SE1-2202 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series are correct and complete. A telecommunication outlet is required and can be found on drawing TE1-4202.
TG10.4-161	6/26/2014	TE1-2202		Three (3) Camera Type 5s in Corridor B1226 are missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series are correct and complete. A telecommunication outlet is required and can be found on drawing TE1-4202.
TG10.4-168	6/27/2014	C1-2001		Sheet C1-2001 dated 3/31/2014 shows what appears to be a Telecom vault on the north side of Minna St. but it is not shown on 'A1' or 'TE1' drawings. If it is a Telecom vault and/or its part of the work, provide direction.	The telecom vault on sheet C1-2001 is an existing telecom vault, but it is not part of the scope of work of this contract. The telecommunication provider has not been determined at this time; therefore, any telecommunication work outside the building is not included in the scope of work.
TG10.4-169	6/27/2014	TE1-2402		Camera Type 5 at Grid Lines C and 2.4 as shown on SE1-2402 is missing a telecom outlet. Is a telecom outlet required? If so please provide direction.	SE1 series are correct and complete. A Telecom outlet is required and can be found on drawing TE1-4402.
TG10.4-170	6/27/2014	TE1-2402		Two (2) of Camera Type 5 at Grid Lines C and 5 as shown on SE1-2402 are missing telecom outlets. Are telecom outlets required? If so please provide direction.	SE1 series are correct and complete. A telecommunication outlet is required and can be found on drawing TE1-4402.
TG10.4-176	6/27/2014		Addendum # 4 dated 6/20/14 paragraph 2.7 28 16 00	Specification 28 16 00 Paragraph 2.7 requires a Knox Box Tamper Switch. 1.) Provide locations and/or elevations of all Knox Box(s); and, 2.) Provide Specification or relevant data as to type of required Knox Box(s).	1. Knox Boxes are located on Custom Pylons defined by Specification Section 28 16 44, Perimeter Security Systems, and indicated on sheets A1-2302 and A1-2303. 2. The Knox Box specification is included in Specification Section 28 16 44 as issued in ASI-0 121/Addendum 5.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-177	6/27/2014		Addendum # 4 dated 6/20/14 paragraph 1.5 & 1.6 25 05 00	Specification Section 25 05 00 Paragraphs 1.5 & 1.6 were revised in Addendum # 4 but only the Title of these sections were revised. The 'Alternate Price' as noted within the title was deleted but the body of the spec section still requires alternate pricing. Please clarify how pricing is to be defined – are they to be included within the base bid price, as an alternate price, or are pricing requirements to be deleted in their entirety?	Separate pricing for the listed items is to be provided. References to "Alternate Price" have been removed from the title and body of Specification Section 25 05 00 paragraphs 1.5 and 1.6, and language has been revised to clarify pricing, as issued in ASI-0121/Addendum 5.
TG10.4-180	6/27/2014	E1-2402, E1-3401	1 on pg E1-3401	The West Generator Room 02281 pull box dimensions are missing. Please advise.	Per Specification Section 26 05 35(3)(3), the TG10.4 Trade Subcontractor is to size pull boxes as required for conduit entrance and configuration.
TG10.4-183	7/11/2014		Section 2.13 E & D 28 13 00	Spec 28 13 00, 2.13 E calls for 1000 access cards to be provided by the contractor. Section 2.13 D requires cards to have optional multi-techonology formats such as proximity with,magnetic strip,smart chips, and/or bar code. Please confirm if every optional multi-technology format is to be incorporated in all 1000 access cards delivered.	The specifications are correct and accurate. All optional technologies listed are to be incorporated on all 1,000 cards delivered.
TG10.4-189	7/14/2014		Section 2.6, D 28 13 00	Card compatibility Section 2.6 D lists out the requirements for card readers to be compatible with three formats. PIV_II is mentioned, PIV has become an outdated lingo in the industry and not necessarily synonymous with either FIPS 201-1 or FIPS 201-2(Federal Information Processing Standards) . Please confirm which of the two standards are required for the cards and readers, FIPS 201-1 or FIPS 201-2?	FIPS 201-2 is the current and correct standard to employ.
TG10.4-191	7/14/2014		Section 2.6, D 28 13 00	The three access control card credentials specified meet homeland security criteria. Are the access control associated hardware components, panels and software then required to meet homeland security specifications as well?	Yes, access control associated hardware components, panels and software are required to meet Homeland Security criteria.
TG10.4-192	7/14/2014	SE1-6002, Detail-1	28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-199	7/14/2014	M1-6710,M1-7001	Termination Schedules	System Emergency Shut Down Switches indicated on Termination Schedules for AHU (M1-6710) and Miscellaneous(M1-7001). Please confirm these (5) Shut-Down Switches are the same.	Confirmed, these five shutdown switches are the same.
TG10.4-201	7/15/2014	M1-7001	Detail-2	Detail-2 on M1-7001 indicates control and monitoring of "Snorkel Dampers" and to see Mechanical Drawings for quantities and locations. Mechanical Drawings do not use the term "Snorkel" in any description. Please clarify location and quantities of "Snorkel Dampers".	"Snorkel dampers" will be changed to read "Outside Air Dampers." The following outside air dampers shall be included: 1. 42x20 duct serving SF-B2-A-1 (Level B2, gridline 2/F) 2. 14x12 duct serving SF-B1-A-4 (Level B1, gridline 1.4/H) 3. 20x14 duct serving SF-B1-A-3 (Level B1, gridline 5/F) 4. 50x32 duct (Level B1, gridline 14/G) 5. 50x32 duct (Level B1, gridline 14/C) 6. 38x38 duct (Level B1, gridline 22/G) 7. 38x38 duct (Level B1, gridline 22/C) 8. 28x28 duct (Level B1, gridline 30.5/D.8) 9. 40x28 duct (Level B1, gridline 30.5/D.8) 10. 12" dia. duct (Level 2, gridline 4/F.7) 11. 36x18 duct (Level 2, gridline 4/F.7)
TG10.4-210	7/16/2014		Page-4 , 1.7 N 28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-211	7/16/2014		Page-2, 1.1 28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				the TJPA's secure website and opening the relevant folder.	
TG10.4-212	7/16/2014	A1-3100(ASI # 118) & SKA 3584(ASI # 119)		Regarding the bollard control connection between the HPU and the Dock Master Offices, 1.) Shall the conduit run overhead and exposed, embedded within the deck, or is it a means & methods issue?; 2.) Where does conduit land in the office or is it too a means & methods issue? 3.) What size conduit is required to HPU connection? 4.) Is the connection only to be low voltage?	1. Conduit shall be embedded wherever possible. Achieving embedment is a means & method issue. 2. This is a means & method issue but provide enough flexibility to provide a data port anywhere along the interior of the office as coordinated with the Architect. Assume data port height as variable but under a maximum of 42". 3. Assume a maximum of 1-1/4" conduit. 4. Yes, the connection is to be low voltage only.
TG10.4-213	7/16/2014		Page-8,1.11 F.3 28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-216	7/16/2014		2.5H 28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-217	7/16/2014		Section 2.6 28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-220	7/16/2014		Page 20, 2.2 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

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TG10.4-221	7/16/2014		Page 20, 2.2 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-223	7/16/2014		Page 20, 2.2 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-226	7/16/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-227	7/16/2014	SE1 / SE1-6400 thu 6410	Page 5-2.1.A.2.a Resolution Target (Pixels / sf) 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-228	7/16/2014	SE1 / SE1-6400 thu 6410	Page 5-2.1.A.2.b Resolution Target (Pixels / sf) 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

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TG10.4-229	7/16/2014	SE1 / SE1-6400 thu 6410	Resolution Target (Pixels / sf) & Page5- 2.1.A.2 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-230	7/16/2014	SE1-2102 - Device # C-TP-003 Note#3)	Exhibit A - A1 Bid Form	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-231	7/17/2014		2.1.F-Video Storage Component 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-232	7/17/2014	SE1 - Security Drawings		*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-233	7/17/2014		2.1.D.2.O - Integral Video Analytics 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-235	7/17/2014	SE1 / SE1-6400 thu 6410	2.2 VAS 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-237	7/17/2014		2.1.D.2.o - Integral Video Analytics / 2.2 - VAS 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-239	7/17/2014	SE1 / SE1-6400 thru 6410	2.1.D.8 Redundant Archiver 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-240	7/17/2014		28 23 00 - 31 - 2.1.F.6.b. / 6.c / 6.e 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-241	7/17/2014		28 23 00 - 31 - 2.1.F.6.b. / 6.c / 6.e 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

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TG10.4-242	7/17/2014	SE1-6410 / SE1-2607	28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-244	7/17/2014	SE1-6408 / SE1-2502	28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-245	7/17/2014		2.1.D.7 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-246	7/17/2014		2.1.D.5 - Global Server 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-247	7/17/2014		2.1.E.5.b.11 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-248	7/17/2014		2.1.E.5.b.18-20 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-249	7/17/2014		2.1.E.1.h 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-250	7/17/2014		2.1.E.3.b.26 28 23 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-252	7/17/2014		Pg 20 - 2.2 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-253	7/17/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-254	7/17/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-255	7/17/2014		Pg 19 - 2.1.D.1.b.(3,4, 5 & 8) 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-256	7/17/2014		Pg 19 - 2.1.D.1.b.(1) 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-257	7/17/2014		Pg 19 - 2.1.D.1.b.(2) 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-258	7/17/2014		Pg 19 - 2.1.D.1.b.13, Pg 9 - 2.1.A.4.a.12.b, Pg 7 - 2.1.A.2.k 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-259	7/17/2014		Pg 19 - 2.1.D.1.b.12, Pg 9 - 2.1.A.4.a.12.c, Pg 7 - 2.1.A.2.k 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-260	7/17/2014		Pg 19 - 2.1.D.1.b.13, Pg 5 - 2.1.A.1.f, Pg 9 - 2.1.A.4.a.12.a 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-261	7/17/2014		Pg 19 - 2.1.D.1.b.13, Pg 5 - 2.1.A.1.f, Pg 9 - 2.1.A.4.a.12.a 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-262	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 7 - 2.1.A.2.k, Pg 8 - 2.1.A.4.a.11.b 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-263	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 8 - 2.1.A.4.a.11.c, Pg 17 - 2.1.A.14.e 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-264	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 8 - 2.1.A.4.a.11.d, Pg 17 - 2.1.A.14.e 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-265	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 8 - 2.1.A.4.a.11.g, 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-266	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 8 - 2.1.A.4.a.11.f, 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-267	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 8 - 2.1.A.4.a.11.i, 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-268	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 6 - 2.1.A.1.n 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-269	7/18/2014		Pg 5 - 2.1.A.1.h 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-270	7/18/2014		Pg 7 - 2.1.A.2.k, Pg 8 - 2.1.A.4.a.11.a 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-271	7/18/2014		Pg 7 - 2.1.A.2.k, Pg 8 - 2.1.A.4.a.11.a 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-272	7/18/2014		Pg 5 - 2.1.A.1.a, Pg 7 - 2.1.A.2.k, Pg 8 - 2.1.A.4.a.11.a 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-273	7/18/2014		Pg 8 - 2.1.A.4.a.11.e 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-274	7/18/2014		Pg 8 - 2.1.A.4.a.11.h 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-275	7/18/2014		Pg 8 - 2.1.A.4.a.11.k 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-276	7/18/2014		Pg 8 - 2.1.A.4.a.10 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-277	7/18/2014		Pg 8 - 2.1.B.2.a.5 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-278	7/18/2014		Pg 19 - 2.1.D.1.b.12, Pg 7 - 2.1.A.2.k, Pg 8 - 2.1.A.4.a.5 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-279	7/18/2014		28 40 00	*Is there a specific PSIM Specification/Matrix that needs to be filled or responded to as part of the RFP response?*	Per Addendum #5, Specification Section 28 40 00 is now provided for reference only and is not to be bid at this time.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-280	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-281	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-282	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-283	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-284	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-285	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-286	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-287	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-288	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-289	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-290	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-291	7/18/2014		28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-292	7/18/2014		Pg 8 - 2.1.A.4.a.11.j 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-293	7/18/2014		Project Bidding Manual - Deleted "G" - BIM	*With item "G" Building information Modeling being deleted from the Bid Manual that provides the requirements of what the trade packages responsibilities are: mean that BIM coordination and Exhibit F is not applicable. Please confirm? If not, please explain.*	BIM coordination is still required as noted in Exhibits A and F. The project bidding manual was revised to eliminate duplicative language.
TG10.4-297	7/18/2014		Exhibit F - Change Management	*At what point are the changes to be incorporated with the 4 and 5D process? Who determines time being added to a schedule and extended project costs? If TG10.4 is lead for BIM how are they to incorporate the 4 & 5D process? How are they to be reimbursed?*	The 4 and 5D requirements were removed in Exhibit F Rev. 2. See pages 3 and 4 of Exhibit F, Rev. 2 (attached).
TG10.4-298	7/18/2014		Exhibit F - BIM Coordination	For the MEP and FLS BIM coordination, how are different Trade Package's programs and versions to be handles throughout the project? Will a standard program and version be established?	See Exhibit F for software versions. Federated model will be coordinated with Autodesk BIM 360 Glue.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-301	7/18/2014		Exhibit F - BIM Coordination	Who is leading the overall BIM coordination for the various trade packages released, past, present, and future? Will Webcor/Obayashi provide a combined set of working drawings reflecting project information outside of this trade package?	Webcor/Obayashi Joint Venture is leading the overall, projectwide BIM modeling coordination effort. Webcor/Obayashi Joint Venture will provide electronic files of working documents as they become available.
TG10.4-304	7/18/2014		Exhibit F - BIM Coordination	Documents state the BIM details are to be level DOD 2; is this the equivalent of the BIM coordination LOD 350/400?	Yes, DOD 2 and LOD 350/400 have the same definition of Model detail.
TG10.4-305	7/18/2014		TG10.2, 10.3, & 10.5; Exhibit A & F	Exhibit A for these Trade Packages have no reference to Exhibit F for BIM requirements; are these Trade Packages excluded from following the Exhibit F requirements?	All Contract Documents are listed in Exhibit A. See Section VII. Contract Document List.
TG10.4-306	7/18/2014		TG10.4 Exhibit A - Interior & Lighting	Please update this section of Exhibit A to reflect the revised scope of work impacted by the QDB responses.	Exhibit A Scopes of Work will not reflect all QBD responses. It is the bidders' responsibility to read, understand, and incorporate QBD responses into their Bids. If prior QBD responses are not clear or do not fully address items of concern, submit another clarifying QBD prior to the QBD due date.
TG10.4-308	7/18/2014		ES-2110 & E1-3211	The profile view for the three conduit entering the south electric room is not shown on drawing ES-2110. The B profile view shows 4-6" and 4-2" conduit. Per the electrical plan drawing E1-3211 detail 2 and 5, it shows a set of 2-6" and 2-2" conduit for each of the three runs. Please advise on the number of conduit required for each run.	A total of 6-2" conduits and 6-6" conduits are required.
TG10.4-311	7/21/2014		Section 1.1E 28 31 76	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-313	7/21/2014		Section 2.1.D.1 28 31 76	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-316	7/21/2014		28 30 02	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-319	7/21/2014	M1-6704, Detail: Heat Pump	25BMCS 25 00 00	Who provides the shutoff valve? Notes from M1-6704 are not clear on that subject.	The shutoff valve comes with the unit. An interlock is required to open and close this valve. This requirement is clearly noted on the drawings.
TG10.4-325	7/21/2014		25 BMCS 25 01 00	Can we put panel 1-A-01 in IDF room 01362 instead of 01261? This would put it physically a lot closer to the I/O it has to pick up.	The location shall remain as shown in the bidding documents. An alternate location can be proposed as a value engineering item.
TG10.4-326	7/21/2014	M1-2403, M1-0052	Detail: Automated Draft Curtains. 25BMCS 25 01 00	Is there any BMS scope for ADC 2-A-1A/1B/2A/2B?	There are no controls requirements for these units.
TG10.4-327	7/21/2014	M1-0051	Detail Supply Fans. 25BMCS 25 00 00	There are 23 supply fans, 8 of which have VFD's. No control diagram or SOO. Please provide points list and SOO for these fans and advise if the VFD's need a software interface.	There are no controls requirements for these VFDs or software interface requirements. These VFDs are provided for soft start purposes.
TG10.4-328	7/21/2014	M1-0051, M1-6709	Detail Exhaust Fans. 25BMCS 25 00 00	The fan schedule on M1-0051 indicates that 7 exhaust fans have VFS's. The points list and control diagram on M1-6709 for "general exhaust" do not mention a VFS. Are the only hardwired points required for these 7 fans still just start/stop (DO) and status (DI)? Is a software interface required for the VFD's?	Start/stop and status are the only control requirements for these fans.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-331	7/22/2014		1.1.A.4 issued 3/31/14 05 50 00	Specification 05 50 00 1.1.A.4 indicates that electrical continuity and grounding for metal fabrications is included in 05 50 00, but give no further information on what is required. Please confirm no grounding of metal fabrications is required, or provide grounding requirements.	Grounding of metal fabrications is required for systems as follows: 1) System includes internal elements that require bonding (such as the dispenser bollards). Refer to product installation requirements. 2) System includes equipment that is called out to be bonded on the drawings (i.e., metal in the utility vaults). Refer to notes on the drawings. 3) Bonding is required by code to a specific application/use. Bond in accordance with applicable codes. Specification Section 05 50 00 paragraph 1.1.A.4 shall be revised to state: "Provide bonding where required by the specific equipment installation requirements or as required by other requirements of the project contract documents." Please note, the revision to Specification Section 05 50 00 paragraph 1.1.A.4 will not be issued prior to bidding.
TG10.4-332	7/22/2014	1/A1-7575, 7/A1-7579 & S1-5000		Details 1/A1-7575 & 7/A1-7579 dated 03/31/14 show a C-Channel for MEP unistrut support, furthermore detail 1/A1-7575 specifically identifies the C-Channel as support for MEP framing. 1/A1-7575 and 7/A1-7579 are not structural slab openings and therefore S1-5000 which marks out slab edge support requirements at openings in structural slabs does not apply to them. In addition, the C-channel shown spans further than allowed by typical structural details (12/S1-5003 allows a max. 8'x6' opening, and to "see plans for larger openings").Please confirm is it the intent for MEP TG10 packages to install these C-Channels and is it required at each floor line ? If so, please provide the size and method of attachment for the C –channel as steel of this size is not typically designed by or installed by MEP trade.	It is the intent that MEP TG10 series packages are to install these C-channels. The size of and method of attachment for C-channels to the structural framing is to be designed by the engineer hired by the MEP trade subcontractors.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-333	7/22/2014		1.6.B Issued 3/21/14 26 50 01	Specification 26 50 01 Paragraph 1.6.B requires unit and alternate pricing per Specification Section 26 50 02 but the reference specification does not address unit or alternate pricing requirements. Provide direction as to required unit and alternate pricing and the method to provide said pricing.	Since unit or alternate pricing has not been requested in Specification Section 26 50 02, unit or alternate pricing is not required.
TG10.4-334	7/22/2014		1.8.E Issued 3.21.14 26 50 01	Specification 26 50 01 Paragraph 1.8.E requires two weeks for submittals upon receipt of order. Due to project size and fixture quantities would four 4 weeks be acceptable for submittals.	Strike the current text for Specification Section 26 50 01 paragraph 1.8.E and replace it with "All submittals under paragraphs A through C above, manufacturer shall provide submittals per Specification Section 01 13 00, Submittals."
TG10.4-335	7/23/2014		Section 2.1 25 35 23	Specification indicates BMCS contractor to provide all non Fire Dampers. Mechanical drawings do not indicate which dampers are to be provided. Please clarify location and sizes of dampers to be provided.	The TG10.4 package only includes the controls portion for dampers. The physical dampers themselves, whether actuated, automatic or manual, are provided by the TG10.3 Trade Subcontractor as coordinated with the TG10.4 Trade Subcontractor.
TG10.4-343	7/25/2014		ASI 117, 118, 119	Considering the release of these ASI packages on 7-15 and the drawings contained within that note Addendum 3, and that the original Addendum 3 indicated that no drawings were reissued, we request a three week extension of the bid closing to 9/11 to ensure that these changes are included in the TG10.4 bid.	See Addendum #5 Exhibit A - Bid date was extended to September 18, 2014.
TG10.4-344	7/25/2014		ES Series	The Electrical Supply drawings issued in Addendum 4 by the SFPUC show the electrical supply duct bank running on top of the current CDSM shoring wall. The duct bank sits at an average depth of 4' below grade while the existing CDSM wall runs at an average of 1' to 2' above grade. Who is responsible for this demo scope of work to remove the CDSM wall to allow for install of the electrical supply duct bank?	The TG10.4 Trade Subcontractor is responsible to expose, demolish and dispose of the shoring wall as necessary for SFPUC duct bank installation. See Exhibit A page 23 for confirmation.
TG10.4-360	7/28/2014		Page 11 28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

Question No.	Submission Date	Drawing No.	Document / Spec. No.	Question	Response
TG10.4-361	7/28/2014		Page 11 28 13 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-363	7/28/2014	Drawing SE1-3001		*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-364	7/28/2014		Page 5 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-365	7/28/2014		Page 5 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-366	7/28/2014		Page 7 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

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TG10.4-367	7/28/2014		Page 7 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-369	7/28/2014		Page 9 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-370	7/28/2014		Page 14 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-372	7/29/2014		Page 18, 2.1 B. 1. B 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*
TG10.4-373	7/29/2014		Page 7 28 40 00	*This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.*	*The response to this question is available only to bidders who have been granted access to the TJPA's secure website.*

I. *Introduction*

Webcor/Obayashi Joint Venture is implementing a virtual building process for this project. This process will include building a digital, three-dimensional Building Information Model (BIM) linked to a project cost and labor productivity database, which will provide a platform for collaboration throughout the project's construction. In implementing this virtual building process as further outlined below, the Subcontractors will have the ability to analyze different construction sequences and methods for construction. In turn, the Subcontractor's provision of accurate virtual building data facilitates analysis and mitigation of potential costs and scheduling impacts.

The participants will adhere to the following guidelines in connection with this virtual building process. The costs of all management, administration, software, modeling, drafting, transmission, submittal, meetings, etc. for this process shall be the responsibility of the subcontractor and are included in this Subcontract.

II. *3D Modeling Requirements*

Subcontractors will be a part of a team that will meet at least bi-weekly, but not more than twice weekly, for coordination meetings to model the building and its systems, coordinate the work, and build the project virtually. The objectives of these meetings include the elimination of as many conflicts and clashes as possible and the development of reliable schedules that allow for efficient workflow and effective production control. The coordination meetings will occur in multiple phases and as described for Target Schedule Development (TSD) in Subsection IV, Item a, below, but shall precede the TSD at each listed phase.

Webcor/Obayashi Joint Venture will manage and lead the coordination process and assist the subcontractors in bringing the individual models together, running clash detection reports, and generally coordinating the process. The individual participants will be partners in this process, model their work, coordinate this with other trades and building components, obtain submittal approvals from the architect and engineers of record, and relocate/modify their systems as necessary when conflicts arise.

The 3D model consists of geometry control models generated and provided by Webcor/Obayashi Joint Venture and/or the Owner's design team from the 3D Database and system models generated and provided by the Subcontractors for their respective scopes of work. The system models, when integrated with the geometry control models, are referred to as the "Federated Model."

The Subcontractor's system models are the Subcontractor's sole responsibility. Prior to commencing any modeling, the Subcontractor must coordinate the initial model orientation with Webcor/Obayashi Joint Venture. All information in the system models shall be consistent with and based on the Contract Documents. The system model shall be maintained throughout the duration of the Project and updated to reflect as-built

conditions. The degree of detail and accuracy of the Subcontractor's system models shall be sufficient to enable accurate and complete clash detection as well as shop drawing extraction. Subcontractors will be required to print their shop drawings directly from the Federated Model, including dimensions, elevations and location of specific trade elements, based off of the building grid and/or coordinates. The printed material shall comply with the submittal requirements noted elsewhere in the contract documents. Lastly, to allow for model quantity extraction for cost and schedule information, the Subcontractor shall coordinate breakdown and classification of systems in the systems model with Webcor/Obayashi Joint Venture.

The Subcontractor's system models shall be fully compatible with Autodesk Revit, Tekla, or Graphisoft ArchiCAD in the version contemporaneously current with Subcontractor's initial submission of its system model, or the version immediately preceding the contemporaneously current version. It shall be the responsibility of the Subcontractor to maintain this compatibility at its own expense. If more trade specific software is required for a particular system model, Subcontractor must obtain Webcor/Obayashi Joint Venture's prior consent to utilize such software.

The Subcontractor shall transmit its system model to Webcor/Obayashi Joint Venture's BIM Coordinator who will manage the coordination process. The Subcontractor shall be required to perform clash detections and identify conflicts which shall be communicated to the Project team in a discrepancy report. Subcontractor shall review the identified conflicts as set forth in the discrepancy report and jointly develop conflict solutions and modify their system models accordingly. Trade coordination and model modification shall at all times remain a responsibility of each Subcontractor.

a. Modeling Schedule

Webcor/Obayashi Joint Venture will develop a Modeling Schedule showing modeling and coordination efforts required by all subcontractors in order to meet the construction and installation performance shown in the Exhibit I Project construction schedule. Subcontractor will be required to maintain its performance to meet the dates shown in the Modeling Schedule Subcontractor shall ensure that it provides adequate modeling and coordination manpower to maintain the modeling/coordination schedule.

b. Modeling Coordination Meetings

Subcontractor shall participate in BIM coordination and review meetings with Webcor/Obayashi Joint Venture. Subcontractors can expect these meetings to occur at least weekly or biweekly depending on the projects schedule needs. As a result of the information exchanged at such meetings, both the system model and the Work depicted in the Subcontractor's system model may be required to be changed by the Subcontractor to achieve coordination with other elements of the Project being provided by others. In accordance with General Conditions subsection 1.03.G, Subcontractor will be compensated for the associated BIM coordination efforts under the provisions for

Change Orders of Article 6. Subcontractor acknowledges that BIM coordination and review meetings will require attendance of personnel that are familiar with both the data entry aspects of the BIM as well as an understanding of the Work to be performed and its relation to other elements of the Project, and the Subcontractor therefore agrees that personnel conversant in both shall attend all such meetings.

III. Cost and Productivity Data

In addition to the 3-D modeling requirements set forth above, all Subcontractors shall provide accurate cost and productivity information to be imported into a project data base in order to facilitate 4-D (time dimension) and 5-D (cost dimension) modeling. This information shall be broken down such that line items describe work activities for each building system included in Subcontractor's scope of work.

a. Scheduling Information. Subcontractor shall provide detailed scheduling information including, but not limited to, the following:
    i. Provide a list of tasks which identify continuous activities that can be performed with other trades.
    ii. Provide a list of predecessor tasks for each above-defined task that needs to be complete before Subcontractor can start the subject task.
    iii. Provide a list of preferred minimum work areas breakdown. This breakdown shall be based on the minimum work areas that will be necessary for the Subcontractor to work efficiently.
    iv. Provide task and specific location-based activity assignments for each item in Subcontractor Submittal Register when submitted in accordance with Exhibit F, Item III.A.12.
    v. All information noted within this Item 'a.' shall be provided within 15 days of Subcontract award.

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~~b.~~ **DELETED** ~~Cost Information. Subcontractor shall provide detailed cost estimating information including, but not limited to, the following:~~
    ~~i. Provide a cost plan broken down into separate line items for each scheduled task defined as continuous Trade Subcontractor activity without interference from other trades and no less than one task per crew in each work area identified in the Project Schedule and coordinated with Subcontractor's task list per 4-D (time dimension) above.~~
    ~~ii. Each estimate line items shall provide labor, material and equipment pricing.~~
    ~~iii. Labor components shall include applicable hourly rate(s) and productivity in units per man-hour as well as crew composition.~~
    ~~iv. Material component shall be of sufficient degree of detail to provide unit pricing per estimate/schedule line item.~~

~~v. Equipment component shall include equipment type productivity in unit per machine hour as well as equipment unit cost.~~

~~vi. General conditions costs shall be listed as a separate line item.~~

~~vii. This information shall be provided within 15 days of Subcontract award.~~

~~c. Production Control Requirements.~~

~~i. Subcontractor shall participate in Production Control Phase Planning sessions as described at Item IV of this exhibit, below, and commit to certain performance based on production rates. By accepting the provisions of this section, Subcontractor expressly agrees to work collaboratively with other subcontractors to promote a high level of productivity and agrees to timely perform its Work so as not to cause delay or disruption of other subcontractors work.~~

~~ii. Subcontractor shall provide a written report on task progress for each task and at each location on a daily basis and as described in Exhibit F, Item III.B.10. The written report shall include the following Production Control related information for each task, and at each location:~~

~~i. Actual man hours worked~~

~~ii. Actual crew size and composition for each task, at each location.~~

~~iii. Each week, Subcontractor shall submit a marked-up schedule indicating the actual start and actual finish dates, as applicable, for each task, at each location.~~

~~iv. If a subcontractor fails to meet its required production rate, the Project Team will evaluate the need for additional resources.~~

~~v. Subcontractors will be required to commit to actions to restore required production rates (Control Actions) if the production rate is too low due to reasons within its own influence.~~

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IV. Project Scheduling and Production Control Phase Planning

Project Schedule, is a critical path method (CPM) schedule that shows the initial plan to construct the project. This schedule sets forth certain dates for performance and a general sequence of construction that is subject to change based on project requirements and as set forth in Section G of the Instructions to Bidders.
Because the BIM requirements contained in this exhibit provide an opportunity to develop a schedule that is optimized for subcontractor performance efficiencies, it is the intent of the Project Team to employ production control techniques to manage the day-to-day construction of the Project. This process will proceed generally in the following manner and is affirmatively acknowledged by Subcontractor as follows:

a. Subcontractor agrees to participate in phased Target Schedule Development (TSD) at completion of each of the following stages of Consolidated Model Development:
    i. TSD#1 – Foundation & Substructure
    ii. TSD#2 – Superstructure & Exterior Envelope

iii. TSD#3 – Mechanical, Electrical, Plumbing, Sprinkler (Fire) [MEPS]
iv. TSD#4 – Interior Finishes
v. TSD#5 – Commissioning

b. Phased Target Schedule Development (TSD) requirements:
   i. Subcontractor agrees that durations for Subcontractor's tasks at each location will be calculated based on quantities at each location divided by the Subcontractor's crew production rate
   ii. Subcontractor agrees to assist with optimization of the overall performance schedule for all trades, working from visualization(s) of labor flow using a Flowline chart (a modified Line of Balance schedule), to:
      i. Balance the number of crews to improve flow
      ii. Remove labor or material spikes to increase manageability and reduce site conflicts
   iii. Use risk analysis to determine buffer placement points and durations required to minimize risk

c. Subcontractor agrees to participate in Mid-Phase Re-optimization Development at least one (1) additional time following each of the TSD for phases of Consolidated Model Development described in Item A, above:
   i. Mid-Phase Re-optimization Development (MRD) requirements:
      i. Subcontractor agrees that durations for Subcontractor's tasks at each location will be calculated based on quantities at each location divided by the Subcontractor's crew production rate.
      ii. Subcontractor agrees to assist with optimization of the overall performance schedule for all trades, working from visualization(s) of labor flow using a Flowline chart (a modified Line of Balance schedule), to enable the following:
         i. Balance the number of crews to improve flow
         ii. Remove labor or material spikes to increase manageability and reduce site conflicts
         iii. Use risk analysis to determine buffer placement points and durations required to minimize risk

V. Miscellaneous Provisions

a. Model Ownership: In accordance with Article 2, subsection 2.07A, BIM files, and other computer files created for the Project shall be made and remain the property of the TJPA, including all intellectual property rights to all documents or materials.
b. Protection of Intellectual Property or Proprietary Information: Subcontractors who provide intellectual property and/or proprietary information which is incorporated into their models shall provide notification of the confidentiality of the information.

c. Other Subcontract Requirements: Subcontractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the Subcontractor of its responsibilities under the Subcontract, including, without limitation, to (i) coordinate its Work with the work of others involved in the Project and (ii) strictly comply with the other requirements of the Subcontract Agreement and the Contract Documents. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, other submissions shall be required of Subcontractor as required by the Contract Documents.

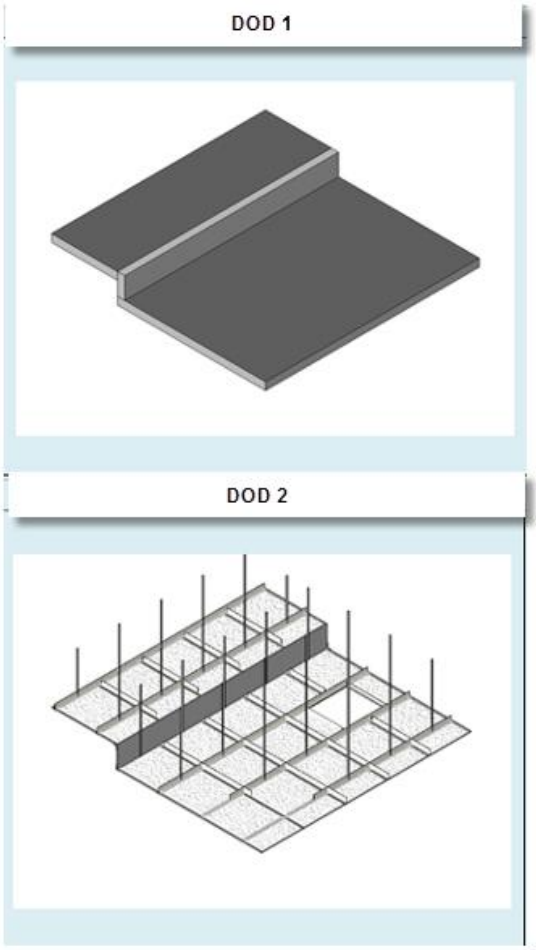
d. BIM Liability: Subcontractor acknowledges and agrees that the TJPA and Webcor/Obayashi Joint Venture shall incur no responsibility or liability with respect to the BIM or the use thereof, including that resulting from errors, omissions or deficiencies in the BIM. In the event that Subcontractor provides deficient information or data that does not represent the Work it will ultimately be providing, or that is corrupted in that the information transmitted contains a virus, and/or that otherwise damages the BIM, Subcontractor shall bear all costs associated with reconstructing the BIM and to otherwise remediate such deficiencies and their effects. In the event Subcontractor discovers an apparent error, inconsistency or omission in its information or submissions it shall notify Webcor/Obayashi Joint Venture within 72 hours and via written correspondence. In the event Subcontractor discovers an apparent error, inconsistency or omission in the information or submissions provided by others Subcontractor shall promptly request clarification of the same from Webcor/Obayashi Joint Venture, with a written Request for Information per General Conditions Article 6.03.

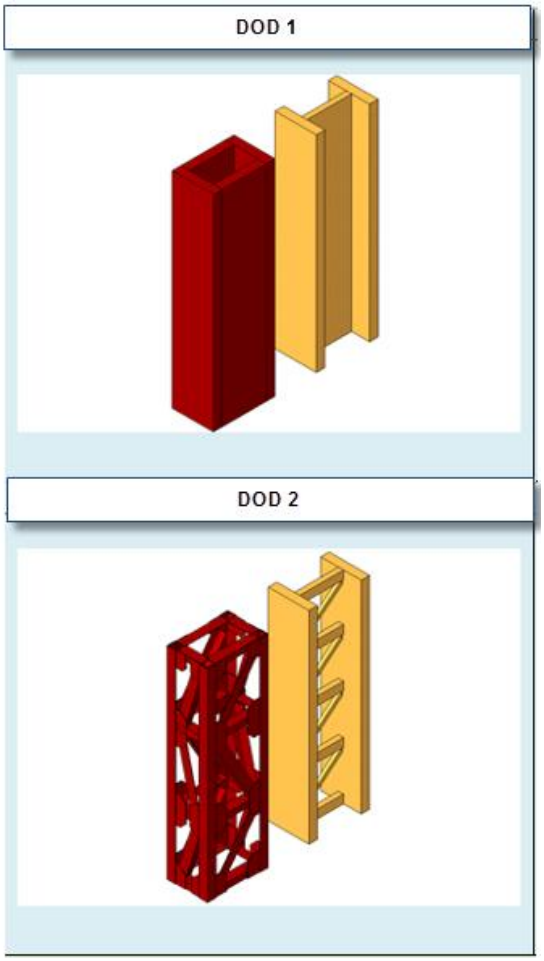
VI. Modeling Specification

a. The goal, through 3D coordination, is to create fully coordinated shop drawings derived from using the Models produced and coordinated by each discipline. These models would then be used for scheduling (4D) and cost management (5D) purposes. This section describes the **Degree of Detail (DOD)** to which each system will be modeled and whether the system should fall under the standard or high level category.

i. DOD 1 indicates standard degree of detail where elements match the approximate space and shape the element occupies or the space required to access equipment for maintenance. Accurate geometry of components with rectangular cross sectional geometry. Components of complex cross sectional geometry are approximated with simplified cross sections and modeled with accurate enveloping geometry. Composite structures are modeled with solids. Symbolic representation of fixtures, equipment, furniture and like.

ii. <u>DOD 2 indicates</u> a high degree of detail dimensionally accurate, and where applicable, manufacturer specific element (does not require manufacturing/fabrication detail – exterior envelope is required) Accurate geometry of components with rectangular and complex cross sectional geometry. The individual layers of composites are broken down to smaller components and built up piece by piece. Exact representation of fixtures, equipment, furniture and like. The model will include secondary components that may influence coordination, such as gusset plates, secondary steel members, hangers, braces etc.





Please refer to the Trade Specific BIM Requirements below for the list of systems that are required to be modeled.

VII. Change Management

Subcontractor will maintain its system model throughout the project duration, incorporating all changes that impact its Work. Subcontractor will update its Work as required through participation in the 3D coordination process outlined above. Subcontract may be required to re-extract shop drawings and prepare updated submittals to incorporate changes to its Work.

After each model update for a change package (e.g. ASI), Subcontractor shall archive a copy of its model before incorporation of further changes. Using versions of its system model, Subcontractor shall publish quantity deltas per system between models. Subcontractor will apply it's bought out unit rate for a particular changed system to the quantity delta to calculate the value of the change per the original contract. This value will serve as a baseline to enable change orders negotiations.

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-146	6/25/2014		28 30 02	Paragraph 2.1.B states Acceptable Fire alarm manufacturers by Siemens or Equal by Edwards or Notfier. SimplexGrinnell requests acceptance to support the Fire Alarm on this project and be considered as an equal Fire Alarm manufacturer to the names currently provided in the Specification.	Specification Section 28 30 02 2.1.B will be updated to read as follows: "1. Acceptable manufacturers: Siemens or equal by Edwards, or Notifier, or SimplexGrinnell."
TG10.4-190	7/14/2014		Section 2.19 A & C 28 13 00	Specification calls for double pole double throw relays and delayed action features in exit buttons. Locknetics 620/630 series exit buttons has been listed as the acceptable manufacturer in the specification but this product is not available with both DPDT(Double Pole Double Throw) and delayed action feature. Please confirm if this product is still acceptable.	Yes, this device will be acceptable.
TG10.4-193	7/14/2014		Section 2.22, F, e 28 13 00	Specs calls for Bosch ISN-CAS as an acceptable manufacturer for security tamper switch. This specified tamper switch has been discontinued, please suggest a replacement acceptable manufacturer for the same.	Bosch D110, Amseco TSW-2T, Primus Cable AL-GRI-4364-TS, or equal, are acceptable tamper switches.
TG10.4-195	7/14/2014		Section 2.1, I, 18a 28 13 00	How many visitor management licenses are required?	Assume fifteen (15) visitor check-in locations.
TG10.4-197	7/14/2014	Schedule SE1-6200, SE1-2250 & SE1-2303	Details-3/SE1-4000, 4/SE1-4000	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-202	7/15/2014	M1-6803	Detail-1	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-203	7/15/2014	M1-6708	Detail-2	Detail 2 indicates control and monitoring of "Train Box" vent fans and to see Mechanical Drawings for quantities and locations. Mechanical Drawings do not use the term "Train Box" in any descriptions. Please clarify location and quanitites of "Train Box" ventilation fans.	Train box ventilation fans include ventilation supply fans SF-B1-C-3, SF-B1-C-4, SF-B2-B-1 and SF-B2-B-2 serving the train box Levels B1 and B2. Refer to notes on fan schedule on sheet M1-0051.
TG10.4-207	7/15/2014	M1-6802	Detail-4	Fire Alarm Points- Termination schedule indicates (12) points per floor. Please confirm the quantity of floors is (5) i.e, B2, B1, Ground, Second, Bus Deck	Yes, the quantity of floors is five (5). However, as explained on our drawing M1-6802 Detail 4, Note 1, the BMCS subcontractor should coordinate the actual fire alarm panel locations with the fire alarm drawings.
TG10.4-208	7/16/2014		Division 25, 27, &28 25 00 00	Johnson Controls and Honeywell are an acceptable manufacturer for the BMCS system but aren't mentioned in several of the interfacing Division 27 and 28 Specifications. Since Specification Divisions 25, 27 & 28 will interface at various levels with one another will Johnson Controls and/or Honeywell be an acceptable manufacturer for any/all Specifications Sections 27 & 28 or only portions thereof?	This is a substitution request. Please complete and submit the attached prebid substitution request form with a follow up QBD so that the substitution request can be properly evaluated by the design team.
TG10.4-209	7/16/2014		Part 2 2.1 A-6 Page 5 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	Refer to the response to TG10.4-208.
TG10.4-214	7/16/2014		Page-8,1.10 L.3 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	
TG10.4-215	7/16/2014		Section 2.4 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-219	7/16/2014		Section 2.7 C.2 Custom Smoke 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-234	7/17/2014		2.1.D.2.o - Integral Video Analytics/2.2-VAS 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-236	7/17/2014	SE1 / SE1- 6400 thu 6410	2.1.D.2.o - Integral Video Analytics 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-238	7/17/2014		2.1.D.1.a / 2.1.D.3 - 2.1.D.14	This question contains Sensitive Security Information and is available only to bidders who have been granted	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
			28 23 00	access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	
TG10.4-294	7/18/2014		"Exhibit F II & TG10.4 Exhibit A 3 BIM Coordination"	Exhibit F states that Webcor/Obayashi will manage and lead the coordination for BIM, but the Trade Package TG10.4 states that this trade will be the lead for BIM coordination. Please provide a clarification of what takes precedence as we assume all the other trade packages have Exhibit F but do not have TG10.4 requirements which leaves us to assume that Webcor/Obayashi will take the lead and manage BIM.	Correct. Webcor/Obayashi Joint Venture is responsible for overall BIM coordination. The TG10.4 Trade Subcontractor is only responsible as team leader of the MEPS BIM coordination efforts under the auspice of Webcor/Obayashi Joint Venture. Other trades that are impacted by or affect the MEPS coordination efforts will be included in the overall BIM coordination effort when necessary.
TG10.4-295	7/18/2014		Exhibit F VII - Change Management	IF TG10.4 is responsible for overall lead of the BIM modeling, what is the lead's responsibility with regards for change management? How will they be reimbursed?	The TG10.4 Trade Subcontractor is the team leader for the MEPS modeling effort. Webcor/Obayashi Joint Venture is responsible for the overall project change management efforts. For concerns on change management, see Article 6 in Specification Section 00 07 00 for definition of what constitutes changes in the work along with Exhibit F Section VII. Change Management.
TG10.4-296	7/18/2014		Exhibit F VII - Change Management	How are changes going to be handled; whereas a trade specific change is issued but impact to another trade's scope is not realized until the shop drawings are presented for coordination and reviewed by other Trades?	Conditions raised in this QBD introduce too many variables to address in a single response. Changes relating to scope impacts of revisions not realized until full coordination efforts are complete can only be addressed on a case-by-case basis, using Specification Section 00 07 00 as a guideline along with Exhibit F Section VII. Change Management to determine changes in the work.
TG10.4-299	7/18/2014		Exhibit F - BIM Coordination	If TG10.4 is responsible for the overall lead of the BIM coordination, are they going to be reimbursed for program and version conversions to establish a common working platform?	All coordination will be conducted through Autodesk BIM 360 Glue. All BIM team members shall use compatible software noted in Exhibit F that allow exporting models into formats that can then be imported into Autodesk BIM 360

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
					Glue without version conversions. Reimbursements are not necessary and will not be considered.
TG10.4-300	7/18/2014		Exhibit F - BIM Coordination	If TG10.4 is responsible for the overall lead of the BIM coordination are they going to be reimbursed for licensing, program and version conversions as related to maintaining the overall BIM coordination?	The fee associated with using Autodesk BIM 360 Glue is $100/per user per month. Example: one user per year is $1,200, and 5 users per year is $6,000. All fees projected for use throughout the project are to be included within the Base Bid Price.
TG10.4-302	7/18/2014		Exhibit F - BIM Coordination	How is the overall project information being coordinated from the various Trade Packages released, past, present, and future as it relates to the trades BIM coordination?	Webcor/Obayashi Joint Venture will be maintaining a master BIM model that includes all final and approved modeling coordination through real time updating in BIM 360 Glue. All personnel with access to BIM 360 Glue can access, view and update the Model in real time. See Exhibit F for more detail on the process.
TG10.4-303	7/18/2014		Exhibit F - BIM Coordination	Confirm that the trade BIM coordination does not include the 4 and 5D, but only 3D, and that each Trade is responsible for their individual 4 and 5D requirements.	Confirmed. 4D and 5D requirements were removed in Exhibit F Rev. 2. See pages 3 and 4 of Exhibit F Rev. 2 (attached). Scheduling itself is still required but only as a parallel exercise independent of the model itself.
TG10.4-307	7/18/2014			With this Federally funded project under the direction of a joint authority; please define the agencies this Trade Package will be responsible to for; licenses, fees, inspections, and certifications?	All licensing, fees, inspections, and certifications requirements are addressed throughout the Divisions 00 and 01 specifications, but most can be specifically located in Specification Sections 00 05 20, 00 05 20A, 00 07 00, 00 08 13, 01 10 20, and 01 14 10/APA.
TG10.4-312	7/21/2014		Section 1.11.6 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-317	7/21/2014		28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	
TG10.4-318	7/21/2014		Section 1.10.A 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-321	7/21/2014	M1-6707	CRAC Units. 25 BMCS 25 01 00	What communication protocol does the BMS use to interface with the "Site Link". For the CRAC's (i.e. BACnet or Modbus). Please confirm the integration will be over IP. How many "Site Link" integrations are there? Are there any sensors, actuators, etc that the BMS contractor needs to install and wire for the CRAC's?	The communication protocol is indicated clearly in the BMCS specifications. Refer to Specification Section 25 16 00. Software Interfaces. All sensor requirements, quantities, etc., are identified on drawing M1-6707.
TG10.4-324	7/21/2014	M1-2202	Detail: AHU. 25BMCS 25 00 00	Does AHU come with any sensors or controls? Can a BMS controller and transformer be located at AHU-B1-A-1 in room B1283? It would need 120VAC (x2) and Ethernet by others.	This is the AHU required for the security operations center. All control requirements (sensors, sequences, etc.) are outlined in detail on drawing M1-6710. The AHU controller should be located near the unit.
TG10.4-339	7/23/2014		28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-340	7/23/2014		28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				responses by logging into the TJPA's secure website and opening the relevant folder.	
TG10.4-341	7/23/2014		28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-342	7/23/2014		28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-346	7/25/2014	E1-0064,2102,3102		On drawing E1-2102, feeder FE012 is shown as "NIC". The feeder schedule nor the enlarged plan drawing for the ATS-B2-A-LRS does not state this feeder or equipment is "NIC". Please advise.	This feeder should not be noted as NIC. See the attached sketch SKE-RFI-TG10.4-346-1.
TG10.4-349	7/25/2014		General	Is an Air Quality Permit required for this project's generators? If so, have the design engineers made their application to the AHJ?	Per Section 26 32 13 paragraph 1.1.B requirements, "It shall be the responsibility of the Contractor to complete the Local Air Quality Management District permits. The generator set supplier shall provide the required engine manufactures data sheet and assist with other technical data requirements required to complete the permit submission application."
TG10.4-350	7/28/2014	TE-8011, Detail-1-6	Para 2.2 27 05 29	Specific to the "Double "U" Channel Grid", Will drawings be provided for the seismic grid showing a layout for each MDF, IDF and TSER (e.g. top view)?	No, plan views will not be added. Coordinate based on elevations and layouts already provided in the drawing set.
TG10.4-351	7/28/2014		Para 2.1.A 27 11 16	Specific to "Equipment Cabinets", the specification lists Chatsworth and Ortronics. You also list B-Line product throughout this specification. Will B-Line	Refer to the response to TG10.4-208.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				Equipment Cabinets be allowed as acceptable equal if they meet the same description?	
TG10.4-352	7/28/2014		Para 2.3.A 27 11 16	Specific to "2-Post Telecom Racks", the specification lists Chatsworth, Ortronics and Siemon Company. You also list B-Line product throughout this specification. Will B-Line 2-Post Racks be allowed as acceptable equal if they meet the same description?	Refer to the response to TG10.4-208.
TG10.4-353	7/28/2014		Para 2.1 27 11 19	Specific to "Optical Fiber Termination Panels", Specification Section 27 11 19 – 2.1.A the Manufacturers list includes Corning, Ortronics, and Siemon Products. You also list Leviton as an acceptable manufacturer for Copper Systems and for Optical Fiber Patch Cords. Can Leviton Optical Fiber Termination Panels, Adapters, Connectors, and Pigtails be used as well? Additionally, Leviton along with Berktek Optical fiber will provide for an equal or better product and carry a lifetime manufacturer's warranty exceeding the 20-year requirement that is listed.	Refer to the response to TG10.4-208.
TG10.4-359	7/28/2014	SKT-1071 to SKT-1076	Para 2.4 27 11 23	Specific to "Textile Innerduct (Maxcell)", with the deletion of multiple IDF/TR Rooms in Addendum 4, please confirm that the textile innerduct will still be required to be installed to these IDF locations for future use.	Yes, all pathways, including innerduct, are to be installed per specs and drawings.
TG10.4-368	7/28/2014		Page 8 28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-374	7/29/2014		Para: 2.8.A 27 11 16	Specific to "36" H Wall/Floor Mount Cabinets", the specification lists Chatsworth, and Ortronics. You also list B-Line product throughout this specification. Will B-Line Wall-Mount	Refer to the response to TG10.4-208.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				Cabinets be allowed as acceptable equal if they meet the same description?	
TG10.4-390	7/31/2014	M1-6706, M1-2305	Radiant Floor System 25 00 00	The points list on M1-6706 lists space humidity, but humidity is not mentioned in the SOO. On M1-2305 no space humidity sensor is shown in the radiant floor area. Please advise if a relative humidity sensor is required and if so, how many?	A humidity sensor is not required.
TG10.4-391	7/31/2014	M1-6803	CBRN Detection Systems 25 00 00	M1-6803 shows 8 DI points and 8 DO points "per CBRN sensor location". Please advise how many CBRN sensors there will be. If possible please provide the location of each so it can be determined which BMS panels the points will be wired to.	Sensor locations and quantities are denoted on the electrical and telecom drawings with junction boxes and conduit provisions.
TG10.4-394	7/31/2014	M1-6902	Irrigation Water 25 00 00	4/M1-6902 shows 2 DI alarm points for "irrigation water pump alarm" and "irrigation water pump low suction alarm". The diagram shows 3 pumps. Will there be 2 alarms for each pump (total of 6), or just 2 alarms for the whole pump skid? Also, please provide the location of the irrigation water pumping kid so it can be determined which BMS panel the points will be wired to.	There will be two alarm points for the irrigation pump skid controller. The irrigation water booster pump skid is located in room B2225 on the train platform level.
TG10.4-395	7/31/2014	M1-2305, M1-6704	Grand Hall CO2 25 00 00	On M1-2305 there are 4 temperature/CO2 combination sensors shown. The SOO and points list on M1-6704 does not list a CO2 sensor, only a button-type temperature sensor. Please advise if CO2 monitoring is required in the grand hall.	Yes, CO2 monitoring is required in the Grand Hall.
TG10.4-401	8/1/2014		National Electrical Code	Please provide what version of NEC this project is to follow. Version determination could have significant impact on Fire Pump Switchgear.	2007 California Electrical Code (which is based on the NEC 2005) is the applicable code.
TG10.4-403	8/1/2014		Exhibit A, Add 4, page 25, Skylights & Glazing Systems	In Exhibit A, Addendum 4, page 25, under Skylights & Glazing Systems it states, "Furnish and install light fixture LE211 on the W-1 Exterior Awning System with surface run conduit and junction boxes as coordinated with Glazing Trade Subcontractor. This Trade	Downlight Fixtures LE211 shall be furnished and installed by the TG10.4 Trade Subcontractor as coordinated with the glazing subcontractor. Actual complete mounting assembly profiles and how they are attached to the W-1 system are to be determined and should

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
				Subcontractor shall then provide all required power, provide all fixture mounting assemblies as coordinated with Glazing Trade Subcontractor and final installation of fixtures." These fixtures per detail on A1-8148 need to be installed by the Glazing contractor. Please confirm.	be addressed under a separate TG10.4 QBD.
TG10.4-404	8/1/2014			The TG10.4 package interfaces with most of the other packages, and in order to provide pricing, per document statements such as, "Trade Subcontractor is responsible for reviewing and coordinating its work with all supplementary information provided." And, "It shall be understood that the Trade Contractor is responsible for compliance with any requirement in the Bidding Documents." Is it possible to make all packages available without having to purchase them? At a minimum please provide them in the drop box all current E, TE, SE drawings for Bus Ramp, TG10.4, Architectural and Structural drawings.	Webcor/Obayashi Joint Venture has worked with the printer (Arc) to make available all documents in PDF format and provided on CD/DVD for the end user's ease of use, review and internal printing when necessary.
TG10.4-405	8/1/2014			Temporary Power; there are a number of unknowns that impact the temporary power: such as staging, phasing, revision to scope via addendums, and subcontractor requirements. Please consider providing an allowance for the temporary power.	Base bid temporary power scope shall be included in the Base Bid price. No allowances will be issued for temporary power. If future addendums or other subcontractor requirements arise beyond that established within the Base Bid scope, they will be treated as a change condition whenever warranted. Regarding staging and phasing, these will be finalized during distribution planning per scope requirement under item #4 on page 10 of TG10.4 Exhibit A.
TG10.4-406	8/1/2014		Detail(s): Exhibit A, Add 4	Addendum 4 Exhibit A deletes the park and the landscape lighting, but references ground level landscape lighting still remains, where is the ground level landscape lighting located for TG10.4?	The exterior ground lighting is as shown on a combination of the current landscaping, architectural and electrical drawings. Shaw Alley contains the bulk of the work scope.
TG10.4-407	8/1/2014	E1-2602,2606,5001,		On drawing E1-2602 and E1-2606, the company switches are not shown on	Refer to attached sketches: SKE-RFI-TG10.4-407-1 and SKE-RFI-TG10.4-407-

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
		& 5003		addendum #4. There are no new changes to the single line drawing E1-5001 and E1-5003. Is the company switch deleted from this bid package? Please advise.	2. The company switches are NIC. Provide conduit and terminate at locations shown on the plans. Cap the conduit for extension in future scope.
TG10.4-408	8/4/2014	E1-2606		There is a pull box symbol at grid line (25,D.8). Should this symbol look similar to the other symbol types shown on the plan for numbered note 2? Please advise.	No. This symbol denotes a pull box and shall be located inside the building. The other symbol denotes a temporary structure that will be the termination point for branch circuit conduits to be extended in the future.
TG10.4-410	8/4/2014		01 10 30/APE, Exhibit A - Sch of Bid $$ 01 10 30 /APD	Add 4 updated the Schedule of Bid Prices in Exhibit A, but did not update specification section 01 10 30/APD and 01 10 30/APE which provide the scope descriptions. Please provide specification sections 01 10 30/APD and 01 10 30/APE updated to be consistent with the Add 4 issued Schedule of Bid Prices in Exhibit A.	Specification Section 01 10 30/APD was issued under TG10.4 Addendum #4 package with a revisions date of 6/20/14. Specification Section 01 10 30/APE was not updated for Addendum #4 but reflects the same alternate number requirements as 01 10 30/APD. Specification 01 10 30/APD is the most current information for Alternate pricing and is reflected in the Exhibit A Schedule of Bid Prices as issued under Addendum #5.
TG10.4-412	8/4/2014	E1-4602 (Add 4), Numbered Note 6		Add 4 drawing E1-4602 shows an area of work identified as "NIC." This area includes all the exterior light fixtures, but also includes the interior light fixtures for the Service Elevator Vestibule, the Janitor's Closet & Storage, the Men's & Women's Restrooms, and the Service Corridor. Just inside the Service Elevator Vestibule is Numbered Note 6, which reads, "Part of scope of work." Please confirm the work shown in the Service Elevator Vestibule, the Janitor's Closet, the Restrooms, and the Service Corridor are to be included in the bid per similar areas on the roof.	Note 6 applies only to the F6 light fixture located between the elevators and the keyed switch on the wall just south of gridline D in the (NIC) hatched area. All other light fixtures and devices in the Service Elevator Vestibule, the Janitor's Closet, the Restrooms, and the Service Corridor on Sheet E1-4602 are not included in the scope of work.
TG10.4-	8/4/2014	E1-3201, 3208,		Will a revised drawing E1-5010 be	Sheets E1-5010 and E1-3208 both

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
413		& 5010		provided showing the double ended switchboards changed to single incoming as shown on E1-3208? Also, on E1-3201 note 4 says to retain space and pad provisions for redundant supply. Should the switchboards have an extra empty bused section for future use? Or eliminate all sections involved in the redundant supply?	indicate a single incoming feed with the redundant feed shown as NIC. An empty bused section is not required; only the pad and space provisions to install a future redundant power supply are required.
TG10.4-416	8/4/2014	E1-5010		MS-B1-A-1; MS-B1-A2; MS-B1-B; MS-B1-D. Please confirm that the noted switchboards should be UL 1558?	Confirmed.
TG10.4-419	8/4/2014	Drawing Sheet: ES Drawings, E1-3208 & E1-5010		Addendum #4 ES drawings, E1-3208 & E1-5010 are not consistent with deleting the bus duct for the double ended main switchgear. Please clarify for consistency. For the main switchgear fed from the vault and is double circuited using conduit and cable, to remain as such or is one sided to be deleted?	The electrical documents Bid Instructions in the Bid Set show the scope of work required for package TG10.4. The redundant bus duct is NIC. The redundant conduit and cable is NIC.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: _____ Date: _____

Drawing Sheet: _____ Paragraph(s): _____

Detail(s): _____

Proposed Substitution: _____

Manufacturer/Address/Phone: _____

Trade Name/Model No.: _____

Product History: ___ New _____ 2-5 years old _____ 5-10 years old ___ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

_____

_____

_____

Reason for not providing specified item:

_____

_____

_____

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

_____

_____

Proposed substitution affects other parts of the Work: ___ No ___ Yes: explain

_____

_____

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

_____

_____

_____

Supporting data attached: ___ Product Data ___ Drawings ___ Test Reports ___ Samples

___ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

_____

_____

_____

_____

_____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

I. *Introduction*

Webcor/Obayashi Joint Venture is implementing a virtual building process for this project. This process will include building a digital, three-dimensional Building Information Model (BIM) linked to a project cost and labor productivity database, which will provide a platform for collaboration throughout the project's construction. In implementing this virtual building process as further outlined below, the Subcontractors will have the ability to analyze different construction sequences and methods for construction. In turn, the Subcontractor's provision of accurate virtual building data facilitates analysis and mitigation of potential costs and scheduling impacts.

The participants will adhere to the following guidelines in connection with this virtual building process. The costs of all management, administration, software, modeling, drafting, transmission, submittal, meetings, etc. for this process shall be the responsibility of the subcontractor and are included in this Subcontract.

II. *3D Modeling Requirements*

Subcontractors will be a part of a team that will meet at least bi-weekly, but not more than twice weekly, for coordination meetings to model the building and its systems, coordinate the work, and build the project virtually. The objectives of these meetings include the elimination of as many conflicts and clashes as possible and the development of reliable schedules that allow for efficient workflow and effective production control. The coordination meetings will occur in multiple phases and as described for Target Schedule Development (TSD) in Subsection IV, Item a, below, but shall precede the TSD at each listed phase.

Webcor/Obayashi Joint Venture will manage and lead the coordination process and assist the subcontractors in bringing the individual models together, running clash detection reports, and generally coordinating the process. The individual participants will be partners in this process, model their work, coordinate this with other trades and building components, obtain submittal approvals from the architect and engineers of record, and relocate/modify their systems as necessary when conflicts arise.

The 3D model consists of geometry control models generated and provided by Webcor/Obayashi Joint Venture and/or the Owner's design team from the 3D Database and system models generated and provided by the Subcontractors for their respective scopes of work. The system models, when integrated with the geometry control models, are referred to as the "Federated Model."

The Subcontractor's system models are the Subcontractor's sole responsibility. Prior to commencing any modeling, the Subcontractor must coordinate the initial model orientation with Webcor/Obayashi Joint Venture. All information in the system models shall be consistent with and based on the Contract Documents. The system model shall be maintained throughout the duration of the Project and updated to reflect as-built

conditions. The degree of detail and accuracy of the Subcontractor's system models shall be sufficient to enable accurate and complete clash detection as well as shop drawing extraction. Subcontractors will be required to print their shop drawings directly from the Federated Model, including dimensions, elevations and location of specific trade elements, based off of the building grid and/or coordinates. The printed material shall comply with the submittal requirements noted elsewhere in the contract documents. Lastly, to allow for model quantity extraction for cost and schedule information, the Subcontractor shall coordinate breakdown and classification of systems in the systems model with Webcor/Obayashi Joint Venture.

The Subcontractor's system models shall be fully compatible with Autodesk Revit, Tekla, or Graphisoft ArchiCAD in the version contemporaneously current with Subcontractor's initial submission of its system model, or the version immediately preceding the contemporaneously current version. It shall be the responsibility of the Subcontractor to maintain this compatibility at its own expense. If more trade specific software is required for a particular system model, Subcontractor must obtain Webcor/Obayashi Joint Venture's prior consent to utilize such software.

The Subcontractor shall transmit its system model to Webcor/Obayashi Joint Venture's BIM Coordinator who will manage the coordination process. The Subcontractor shall be required to perform clash detections and identify conflicts which shall be communicated to the Project team in a discrepancy report. Subcontractor shall review the identified conflicts as set forth in the discrepancy report and jointly develop conflict solutions and modify their system models accordingly. Trade coordination and model modification shall at all times remain a responsibility of each Subcontractor.

a. Modeling Schedule

Webcor/Obayashi Joint Venture will develop a Modeling Schedule showing modeling and coordination efforts required by all subcontractors in order to meet the construction and installation performance shown in the Exhibit I Project construction schedule. Subcontractor will be required to maintain its performance to meet the dates shown in the Modeling Schedule Subcontractor shall ensure that it provides adequate modeling and coordination manpower to maintain the modeling/coordination schedule.

b. Modeling Coordination Meetings

Subcontractor shall participate in BIM coordination and review meetings with Webcor/Obayashi Joint Venture. Subcontractors can expect these meetings to occur at least weekly or biweekly depending on the projects schedule needs. As a result of the information exchanged at such meetings, both the system model and the Work depicted in the Subcontractor's system model may be required to be changed by the Subcontractor to achieve coordination with other elements of the Project being provided by others. In accordance with General Conditions subsection 1.03.G, Subcontractor will be compensated for the associated BIM coordination efforts under the provisions for

Change Orders of Article 6. Subcontractor acknowledges that BIM coordination and review meetings will require attendance of personnel that are familiar with both the data entry aspects of the BIM as well as an understanding of the Work to be performed and its relation to other elements of the Project, and the Subcontractor therefore agrees that personnel conversant in both shall attend all such meetings.

III. Cost and Productivity Data

In addition to the 3-D modeling requirements set forth above, all Subcontractors shall provide accurate cost and productivity information to be imported into a project data base in order to facilitate 4-D (time dimension) and 5-D (cost dimension) modeling. This information shall be broken down such that line items describe work activities for each building system included in Subcontractor's scope of work.

a. Scheduling Information. Subcontractor shall provide detailed scheduling information including, but not limited to, the following:
    i. Provide a list of tasks which identify continuous activities that can be performed with other trades.
    ii. Provide a list of predecessor tasks for each above-defined task that needs to be complete before Subcontractor can start the subject task.
    iii. Provide a list of preferred minimum work areas breakdown. This breakdown shall be based on the minimum work areas that will be necessary for the Subcontractor to work efficiently.
    iv. Provide task and specific location-based activity assignments for each item in Subcontractor Submittal Register when submitted in accordance with Exhibit F, Item III.A.12.
    v. All information noted within this Item 'a.' shall be provided within 15 days of Subcontract award.

A…

~~b.~~ **DELETED** ~~Cost Information. Subcontractor shall provide detailed cost estimating information including, but not limited to, the following:~~
    ~~i. Provide a cost plan broken down into separate line items for each scheduled task defined as continuous Trade Subcontractor activity without interference from other trades and no less than one task per crew in each work area identified in the Project Schedule and coordinated with Subcontractor's task list per 4-D (time dimension) above.~~
    ~~ii. Each estimate line items shall provide labor, material and equipment pricing.~~
    ~~iii. Labor components shall include applicable hourly rate(s) and productivity in units per man-hour as well as crew composition.~~
    ~~iv. Material component shall be of sufficient degree of detail to provide unit pricing per estimate/schedule line item.~~

~~v. Equipment component shall include equipment type productivity in unit per machine hour as well as equipment unit cost.~~

~~vi. General conditions costs shall be listed as a separate line item.~~

~~vii. This information shall be provided within 15 days of Subcontract award.~~

~~c. Production Control Requirements.~~

~~i. Subcontractor shall participate in Production Control Phase Planning sessions as described at Item IV of this exhibit, below, and commit to certain performance based on production rates. By accepting the provisions of this section, Subcontractor expressly agrees to work collaboratively with other subcontractors to promote a high level of productivity and agrees to timely perform its Work so as not to cause delay or disruption of other subcontractors work.~~

~~ii. Subcontractor shall provide a written report on task progress for each task and at each location on a daily basis and as described in Exhibit F, Item III.B.10. The written report shall include the following Production Control related information for each task, and at each location:~~

~~i. Actual man hours worked~~

~~ii. Actual crew size and composition for each task, at each location.~~

~~iii. Each week, Subcontractor shall submit a marked-up schedule indicating the actual start and actual finish dates, as applicable, for each task, at each location.~~

~~iv. If a subcontractor fails to meet its required production rate, the Project Team will evaluate the need for additional resources.~~

~~v. Subcontractors will be required to commit to actions to restore required production rates (Control Actions) if the production rate is too low due to reasons within its own influence.~~

..A

IV. Project Scheduling and Production Control Phase Planning

Project Schedule, is a critical path method (CPM) schedule that shows the initial plan to construct the project. This schedule sets forth certain dates for performance and a general sequence of construction that is subject to change based on project requirements and as set forth in Section G of the Instructions to Bidders.
Because the BIM requirements contained in this exhibit provide an opportunity to develop a schedule that is optimized for subcontractor performance efficiencies, it is the intent of the Project Team to employ production control techniques to manage the day-to-day construction of the Project. This process will proceed generally in the following manner and is affirmatively acknowledged by Subcontractor as follows:

a. Subcontractor agrees to participate in phased Target Schedule Development (TSD) at completion of each of the following stages of Consolidated Model Development:
    i. TSD#1 – Foundation & Substructure
    ii. TSD#2 – Superstructure & Exterior Envelope

iii. TSD#3 – Mechanical, Electrical, Plumbing, Sprinkler (Fire) [MEPS]
iv. TSD#4 – Interior Finishes
v. TSD#5 – Commissioning

b. Phased Target Schedule Development (TSD) requirements:
   i. Subcontractor agrees that durations for Subcontractor's tasks at each location will be calculated based on quantities at each location divided by the Subcontractor's crew production rate
   ii. Subcontractor agrees to assist with optimization of the overall performance schedule for all trades, working from visualization(s) of labor flow using a Flowline chart (a modified Line of Balance schedule), to:
      i. Balance the number of crews to improve flow
      ii. Remove labor or material spikes to increase manageability and reduce site conflicts
   iii. Use risk analysis to determine buffer placement points and durations required to minimize risk

c. Subcontractor agrees to participate in Mid-Phase Re-optimization Development at least one (1) additional time following each of the TSD for phases of Consolidated Model Development described in Item A, above:
   i. Mid-Phase Re-optimization Development (MRD) requirements:
      i. Subcontractor agrees that durations for Subcontractor's tasks at each location will be calculated based on quantities at each location divided by the Subcontractor's crew production rate.
      ii. Subcontractor agrees to assist with optimization of the overall performance schedule for all trades, working from visualization(s) of labor flow using a Flowline chart (a modified Line of Balance schedule), to enable the following:
         i. Balance the number of crews to improve flow
         ii. Remove labor or material spikes to increase manageability and reduce site conflicts
         iii. Use risk analysis to determine buffer placement points and durations required to minimize risk

V. Miscellaneous Provisions

a. Model Ownership: In accordance with Article 2, subsection 2.07A, BIM files, and other computer files created for the Project shall be made and remain the property of the TJPA, including all intellectual property rights to all documents or materials.
b. Protection of Intellectual Property or Proprietary Information: Subcontractors who provide intellectual property and/or proprietary information which is incorporated into their models shall provide notification of the confidentiality of the information.

c. Other Subcontract Requirements: Subcontractor agrees that neither the BIM nor the use of the BIM is in lieu of nor intended to relieve the Subcontractor of its responsibilities under the Subcontract, including, without limitation, to (i) coordinate its Work with the work of others involved in the Project and (ii) strictly comply with the other requirements of the Subcontract Agreement and the Contract Documents. It is expressly understood and agreed that, notwithstanding the requirement for submittals in connection with the BIM, other submissions shall be required of Subcontractor as required by the Contract Documents.

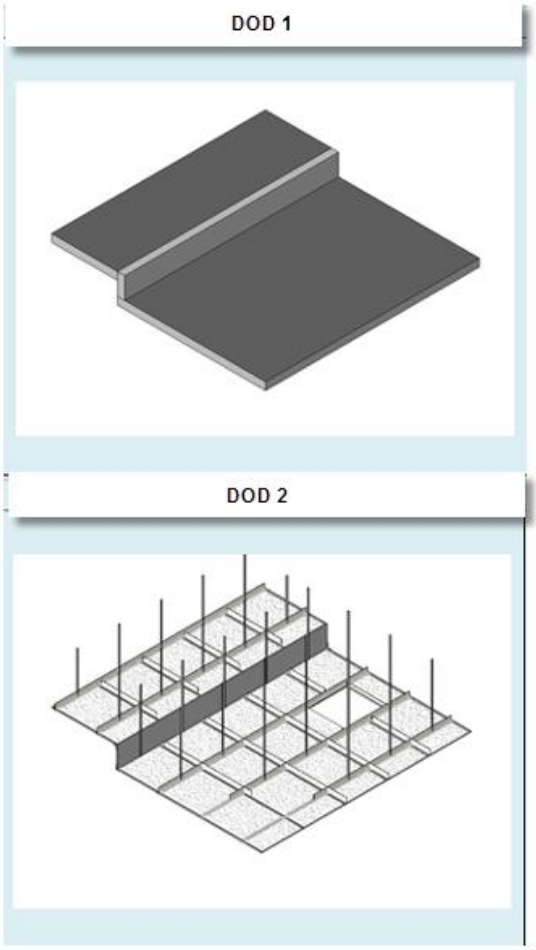
d. BIM Liability: Subcontractor acknowledges and agrees that the TJPA and Webcor/Obayashi Joint Venture shall incur no responsibility or liability with respect to the BIM or the use thereof, including that resulting from errors, omissions or deficiencies in the BIM. In the event that Subcontractor provides deficient information or data that does not represent the Work it will ultimately be providing, or that is corrupted in that the information transmitted contains a virus, and/or that otherwise damages the BIM, Subcontractor shall bear all costs associated with reconstructing the BIM and to otherwise remediate such deficiencies and their effects. In the event Subcontractor discovers an apparent error, inconsistency or omission in its information or submissions it shall notify Webcor/Obayashi Joint Venture within 72 hours and via written correspondence. In the event Subcontractor discovers an apparent error, inconsistency or omission in the information or submissions provided by others Subcontractor shall promptly request clarification of the same from Webcor/Obayashi Joint Venture, with a written Request for Information per General Conditions Article 6.03.

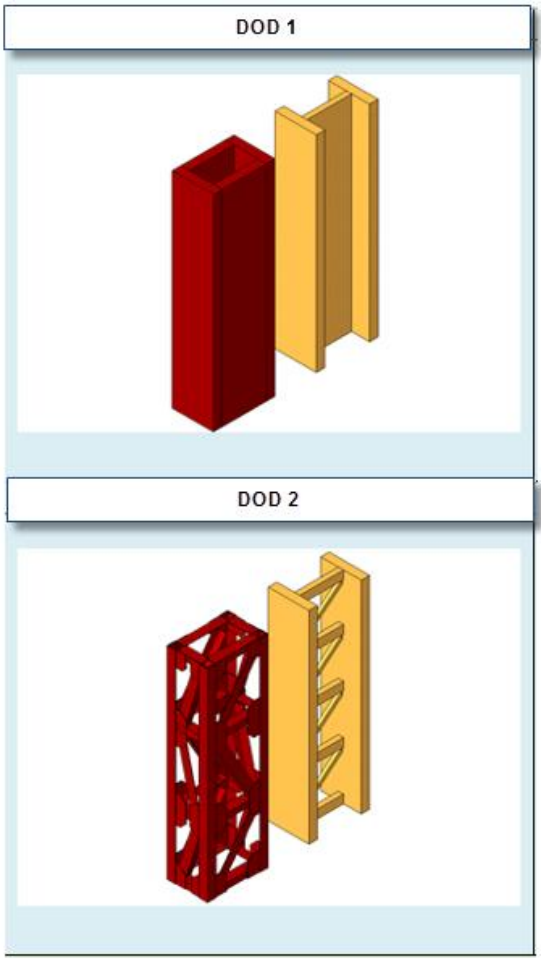
VI. Modeling Specification

a. The goal, through 3D coordination, is to create fully coordinated shop drawings derived from using the Models produced and coordinated by each discipline. These models would then be used for scheduling (4D) and cost management (5D) purposes. This section describes the **Degree of Detail (DOD)** to which each system will be modeled and whether the system should fall under the standard or high level category.

i. DOD 1 indicates standard degree of detail where elements match the approximate space and shape the element occupies or the space required to access equipment for maintenance. Accurate geometry of components with rectangular cross sectional geometry. Components of complex cross sectional geometry are approximated with simplified cross sections and modeled with accurate enveloping geometry. Composite structures are modeled with solids. Symbolic representation of fixtures, equipment, furniture and like.

ii. <u>DOD 2 indicates</u> a high degree of detail dimensionally accurate, and where applicable, manufacturer specific element (does not require manufacturing/fabrication detail – exterior envelope is required) Accurate geometry of components with rectangular and complex cross sectional geometry. The individual layers of composites are broken down to smaller components and built up piece by piece. Exact representation of fixtures, equipment, furniture and like. The model will include secondary components that may influence coordination, such as gusset plates, secondary steel members, hangers, braces etc.





Please refer to the Trade Specific BIM Requirements below for the list of systems that are required to be modeled.

VII. Change Management

Subcontractor will maintain its system model throughout the project duration, incorporating all changes that impact its Work. Subcontractor will update its Work as required through participation in the 3D coordination process outlined above. Subcontract may be required to re-extract shop drawings and prepare updated submittals to incorporate changes to its Work.

After each model update for a change package (e.g. ASI), Subcontractor shall archive a copy of its model before incorporation of further changes. Using versions of its system model, Subcontractor shall publish quantity deltas per system between models. Subcontractor will apply it's bought out unit rate for a particular changed system to the quantity delta to calculate the value of the change per the original contract. This value will serve as a baseline to enable change orders negotiations.

SHEET E1-2102

CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-B2-A-1, UON.

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM B2221, UON

SHEET NOTES

A. ALL RECEPTACLES, FIRE ALARM DEVICES AND EQUIPMENT SHOWN HALFTONE AND LABELED (F) ARE FOR REFERENCE ONLY, TO BE INSTALLED IN PHASE 2. ALL DEVICES AND EQUIPMENT SHOWN FULLTONE ARE TO BE INSTALLED IN PHASE 1, CONSTRUCTION SCOPE.

B. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

SHEET NOTES CON'T.

C. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN, FOR PHASE 1 DEVICES ONLY. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA-130).

D. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

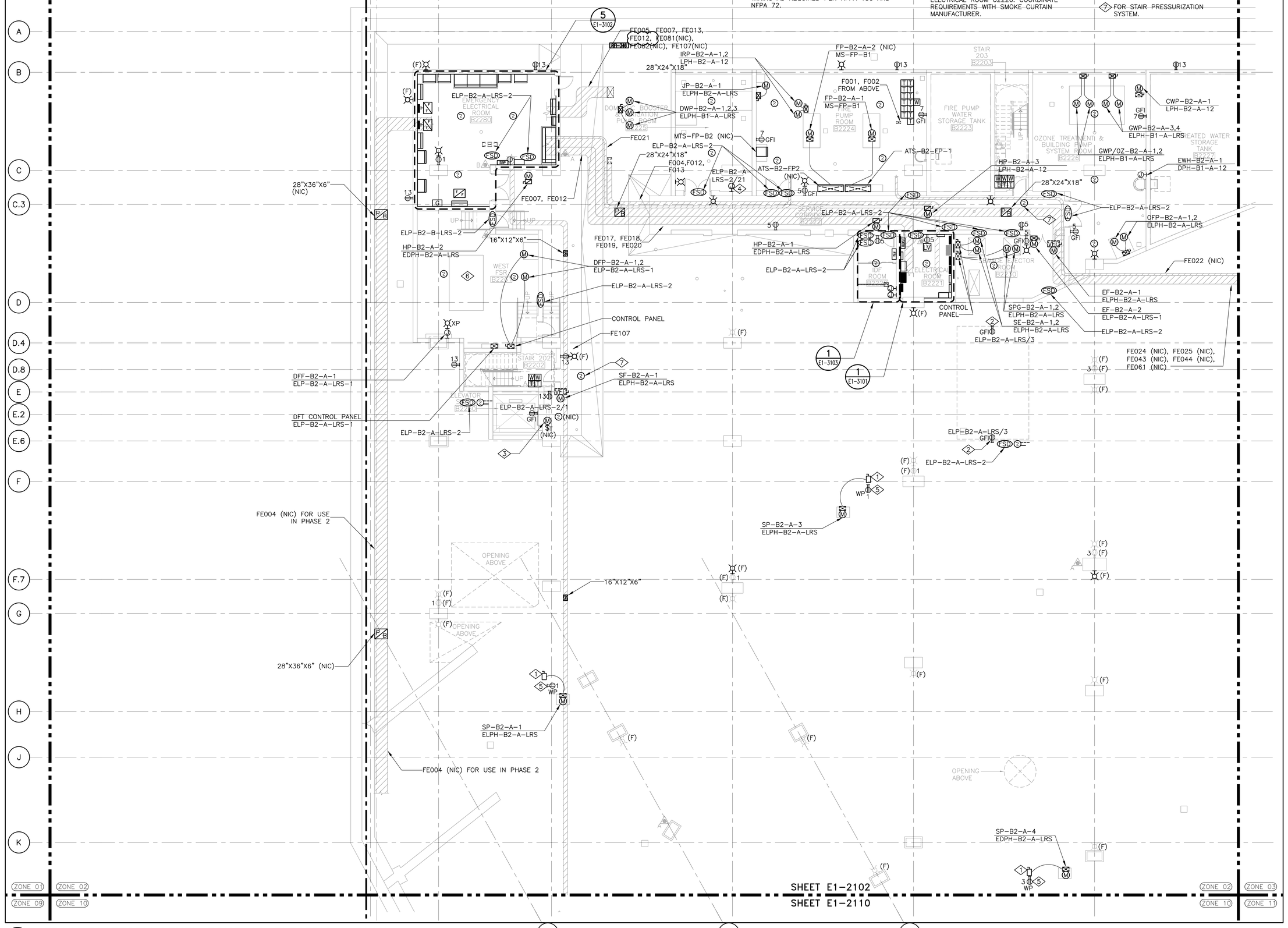
E. PROVIDE REDUNDANT CONDUIT PATH FOR ALL PHASE 1 FIRE ALARM DEVICES CLASS A WIRING AS REQUIRED PER NFPA 130 AND NFPA 72.

NUMBERED NOTES

1. MOUNT DISCONNECT TEMPORARILY ON UNISTRUT. DISCONNECT TO BE RELOCATED TO TRAIN PLATFORM WALL DURING FUTURE PHASE.
2. MOUNTED IN THE SUSPENDED ELEVATOR PIT ABOVE.
3. PROVIDE CONNECTION TO SMOKE CONTROL CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 02226. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.

NUMBERED NOTES CON'T.

4. PROVIDE 120V EMERGENCY POWER WITH HARDWIRED CONNECTION TO BMCS.
5. MOUNT RECEPTACLE NEXT TO PUMP DISCONNECT.
6. PROVIDE CLASS I, DIVISION 2 RATED EQUIPMENT IN THIS ROOM.
7. FOR STAIR PRESSURIZATION SYSTEM.



1 TRAIN PLATFORM LEVEL ZONE 02 ELECTRICAL PLAN
E1-2000 SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspflk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID – ADDENDUM #2	CFH
4	04/23/14	ISSUED FOR BID – ADDENDUM #3	CFH
5	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: TRAIN PLATFORM LEVEL
ZONE 02 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-20820
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: C. GRANT
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: E
SHEET NUMBER: SKE-RFI-TG10.4-346-1
SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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SHEET E1-2602

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

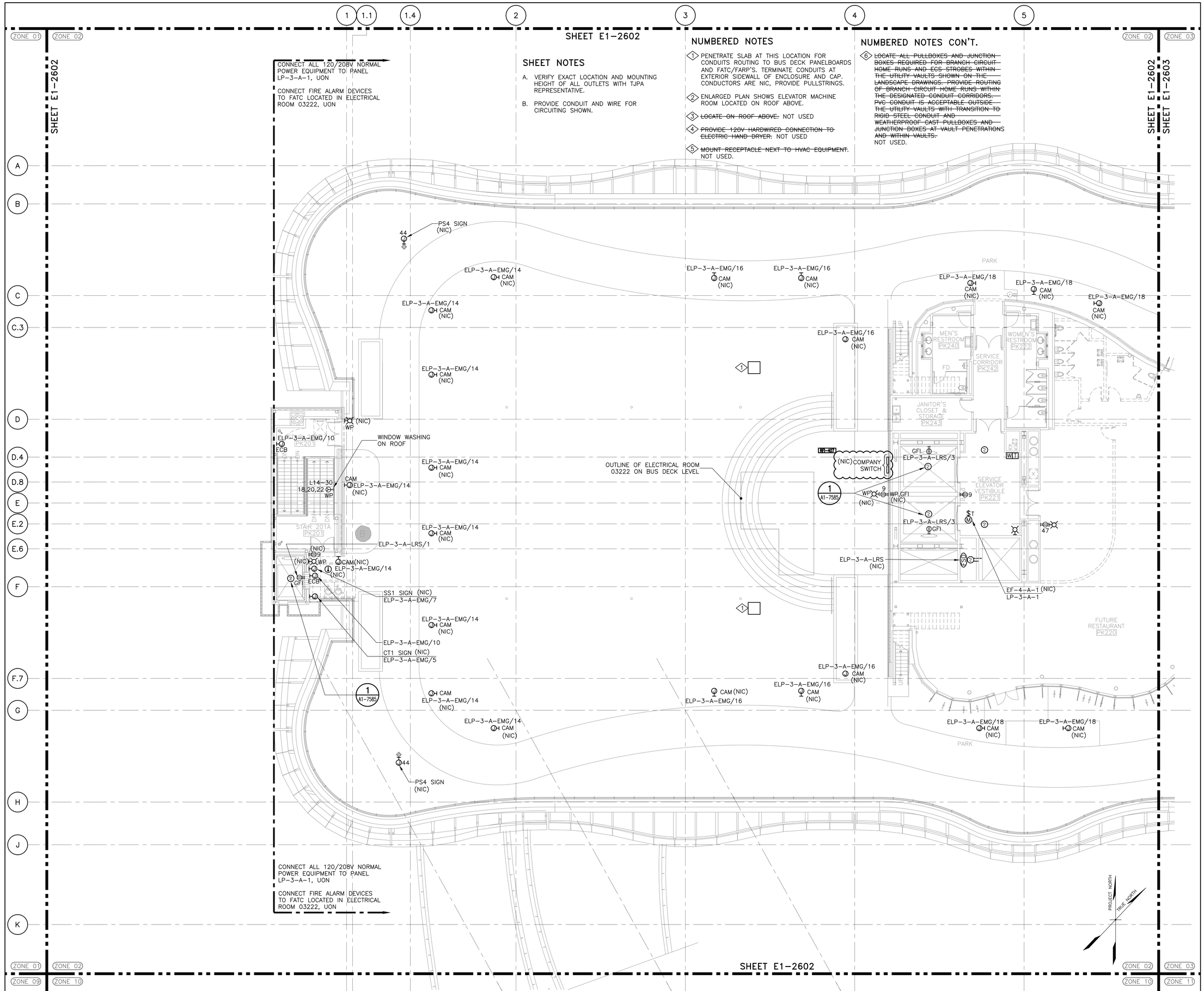
B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. PENETRATE SLAB AT THIS LOCATION FOR CONDUITS ROUTING TO BUS DECK PANELBOARDS AND FATC/FARP'S. TERMINATE CONDUITS AT EXTERIOR SIDEWALL OF ENCLOSURE AND CAP. CONDUCTORS ARE NIC, PROVIDE PULLSTRINGS.
2. ENLARGED PLAN SHOWS ELEVATOR MACHINE ROOM LOCATED ON ROOF ABOVE.
3. ~~LOCATE ON ROOF ABOVE.~~ NOT USED
4. ~~PROVIDE 120V HARDWIRED CONNECTION TO ELECTRIC HAND DRYER.~~ NOT USED
5. ~~MOUNT RECEPTACLE NEXT TO HVAC EQUIPMENT.~~ NOT USED.

NUMBERED NOTES CON'T.

6. ~~LOCATE ALL PULLBOXES AND JUNCTION BOXES REQUIRED FOR BRANCH CIRCUIT HOME RUNS AND ECS STROBES WITHIN THE UTILITY VAULTS SHOWN ON THE LANDSCAPE DRAWINGS. PROVIDE ROUTING OF BRANCH CIRCUIT HOME RUNS WITHIN THE DESIGNATED CONDUIT CORRIDORS. PVC CONDUIT IS ACCEPTABLE OUTSIDE THE UTILITY VAULTS WITH TRANSITION TO RIGID STEEL CONDUIT AND WEATHERPROOF CAST PULLBOXES AND JUNCTION BOXES AT VAULT PENETRATIONS AND WITHIN VAULTS.~~ NOT USED.



1 E1-2002 PARK LEVEL ZONE 02 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
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San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	05/30/14	ISSUED FOR CONSTRUCTION	CFH
2	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
PARK LEVEL
ZONE 02 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER CAROLINE FENLON HARDING No. E-18460 ELECTRICAL STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE E
FACILITY NO. 140
REVISION 1
SHEET NUMBER SKE-RFI-TG10.4-407-1
SEQUENCE NUMBER ___ of ___

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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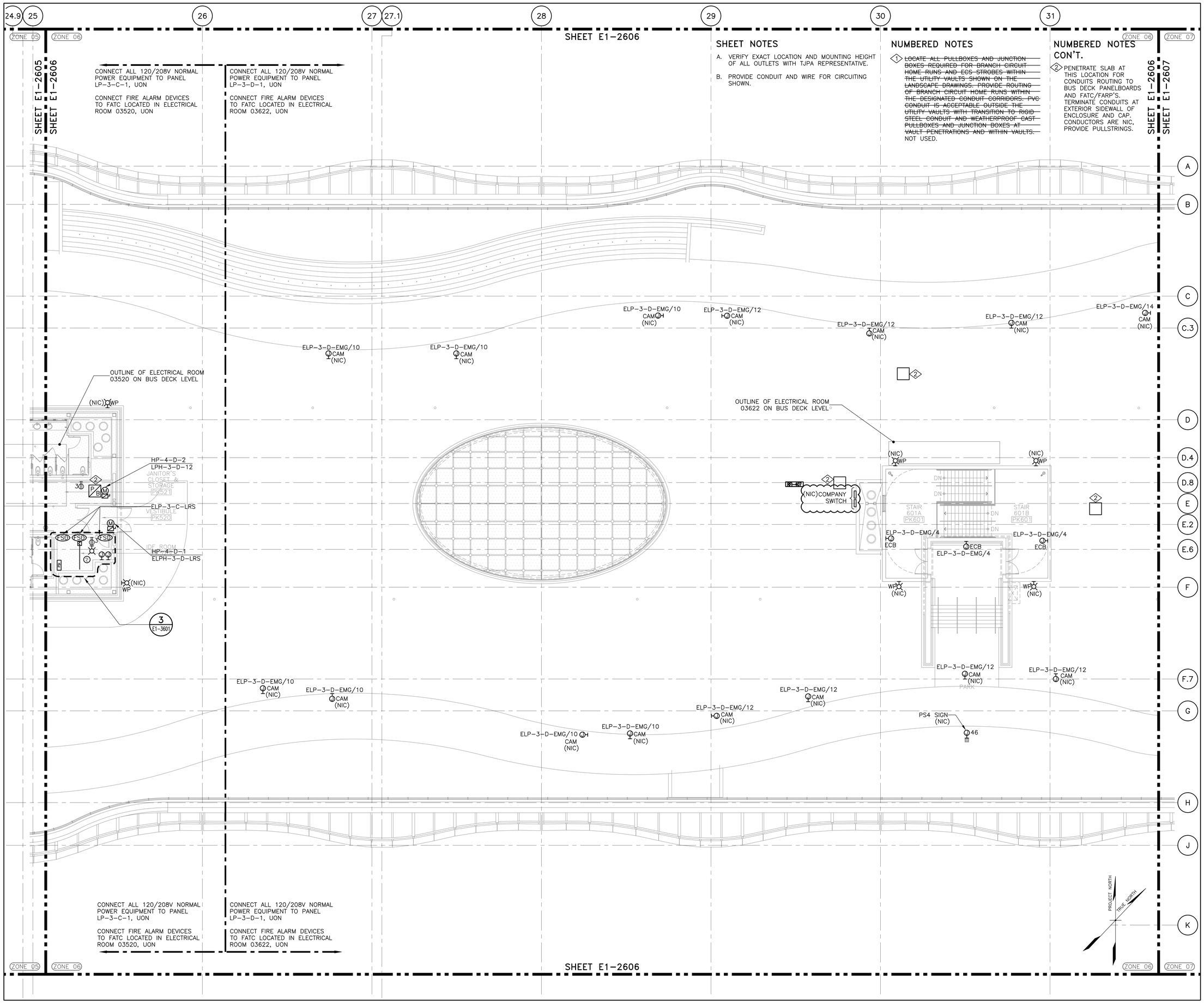
ISSUED FOR CONSTRUCTION



1 E1-2002 PARK LEVEL ZONE 06 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. ~~LOCATE ALL PULLBOXES AND JUNCTION BOXES REQUIRED FOR BRANCH CIRCUIT HOME RUNS AND ECS STROBES WITHIN THE UTILITY VAULTS SHOWN ON THE LANDSCAPE DRAWINGS. PROVIDE ROUTING OF BRANCH CIRCUIT HOME RUNS WITHIN THE DESIGNATED CONDUIT CORRIDORS. PVC CONDUIT IS ACCEPTABLE OUTSIDE THE UTILITY VAULTS WITH TRANSITION TO RIGID STEEL CONDUIT AND WEATHERPROOF CAST PULLBOXES AND JUNCTION BOXES AT VAULT PENETRATIONS AND WITHIN VAULTS.~~ NOT USED.

NUMBERED NOTES CON'T.

2. PENETRATE SLAB AT THIS LOCATION FOR CONDUITS ROUTING TO BUS DECK PANELBOARDS AND FATC/FARP'S. TERMINATE CONDUITS AT EXTERIOR SIDEWALL OF ENCLOSURE AND CAP. CONDUCTORS ARE NIC, PROVIDE PULLSTRINGS.

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
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San Francisco, CA 94105
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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
4	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
7	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
PARK LEVEL
ZONE 06 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-19980
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: C
SHEET NUMBER: SKE-RFI-TG10.4-407-2
SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-218	7/16/2014		Section 2.7 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-243	7/17/2014	SE1-2502 / SE1-2506	28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-314	7/21/2014		Section 2.2.C.4 28 30 02	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-315	7/21/2014		Section 2.1G.1 & 2 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-329	7/21/2014	M1-0051, M1-6708	Detail: EF-1-A-2. 25BMCS 25 00 00	The schedule M1-0051 says that EF-1A-2 does not have a VFD, but 1/M1-6708 shows the fan with a VFD and a software interface. Please advise whether or not this fan has a VFD.	The loading dock exhaust fan EF-1-A-1 shall be provided with a VFD. Detail 1/M1-6708 fan designation should be EF-1-A-1 instead of EF-1-A-2.
TG10.4-330	7/21/2014	Detail 1/A1-9208		Detail 1/A1-9208 indicates notching base plates with electrical conduit as required. Since these conditions cannot possibly be known prior to bidding and subsequent detailing efforts, how do we accommodate required scope within the Base Bid price and to what extent can notching occur on any given base plate?	All plate notching shall be avoided whenever and wherever possible. Detail 1/A1-9208 was only provided to address exceptional cases when plate notching is unavoidable. If notching becomes unavoidable it shall follow the criteria set forth in Exhibit A page 16,"Deck and Wall Coring and Cutting".
TG10.4-337	7/23/2014		Para B.5 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	No. The requirements of Specification Section 28 31 76 require the Autonomous Control Units (ACU's) to be UL 2572 and UL 864 listed. The standard of installation requirements of NFPA 72 - The National Fire Alarm and Signaling Code, permit the override of signals based upon an established priority of messages.
TG10.4-338	7/23/2014	SS-9000, Detail 1	Para B.5 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-345	7/25/2014	E1-2306		On drawing E1-2306, numbered note 6 states "equipment and devices will be provided with prefab booths." Per the note at grid line (30,C), the booths are "NIC". What is the electrical contractor's scope of work for these booths? Please confirm the note at grid line (30,F.7) should read "6 (NIC) instead of "5 (NIC). Please advise.	Branch circuit power and equipment power: Single points of connection of branch circuits to be provided and terminated at junction boxes are to be located in the booth by the TG10.4 contractor. Extension of wiring and wiring devices inside the booth shall be provided by the prefabricated booth manufacturer. Fire alarm: Fire alarm devices and fire alarm wiring throughout the booth shall be provided by the TG10.4 contractor. Empty conduit and back boxes shall be provided by the prefabricated booth manufacturer. Lighting: Single points of connection of lighting branch circuits and control wirings to be provided and terminated at junction boxes are to be located in the booth by the TG10.4 contractor. Extension of wiring, luminaire and lighting control devices inside the booth will be provided by the prefabricated booth manufacturer. Yes, note should read "6 (NIC)" in lieu of "5 (NIC)". Note: The Not In Contract (NIC) note is specific to these "E" series drawings and does not impact low voltage scope of work identified in TE1 series drawings.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-347	7/25/2014			We would like to use Notifier for the Fire/Mass Notification.I believe we can give Redundancy Required for this project. Plus it will save money and ceiling space. Please see attachments.	No. While the proposed Notifier NFC - 50/100(E) First Command unit is UL 2572 (Mass Notification Systems) and UL 864 (Emergency Voice Communication for Fire), the submitted information does not indicate that the product is capable of the IP based communication protocols as outlined in Specification Section 28 31 76, paragraph 2.1.G. This product does not appear capable of interfacing with the other sub-systems and protocols required.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-348	7/25/2014	E1-2502		On drawing E1-2502, numbered note 5 states "equipment and devices will be provided with prefab booth." Per the note at grid line(1.4,E.2), the booth is "NIC". What is the electrical contractor's scope of work for this booth?	Branch circuit power and equipment power: Single points of connection of branch circuits to be provided and terminated at junction boxes are to be located in the booth by the TG10.4 contractor. Extension of wiring and wiring devices inside the booth shall be provided by the prefabricated booth manufacturer. Fire alarm: Fire alarm devices and fire alarm wiring throughout the booth shall be provided by the TG10.4 contractor. Empty conduit and back boxes shall be provided by the prefabricated booth manufacturer. Lighting: Single points of connection of lighting branch circuits and control wirings to be provided and terminated at junction boxes are to be located in the booth by TG10.4 contractor. Extension of wiring, luminaire and lighting control devices inside the booth will be provided by prefabricated booth manufacturer. Note: Area identified 1.4/E-2 shown as Not In Contract (NIC), is specific to these "E" series drawings and does not impact low voltage scope of work identified in TE1 series drawings.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-354	7/28/2014		Para 2.1 27 13 23	Specific to "Backbone Single-mode Optical Fiber Cable", Specification Section 27 13 23 – 2.1 - C.4.d describes that the fiber core shall be protected by "interlocking armored" cable. Typically "armored" fiber is deployed in harsh environments or more specifically when conduit or optical fiber innerduct is not used. Since the optical fiber backbone will be installed within textile innerduct and metallic conduit, can an all- dielectric or "non-armored" single-mode optical fiber be used?	Drawings and Specifications are correct. Install per Specifications.
TG10.4-355	7/28/2014		Para 2.2 27 13 23	Specific to "Backbone Laser-Optimized Multimode Optical Fiber Cable", specification 27 13 23 – 2.1. - C.4.d describes that the fiber core shall be protected by "interlocking armored" cable. Typically "armored" fiber is deployed in harsh environments or more specifically when conduit or optical fiber innerduct is not used. Since the optical fiber backbone will be installed within textile innerduct and metallic conduit, can an all-dielectric or "non-armored" multimode optical fiber be used?	Specifications are correct. Install per Specification.
TG10.4-356	7/28/2014	TE-8001, TE-8002 & TE-8004	Detail 7-8, 7-8, 2-7	Specific to "Horizontal Backbone Single-mode and/or Laser-Optimized Multimode Optical Fiber Cable". The outlet details shown on sheet TE-8001 (7-8), TE-8003 (7-8), and TE-8004 (2-7) show horizontal outlet cable requirements; however there is no description of horizontal optical fiber cabling in the specification documents and no Specification section 27 15 23 included. Will a specification section 27 15 23 be issued?	See attached Specification Section 27 15 23 COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-357	7/28/2014	TE-8001, TE-8002 & TE-8004	Detail 7-8, 7-8, 2-7	Specific to "Horizontal Backbone Single-mode and/or Laser-Optimized Multimode Optical Fiber Cable". The outlet details shown on sheet TE-8001 (7-8), TE-8003 (7-8), and TE-8004 (2-7) show horizontal outlet cable requirements; however the only mention of optical fiber requirements is for backbone in specification 27 13 23 which lists interlocking armored fiber. Is interlocking armored fiber required for the horizontal cable as well? With interlocking armored fiber, the outside diameter could be up to .48 in. causing fill ratio and installation concerns in the 1-1/4" conduit pathways that are being proposed for this project.	See attached Specification Section 27 15 23 COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING. There is no requirement for armored cable in the horizontal.
TG10.4-358	7/28/2014		Para 3.2 27 16 19	Specific to "Patch Cords", specification 27 16 19 – 3.2 - A.6 requires unit pricing for each of the patch cords listed to be provided. The "Schedule of Bid Prices" in Exhibit A does not include a place to provide this unit pricing. Where is this unit price supposed to be submitted?	Patch cord unit pricing as requested under 27 16 19 Paragraph 3.2.A.6 is not required for bidding purposes. Unit pricing will be required post bid award in a format determined by awarded Bidder. Unit pricing will be for consideration and possible future purchase. However, Webcor/Obayashi Joint Venture is not obligated to purchase any patch cord at any time during the contract period.
TG10.4-362	7/28/2014		Page 14 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-375	7/31/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-388	7/31/2014	M1-2305, M1-6704	Grand Hall Ventilation 25 00 00	1/M1-6704 describes the control of "operable windows" for the grand hall ventilation. On M1-2305 there are 34 "operable windows" shown (note #12) as well as 14 "operable doors" (note #13). Please confirm that the BMS is to control the 14 operable doors in the same way as the operable windows, as described in the SOO on M1-6704.	Confirmed. The BMCS is required to control the 14 operable doors in the same way as the operable windows.
TG10.4-393	7/31/2014	M1-6901	Elevator Moisture Alarms 25 00 00	4/M1-6901 shows the BMS monitoring an "elevator sump moisture alarm" and to refer to plumbing for quantities and locations. I do not have plumbing drawings, but from the mechanicals it appears that there are 10 elevators (5 sets of 2) in the building. Can we assume there will be 10 of these points located at the bottom of the elevator shafts?	Elevator sump pits are shown on the architectural drawings. There are 11 elevator shafts in total therefore there shall be 11 elevator sump moisture alarm points.
TG10.4-396	7/31/2014	M1-6802	Fire Alarm System 25 00 00	4/M1-6802 shows 12 DI points per floor for the fire alarm system monitoring. The I/O code says "monitor contacts of the FDACS status at the main FDACS panel". Please confirm that all of the fire alarm points will be wired from a single main fire alarm panel, and please also provide the location of that panel.	Yes, there are 12 points per floor. Per the drawing notes, coordinate panel locations with the fire alarm drawings.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-400	8/1/2014		Division 26	Division 26 reads: (Switchboards) The trip unit shall meter the following values, which shall be displayed on the LCD (if the manufacturers trip unit cannot incorporate the specified functions, separate device(s) with equal function shall be provided for each breaker.) a. Current, RMS, each phase. b. Voltage, RMS (V), line-to-line or line-to-neutral. c. Energy (kWh, MWH, GWH), each phase and total, user resettable. d. Peak Power Demand (KW, MW), user resettable. e. Real power (KW, MW), each phase and total. f. Reactive power (KVAR, MVAR), each phase and total. g. Apparent power (KVA, MVA), each phase and total. h. Frequency (Hz). i. Power factor. j. Waveform capture capability. Upon triggering, a total of eight cycles of voltage (each phase) and current (each phase) shall be recorded. The eight cycles shall include four pre-trigger and four post-trigger cycles. The waveform capture shall be configurable to trigger by manually over communications (when specified), by an overcurrant trip, by a protective relay trip (when specified), or by a current alarm. Waveform data shall be available in "Comtrade" file format via serial communications or at a front port at the trip unit. What is the intent of providing for this information? Power Management? Is it the intent that this is being provided for the BMCS? (Most of Div. 26 does not make a connection between the Swgr & the BMCS) Please provide intent and clarify.	It is noted that the power monitoring features that are included with the switchgear for this bid package are not all initially utilized or fully monitored by the BMCS for this phase of the project. These features are included to allow local data retrieval and monitoring at a future date by the BMCS or other SCADA monitoring system for the Phase 2 train station.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-402	8/1/2014		Division 27 & 28	Is it the intent of Division 27 & 28 specification to be performance based? If so, please confirm the use of manufacturers and equipment not listed in the specification that can be used. As long as the intent of the specification can be met.	Regarding Specification Section 28 30 02 Fire Management System, the intent is for the system to be performance based with the systems as listed. The components provided by the alternate manufacturers shall be equal to the specified product. Regarding Specification Section 28 31 76 Emergency Communication/Mass Notification System Integration, the following equipment manufacturers/products (in alphabetical order) that could be identified as acceptable under system/equipment include: 1. Athoc - IWSAlerts System 2. Eaton/Cooper - Alerity System 3. Siemens - Desigo CC Mass Notification The Emergency Communication/Mass Notification System (ECS/MNS) as outlined in Specification Section 28 31 76 will not be bid as part of TG10.4. It will either be bid or added to an existing contract via change order in the near future when the Emergency Operations Plan has been developed. Specification Section 28 31 76 and the related ECS/MNS drawings SS-0000, SS-0050, SS-2000, SS-2001, and SS-9000 are reference documents only, at this time. Regarding all Specification Sections under Division 27 and the remainder of Division 28, the intent is for the system to be performance based with the systems as listed. The components provided by the alternate manufacturers shall be equal to the specified product. Proposed products not listed are to be submitted as substitution requests.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-414	8/4/2014	E1-5001 - 5010		Does the switchgear in this project require selective coordination? If so, are all the panel boards to be part of the selective coordination?	Yes, the switchgear requires selective coordination. Selective coordination shall also be provided as required by code, including all distribution equipment supplied by the diesel generators, and including the UPS and downstream distribution. These systems support life safety and emergency communications systems in the building. A full system coordination study is required. The study shall include all panelboards in the system, including those that are not required to be selectively coordinated.
TG10.4-415	8/4/2014	E1-5010, Detail :MS-FP-B1		Does each 2000A breaker need to be in its own partitioned section or is group mounting in 1 section acceptable?	Stacked breakers are acceptable as long as other requirements are not affected. The Contractor must include the required utility underground service entrance termination provisions.
TG10.4-417	8/4/2014	Drawing Sheet: SKT-1003(TE1-2102) Detail(s): And all other TE1 Drawings		What is the revised clouded and tagged area identified as VE ID #11? There is no narrative for VE ID #11. Is ID #11 supposed to be ID #12?	VE ID #11 noted in narrative, deletion of speakers on the train platform. VE ID #12 noted in narrative, deletion of speakers on the lower concourse.
TG10.4-418	8/4/2014	Drawing Sheet: SKT-1044(TE1-2702) SKT-1066(TE1-5700)		The Roof Park Restaurant Terrace Level was never in the previous bid documents. Addendum #4 has now deleted devices and an IDF Room. What scope of work with this level will be part of this bid package? Is the Terrace Restaurant a part of the TG10.4 package? If so, please provide drawings so an accurate take off can be completed.	The referenced sketches are correct and accurate; the restaurant is not part of TG10.4 Package.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-420	8/4/2014	Drawing Sheet: E1-4310 (Add 4)	D.1.15, Pg. 3 (Add 2) Exhibit A, Pg. A1-2 (Add 5) 01 10 30 /APD	Deductive Alternate 23 eliminates a guard booth from the Base Bid on E1-4310. Add#4 made all equipment and devices associated with this guard booth NIC. With the understanding that this guard booth is no longer to be included in the base bid, please confirm that deductive alternate 23 (Bid Item 11) is also eliminated by Add #4.	That is incorrect, Deduct Alternate #23 was not eliminated by Addendum #4.
TG10.4-421	8/5/2014	A1-3005, A1-9850 & E1-2202		Regarding Breakrooms on the lower concourse with sinks and future dishwashers and refrigerators; 1.) Per the electrical drawing E1-2202 it doesn't appear the power plan captures power outlets required for the garbage disposals, dishwashers and refrigerators. However, the plan views per A1-9850 appear to capture required outlets for refrigerators and dishwashers only. Please advise.	For the updated breakroom elevations, refer to SKA-3924. Refer to attached sketches: SKE-RFI-TG10.4-421-1 SKE-RFI-TG10.4-421-2 SKE-RFI-TG10.4-421-3 SKE-RFI-TG10.4-421-4 SKE-RFI-TG10.4-421-5 Electrical outlets for these pieces of equipment are indicated.
TG10.4-422	8/11/2014	E1-2202		On drawing E1-2202, utility and ups power track busway are shown in the tech support room. The utility power track busway was deleted for the IDF rooms. Is the utility power track busway required for this room? Is there a track busway schedule for this room? Please advise.	Yes, the utility power track busway is required for this room. Refer to the attached sketch, SKE-RFI-TG10.4-422-1, for the normal power track busway schedule.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-424	8/11/2014	E1-4100 & 4200 Series E1-2100 & 2200 Series. Train Platform & Lower Concourse	(3.4)(A-C) 26 05 19	The power drawings have a sheet note that states, "Provide conduit and wire for circuiting shown, for phase 1 devices only. Refer to specifications for fire resistive requirements (NFPA-130)." This sheet note is listed on all the power drawings for both the Train Platform and Lower Concourse levels. Conversely, this sheet note is also listed on the lighting drawings, but ONLY on the Train Platform level. Please confirm this sheet note is not applicable to drawings E1-4202 through E1-4211.	This note is applicable to the lower concourse as well: E1-4202 through E1-4211.
TG10.4-425	8/11/2014		(1.2.A) 26 32 13	Specifies Tier III rated engine. This 3850hp engine falls into the Tier II rating. Exhaust after treatment would need to be added, which would reduce the emission levels down to Tier IV levels. Are you requiring a DPF to meet Tier IV levels, or is the BAAQMD approved Tier II engine acceptable?	Tier II engine is acceptable as long as it meets BAAQMD requirements.
TG10.4-426	8/11/2014		(2.2.B) 26 32 13	8% reserve factor conflicts with 1.2.A.3, which specifies 5% reserve factor. Please clarify.	5% reserve factor is acceptable.
TG10.4-427	8/11/2014		-2.7 26 32 13	DPF "AS REQUIRED" - This engine is Tier II rated per BAAQMD and is approved "AS IS" for use in emergency stand by application in San Francisco. No DPF is required to meet air quality requirements set by the local air board. Is the statement "TO MEET AIR REQUIREMENTS" referring to the local Air Board, or the requirements to meet Tier III levels?	The generators serve more than emergency loads; they also serve optional standby equipment. BAAQMD review is required to confirm particulate filtering and annual test hours.
TG10.4-439	8/11/2014		27 51 16	Since this system is acting as a standard PA system will it be required for the system to allow a desk phone to send routine PA announcements?	A desk phone will not be required for PA announcements. Networked paging stations will be used to generate PA announcements.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-440	8/11/2014		28 05 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-441	8/11/2014		27 51 16	PA 27 51 16-1.2 C. asks the vendor to provide 3-12 months advance notification of any changes in the software APR/SDK that may impact performance of the Physical Security Information Management System. How are we to measure the impact when the documents do not define a clear SOO for integration with the ECS/MNS and how may affect performance?	Per Addendum #5, Specification Section 28 40 00 that is referenced in 27 51 16 / 1.2 C is now provided for reference only and is not to be bid at this time.

SECTION 27 15 23 - COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Provides specifications for optical fiber backbone cabling to distribute optical network signals between telecommunications distribution spaces.

B. Section Includes:

1. Horizontal Single-mode Optical Fiber Cable
2. Horizontal LOMMF Optical Fiber Cable

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. EIA: Electronics Industry Alliance
2. LOMMF: Laser Optimized Multimode Fiber
3. MMF: Multimode Fiber
4. RCDD: Registered Communications Distribution Designer
5. SMF: Single-mode Fiber
6. TIA: Telecommunications Industry Association

B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)

1. National Electric Safety Code (NESC)
2. National Fire Protection Association (NFPA)
3. California Electrical Code
4. California Building Code

C. Reference Material: Refer to the most recent version, update or addenda.

1. Institute of Electrical and Electronic Engineers (IEEE):

   a. ANSI/IEEE 802.3ab: 1000Base-T Ethernet Specification
   b. ANSI/IEEE 802.3ae: 10Gb/s Ethernet Specifications

2. Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) standards and specifications:

   a. ANSI/TIA/EIA-568-C.1: Commercial Building Telecommunications Cabling Standard Part-1: General Requirements
   b. ANSI/TIA/EIA-568-C.3: Commercial Building Telecommunications Cabling Standard – Part 3 Optical fiber cabling components
   c. ANSI/TIA/EIA-598-B: Optical Fiber Color Coding
   d. ANSI/TIA/EIA-758: Customer-owned Outside Plant Telecommunications Infrastructure Standard
   e. ANSI/TIA-492AAAC-A: Detail specification for 850 nm Laser-Optimized, 50-µm Core Diameter/125-µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers
   f. ANSI/TIA-492CAAB: Detail Specification for Class lVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak
   g. ANSI/TIA-942: Telecommunications Infrastructure for Data Centers

3. Building Industry Consulting Services International (BICSI) Manuals:

   a. Telecommunications Distribution Methods Manual (TDMM)
   b. Information Transport Systems Installation Manual (ITSIM)

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate all telecommunications work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the TJPA Representative. Any repairs or changes made necessary in the contract work, caused by the contractors neglect, shall be made by the contractor at their own expense.

B. Scheduling:

1. Contract documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of six (6) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the TJPA Representative prior to installation. The contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the TJPA Representative for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

B. Shop Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Shop drawings shall include evidence of telecommunications optical fiber cable has been coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual component for review and action by the TJPA Representative prior to installation.

1.5 INFORMATION SUBMITTALS

A. Certificates:

1. Submit management and installation team reference documentation verifying that:

C. Description:

1. All single-mode optical fiber cable shall be capable of Ethernet signal transmission at 10 Gb/s up to 10,000 meters in the 1310nm operating window. Maximum attenuation for a single-mode outside plant cable shall be no greater than 0.65dB per kilometer using 1310nm and 0.5dB per kilometer using 1550nm wavelengths respectively.
2. Each optical fiber strand shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification and all EIA/TIA 568B.3 and 568B.3-1 performance parameters.
3. All optical fibers inside each individual cable shall be provided in counts indicated in the TE-series drawings and usable to the fullest capacity specified by the manufacturer and meet required specifications at all times.
4. Indoor horizontal single-mode optical fiber cables shall be:

   a. Individual jacketed, tight buffered fiber type.
   b. The individual fibers are grouped in jacketed subunits color coded per TIA-598.
   c. Have integrated dielectric central and strength members.
   d. Flame retardant outer jacket in a yellow colored to designate the type of optical fiber.

5. The optical fiber cables shall be rated per the installation environment as required by the local Authority Having Jurisdiction and/or National Fire Codes. Select an appropriate cable construction, including external jacket properties, when installing optical fiber cables in aerial, outdoor, underground and corrosive environments.
6. All SMF shall meet or exceed TIA compliant network cable-testing device certification by an independent laboratory, such as ETL, for verification of high speed, TIA/EIA T568B-compliant performance.

D. Accessory Products:

1. Provide any accessory products related to the optical fiber backbone cabling required to provide a complete and functional infrastructure system.

2.2 HORIZONTAL LASER-OPTIMIZED MULTIMODE OPTICAL FIBER CABLE

A. Manufacturer List:

1. Corning Cable Systems
2. Superior Essex
3. Siemon Company
4. Berktek

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

C. Description:

1. All LOMMF cables shall be capable of Ethernet signal transmission at 10 Gb/s up to 300 meters at 500/2000 MHz/km effective modal bandwidth, while allowing the use of low-cost, 850 nm vertical cavity surface emitting laser (VCSEL). Maximum attenuation for a LOMMF cable shall be no greater than 3.0dB per kilometer using 850nm and 1.0dB per kilometer using 1300nm wavelengths respectively.
2. Each optical fiber strand shall be sufficiently free of surface imperfections and inclusions to meet the optical, mechanical, and environmental requirements of this specification and all EIA/TIA 568B.3 and 568B.3-1 performance parameters.

a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents.

B. Qualification Statements:

1. The contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.6 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Submit manufacturers extended warranty certification documentation one (1) week after the warranty acceptance by the manufacturer. It shall be the contractor's responsibility to facilitate the manufacturer-specific warranty requirements.

B. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a minimum of two (2) weeks after completion of all Division-27 work for TJPA Representative reference.

1.7 QUALITY ASSURANCE

A. Qualifications – Manufacturer:

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.1 HORIZONTAL SINGLE-MODE OPTICAL FIBER CABLE

A. Manufacturer List:

1. Corning Cable Systems
2. Superior Essex
3. Siemon Company
4. Berktek

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each assembly selected shall address the particular infrastructure requirements.

3. All optical fibers inside each individual cable shall be provided in counts indicated in the TE-series drawings and be usable to the fullest capacity specified by the manufacturer and meet required specifications at all times.
4. Indoor horizontal 50 µm multi-mode optical fiber cable shall be:

    a. Individual jacketed, tight buffered fiber type.
    b. The individual fibers are grouped in jacketed subunits color coded per TIA-598.
    c. Have integrated dielectric central and strength members.
    d. Flame retardant outer jacket in a industry standard aqua color to designate the type of optical fiber.

5. The optical fiber cables shall be rated per the installation environment as required by the local Authority Having Jurisdiction and/or National Fire Codes. Select an appropriate cable construction, including external jacket properties, when installing optical fiber cables in aerial, outdoor, underground and corrosive environments.

D. Accessory Products:

1. Provide any accessory products related to the optical fiber backbone cabling required to provide a complete and functional infrastructure system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:

1. Electrical requirements (conduit installation and capacity)
2. The telecommunications rooms are the size shown on the project drawings.
3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.
4. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the TJPA Representative and obtain written instructions for changes or revisions.

3.2 BACKBONE OPTICAL FIBER (SMF AND LOMMF) CABLE

A. Process:

1. Install all backbone cable per the manufacturer’s recommended installation instructions, under the guidelines of TIA/EIA 568 B and BICSI, and in quantities indicated in the TE-series drawings.
2. Install all cables with proper attention paid to bend radii, pulling method, attachment method, and pulling forces. The cable manufacturer's specifications for each particular cable type shall be followed exactly.
3. Backbone cable shall be visually inspected for insufficient bend radius during and after pulling. Damaged cables, or those installed under questionable methods and/or circumstances shall be replaced at no additional cost to TJPA.
4. All cable shall be pulled using an appropriate measuring device to ensure that the specified force is not exceeded as noted in BICSI guidelines.
5. Install backbone cables with attention paid to aesthetic means and methods when routing cabling within IT spaces. No backbone cable shall be left unsupported for more than three (3) feet vertically or horizontally at any time.

6. Fiber optic cables shall be placed in neat bundles separated from other communications cabling. Fiber optic cables shall be neatly placed and lashed with Velcro ties to the horizontal and vertical cable management and runways at minimum 4-foot intervals, not to exceed every 4th rung, plus all locations where the cables change direction.
7. Provide radius drop out fittings at all locations where fiber optic cables transition from vertical to horizontal cable management systems.
8. All backbone cable shall be securely fastened to the termination shelf with a manufacturers strain relief bracket and termination panel cable clamp in a way that does not damage the optical fiber strands or impede the performance of the media. This secure fastening method shall also serve to insure a secure termination environment.
9. A minimum of three feet (3'-0") of each optical fiber strand shall be left protected within the termination shelf for any future re-termination of a particular optical fiber strand.
10. All backbone cables shall be clearly labeled on both ends and in an accessible location no more than one (1) foot from each cable end.

3.3 RE-INSTALLATION

A. No additional burden to TJPA regarding costs, network down-time and/or end user interruption shall result from the re-installation of specified components. Scheduling for re-installation work shall be coordinated, in writing, with TJPA Representative prior to beginning the work.

3.4 CLOSEOUT ACTIVITIES

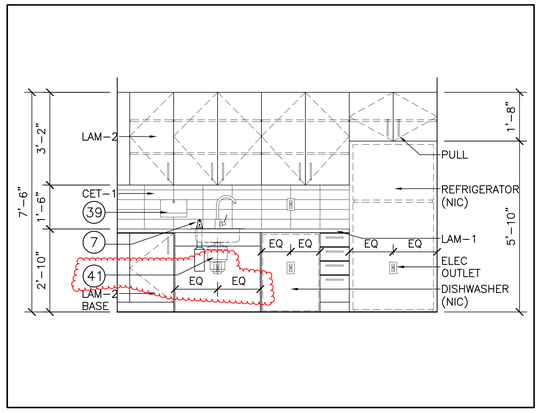
A. Contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by TJPA Representative.

B. Contractor to submit all as-built drawings and any test documentation required prior to acceptance by TJPA Representative.

END OF SECTION 27 15 23

SPECIFICATION ISSUE LOG

Revision	Date
0	08/08/14



1 A1-9802 ELEVATION – SFPD BREAK ROOM
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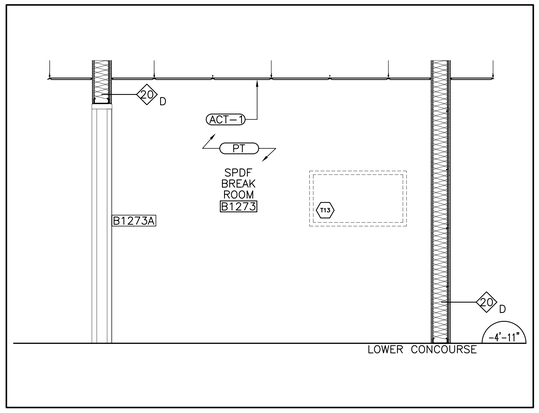

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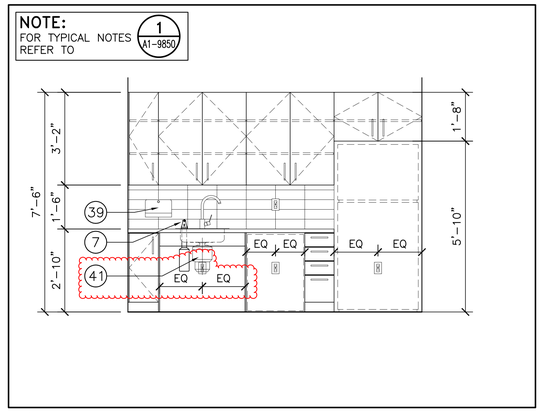

3 A1-9802 ELEVATION – SOC BREAK ROOM
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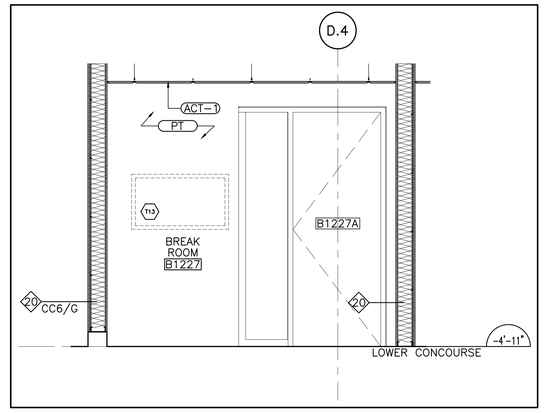

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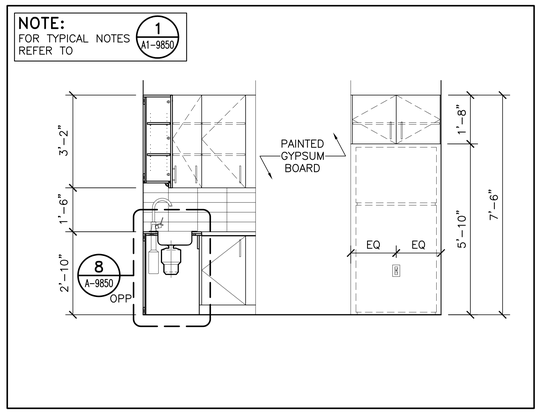

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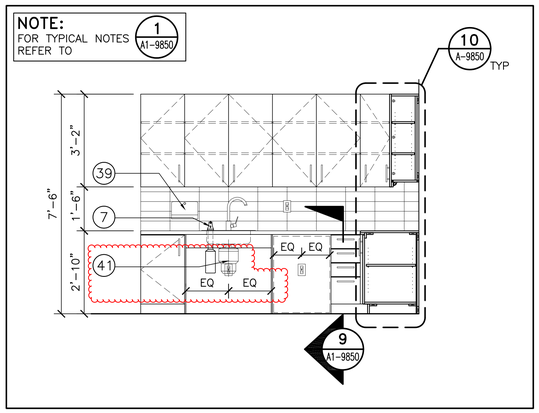

6 A1-9802 ELEVATION – JANITORIAL LUNCH ROOM
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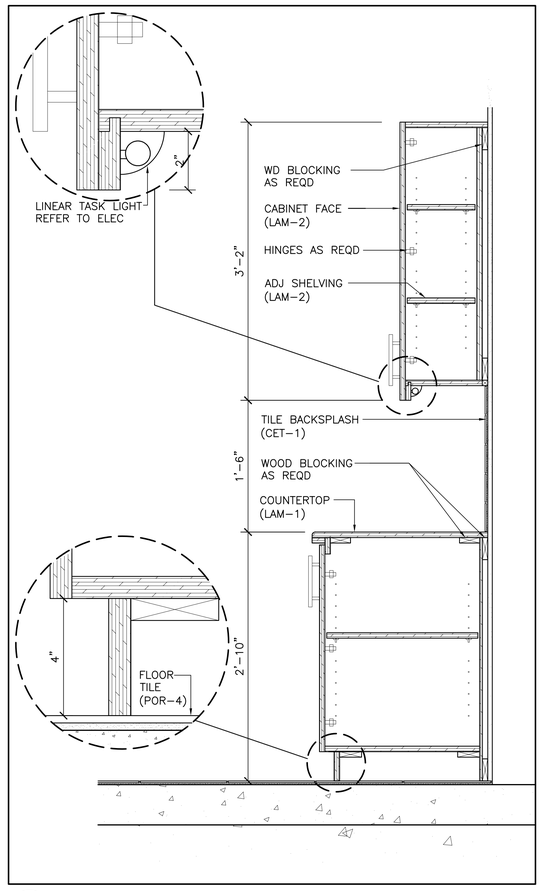

10 A1-9850 SECTION – KITCHEN
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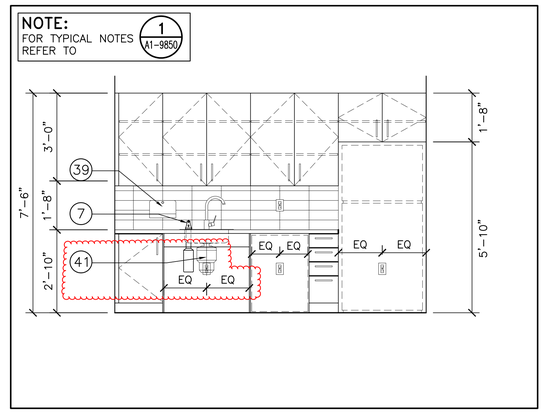


7 A1-9802 ELEVATION – MAINTENANCE WORKSHOP
SCALE: 1/2" = 1'-0"

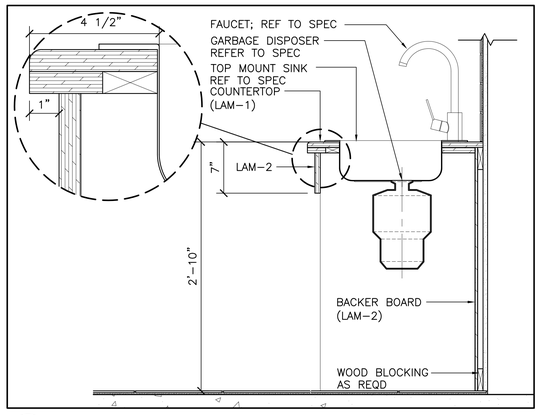
TYPICAL NOTES:

FOR LEGEND REFER TO A1-9000

1. FLOOR TILES 12"X12" PORCELAIN TYPE POR-4 ; REFER TO SPECS
2. TILE TO EXTEND UNDER REF. & EQUIPMENT
3. FOR WALL TYPES REFER TO ZONE PLAN
4. CABINET FINISH:

   LAM-1 – LAMINATE FACE FOR UPPER AND LOWER CABINETS IN KITCHEN AND LUNCH ROOMS (SOC AREA)

   LAM-2 – LAMINATE COUNTERTOP IN KITCHEN AND LUNCH ROOMS AND WHERE SHOWN (SOC AREA)



8 A1-9850 SECTION – BASE CABINET
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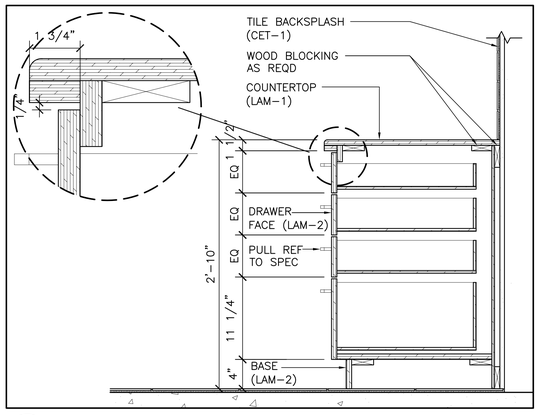

9 A1-9850 SECTION – BASE CABINET DRAWERS
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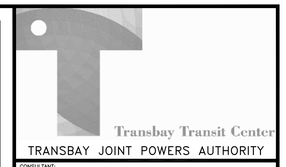
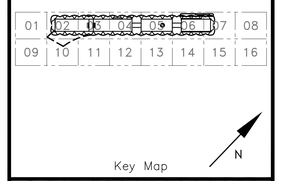


TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
Pelli Clarke Pelli Architects
adamson ASSOCIATES, INC



Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	03/31/14	ISSUED FOR CONSTRUCTION	GM

CONTRACT NO.
08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
LUNCH/BREAK ROOM
PARTIAL PLANS AND ELEVATIONS

ARCHITECT/ENGINEER SEAL

NOT FOR
CONSTRUCTION

APPROVED:
PRINCIPAL ARCHITECT G. METZGER
APPROVED:
PROJECT MANAGER S. ROTT
APPROVED:
PROJECT MANAGER E. DEL ANGEL

DESIGNED BY: P. MACPHAIL	CHECKED BY: W.R. BRADLEY
DRAWN BY: A.SUN	DATE: 08/14/2014
SCALE: AS NOTED	SIZE E / FACILITY NO. 140 / REVISION 0
SHEET NUMBER SKA- 3924	SEQUENCE NUMBER ___ of ___

BASED ON SHEET A1-9850

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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XREFS: TJPA-TB 34x44E.dwg\ XAELEVB107.dwg

SHEET NOTES

A. THIS DRAWING INCLUDES SCOPE OF WORK FOR FUTURE BID PACKAGES. EARLY BELOW GRADE (EBG) SCOPE OF WORK ON THIS SHEET IS LIMITED ONLY TO GROUNDING ELECTRODE CONDUCTORS EMBEDDED IN SLAB AND MAIN GROUNDING BUS (MGB) IN THE MAIN ELECTRICAL ROOM. SEE GENERAL NOTES ON SHEET E-0006 FOR COMPLETE TG.06 BELOW GRADE SCOPE OF WORK.

B. ALL RECEPTACLES, FIRE ALARM DEVICES AND EQUIPMENT SHOWN HALFTONE AND LABELED (F) ARE FOR REFERENCE ONLY, TO BE INSTALLED IN PHASE 2. ALL DEVICES AND EQUIPMENT SHOWN FULLTONE ARE TO BE INSTALLED IN PHASE 1, CONSTRUCTION SCOPE.

C. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

D. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

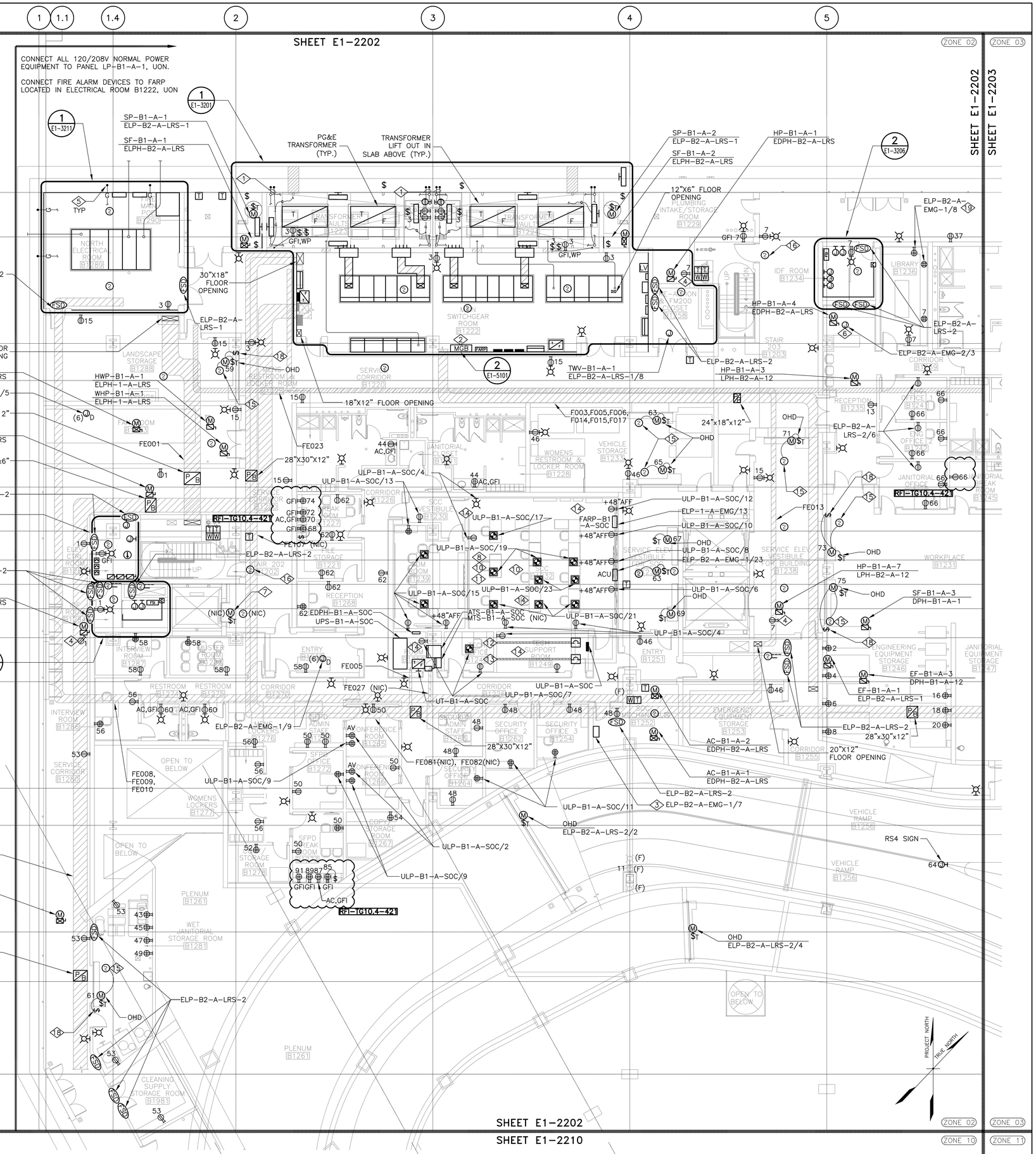
E. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

F. PROVIDE REDUNDANT CONDUIT PATH FOR ALL PHASE 1 FIRE ALARM DEVICES CLASS A WIRING AS REQUIRED PER NFPA 130 AND NFPA 72.

G. REFER TO FIRE PROTECTION DRAWINGS FOR PREACTION SPRINKLER AND CLEAN AGENT SYSTEM DETAILS. PROVIDE 120V POWER FOR PANELS AND ASSOCIATED CONTROL DEVICES AND MAKE CONNECTIONS TO EQUIPMENT INCLUDING ACCESSORIES.

NUMBERED NOTES

1. UNDER EARLY BELOW GRADE (EBG) SCOPE OF WORK PROVIDE GROUNDING ELECTRODE CONDUCTOR (GEC) EMBEDDED IN THE LOWER CONCOURSE FLOOR SLAB STUBBED UP AT EACH CORNER OF THE PG&E VAULTS FOR EXTENSION BY UTILITY.
2. UNDER EBG SCOPE OF WORK PROVIDE MAIN GROUNDING BUS (MGB). TEMPORARILY MOUNT MGB ON A UNI-STRUT OR A COLUMN NEARBY. CONNECT GEC FROM GROUND LOOP AND UFER GROUND TO THE MGB, PROVIDE ADEQUATE SLACK IN THE GEC. SO IT CAN BE RELOCATED TO PERMANENT LOCATION IN PHASE 1.
3. PREACTION SPRINKLER CONTROL PANEL. CONNECT TO FIRE ALARM SYSTEM. PREACTION SPRINKLER SYSTEM SHALL RECEIVE SMOKE DETECTION ALARMS FROM FIRE ALARM SYSTEM.
4. MOUNT RECEPTACLE NEXT TO MECHANICAL EQUIPMENT.
5. GEC IN FLOOR SLAB. SEE ENLARGED PLAN FOR EXTENSION.
6. PROVIDE 120V EMERGENCY CONNECTION TO FUEL FILL BOX.
7. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 02226. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.
8. EXACT EQUIPMENT LAYOUT TO BE CONFIRMED WITH SFFD.
9. NOT USED.
10. PROVIDE FOUR 120V, 20A CIRCUITS THIS ROOM FROM PANEL ULP-B1-A-SOC FOR ECS EQUIPMENT. SEE PANEL SCHEDULE.
11. NOT USED.
12. UPS POWER TRACK BUSWAY. CONNECT TO ULP-B1-A-SOC.
13. ~~UTILITY POWER TRACK BUSWAY. CONNECT TO~~ DPL-B1-A-1.
14. REFER TO FIRE PROTECTION DRAWINGS FOR SMOKE DETECTION REQUIREMENTS FOR PREACTION OR CLEAN AGENT SYSTEM ACTIVATION.
15. SMOKE DETECTOR TO BE WITHIN 5FT OF DOOR. REFER TO DETAIL 1/E1-6009 FOR WIRING DETAIL.
16. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.
17. NOT USED.
18. CONTROL SWITCH FOR OVERHEAD DOOR MANUFACTURER PROVIDED. PROVIDE SWITCH BACKBOX AND 1/2" EC FROM SWITCH TO MOTOR.
19. FOR BMCS COMPUTER WORKSTATION.



1 E1-2000 LOWER CONCOURSE LEVEL ZONE 02 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24 SCALE IN FEET

SHEET E1-2210

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	08/30/12	ISSUED FOR CONSTRUCTION - BELOW GRADE PACKAGE	CFH
2	05/31/13	100% CONSTRUCTION DOCUMENTS	CFH
3	06/10/13	PER ASI No. 0104	CFH
4	01/23/14	ISSUED FOR BID	CFH
5	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
6	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
7	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH
8	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: LOWER CONCOURSE LEVEL
ZONE 02 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

APPROVED: PRINCIPAL ENGINEER — C. FENLON-HARDING
APPROVED: PROJECT MANAGER — W. GAW
APPROVED: PROJECT MANAGER — C. FENLON-HARDING
DESIGNED BY: J. TILLS — CHECKED BY: C. GRANT
DRAWN BY: A. CELIS — DATE: 06/20/2014
SCALE: 1/8" = 1'-0 — SIZE: E — FACILITY NO.: 140 — REVISION: 6
SHEET NUMBER: SKE-RFI-TG10.4-421-1 — SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

XREFS: XAGRID-96.dwg\ XAZONES.dwg\ XAFLRB1PH1.dwg\ TJPA-TB 34x44E.dwg\ XAGRID.dwg\ XEFLRB1PH1.dwg\ CFH-STAMP.dwg

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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SHEET NOTES

A. THIS DRAWING INCLUDES SCOPE OF WORK FOR FUTURE BID PACKAGES. EARLY BELOW GRADE (EBG) SCOPE OF WORK ON THIS SHEET IS LIMITED ONLY TO GROUNDING ELECTRODE CONDUCTORS EMBEDDED IN SLAB AND MAIN GROUNDING BUS (MGB) IN THE MAIN ELECTRICAL ROOM. SEE GENERAL NOTES ON SHEET E-0006 FOR COMPLETE TG.06 BELOW GRADE SCOPE OF WORK.

B. ALL RECEPTACLES, FIRE ALARM DEVICES AND EQUIPMENT SHOWN HALFTONE AND LABELED (F) ARE FOR REFERENCE ONLY, TO BE INSTALLED IN PHASE 2. ALL DEVICES AND EQUIPMENT SHOWN FULLTONE ARE TO BE INSTALLED IN PHASE 1, CONSTRUCTION SCOPE.

SHEET NOTES CON'T.

C. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

D. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

E. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

F. PROVIDE REDUNDANT CONDUIT PATH FOR ALL PHASE 1 FIRE ALARM DEVICES CLASS A WIRING AS REQUIRED PER NFPA 130 AND NFPA 72.

SHEET E1-2203

NUMBERED NOTES

1. UNDER EARLY BELOW GRADE (EBG) SCOPE OF WORK PROVIDE GROUNDING ELECTRODE CONDUCTOR (GEC) EMBEDDED IN THE LOWER CONCOURSE FLOOR SLAB STUBBED UP AT EACH CORNER OF THE PG&E VAULTS FOR EXTENSION BY PG&E.

NUMBERED NOTES CON'T.

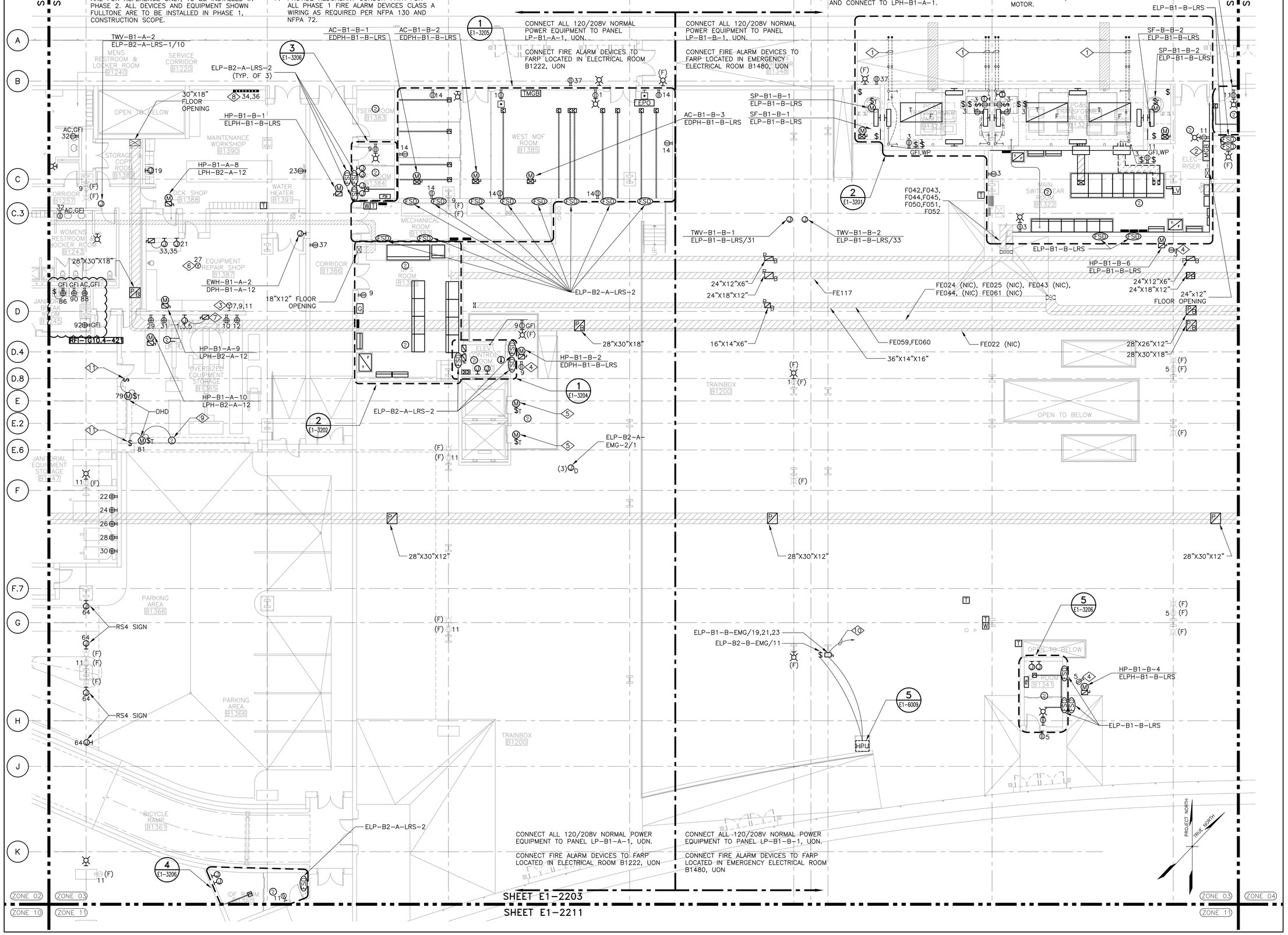
2. UNDER EBG SCOPE OF WORK PROVIDE MAIN GROUNDING BUS (MGB). TEMPORARILY MOUNT MGB ON A UNI-STRUT OR A COLUMN NEARBY. CONNECT GEC FROM GROUND LOOP AND UFER GROUND TO THE MGB. PROVIDE ADEQUATE SLACK IN THE GEC. SO IT CAN BE RELOCATED TO PERMANENT LOCATION IN PHASE 1.
3. PROVIDE 20G BRANCH CIRCUIT AND DISCONNECT AND CONNECT TO LPH-B1-A-1.

NUMBERED NOTES CON'T.

4. MOUNT RECEPTACLE NEXT TO MECHANICAL EQUIPMENT.
5. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03380.
6. PROVIDE L5-20R RECEPTACLE AND 2#12+1#12G TO LP-B1-A-1.
7. PROVIDE 30G BRANCH CIRCUIT AND DISCONNECT AND CONNECT TO LPH-B1-A-1.

NUMBERED NOTES CON'T.

8. PROVIDE WIREMOLD WITH RECEPTACLES 6" O.C.
9. SMOKE DETECTOR TO BE WITHIN 5FT OF DOOR. REFER TO DETAIL 1/E1-6009 FOR WIRING DETAIL.
10. ROUTE TWO 1"C FROM HPU TO FIRST BOLLARD IN SERIES FOR POWER AND CONTROL WIRING.
11. CONTROL SWITCH FOR OVERHEAD DOOR MANUFACTURER PROVIDED. PROVIDE SWITCH BACKBOX AND 1/2" EC FROM SWITCH TO MOTOR.



1 E1-2000 LOWER CONCOURSE LEVEL ZONE 03 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
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San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	08/30/12	ISSUED FOR CONSTRUCTION - BELOW GRADE PACKAGE	CFH
2	05/31/13	100% CONSTRUCTION DOCUMENTS	CFH
3	06/10/13	PER ASI No. 0104	CFH
4	01/23/14	ISSUED FOR BID	CFH
5	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
6	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
7	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH
8	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ZONE 03 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER FENLON - HARDING
No. E20560
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: C. GRANT
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: 6
SHEET NUMBER: SKE-RFI-TG10.4-421-2
SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

XREFS: XAGRID-96.dwg\ XAZONES.dwg\ XAFLRB1PH1.dwg\ TJPA-TB 34x44E.dwg\ XAGRID.dwg\ XEFLRB1PH1.dwg\ CFH-STAMP.dwg

SKE-RFI-TG10.4-421-3

B

PANEL:	LP-B1-A-1 (SECTION 1 of 3)				277/480V, 3 PHASE-4 WIRE					SURFACE MOUNTED			
MAIN:	250A MCB				BUS AMPACITY: 400A					10,000 AIC SYMMETRICAL			
TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA)						CKT	DEVICE	DESCRIPTION	TYP
				A	B	C	A	B	C				
R	EQMT RM RECPT, GENERAL RECPT	20/1	1	1,260			1,440			2	20/1	ENGINEERING EQUIPMENT STORE	E
R	EQMT RM RECPT, GENERAL RECPT	20/1	3		1,260			1,440		4	20/1	ENGINEERING EQUIPMENT STORE	E
R	EQMT RM RECPT, GENERAL RECPT	20/1	5			900			1,440	6	20/1	ENGINEERING EQUIPMENT STORE	E
R	EQMT RM RECPT, GENERAL RECPT	20/1	7	1,260			1,440			8	20/1	ENGINEERING EQUIPMENT STORE	E
R	EQMT RM RECPT, GENERAL RECPT	20/1	9		1,080			1,440		10	20/1	OVERSIZE EQUIPMENT	E
R	EQMT RM RECPT, GENERAL RECPT	20/1	11			1,440			1,440	12	20/1	OVERSIZE EQUIPMENT	E
R	RECEPTION, GENERAL RECPT	20/1	13	500			1,260			14	20/1	EQMT RM RECPT, GENERAL RECPT	R
R	EQMT RM RECPT, GENERAL RECPT	20/1	15		1,260			1,440		16	20/1	ENGINEERING EQUIPMENT STORE	E
E	JANITOR LUNCHROOM VENDING	20/1	17			1,000			1,440	18	20/1	ENGINEERING EQUIPMENT STORE	E
E	MAINT WORKSHOP VENT HOOD	20/1	19	1,440			1,440			20	20/1	ENGINEERING EQUIPMENT STORE	E
E	EQUIPMENT ROOM VENT HOOD	20/1	21		1,440			1,440		22	20/1	ENGINEERING EQUIPMENT STORE	E
R	MAINTENANCE WORKSHOP VIDEO	20/1	23			500			1,440	24	20/1	ENGINEERING EQUIPMENT STORE	E
~~R~~	~~JANITOR LUNCHROOM VIDEO~~ **SPARE**	20/1	25				1,440			26	20/1	ENGINEERING EQUIPMENT STORE	E
E	ELECTRIC WRENCH	20/1	27		1,440			1,440		28	20/1	ENGINEERING EQUIPMENT STORE	E
E	OVERSIZE EQUIPMENT	20/1	29			1,440			1,440	30	20/1	ENGINEERING EQUIPMENT STORE	E
E	OVERSIZE EQUIPMENT	20/1	31	1,440			360			32	20/1	MENS/WOMENS CHANGE ROOMS	R
E	EQUIP ROOM WELDING BENCH	20/2	33		1,248			1,080		34	20/1	MAINT WORKSHOP WIREMOLD	R
E	"	"	35			1,248			1,080	36	20/1	MAINT WORKSHOP WIREMOLD	R
R	EQMT RM RECPT, GENERAL RECPT	20/1	37	900						38	20/1	SPARE	
	SPARE	20/1	39							40	20/1	SPARE	
	SPARE	20/1	41							42	20/1	SPARE	
SUBTOTAL (VA)				6,800	7,728	6,528	7,380	8,280	8,280	SUBTOTAL (VA)			
SUBTOTAL ALL PHASES (VA)				PHASE A		PHASE B		PHASE C		SUBTOTAL ALL PHASES (AMPS)			
44,996				14,180		16,008		14,808		125			

SKE-RFI-TG10.4-421-4

PANEL:	LP-B1-A-1 (SECTION 2 of 3)				277/480V, 3 PHASE-4 WIRE						SURFACE MOUNTED		
MAIN:	MLO				BUS AMPACITY: 400A						10,000 AIC SYMMETRICAL		
TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA)						CKT	DEVICE	DESCRIPTION	TYP
				A	B	C	A	B	C				
E	WET JANITORIAL STORAGE ROOM	20/1	43	1,440			360			44	20/1	SOC RESTROOM RECPT	R
E	WET JANITORIAL STORAGE ROOM	20/1	45		1,440			720		46	20/1	SOC GENERAL RECPT	R
E	WET JANITORIAL STORAGE ROOM	20/1	47			1,440			1,080	48	20/1	SOC OFFICE CONV RECPT	R
E	WET JANITORIAL STORAGE ROOM	20/1	49	1,440			1,440			50	20/1	SOC OFFICE CONV RECPT	R
R	PAINT SUPPLY STORAGE ROOM	20/1	51		1,440			1,000		52	20/1	SOC COPY MACHINE	E
R	BUILDING STORAGE ROOM CONV	20/1	53			1,080			1,000	54	20/1	SOC COPY MACHINE	E
R	BUILDING STORAGE ROOM CONV	20/1	55	900			1,080			56	20/1	SOC GENERAL RECPT	R
R	BUILDING STORAGE ROOM CONV	20/1	57		900			1,260		58	20/1	SOC GENERAL RECPT	R
M	RM B1288 - OVER HEAD DOOR	20/1	59			864			360	60	20/1	SOC RESTROOM RECPT	R
M	RM B1281 - OVER HEAD DOOR	20/1	61	864			1,260			62	20/1	SOC GENERAL RECPT	R
M	RM B1233 - OVER HEAD DOOR	20/1	63		864			1,200		64	20/1	SIGNAGE (5)	E
M	RM B1233 - OVER HEAD DOOR	20/1	65			864			1,260	66	20/1	ENG/JANITORIAL OFFICE	R
M	RM B1237 - OVER HEAD DOOR	20/1	67	864			972			68	20/1	~~SPARE~~ **BREAK RM B1227 GD**	**K**
M	RM B1237 - OVER HEAD DOOR	20/1	69		864					70	20/1	~~SPARE~~ **BREAK RM B1227 MW (NIC)**	**K**
M	RM B1238 - OVER HEAD DOOR	20/1	71			864				72	20/1	~~SPARE~~ **BREAK RM B1227 DW (NIC)**	**K**
M	RM B1246 - OVER HEAD DOOR	20/1	73	864						74	20/1	~~SPARE~~ **BREAK RM B1227 REF (NIC)**	**K**
M	RM B1246 - OVER HEAD DOOR	20/1	75		864					76	20/1	SPARE	
M	RM B1279 - OVER HEAD DOOR	20/1	77			864				78	20/1	SPARE	
M	RM B1365 - OVER HEAD DOOR	20/1	79	864						80	20/1	SPARE	
M	RM B1365 - OVER HEAD DOOR	20/1	81		1,656					82	20/1	SPARE	
	SPARE		83							84	20/1	SPARE	
SUBTOTAL (VA)				7,236	8,028	5,976	5,112	4,180	3,700	SUBTOTAL (VA)			
SUBTOTAL ALL PHASES (VA)				PHASE A		PHASE B		PHASE C		SUBTOTAL ALL PHASES (AMPS)			
34,232				12,348		12,208		9,676		95			

SKE-RFI-TG10.4-421-5

PANEL:	LP-B1-A-1 (SECTION 3 of 3)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	MLO	BUS AMPACITY: 400A	10,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
K	~~SPARE~~ **SFPD BREAK RM B1273 GD**	20/1	85	972						86	20/1	~~SPARE~~ **JAN BREAK RM B1245 GD**	K
K	~~SPARE~~ **SFPD BREAK RM B1273 MW (NIC)**	20/1	87							88	20/1	~~SPARE~~ **JAN BREAK RM B1245 MW (NIC)**	K
K	~~SPARE~~ **SFPD BREAK RM B1273 DW (NIC)**	20/1	89							90	20/1	~~SPARE~~ **JAN BREAK RM B1245 DW (NIC)**	K
K	~~SPARE~~ **SFPD BREAK RM B1273 REF (NIC)**	20/1	91							92	20/1	~~SPARE~~ **JAN BREAK RM B1245 REF (NIC)**	K
	SPARE	20/1	93							94	20/1	SPARE	
	SPARE	20/1	95							96	20/1	SPARE	
	SPARE	20/1	97							98		SPACE	
	SPARE	20/1	99							100		SPACE	
	SPARE	20/1	101							102		SPACE	
	SPACE		103							104		SPACE	
	SPACE		105							106		SPACE	
	SPACE		107							108		SPACE	
	SPACE		109							110		SPACE	
	SPACE		111							112		SPACE	
	SPACE		113							114		SPACE	
	SPACE		115							116		SPACE	
	SPACE		117							118		SPACE	
	SPACE		119							120		SPACE	
	SPACE		121							122		SPACE	
	SPACE		123							124		SPACE	
	SPACE		125							126		SPACE	
	SUBTOTAL (VA)			972	0	0	0	0	0			SUBTOTAL (VA)	

TOTAL ALL PHASES, ALL PANEL SECTIONS (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES, ALL PANEL SECTIONS (AMPS)
80,200	27,500	28,216	24,484	223

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	39,816 VA	1.00	39,816 VA
H = ELECTRIC HEAT	0 VA	1.00	0 VA
K = KITCHEN EQUIPMENT	1,944 VA	0.65	1,264 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	864 VA	0.25	216 VA
m - ALL MOTORS	11,160 VA	1.00	11,160 VA
R = RECEPTACLE	27,280 VA	NEC DEMAND	18,640 VA

CONNECTED LOAD SUMMARY
80,200 VA
223 AMPS

NEC LOAD SUMMARY
71,096 VA
197 AMPS

B

TRACK BUSWAY B1385-C SCHEDULE

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 100A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 100A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
5	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
6	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
7	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
8	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
9	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK

TRACK BUSWAY B1385-D SCHEDULE

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 100A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 100A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
5	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
6	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
7	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
8	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
9	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK

TRACK BUSWAY B1385-E SCHEDULE

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 100A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 100A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
2	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
3	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
4	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
5	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
6	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
7	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
8	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
9	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
10	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
11	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
12	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
13	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET
14	CIRCUIT BREAKER J-BOX W/CORD	20A/3-POLE	120/208V/3PH	6 FEET	(1) NEMA L21-20 RECPT.	EQUIPMENT CABINET

TYPICAL TRACK BUSWAY SCHEDULE – LOWER CONCOURSE – UPS POWER

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 30A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 60A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX	30A/2-POLE	208V/1PH	NA	HARDWIRED	DAS WALL PANEL
5	CIRCUIT BREAKER J-BOX	20A/1-POLE	120V/1PH	NA	HARDWIRED	SECURITY WALL PANEL
6	CIRCUIT BREAKER J-BOX	(2) 20A/1-POLE	120V/1PH	NA	FIELD WIRED L5-20 RECPT.	AV, RACK-MOUNT PLUGSTRIP
7	CIRCUIT BREAKER J-BOX	(2) 20A/1-POLE	120V/1PH	NA	FIELD WIRED DOUBLE DUPLEX RECPT.	SECURITY, DAS AND BAS SYSTEM PANELS
8	CIRCUIT BREAKER J-BOX	(2) 20A/1-POLE	120V/1PH	NA	FIELD WIRED DOUBLE DUPLEX RECPT.	SECURITY, DAS AND BAS SYSTEM PANELS

RFI-TG10.4-422

TYPICAL TRACK BUSWAY SCHEDULE – LOWER CONCOURSE – UTILITY POWER

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 30A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 60A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	SPARE
5	CIRCUIT BREAKER J-BOX	20A/1-POLE	120V/1PH	NA	HARDWIRED	BMCS PANEL
6	CIRCUIT BREAKER J-BOX	20A/1-POLE	120V/1PH	NA	SPARE NEMA L5-20 RECPT.	DIGITAL SIGNAGE
7						
8						

TRACK BUSWAY B1385-A SCHEDULE

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 100A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 100A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
5	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
6	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
7	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
8	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
9	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK

TRACK BUSWAY B1385-B SCHEDULE

VOLTAGE: 120/208V, 3PH, 4W — POWER FEED: 100A MCB — LENGTH AS SHOWN WITH ALL CONNECTOR ACCESSORIES AS REQUIRED.
BUS AMPACITY: 100A — AIC RMS: 22,000A

PLUG-IN UNIT	TYPE	DEVICE RATING	VOLTAGE	CORD LENGTH	WIRING DEVICE	LOAD SERVED
1	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
2	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
3	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
4	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
5	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
6	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
7	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
8	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK
9	CIRCUIT BREAKER J-BOX W/CORD	30A/2-POLE	208V/1PH	6 FEET	(1) NEMA L6-30 RECPT.	TELECOM RACK

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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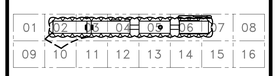


Key Map

N

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO.
08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
SCHEDULES – TRACK BUSWAY

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRIS FENLON - HARDING
No. E16960
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER — C. FENLON-HARDING
APPROVED:
PROJECT MANAGER — W. GAW
APPROVED:
PROJECT MANAGER — C. FENLON-HARDING

DESIGNED BY:	CHECKED BY:
J. TILLS	G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014

SCALE:	SIZE	FACILITY NO.	REVISION
NTS	E	140	B

SHEET NUMBER: SKE-RFI-TG10.4-422-1
SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

TG10.4 – Electrical, Communications, Security, and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-198	7/14/2014	M1-6710	Detail-1	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-320	7/21/2014	M1-6705, M1-2502 thru M1-2507	Detail: Bus Terminal Ventilation. 25 BMCS 25 01 00	Space Temp sensors listed on M1-6705 points list but aren't required in SOO. Also, Temp sensors are not shown on M1-2502 thru 2507, although CO and NO sensors are. Are temp sensors required anywhere the CO and NO sensors are shown?	Space temperature sensors will be used for temperature control. If the space gets too hot, the fans will be enabled. There will be temperature sensors as shown on the attached four sketches SKM-196.
TG10.4-322	7/21/2014	M1-0052	Detail: Split System AC Unit. 25BMCS 25 00 00	Does the BMS contractor have to install any wiring between AC-1-A-1 and its condenser unit ACC-1-A-1? Does the BMS need to monitor or control anything for this AC unit?	Control wiring between the AC unit and the ACC unit will be provided by the AC unit manufacturer per Specification Section 23 81 16. See the attached page from Specification Section 25 16 00 and drawing M1-7001. A software interface (BACnet) is required for these units. The revised Specification Section and drawing show the required points and interface details.
TG10.4-323	7/21/2014	M1-0052, M1-2103, M1-2107	Detail: Drycoolers. 25BMCS 25 00 00	Does the BMS have any scope with the 2 "drycooler" units ACC-B2-A-1 and ACC-B2-D-1?	These units are integral to the AC units mentioned in TG10.4-322. There are no control requirements. Refer to the response to TG10.4-322 for an explanation of the necessary requirements for the AC units.
TG10.4-371	7/29/2014	Addendum 2 SE1-3204		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-386	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-387	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-389	7/31/2014	M1-6705, M1-2604	Lobby Ventilation 25 00 00	2/M1-6705 shows BMS control of "operable windows" for lobby ventilation. Other than for the grand hall shown on M1-2305, the only other mechanical drawing that shows such windows and doors is on M1-2604 where there are 14 "operable windows" (note #5), 6 "operable doors" (note #6), and 2 "operable glass louvers" (note #1) shown on the bus deck level. Are these doors, windows, and louvers for the lobby ventilation described on M1-6705? Does the BMS control just windows, or is it windows and doors and louvers? Also, the points list on M1-6705 lists space humidity. SOO mentions OA humidity only. Is a humidity signal required for every temperature sensor (qty 12), or is a single OA humidity sensor needed, or both?	Refer to the response to TG10.4-388 (Q&A Response Set #14) regarding operable window and door controls. Since this is a naturally ventilated space, the actual humidity being sensed is the outside air humidity. A space humidity sensor is required. The humidity sensor is not required for every temperature sensor location; provide one OA humidity sensor as shown on the BMCS drawings.
TG10.4-392	7/31/2014	M1-6901	Domestic Water Pumping System 25 00 00	3/M1-6901 shows 2 DI alarm points for "domestic water pump alarm" and "domestic water pump low suction pressure alarm". The diagram shows 3 pumps. Will there be 2 alarms for each pump (total of 6), or just 2 alarms for the whole pump skid? Also please provide the location of the domestic water pumping skid so it can be determined which BMS panel the points will be wired to.	There will be two alarm points for the domestic water pump skid controller. The domestic water booster pump skid is located in room B2225 on the train platform level.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-397	7/31/2014	E1-5301, E1-5302, E1-5303,2/M1-6802	Lighting Breaker Panel Power Monitoring 25 00 00	2/M1-6802 says that for every lighting breaker panel to “provide an electrical submeter and a software interface to each electrical submeter”. On the lighting riser diagrams on E1-5301, E1-5302, and E1-5303 there are approximately 60 “dimming panel with breakers” shown. On E1-5302 there is a “quantum light management hub” shown with a BACnet Ethernet connection to the BMS. Does the BMS have to provide an energy meter for every one of the “dimming panel with breakers”, or can all of that information be received from the single BACnet connection to the lighting system shown on E1-5302?	Referencing sheet E1-5302, the light management hubs connect to the converged building IP network, not directly to the building management and control system. Provide the meters specified in Division 25 for energy metering of the building lighting systems. Refer to the response to TG10.4-399 for additional related information regarding meters.
TG10.4-398	8/1/2014		Division 25, 27, & 28.	With reference to Division 25, 27 & 28, there is a considerable amount of integration and over all interfaces that need to be put in place in order for this facility to operate per the intent of the bid documents, but where is the active head end equipment that will enable this to be implemented?	See M1-6002 for BMCS head end equipment. 27 series TE specifications are complete and accurate. Paging system equipment is specified. 28 series SE specifications are complete and accurate. Security system "active head-end equipment" is specified. If this question relates to active network equipment, it should be noted that network design has yet to be completed. The ECS/MNS as outlined in Specification Section 28 31 76 will not be bid as part of TG10.4. It will be contracted for after the Emergency Operations Plan has been developed. Specification Section 28 31 76 and the related ECS/MNS drawings SS-0000, SS-0050, SS-2000, SS-2001, and SS-9000 are reference documents only at this time.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-399	8/1/2014		Division 25 & 26	Division 25 requires all panel boards to have metering, but the single line show a number of the circuit breakers with power monitoring provisions; there appears to be some duplication between the two. Is a separate power monitoring system to be provided for the TG10.4 package? If not, please provide clarity between, what is being provided in Division 26 for Division 25.	Except as included for the switchboard, a separate power monitoring system for panelboards is not required. For panelboards, meters are included as specified in Division 25 for energy demand reporting. For switchboards, power monitoring and metering is proposed using the integrated switchboard metering/ monitoring equipment. These systems will report data to the BMCS as noted in the Division 25 field termination schedules. Refer to the attached sketch SKE-RFI-TG10.4-399-1 for clarification.
TG10.4-409	8/4/2014		Revisions to Construction Documents , ASI 117-119 , Part 1. Revision 1.1 A or B	States "This revision package is issued to incorporate all approved modifications and clarification provided in ASI referenced and shall form part of the contract documents for..." This goes on to list all Trade Packages this information is being incorporated into, but does not list TG10.4. Please clarify.	ASI 117, ASI 118, and ASI 119 were issued in Addendum #4 to TG10.4.
TG10.4-423	8/11/2014	E1-4407 (Add 1)	26 51 00/APA	Addendum 1 drawing E1-4407, dated 02/21/14, shows a quantity of 7 Type L70 fixtures. Specification section 26 51 00/APA does not provide any information on these fixtures. Please provide missing information so these fixtures can be priced by our vendors.	Please see attached sketch SKE-RFI-TG10.4-423-1. The fixtures in question are type L163.
TG10.4-428	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-429	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

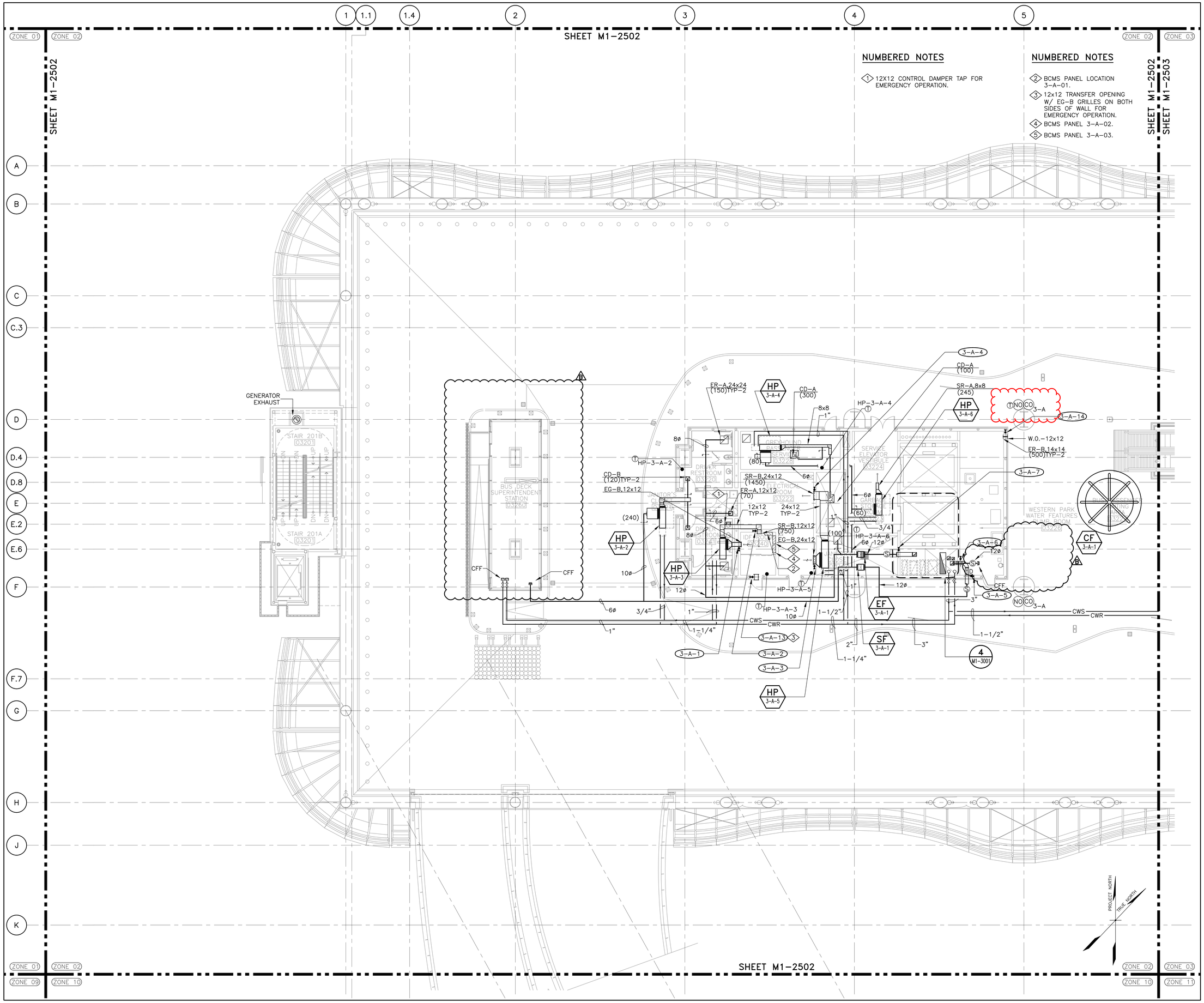
Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-430	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-432	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-433	8/11/2014		28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-434	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-435	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-436	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-437	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-438	8/11/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-442	8/11/2014		Exhibit A (Add 5), pg 16	Addendum #5, Exhibit A page 16 Line and Low Voltage Connection. How is Electrical contractor supposed to determine where and how much 24 V wiring and low voltage transformers for their scope of work? The are not enough details provided in our documents. Please provide a reasonable amount of information for pricing purposes.	The vast majority of the Low Voltage portions of the plumbing, HVAC, fire sprinkler and fire suppression scopes of work are limited to the rooms in which the equipment and their associated control/monitoring panels and/or devices are located; it can be assumed every piece of equipment, valve, etc. shown in the plumbing and mechanical drawings will require a low voltage home run to a panel/device on an adjacent wall as shown. Example: Using a combination of equipment room layouts and riser diagrams a bidder can ascertain how many points of Low Voltage connections within a particular equipment room are required - very similar to ascertaining Line Voltage requirements. For panels, controllers, and devices on walls within the same equipment room, a bidder can assume panels/devices are interconnected via low voltage conduit/wire. If there are specific equipment rooms or systems requiring more definition of low voltage scopes of work, submit a QBD for specific rooms or systems in question.
TG10.4-443	8/11/2014		Exhibit A (Add 5), pg 21	Addendum #5, Exhibit A page 21; Mechanical Devices: does this speak to the BMCS controlling or providing the actuator for the smoke fire dampers? Are the SFD's to be controlled and monitored by the fire alarm? With the direction provided in Exhibit A having the SFD provided by the MC and actuator by the BMCS will probably void the UL rating of the SFD. Industry standard is the SF damper and actuator making up the SFD as a single unit and there is no reason for the BMCS to have control as part of the FLS by the fire alarm unless the BMCS has the appropriate UL rating.	The TG10.3 Trade Subcontractor will provide all actuators for Smoke/Fire Damper (SFD) assemblies as coordinated with TG10.4 BMCS system to ensure proper UL compliance for entire SFD assembly. Therefore, the TG10.4 Trade Subcontractor is no longer responsible to provide controller for UL required SFDs. The TG10.4 Trade Subcontractor's responsibility is revised to coordinating with the TG10.3 Trade Subcontractor for proper controller selection and connection to and integration of the provided controller.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-445	8/12/2014		TG10.4-189 Response, Para:2.10 H 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-447	8/19/2014		TG10.4-191 and TG10.4-192	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-448	8/19/2014	SE1-4000 Detail :1,2,3,4,6	28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-449	8/19/2014		2.1, I,System Functionality ,18,K 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-450	8/19/2014	SE-6400 - SE-6410	Para: 2.1.A.2 ; 2.1.G.6.b 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-451	8/19/2014		2.1.G.6.b 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-452	8/19/2014		27 05 26	Please confirm that specification section 27 05 26 is to comply with the requirements of Section "01 80 50 - Seismic Design Criteria For Nonstructural Components"?	Yes, the Trade Subcontractor is to comply with the requirements of Specification Section 01 80 50. See the attached Revision 1 to Specification Section 27 05 26.
TG10.4-453	8/19/2014		27 05 28.29	Please confirm that specification section 27 05 29 is to comply with the requirements of Section "01 80 50 - Seismic Design Criteria For Nonstructural Components"?	Yes, the Trade Subcontractor is to comply with the requirements of Specification Section 01 80 50. See the attached Revision 1 to Specification Section 27 05 29.
TG10.4-454	8/19/2014		27 05 28.33	Please confirm that specification section 27 05 33 is to comply with the requirements of Section "01 80 50 - Seismic Design Criteria For Nonstructural Components"?	Yes, the Trade Subcontractor is to comply with the requirements of Specification Section 01 80 50. See the attached Revision 1 to Specification Section 27 05 33.



NUMBERED NOTES

1. 12X12 CONTROL DAMPER TAP FOR EMERGENCY OPERATION.

NUMBERED NOTES

2. BCMS PANEL LOCATION 3-A-01.
3. 12x12 TRANSFER OPENING W/ EG-B GRILLES ON BOTH SIDES OF WALL FOR EMERGENCY OPERATION.
4. BCMS PANEL 3-A-02.
5. BCMS PANEL 3-A-03.

1 M1-2001 BUS DECK LEVEL ZONE 02 MECHANICAL PLAN
SCALE: 1/8" = 1'-0

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	WLG
2	06/20/14	ISSUED FOR BID – ADDENDUM #4	WLG

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BUS DECK LEVEL
ZONE 02 MECHANICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
WAYNE L. GAW
No. M024042
Exp. 9-30-15
MECHANICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	W. GAW
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	W. GAW
DESIGNED BY: W. GAW	CHECKED BY: G. CRAIG
DRAWN BY: F. SOTO	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: B
SHEET NUMBER: M1-2502	SEQUENCE NUMBER: __ of __

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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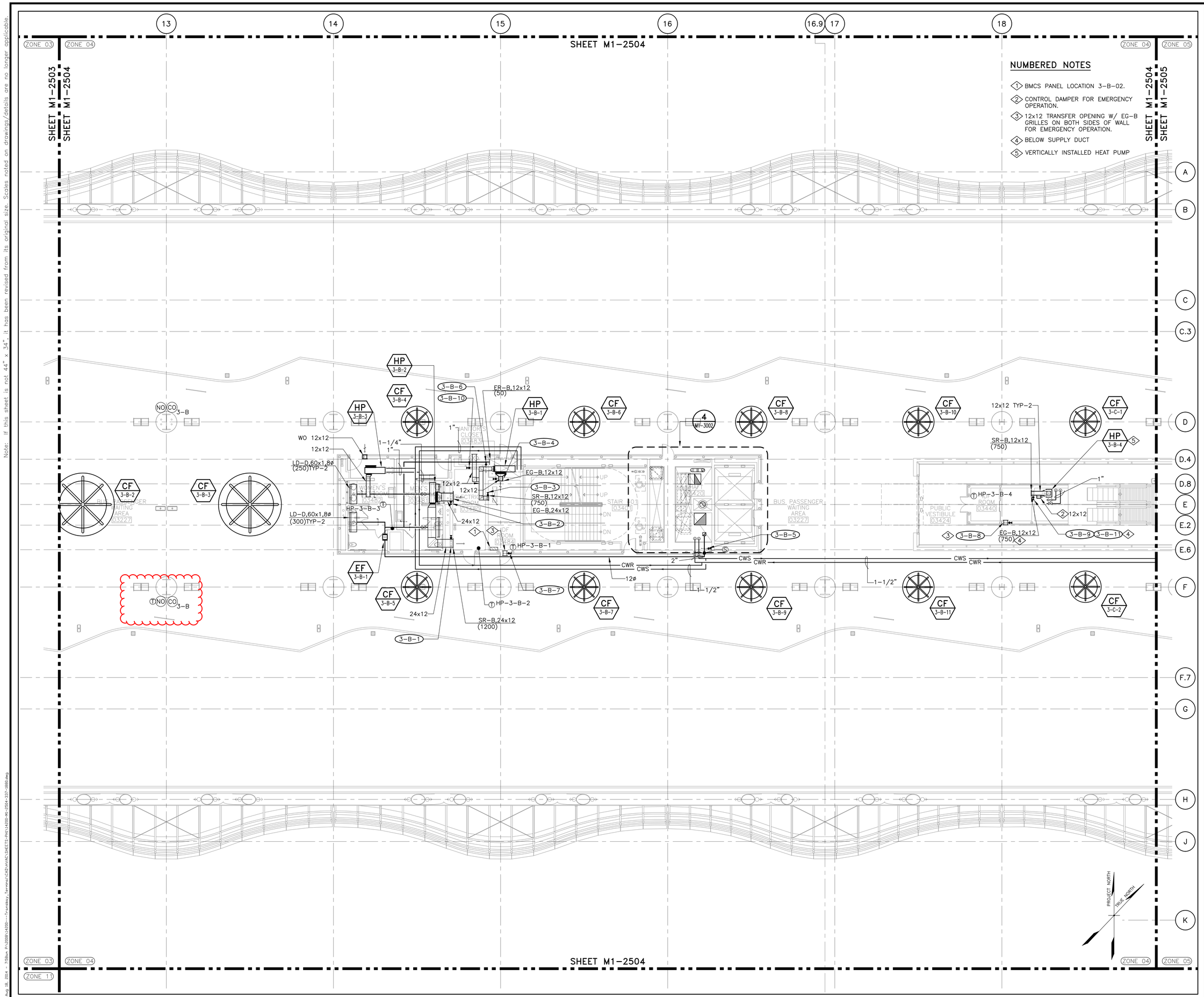
SKM-196: BUS DECK TEMPERATURE SENSORS
RE: RFI10.4-320



NUMBERED NOTES

1. BMCS PANEL LOCATION 3-B-02.
2. CONTROL DAMPER FOR EMERGENCY OPERATION.
3. 12x12 TRANSFER OPENING W/ EG-B GRILLES ON BOTH SIDES OF WALL FOR EMERGENCY OPERATION.
4. BELOW SUPPLY DUCT
5. VERTICALLY INSTALLED HEAT PUMP

1 M1-2001 BUS DECK LEVEL ZONE 04 MECHANICAL PLAN
SCALE: 1/8" = 1'-0

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	WLG

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: BUS DECK LEVEL
ZONE 04 MECHANICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
WAYNE L. GAW
No. 18000
Exp. 9-30-15
MECHANICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER W. GAW
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER W. GAW

DESIGNED BY: W. GAW	CHECKED BY: G. CRAIG
DRAWN BY: F. SOTO	DATE: 01/23/2014
SCALE: 1/8" = 1'-0	SIZE: E; FACILITY NO.: 140; REVISION: A

SHEET NUMBER: M1-2504
SEQUENCE NUMBER: ___ of ___

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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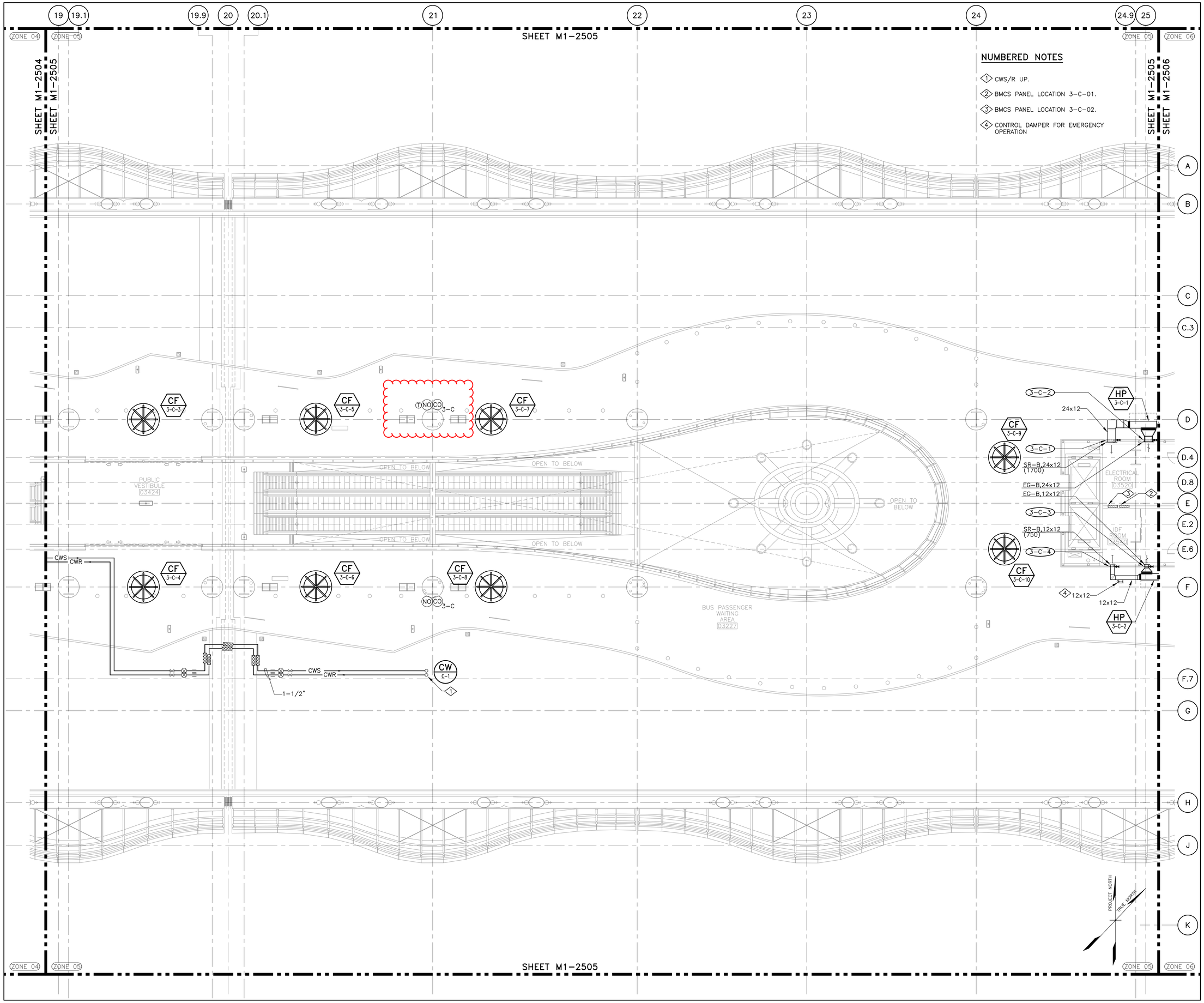
SKM-196: BUS DECK TEMPERATURE SENSORS
RE: RFI10.4-320



NUMBERED NOTES

1. CWS/R UP.
2. BMCS PANEL LOCATION 3-C-01.
3. BMCS PANEL LOCATION 3-C-02.
4. CONTROL DAMPER FOR EMERGENCY OPERATION

1 (M1-2001) BUS DECK LEVEL ZONE 05 MECHANICAL PLAN
SCALE: 1/8" = 1'-0

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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SKM-196: BUS DECK TEMPERATURE SENSORS
RE: RFI10.4-320

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
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San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	WLG

REVISIONS

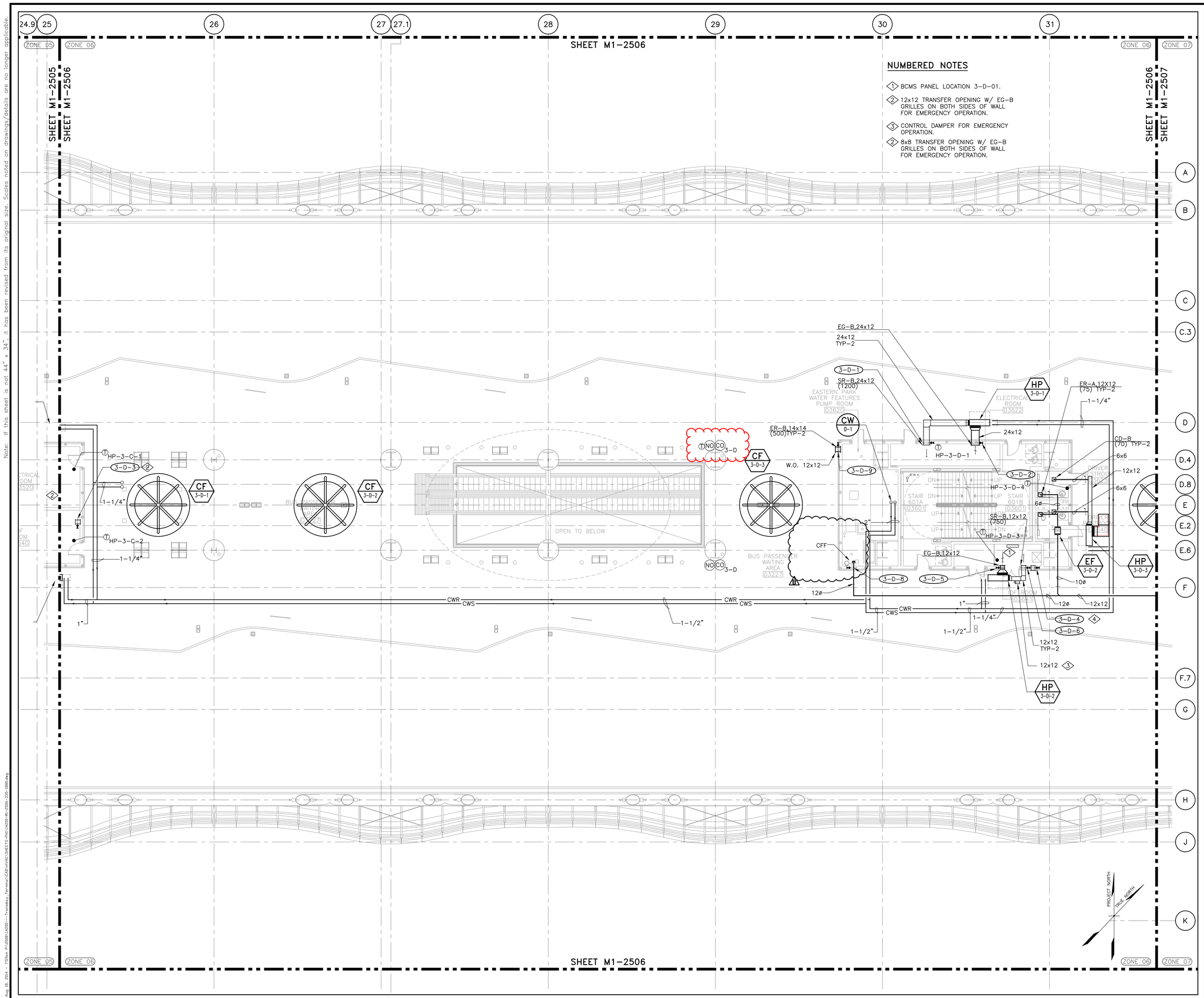
CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BUS DECK LEVEL
ZONE 05 MECHANICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
WAYNE L. GAW
No. M024024
Exp. 6-30-15
MECHANICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	W. GAW
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	W. GAW
DESIGNED BY: W. GAW	CHECKED BY: G. CRAIG
DRAWN BY: F. SOTO	DATE: 01/23/2014
SCALE: 1/8" = 1'-0	SIZE: E; FACILITY NO.: 140; REVISION: A
SHEET NUMBER: M1-2505	SEQUENCE NUMBER: __ of __



1 (M1-2001) BUS DECK LEVEL ZONE 06 MECHANICAL PLAN
SCALE: 1/8" = 1'-0

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	WLG
A	06/20/14	ISSUED FOR BID – ADDENDUM #4	WLG

REVISIONS

CONTRACT NO.
08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BUS DECK LEVEL
ZONE 06 MECHANICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
WAYNE L. GAW
No. M-18763
Exp. 6-30-15
MECHANICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER W. GAW
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER W. GAW

DESIGNED BY:	CHECKED BY:
W. GAW	G. CRAIG
DRAWN BY: F. SOTO	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E; FACILITY NO.: 140; REVISION: B

SHEET NUMBER
M1-2506

SEQUENCE NUMBER
__ of __

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SKM-196: BUS DECK TEMPERATURE SENSORS
RE: RFI10.4-320

1. Any BMCS alarm as required and determined as a critical security alarm to the facility (i.e. CBRN detection, etc). These alarm point should be coordinated and discussed with the TJPA representative prior to implementation.
2. Real-time alarm data as well as time adjustable alarm queries.
3. Provide any required cabling from the BMCS to the converged IP network for communication with the PSIM Systems.
4. Provide all information monitored on a floor plan graphical displays and a general monitoring screen for all PSIM information.

2.12 INTERFACE BETWEEN BMCS AND PACKAGED AC UNITS

A. Provide a BACNet MSTP software interface between the BMCS and each packaged AC unit controllers.

B. The software communications interface shall be set up so as to provide, at minimum, the following monitoring and control points:

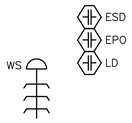
1. Unit General Alarm
2. Unit Status
3. Supply Air Temperature
4. Compressor Status(es)
5. Dirty Filter Alarm
6. Owner Defined Points

END OF SECTION 25 16 00

SPECIFICATION ISSUE LOG

Revision	Date
A	01/23/14

RFI TG10.4-322 SK-1



FIELD TERMINATION SCHEDULE – MISCELLANEOUS

FT	DESCRIPTION	DI	DO	AI	AO	HI	CI	NOTES
WS	WEATHER STATION			94				TYPICAL OF 5 AT THE FOLLOWING LOCATIONS: 1. ROOF OF WEST PAVILION 2. COORDINATE WITH ARCHITECT. 3. COORDINATE WITH ARCHITECT. 4. COORDINATE WITH ARCHITECT. 5. COORDINATE WITH ARCHITECT.
EPO	WETLAND EMERGENCY SHUTOFF	52						
LD	LEAK DETECTION ALARM	2						TYPICAL OF 2 (ONE UNDER SOC RAISED FLOOR AND ONE IN NATURAL GAS METER ROOM.
ESD	SYSTEM EMERGENCY SHUTDOWN	52						TYPICAL FOR THE SOC, BACKUP SOC, FCC, BACKUP FCC, AND ENGINEERING CONTROL ROOM.

1 / M1-7001 BMCS DETAILS – MISCELLANEOUS
SCALE: 1:1

SEQUENCE OF OPERATION – SNORKEL DAMPER OPERATION

A. SYSTEM DESCRIPTION – THIS SYSTEM CONSISTS OF AUTOMATIC CONTROL OF THE SNORKEL DAMPERS PROVIDING FRESH AIR TO THE LOWER CONCOURSE AREA. THESE DAMPERS ARE TYPICALLY ALWAYS OPEN EXCEPT DURING A CBRN DETECTION EVENT.

B. SYSTEM OFF – WHEN THE SYSTEM IS OFF:

1. THE DAMPERS SHALL BE CLOSED.

C. INITIATION OF SYSTEM START–UP – SYSTEM START–UP SHALL BE INITIATED AS FOLLOWS:

1. BY AN OPERATOR MANUALLY ENTERED COMMAND AT THE BMCS.
2. AUTOMATICALLY BASED ON WHEN THE ASSOCIATED AREA IS IN OCCUPIED MODE.

D. SYSTEM OPERATION – WHEN SYSTEM START–UP HAS BEEN INITIATED, THE FOLLOWING SEQUENCES SHALL BE IMPLEMENTED:

1. THE DAMPERS SHALL FULLY OPEN.

E. SETPOINTS – NONE

F. INITIATION OF SYSTEM SHUTDOWN – SYSTEM SHUTDOWN SHALL BE INITIATED AS FOLLOWS:

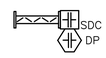
1. BY OPERATOR MANUALLY ENTERED SYSTEM SHUTDOWN COMMAND.
2. AUTOMATICALLY BASED ON CBRN DETECTION.
3. ACTIVATION OF THE EMERGENCY SHUTDOWN SWITCH.

G. ALARMS – THE BMCS SHALL GENERATE AN ALARM:

5. IF EQUIPMENT FAILS IN SERVICE.

H. FAILURE POSITIONS – WHEN A BMCS COMPONENT FAILURE OCCURS OR A POWER FAILURE OCCURS:

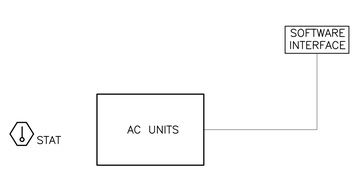
1. THE DAMPERS SHALL REMAIN IN THE LAST COMMANDED POSITION.



FIELD TERMINATION SCHEDULE – ARCHITECTURAL OUTSIDE AIR DAMPERS

FT	DESCRIPTION	DI	DO	AI	AO	HI	CI	NOTES
SDC	OUTSIDE AIR DAMPER CONTROL		21					REFER TO MECHANICAL FOR QUANTITIES AND LOCATIONS.
DP	DAMPER POSITION	61						REFER TO MECHANICAL FOR QUANTITIES AND LOCATIONS.

2 / M1-7001 BMCS DETAILS – ARCHITECTURAL OUTSIDE AIR INTAKES
SCALE: 1:1



FIELD TERMINATION SCHEDULE – PACKAGE AC UNITS TYPICAL FOR AC–1–A–1 & ACC–1–A–1)

FT	DESCRIPTION	DI	DO	AI	AO	HI	CI	NOTES
US	UNIT STATUS						15	
UA	UNIT GENERAL ALARM						15	
SAT	SUPPLY AIR TEMPERATURE						15	
CS	COMPRESSOR STATUS						15	
DFA	DIRTY FILTER ALARM						15	
STAT	THERMOSTAT					2		
OD	OWNER DEFINED POINTS						15	

3 / M1-7001 BMCS DETAILS – PACKAGES AC UNITS
SCALE: 1:1

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Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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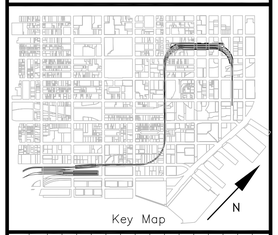


Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	JH
2	08/15/14	ADDED AC UNIT INTERFACE REQUIREMENTS	JL

CONTRACT NO.
08–04–CMGC–000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BMCS DETAILS
SNORKEL DAMPERS
PHASE I

ARCHITECT/ENGINEER SEAL

APPROVED:
PRINCIPAL ARCHITECT J. HATCHER
APPROVED:
PROJECT MANAGER J. LLOYD
APPROVED:
PROJECT MANAGER B. VEAZEY

DESIGNED BY:	CHECKED BY:
J. HATCHER	R. MELLOR
DRAWN BY: R. STASKUS	DATE: 08/15/2014
SCALE: 1:1	SIZE E / FACILITY NO. 140 / REVISION A
SHEET NUMBER M1–7001	SEQUENCE NUMBER ___ of ___

RTest (Text)

RFI TG10.4-322 SK-2

SHEET NOTE

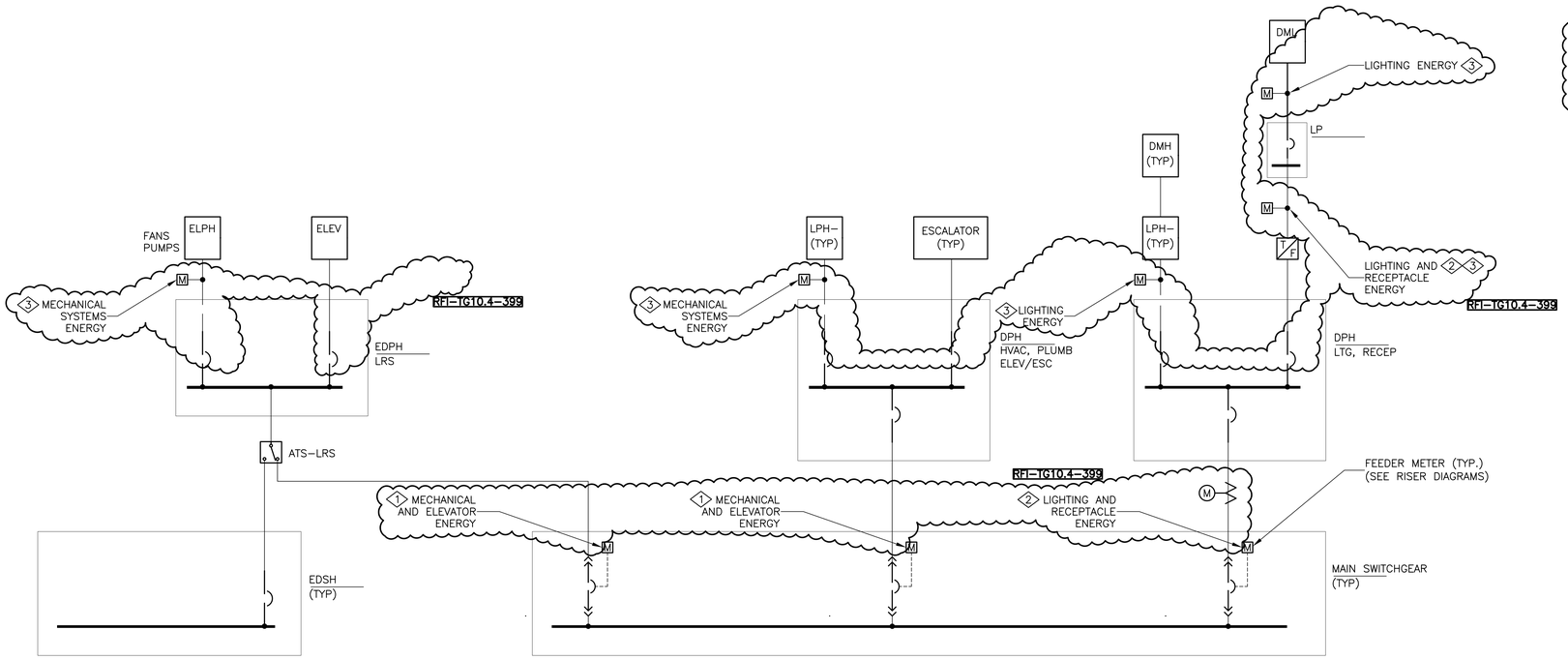
A. REFER TO EQUIPMENT SPECIFICATIONS SECTION 262412 FOR CIRCUIT BREAKER REQUIREMENTS FOR INTEGRATED METERING IN SWITCHGEAR. RFI-TG10.4-399

NUMBERED NOTE

RFI-TG10.4-399

1. MECHANICAL AND ELEVATOR ENERGY USAGE WILL BE CALCULATED BY SUBTRACTIVE METERING FROM SHARED FEEDER.
2. LIGHTING AND RECEPTACLE ENERGY USAGE WILL BE CALCULATED BY SUBTRACTIVE METERING FROM SHARED FEEDER.
3. ENERGY METER SPECIFIED IN SPECIFICATIONS SECTION 253010.

RFI-TG10.4-399



1 / E1-5001 ELECTRICAL SYSTEM MONITORING RISER DIAGRAM
SCALE: NTS

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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: ELECTRICAL SYSTEM MONITORING RISER DIAGRAM

ARCHITECT/ENGINEER SEAL

APPROVED: PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED: PROJECT MANAGER W. GAW
APPROVED: PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: C. FENLON-HARDING
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 01/23/2014
SCALE: NTS
SIZE: E
FACILITY NO.: 140
REVISION: A
SHEET NUMBER: SKE-RFI-TG10.4-399-1
SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

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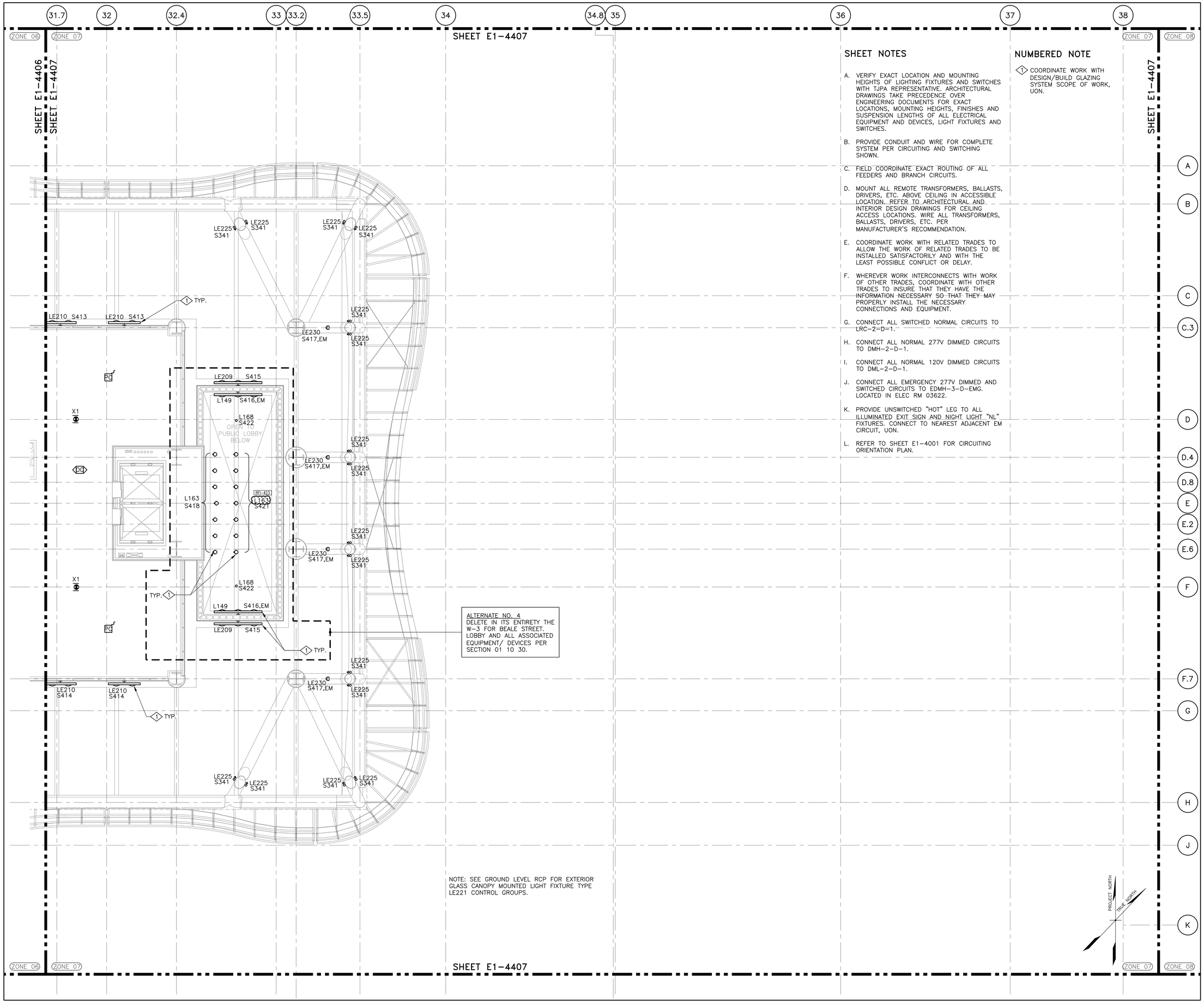

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS OF LIGHTING FIXTURES AND SWITCHES WITH TJPA REPRESENTATIVE. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE OVER ENGINEERING DOCUMENTS FOR EXACT LOCATIONS, MOUNTING HEIGHTS, FINISHES AND SUSPENSION LENGTHS OF ALL ELECTRICAL EQUIPMENT AND DEVICES, LIGHT FIXTURES AND SWITCHES.

B. PROVIDE CONDUIT AND WIRE FOR COMPLETE SYSTEM PER CIRCUITING AND SWITCHING SHOWN.

C. FIELD COORDINATE EXACT ROUTING OF ALL FEEDERS AND BRANCH CIRCUITS.

D. MOUNT ALL REMOTE TRANSFORMERS, BALLASTS, DRIVERS, ETC. ABOVE CEILING IN ACCESSIBLE LOCATION. REFER TO ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS FOR CEILING ACCESS LOCATIONS. WIRE ALL TRANSFORMERS, BALLASTS, DRIVERS, ETC. PER MANUFACTURER'S RECOMMENDATION.

E. COORDINATE WORK WITH RELATED TRADES TO ALLOW THE WORK OF RELATED TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE CONFLICT OR DELAY.

F. WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT THEY HAVE THE INFORMATION NECESSARY SO THAT THEY MAY PROPERLY INSTALL THE NECESSARY CONNECTIONS AND EQUIPMENT.

G. CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-D-1.

H. CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-D-1.

I. CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-D-1.

J. CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-3-D-EMG. LOCATED IN ELEC RM 03622.

K. PROVIDE UNSWITCHED "HOT" LEG TO ALL ILLUMINATED EXIT SIGN AND NIGHT LIGHT "NL" FIXTURES. CONNECT TO NEAREST ADJACENT EM CIRCUIT, UON.

L. REFER TO SHEET E1-4001 FOR CIRCUITING ORIENTATION PLAN.

NUMBERED NOTE

1 COORDINATE WORK WITH DESIGN/BUILD GLAZING SYSTEM SCOPE OF WORK, UON.

2 / E1-2001 SECOND LEVEL ZONE 07 LIGHTING PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

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Transbay Transit Center
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Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
SECOND LEVEL
ZONE 07 LIGHTING PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CARLINE FENLON - HARDING
No. E-18360
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: L. SERRANO
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 02/21/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: B
SHEET NUMBER: SKE-RFI-TG10.4-423-1
SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

SECTION 27 05 26 – COMMUNICATIONS GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. Provides specifications for telecommunications grounding and bonding system within each technology distribution space, for telecommunications pathways, and all associated components.

1 . . .

B. **Refer to Section 01 80 50 for the seismic bracing/anchorage requirements**. ***. . . 1***

C. Section includes:

1. ANSI-J-STD-607-A compliant grounding/bonding bars, cables, and associated components.

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. EIA: Electronics Industry Alliance
2. IDF: Intermediate Distribution Facility
3. MDF Main Distribution Facility
4. TIA: Telecommunications Industry Association

B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)

1. National Electric Safety Code (NESC)
2. National Fire Protection Association (NFPA)
3. California Building Code
4. California Electrical Code
5. Local Municipal Codes

C. Reference Material: Refer to the most recent version, update or addenda.

1. Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) standards and specifications:

   a. ANSI-J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   b. ANSI/TIA/EIA-568-C, Series of Standards for Commercial Building Telecommunications
   c. ANSI/TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
   d. ANSI/TIA-942: Telecommunications Infrastructure for Data Centers

2. Electronics Industry Alliance (EIA):

   a. ANSI/EIA-310-D: Cabinets, Racks, Panels and Associated Equipment Standard

3. Building Industry Consulting Services International (BICSI) Manuals:

   a. Telecommunications Distribution Methods Manual (TDMM)
   b. Information Technology Systems Installation Manual (ITSIM)

4. International Electrical Testing Association

   a. Acceptance Testing Specifications ATS-2009 (NETA ATS-2009)

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate all telecommunications work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the TJPA Representative. Any repairs or changes made necessary in the contract work, caused by the contractors neglect, shall be made by the contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of work.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the TJPA Representative prior to installation. The contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the TJPA Representative for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents

B. Shop Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Shop drawings shall include evidence of grounding and bonding components are coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual component for review and action by the TJPA Representative prior to installation.

1.5 INFORMATION SUBMITTALS

A. Certificates:

1. Submit management and installation team reference documentation verifying that:

a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.

2. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents.

B. Qualification Statements:

1. The contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

1.6 CLOSEOUT SUBMITTALS

A. Warranty Documentation:

1. Submit manufacturers extended warranty certification documentation one (1) week after the warranty acceptance by the manufacturer. It shall be the contractor's responsibility to facilitate the manufacturer-specific warranty requirements.

B. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings within four (4) weeks after completion of all Division-27 work.

1.7 QUALITY ASSURANCE

A. Qualifications – Manufacturer:

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available onsite for review at all times for each field technician.

PART 2 - PRODUCTS

2.1 METALLIC CABLE SPECIFICATIONS

A. Manufacturer list:

1. Harger
2. General cable
3. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Bonding Conductor: Minimum #6 AWG THHN - sized at 2 kcmil per linear foot of conductor length up to a maximum size of 4/0 AWG - Must be UL listed.
2. Telecom Bonding Backbone Cable: 4/0 AWG THHN. - Must be UL listed.
3. Cable jacket marking: Must be legible and shall contain the following information:

   a. Manufacturer's name,
   b. Copper conductor gauge,
   c. UL listing.

4. Cable jacket shall be green with black lettering.

D. Accessory Products:

1. Provide any accessory products related to the grounding and bonding cable required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.2 LUGS

A. Manufacturer List:

1. Harger
2. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Long-barrel compression lugs shall be used on all ground wire.
2. All stranded copper ground wires shall be terminated at the equipment racks in a 2-hole, long-barrel compression lugs.
3. Number 4/0 AWG stranded copper ground wires shall be terminated at the ground bar in a 2-hole, long-barrel compression lugs.

D. Accessory Products:

1. Provide any accessory products related to the grounding and bonding lugs required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.3 TELECOM MAIN GROUND BAR (TMGB)

A. Manufacturer List:

1. Chatsworth
2. Harger
3. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Copper ground bar, 24 inches long x 4 inches high x ¼-inch thick.
2. Provide with mounting brackets, insulated stand-offs, and attachment hardware.
3. Ground bar shall be provided with pre-drilled 7/16-inch hole sets on 1-inch centers, to accommodate two-hole lug attachment.

D. Accessory Products:

1. Provide any accessory products related to the grounding and bonding bars required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.4 TELECOM GROUND BAR (TGB)

A. Manufacturer List:

1. Chatsworth
2. Harger
3. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Copper ground bar, 24 inches long x 4 inches high x ¼-inch thick.
2. Provide with mounting brackets, insulated stand-offs, and attachment hardware.
3. Ground bar shall be provided with pre-drilled 5/16-inch hole sets on 5/8-inch centers, and 7/16-inch hole sets on 1-inch centers to accommodate two-hole lug attachment.

D. Accessory Products:

1. Provide any accessory products related to the grounding and bonding bars required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.5 GROUNDING STRAP

A. Manufacturer List:

1. Chatsworth
2. Harger
3. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Flexible tin plated copper wire, #6 AWG, 12” long with crimped lugs on each end and ¼”-20 mounting hardware.

D. Accessory Products:

1. Provide any accessory products related to the grounding and bonding strap required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.6 SHIELD BOND CONNECTOR

A. Manufacturer List:

1. 3M
2. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Shield bonding assembly, with base and top members made of tin-plated tempered brass, slightly curved to exert a continuous spring force on sheath and shield after clamping, and two securing lock nuts. Designed to make a stable, low resistance electrical connection between the shield of a communications cable and a wire conductor.
2. Shield bond connector for cables of 100-pair or less.

   a. 3-M Scotchlok 4460-D,

3. Shield bond connector for cables of more than 100-pair.

   a. 3-M Scotchlok 4460,

D. Accessory Products:

1. Provide any accessory products related to the shield bond connector required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.7 CONDUIT GROUNDING FITTINGS

A. Manufacturer List:

1. Steel City
2. Harger
3. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Insulated grounding bushing, malleable iron/zinc plated, for copper or aluminum bare ground wire, 105 degree C thermoplastic liner, heavy reinforced ribs. Size as required.

   a. Steel City, BG-803 (1-inch),

2. EMT steel set-screw connectors with heavy steel walls, insulated throat, male hub thread NPS, pre-set pre-staked set screws, steel/zinc plated finish. Size as required.

    a. Steel City, TC-723 (1-inch),

D. Accessory Products:

1. Provide any accessory products related to the conduit grounding fittings required to provide a complete and functional ANSI-J-STD-607-A compliant system.

2.8 U CHANNEL SUPPORT SYSTEM GROUNDING FITTINGS

A. Manufacturer List:

1. B-Line
2. Panduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. An assembly of components to provide bonding of the U channel support system to the ground bar in each Telecom Room shall be provided. All components to be by the same manufacturer.
2. Stud nut with spring, ¾" stud length, ¼-20 thread size, zinc-plated, to fit installed strut support system.

    a. B-Line SN224-3/4,

3. No twist square washer, 3/8" hole, zinc-plated.

    a. B-Line B200D,

4. Lock washer, ¼", zinc-plated, stainless steel.

    a. B-Line ¼" LW,

5. Hex nut, ¼", zinc-plated, stainless steel.

    a. B-Line ¼" HN,

D. Accessory Products:

1. Provide any accessory products related to the U-channel support system grounding fittings required to provide a complete and functional ANSI-J-STD-607-A compliant system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section. Examples of work which must be checked include, but are not limited to:

1. Electrical requirements (conduit installation and capacity)
2. The telecommunications rooms are the size shown on the project drawings.
3. Adequate clearances of doors, riser spaces and ceilings for all component of the telecommunications system.

B. Examine and compare the telecommunications drawings and specifications with the drawings and specifications of other trades. Report any discrepancies between them to the TJPA Representative and obtain written instructions for changes or revisions.

3.2 GROUND BAR INSTALLATION – TMGB and TGB

A. The Contractor shall install telecommunication ground bars in all telecom rooms to which all bonding conductors, bonding terminal points within the room, and telecom bonding backbone conductors will terminate.

1. The ground bar shall be installed per manufacturers instructions at a height and location indicated on the telecom enlarged floor plan drawings for each telecom room. If no height or location information is provided in TE-series drawings, Contractor to propose location in shop drawings based on industry standards and common practices.
2. All connections to the ground bar shall use antioxidant joint compound.

3.3 GROUND JUMPER & WIRE INSTALLATION

A. All lug connections to the ground bars and opposite end shall use antioxidant joint compound.

B. Install and bond a 4/0 gauge ground wire using a 2-hole, long-barrel compression lug from the TMGB ground bar in the MDF room to the main ground bar at the main building electrical service. There shall be no splices or mechanical couplers installed between the wire points of origin and termination.

C. Install and bond a 4/0 gauge ground wire using a 2-hole, long-barrel compression lug from the TGB ground bar in the MDF room to the TMGB ground bus in the MDF room. There shall be no splices or mechanical couplers installed between the wire points of origin and termination.

D. Install and bond a 4/0 gauge ground wire using a 2-hole, long-barrel compression lug from the TGB ground bar in each of the IDF rooms to the TMGB ground bus in the MDF room. There shall be no splices or mechanical couplers installed between the wire points of origin and termination.

E. Place copper ground conductor in minimum 1” size EMT conduit when routing outside of the telecom rooms to existing ground bars in electrical distribution panels or to existing building steel connections outside the telecom rooms. Grounding of the conduit should be done at the electrical distribution panels or building steel connections only (not on ground bar) unless otherwise required by code.

F. Install a continuous bonding conductor (wire) as an uninterrupted conductor section bonded to each layer of cable runway. There shall be no splices or mechanical couplers installed between the wire points of origin and termination except as specified herein.

G. Unless otherwise noted, all bonding and ground wires on telecom cable trays and runways shall be routed on the outer edge of the cable trays and cable runways.

H. Bond all equipment racks and cabinets using individually home run bonding conductors using 2 hole irreversible compression lugs to the predrilled insulated ground bar in the telecom room.

I. Bond all metallic components within telecom spaces using individually home run bonding conductors using 2 hole irreversible lugs to the predrilled insulated ground bar in each telecom room.

3.4 LUG INSTALLATION

A. Provide all ground wire lugs on ground jumpers and conductors.

B. Ground wires from equipment racks shall be minimum #6 AWG THHN - sized at 2 kcmil per linear foot of conductor length up to a maximum size of 4/0 AWG and shall have crimp-on 2-hole, long-barrel lugs placed on each end.

C. Ground wires from cable runway shall be minimum #6 AWG THHN - sized at 2 kcmil per linear foot of conductor length up to a maximum size of 4/0 AWG, and shall have crimp-on 2-hole, long-barrel lugs placed on each end.

D. Ground wires from and to other ground bars, and the building electrical service entrance shall be 4/0 AWG and shall have 2-hole long barrel compression lugs placed on each end.

E. Ground wire from cable tray and conduits used for routing of telecom station cable into a telecom rooms shall be minimum #6 AWG THHN - sized at 2 kcmil per linear foot of conductor length up to a maximum size of 4/0 AWG, and shall have a 2-hole long barrel compression lug placed at each end. The 2-bolt lugholes shall be ¼-inch on ¾-inch centers.

F. Utilize the lug-crimping tool designed to work specifically with the specified lugs. Use of tools not specifically designed for lug crimping, or other methods of crimping shall be deemed unacceptable. Lugs installed in an unacceptable manner shall be replaced at no cost to the TJPA.

3.5 GROUNDING STRAP INSTALLATION

A. Provide a grounding strap between cable runway sections and cable tray segments in order to provide a continuous ground path throughout the pathway assembly.

3.6 SHIELD BOND CONNECTOR INSTALLATION

A. Provide a shield bond connector to the shield of each fiber optic and copper riser cable in order to make a stable, low-resistance connections between the shield and a bonding conductor.

B. The bonding jumper at the shield bond connector end shall have a single hole standard barrel lug with a #6 AWG conductor. The other end of the bonding jumper shall be a 2-hole long barrel compression for bonding at the predrilled insulated ground bar.

3.7 CONDUIT GROUNDING INSTALLATION

A. All conduit used for routing of ground cables between telecom rooms and the main electrical ground bar shall have a threaded grounding bushing with set screws to ensure electrical and mechanical connection.

B. All conduit used for routing of station cables into the telecom rooms shall have a threaded grounding bushing with set screws to ensure electrical and mechanical connection.

C. The conduit shall have a steel set screw coupling with a threaded insulated grounding bushing securely connected to the point of termination within the telecom room or the main electrical closet.

D. The bonding jumper shall be stripped and tightened securely on the set screw connection at the grounding bushing. The other end of the bonding jumper shall be properly connected in a two-hole long barrel lug and secured to the pre-drilled insulated ground bar two (2) ¼”-20 x ¾” hex head cap screws with ¼”-20 lock washers and ¼”-20 hex nuts.

E. If banks of conduits are used to provide entry of communications cable into a telecom room, the conduits may be grounded by either of the following methods:

1. Each individual conduit shall have an insulated grounding bushing with a continuous bonding jumper in a daisy chain configuration, bonded to a predrilled insulated ground bar in the telecom room.
2. The individual conduits shall be securely clamped in an approved manner to a strut trapeze assembly, which shall be bonded to a predrilled insulated ground bar in the telecom room.

3.8 COMMUNICATION CABLE METAL TERMINAL BLOCK GROUNDING INSTALLATION

A. All communication cable metal terminal blocks shall be properly bonded to the pre-drilled insulated ground bar in the Telecom Room.

B. Individual columns of terminal blocks and vertical backboards come with set screw type grounding connectors. One continuous daisy-chain style connection of #6 AWG wire, stripped at each point of connection, shall be used to bond the terminal blocks and vertical backboards through the equipment provided grounding connectors. The bonding jumper shall continue on and be properly connected in a two-hole long barrel lug and secured to the pre-drilled insulated ground bar.

3.9 CABLE IDENTIFICATION

A. All ground cable segments shall be labeled “GND-# xxx”. The “#” shall be a sequential number sequence beginning with “1” at each telecom room. The “xxx” shall identify the termination location on the opposite end of the cable. Cable shall be identified within 12 inches of the device that is being grounded.

3.10 CABLE TESTING

A. All ground connections shall be checked and the entire system shall be checked for continuity.

B. Ground tests shall meet the requirements of the NEC and ANSI-J-STD-607-A.

C. All tests shall be in accordance with the International Electrical Testing Association – Acceptance Testing Specifications ATS-2009 (NETA ATS-2009)

D. Final test to be conducted in the presence of the TJPA Representative.

E. The Contractor shall test for continuity on all ground cables between the object that is being bonded to and the ground bar on the following segments:

1. TGB ground bar in the MDF room and the telecom main ground bar (TMGB) in the MDF room.
2. TGB ground bar in each of the telecom rooms and the telecom main ground bar (TMGB) in the MDF room.
3. TMGB and main electrical ground bar in the building electrical service entrance room.
4. Ground bar in the telecom room and the equipment racks and cabinets bonded to the ground bar.
5. Ground bar in the telecom room and the cable runway segments bonded to the ground bar.

6. Ground bar in the telecom room and the metal communications cable terminal blocks bonded to the ground bar.
7. Ground bar in the Telecom Room and the cable tray segments bonded to the ground bar.

F. Prepare test reports, certified by the testing organization, of the ground resistance at each test location. Provide the ground cable number for each telecom room in an MS Excel spreadsheet format with continuity test results expressed in milliohms.

3.11 RE-INSTALLATION

A. No additional burden to the TJPA regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re-installation work shall be coordinated, in writing, with the TJPA Representative prior to beginning any re-installation work.

3.12 CLOSEOUT ACTIVITIES

A. All specified grounding and bonding components shall be installed per the Drawings and Specifications.

B. Contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by the TJPA Representative.

C. Contractor to submit all as-built drawings and any test documentation required prior to acceptance by the TJPA Representative.

D. Any deficiencies noted in field observations and punch lists shall be corrected.

END OF SECTION 27 05 26

SPECIFICATION ISSUE LOG

Revision	Date
1	08/12/14

2SECTION 27 05 29 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Provides specifications for non-continuous cable support components utilized to provide pathways support to telecommunications cables traveling outside cable trays, conduits, or other continuous cable supports.

1 . . .

B. **Refer to Section 01 80 50 for the seismic bracing/anchorage requirements**. ***. . . 1***

C. Section Includes:

1. Non-continuous cable supports.
2. Double "U" channel post & grid support system.

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. AHJ: Authority Having Jurisdiction
2. BICSI: Building Industry Consulting Service International
3. EIA: Electronics Industry Alliance
4. TIA: Telecommunications Industry Association

B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)

1. National Electric Safety Code (NESC)
2. National Fire Protection Association (NFPA)
3. California Electrical Code
4. California Building Code

C. Reference Material: Refer to the most recent version, update or addenda.

1. Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) standards and specifications:

   a. TIA/EIA-568-C.1: Commercial Building Telecommunications Cabling Standard Part-1: General Requirements
   b. TIA/EIA-569-B: Commercial Building Standard for Telecommunications Pathways and Spaces
   c. ANSI/J-STD-607-A: Commercial Building Grounding and Bonding Requirements for Telecommunication

2. BICSI Guidelines:

   a. Telecommunications Distribution Methods Manual (TDMM)
   b. Information Transport Systems Installation Manual (ITSIM)

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate the telecommunications cabling work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the TJPA Representative. Any repairs or changes made necessary in the contract work, caused by the contractor's neglect, shall be made by the contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit all product data in accordance with general requirements of the construction documents.
2. Submit product cut sheets and a detailed list of components a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Alternate and "Or Equal" designated products must be submitted for review and judgment to the TJPA Representative prior to installation. The contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
4. Any request of an alternate or substitution must be submitted to the TJPA Representative for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

B. Shop Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents.
2. Submit shop drawings a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Shop drawings shall include evidence of hangars and support system components are coordinated with field conditions and the work of other trades.
4. Seismic design drawings showing seismic support and bracing, including calculations prepared by the Contractor's California Certified structural engineer, shall be provided for approval by TJPA Representative prior to fabricating or installing any supports.
5. This submittal may have a written component and a visual, drawn component for review and action by the TJPA Representative prior to installation.

1.5 INFORMATION SUBMITTALS

A. Certificates:

1. Submit management and installation team reference documentation verifying:

a. The project manager is a RCDD in good standing with BICSI and is qualified to manage the scope of work described in the contract documents and has five (5) years of experience managing similar projects in size and scope. The documentation shall include the RCDD registration number.
b. The field supervisor is a BICSI trained technician that is qualified to perform and oversee the work described in the contract documents.

B. Qualification Statements:

1. The contractor shall submit documentation that within the past 12 months, a minimum of 75% of all installation personnel have been trained or certified by the manufacturer of the products they are installing.

CLOSEOUT SUBMITTALS

C. As-Built Drawings:

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings within four (4) weeks after completion of all Division-27 work for TJPA Representative reference.

1.6 QUALITY ASSURANCE

A. Qualifications – Manufacturer:

1. Component manufactures shall be ISO 9001:2000 and offer products that are RoHS compliant.

B. Qualifications – Installer:

1. At a minimum, seventy-five percent (75%) of the onsite contractor provided field technicians shall be factory certified within 12 months by the manufacturer of the selected telecommunications system components being installed. Proof of certification shall be available on site for review at all times for each field technician.

PART 2 - PRODUCTS

2.1 NON CONTINUOUS CABLE SUPPORTS

A. Manufacturer List:

1. B-Line Cable hook system
2. Erico Caddy CableCat support system
3. Panduit J-Mod cable support system

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular infrastructure requirements.
2. Select support system components capable of supporting the telecommunications cable quantities required for each location. Options are as follows:

   a. Support slings
   b. Four inch (0’4”), two inch (0’2”) J-hook supports

C. Description:

1. Non-continuous cable supports shall be available in multiple sizes, styles and materials. Rigid supports shall be equipped with flared edges and pre-configured bend radius controls.
2. Provide drop wire supports and threaded rod assemblies in areas where structural mounting surfaces are non-functional or inaccessible.
3. Sling assemblies shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance FTP/UTP and optical fiber cables. Support slings shall have a static load limit of 100 lbs.

4. Non-continuous cable supports sized 1 5/16” and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable.
5. Select approved non-continuous cable supports suitable for specific installation environments and/or air handling (plenum) spaces.

2.2 DOUBLE “U” CHANNEL GRID & POST SUPPORT SYSTEM

A. Double “U” channel, 3-1/4 “ x 1-5/8”, provide length as required, 12 gauge:

1. B-Line B-22A,

B. Post base fitting of quarter” steel plate with four 3/4” holes for concrete slab attachment, four 9/16” holes with four ½-13 hex head bolts and four ½-13 spring nuts for attachment to vertical B22A double “U” channel:

1. B-Line Part No. B281SQ,

C. Seven-Hole Cross Gusset Plate fitting of quarter” steel plate with seven 9/16” holes for attachment to horizontal double “U” channel with seven ½-13 hex head bolts and seven ½-13 spring nuts:

1. B-Line B334,

D. Five Hole Corner Gusset Plate fitting of quarter” steel plate with five 9/16” holes for attachment to horizontal double “U” channel with five ½-13 hex head bolts and five ½-13 spring nuts:

1. B-Line B556,

E. Five Hole Tee Gusset Plate fitting of quarter” steel plate with five 9/16” holes for attachment to horizontal double “U” channel with five ½-13 hex head bolts and five ½-13 spring nuts:

1. B-Line B532,

F. Three Hole Corner 90 degree angle fitting of quarter” steel plate with three 9/16” holes:

1. B-Line B374,

G. Four Hole Corner 90 degree angle fitting of quarter” steel plate with four 9/16” holes:

1. B-Line B115,

H. Square washer of quarter” steel plate with one 9/16” hole:

1. B-Line B202,

I. Four hole splice clevis fitting for B22A double “U” channel splicing of quarter” steel plate with four 9/16” holes:

1. B-Line 172-22A,

J. Eight hole double wing connection fitting of quarter” steel plate with eight 9/16” holes:

1. B-Line B272,

K. Nine hole triple wing connection fitting of quarter” steel plate with nine 9/16” holes:

1. B-Line B124,

L. Rack to runway support plate to bolt equipment racks to “U” channel grid:

1. B-Line SB2133-15,

M. “U” Channel metal end caps for B22A channel:

1. B-Line B205,

N. “U” Channel plastic end caps for B22A channel:

1. B-Line B822A

O. All thread rods, flat washers, lock washers and hex nuts, sizes as required:

1. B-Line,

P. Spring nut for use with ½” bolts in the B22A “U” channels:

1. B-Line N225,

PART 3 - EXECUTION

3.1 EXAMINATION

A. Check actual site conditions prior to start of any work. Ensure all preceding trade work associated with the telecommunications system is accurate and complete before proceeding with installation or use of products specified in this section.

3.2 NON-CONTINUOUS CABLE SUPPORT INSTALLATION

A. Process:

1. Follow manufacturer’s instructions and recommended industry standards and guidelines.
2. The installed non-continuous support system must be an independent support structure for the voice/data communication system.
3. Draping cables over other structures in the ceiling is unacceptable. Water pipes, ceiling grid, sprinkler system, electrical supports, air ducts or any other in-ceiling structure may not be used for cable support.
4. Contractor installed supports shall be used to supplement the main cable support system when any cabling leaves the main support system or is unsupported for more than three and one half feet (3.5’-0”) feet.
5. Non-continuous supports shall be installed with ceiling wire or threaded rod secured to the slab above to support the telecommunications cable infrastructure parallel to the slab throughout the cable plant, unless site conditions dictate a non-parallel installation.
6. Cable must be routed to follow existing corridors and parallel or 90 degree angles from all walls and the cable tray whenever possible.

3.3 HARDWARE INSTALLATION:

A. Provide seismic support and bracing for all support systems installed under this work. Provide seismic design calculations and seismic design sketches prepared by the Contractor’s California Certified structural engineer for coordination and approval by TJPA’s Representative prior to fabricating or installing any supports. Any proposed reinforcement to be the responsibility of the Contractor. Coordinate seismic design with existing architectural, structural, mechanical, electrical, plumbing and fire protection conditions and other installed components and site conditions.

3.4 DOUBLE "U" CHANNEL GRID & POST SUPPORT SYSTEM

A. The horizontal double "U" channel support grid shall consist of 12 gauge, 3-¼" x 1-5/8", double "U" channel and fittings installed to the following:

1. The bottom of the horizontal, double "U" channel grid is located at a height as indicated on the drawings.
2. The horizontal double "U" channel grid shall be leveled to a tolerance of 1/8" over 10 feet.
3. The sections that span the width of the rooms shall be continuous sections. Provide overlap of these continuous sections at vertical post locations on the perimeter and corners of the U channel grid. These overlaps are needed to provide attachment space for double and triple wing connection fittings that bolt the horizontal U channel grid to the vertical posts.
4. The sections that span the length of the rooms shall be individual sections of crossing runs and shall be installed in between the continuous runs. These sections shall be joined by splices as required to create a continuous run. Crossing splices shall be made with the applicable gusset plates on both sides of the horizontal double "U" channel grid at all instances except where noted different.
5. Coordinate the final location of the horizontal double "U" channel grid with the Telecom drawings and existing architectural, structural, mechanical, electrical, plumbing and fire protection conditions and other existing conditions.
6. Bolting hardware shall at a minimum be ½" thread except where noted different.
7. Open ends of the horizontal double "U" channel shall be closed off with plastic or metal end caps.
8. 19" Equipment racks shall be bolted to the double "U" channel grid with rack to runway support plate fittings using J-bolts to bolt the plate fitting to the racks and ½" bolts and spring nuts to attach the support plates to the "U" channel.

B. The vertical double "U" channel post supports shall consist of 12 gauge, 3-¼" x 1-5/8", double "U" channel and fittings installed to the following:

1. Post bases for vertical double "U" channel posts to be anchored with four (4) ½" x 4-1/2" carbon steel expansion anchors to the concrete floor.
2. The vertical post bases need to be orientated as shown on telecom drawings to ensure that vertical double "U" channel posts face correctly to provide the correct clearances in the rooms. Coordinate the final location of the vertical double "U" channel posts with Telecom drawings and existing architectural, structural, mechanical, electrical, plumbing and fire protection conditions and other existing conditions.
3. The top ends of the vertical double "U" channel posts shall be attached to the bottom of the horizontal support grid with the appropriate "U" channel fittings as specified.
4. Open ends of the double "U" channel shall be closed off with metal end caps.
5. Bolting hardware shall at a minimum be ½" thread except where noted different.

C. All field-cut, "U" channels shall be deburred prior to placement.

D. The Contractor shall at all times utilize the appropriate manufacturers fittings and hardware as specified.

E. The double "U" channel grid & post support system shall be bonded and grounded to the telecom ground bar with a continuous #6 AWG cable and the terminal ground support.

3.5 RE-INSTALLATION

A. No additional burden to TJPA regarding costs, network down-time, and end user interruption shall result from the re-installation of specified components. Scheduling for re-installation work shall be coordinated, in writing, with TJPA Representative prior to beginning any re-installation work.

3.6 CLOSEOUT ACTIVITIES

A. Contractor shall provide documentation of all telecommunications system components under this section utilized throughout the site for review and reference by TJPA Representative.

B. Contractor to submit all as-built drawings and any test documentation required prior to acceptance by TJPA Representative.

END OF SECTION 27 05 29

SPECIFICATION ISSUE LOG

Revision	Date
1	08/18/14

SECTION 27 05 33 - CONDUITS AND BOXES FOR COMMUNICATION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Provides specifications for conduit pathways, back boxes and pull box enclosures utilized for the distribution and housing of telecommunications cabling and components:

1 . . .

B. **Refer to Section 01 80 50 for the seismic bracing/anchorage requirements**. ***. . . 1***

C. Section Includes:

1. Telecom EMT conduits
2. Telecom pull boxes and back boxes

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. ANSI: American National Standards Institute
2. BICSI: Building Industry Consulting Service International
3. RCDD: Registered Communications Distribution Designer
4. UL: Underwriters Laboratory

B. Codes and Regulations: (Note: Reference Division One for specific code versions governing the work in addition to the information noted below.)

1. National Electric Safety Code (NESC)
2. National Fire Protection Association (NFPA)
3. NFPA 130 – Fixed Guideway Transit and Passenger Rail Systems.
4. California Electrical Code
5. California Building Code
6. Local Municipal Codes

C. Reference Material: Refer to the most recent version, update or addenda.

1. Telecommunications Industry Association/Electronics Industries Alliance (TIA/EIA) standards and specifications:

   a. ANSI/TIA/EIA-568-C, Series of Standards for Commercial Building Telecommunications
   b. ANSI/TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
   c. ANSI/TIA-606-A Administration Standard for Commercial Telecommunications Infrastructure
   d. ANSI-J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

2. Building Industry Consulting Services International (BICSI) Manuals:

   a. Telecommunications Distribution Methods Manual (TDMM)
   b. Information Technology Systems Installation Manual (ITSIM)

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Install and coordinate all telecommunications work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interference in a manner accepted by the TJPA Representative. Any repairs or changes made necessary in the contract work, caused by the contractors neglect, shall be made by the contractor at their own expense.

B. Scheduling:

1. Contract Documents and the overall construction schedule must be carefully reviewed to determine all required interfacing and timing of the work.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Submit all product data in accordance with general requirements of the construction documents including Telecom pull boxes (sized per NEC) and conduits with installation hardware: manufacturers cut sheet or catalog cut of each of the components to be used with the pull boxes and conduits.
2. Other components used in the support or the performance of the requirements in this Section.
3. Submit product cut sheets and a detailed list of components a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
4. Alternate and "Or Equal" designated products must be submitted for review and judgment to the TJPA Representative prior to installation. The contractor-proposed alternate products or components must be verified by two (2) independent sources within the past 6 months. This request shall include the two (2) independent sources, the original product's specification sheet, the proposed substitute product cut sheet, and a written request to review the substitute product.
5. Any request of an alternate or substitution must be submitted to the A/E for action no later than fourteen (14) calendar days after release of the original telecommunications bid documents.

B. Shop Drawings:

1. Submit all shop drawings in accordance with the general requirements of the construction documents. Shop drawings shall include routing layout of telecom conduit and pull boxes with support, bracing, anchoring and fittings for the hardware. Provide to the TJPA's Representative for approval prior to installing the conduit pathway system.
2. Submit shop drawings a minimum of twelve (12) weeks prior to commencement of Division-27 work for TJPA Representative review and action.
3. Shop drawings shall include evidence of pathway system components that have been coordinated with field conditions and the work of other trades.
4. This submittal may have a written component and a visual component for review and action by the TJPA Representative prior to installation.

1.5 CLOSEOUT SUBMITTALS

A. As-Built Drawings

1. Submit all as-built drawings in accordance with the general requirements of the construction documents.
2. Submit as-built drawings a within four (4) weeks after completion of all Division-27 work for TJPA Representative reference.

PART 2 - PRODUCTS

2.1 EMT CONDUIT – TELECOM

A. Manufacturers

1. Wheatland Tube
2. Republic Conduit

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Continuous, seamless steel tubing galvanized or sherardized on exterior, coated on interior with smooth hard finish of lacquer, varnish or enamel.
2. Electrical Metallic Galvanized Tubing and Fittings with natural finish for all conduits not exposed: ANSI C80.3 with compression-type fittings.

D. Accessory Products:

1. Provide any accessory products related to the telecom conduits required to provide a complete and functional infrastructure system.
2. Supporting devices: U channel trapeze assemblies, 1/2”Threaded rods, clamps, conduit straps, C-clamps and retainers.

2.2 PULL BOXES - TELECOM

A. Manufacturers:

1. B-Line,
2. Hoffman Engineering Co,

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. Indoor Pull boxes: Galvanized steel, screw cover pull box. Grey polyester powder coat finish inside and out. NEMA Type 1.
2. Pull boxes to be sized per NEC code to accommodate the number of EMT conduits as shown on Telecom drawings with adequate clearances, access and cable management space.

D. Accessory Products:

1. Provide any accessory products related to the telecom pull boxes required to provide a complete and functional infrastructure system.
2. Fasteners: ¾" Carbon steel expansion anchors with 2 ½" embed into concrete slab for pull box U-channel support attachment to concrete slab. The anchors must be tested and approved under dual load conditions: Hilti Kwikbolt 3, Ramset/Redhead Trubolt.
3. U-channel systems: 16 gauge steel channels. Provide fittings and accessories that match with the U-channel of the same manufacturer.

2.3 BACK BOXES – TELECOM

A. Manufacturers:

1. Randl 5 Square Telecom Boxes
2. The Siemon Company

B. Product Options:

1. The indicated manufacturers shall be the basis of the design and each component selected shall address the particular requirements for each situation.

C. Description:

1. All telecom back boxes shall be provided in a minimum of five inch square by 2.875" deep metal box rated for the installation environment and approved for each specific use.
2. Telecom back boxes shall have an integral cable management system to facilitate minimum bend radius of all telecom cable types.
3. Factory side, top, bottom, and back (rear) knockouts shall be available for multiple telecom conduit sizes to mate directly with the back boxes with factory couplers.

D. Accessory Products:

1. Provide any accessory products related to the telecom back boxes required to provide a complete and functional infrastructure system.
2. Include mounting hardware, Extension Rings, Blank Covers, and couplers, etc – where appropriate.

PART 3 - EXECUTION

3.1 TELECOM CONDUITS AND BOXES

A. Pull boxes:

1. Install Pull boxes in easily accessible locations.
2. Install Horizontal cabling boxes immediately above suspended ceilings.
3. A pull box should not be used in lieu of a bend.
4. Conduits that enter the pull box from opposite ends with each other should be aligned.
5. For direct access to a box located above inaccessible ceilings provide a suitable, marked, hinged access panel (or equivalent) in the ceiling. This access panel can also serve as the cover for the box.

6. Pull box sizing table:

Conduit Trade Size (in.)	Pull box Width (in.)	Pull box Length (in.)	Pull box Depth (in.)	Pull box Width Increase for Additional Conduit (in.)
1	4	16	3	2
1 1/4	6	20	3	3
1 1/2	8	27	4	4
2	8	36	4	5
2 1/2	10	42	5	6
3	12	48	5	6
3 1/2	12	54	6	6
4	15	60	8	8

B. Back Boxes:

1. Provide 5" H X 5" W X 2-7/8" D outlet back boxes with integrated cable management at all telecom outlet locations shown on drawings.
2. Provide (1) 1-1/4" conduit from back box to telecom cable tray, except as otherwise noted. All connectors and couplings shall be zinc-plated steel set screw type. Die cast zinc fittings are not to be used. Provide bushing on ends of all conduits.
3. Provide pull string in all conduits.
4. Provide single gang plaster ring on all communications outlet back boxes, unless indicated otherwise.
5. Provide bonding to cable pathways.

C. Conduit support and bracing:

1. Coordinate layout and installation of conduits and pull boxes with other trade conditions to ensure adequate clearances, access and cable management.
2. Provide seismic support and bracing for all conduits and pull boxes installed under work of this project per the project's structural requirements.
3. Provide seismic design calculations and seismic design drawings prepared by the Contractor's Structural Engineer for coordination and approval by TJPA Representative prior to fabricating or installing any supports. Any proposed reinforcement is the responsibility of the Contractor.
4. Install and provide support for EMT conduits and pull boxes in accordance with the latest edition of the NEC code, as well as all state and local codes and requirements. Coordinate installation and location with existing conditions. Notify and get the TJPA Representative approval before installing conduits and pull boxes where the location need to deviate from the contract documents.
5. Install conduits above ceilings at height to provide access to pull boxes and cable access to where conduits terminate to meet up with cable trays. Install conduits and pull boxes level and square and at proper elevations. Ensure adequate clearances, access and cable management.
6. Provide and install expansion or deflection fittings for conduits runs at all instances at seismic or expansion joints to allow for movement in any direction.

D. Conduit routing, bends and radius guidelines:

1. If the conduit has an internal diameter of 2 inches or less the bend radius must be at least 6 times the internal conduit diameter.
2. If the conduit has an internal diameter of more than 2 inches the bend radius must be at least 10 times the internal conduit diameter.

3. Conduit bends should be smooth, even, and free of kinks or other discontinuities that may have detrimental effects on pulling tension or cable integrity during or after installation.
4. If a conduit run requires more than two 90 degree bends then provide a pull box between sections with two bends or less.
5. If a conduit run requires a reverse bend (between 100 degrees and 180 degrees), insert a pull point or pull box at each bend having an angle from 100 degrees to 180 degrees.
6. Consider an offset as equivalent to a 90 degree bend.
7. Achieve the best direct route with no bend greater than 90 degrees or an aggregate of bends in excess of 180 degrees between pull points or pull boxes.
8. Contain no continuous sections longer than 100 ft.
9. For runs that total more than 100 ft. in length, pull points or pull boxes should be inserted so that no segment between points/boxes exceeds the 100 ft. limit.
10. Withstand the environment to which they will be exposed, including NFPA 130 compliance, where required.
11. Conduits should not be routed through areas in which flammable material may be stored or over or adjacent to boilers, incinerators, hot-water lines and steam lines.
12. Keep conduits at least 6' from parallel runs of steam/water pipes or mechanical ductwork.

E. Conduit terminations:

1. Join conduits with fittings designed and approved for the purpose. Make the joints tight without protruding lips that can snag cable pulling inside the conduits.
2. Where conduits are terminated with locknuts and bushings align the conduit to enter squarely and install the locknuts with dished part against the box. Use two locknuts, one inside and one outside the box.
3. Ream all conduit ends and fit them with an insulated bushing to eliminate sharp edges that can damage cables during installation or service.
4. Conduits that enter a telecom room should terminate near the corners.
5. Terminate conduits that protrude through the structural floor 3 inches above the surface.
6. Maintain the integrity of all fire stop barriers for all floor or wall penetrations.

F. Provide grounding and bonding for conduits and pull boxes as indicated by NEC code and instructed by manufacturer.

G. Conduits shall be clearly labeled at both ends designating the opposite locations(s) served.

H. Conduit Protection:

1. Remove burrs, dirt and construction debris from conduits and pull boxes.
2. Conduits shall be left capped for protection.
3. Provide final protection and maintain conditions in a manner acceptable to the TJPAs Representative to ensure that coatings, finishes and pull boxes are without damage or deterioration at completion. Repair damage to galvanized finishes with zinc-rich paint recommended by the manufacturer.

3.2 ACCEPTANCE

A. Specified shop drawings and product submittals shall have been submitted for review and all review comments and deficiencies shall have been resolved. Final shop drawings and product submittals shall have been submitted, reviewed and found to meet the requirements of the specifications.

B. Issues and deficiencies identified in field reports and punch lists shall have been resolved. Final as-built drawings shall have been submitted, reviewed and found to meet the requirements of the specifications.

C. Contractor shall provide written notice of final completion of the telecom infrastructure. Upon receipt, the TJPA's Representative will review/observe the completed installation.

END OF SECTION 27 05 33

SPECIFICATION ISSUE LOG

Revision	Date
1	08/12/14

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-378	7/31/2014		Enclosures and Racks 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-476	8/20/2014	ES-2223, ES-2224, & ES-2225		Drawings ES-2223, ES-2224, & ES-2225 all have sheet note 6 attached to the primary cables. Sheet note 6 states, "Contractor shall route 12kv main loop to each VFI..." Typically SFPUC would provide and install the primary cables and terminate them to their utility transformers. Please confirm the routing of the primary cables, furnished by others, and the termination of those cables to the SFPUC utility transformer is by SFPUC rather than the TG10.4 Contractor	Confirmed. Conductors will be pulled and terminated by SFPUC/PG&E. However, mandrelling in preparation of conductor install is by the TG10.4 Trade Subcontractor.
TG10.4-477	8/20/2014	E1-2202 (Add 4) & E1-5201		Drawing E1-2202 was issued with Addendum 4 and deletes the following System Panels from the "Secondary Fire Command Center" (Room #B1232 at column lines 3.5/E): (1) Life Safety Interface to PA System (LSI). (1) Fire Alarm Control Panel (FACP). (1) Voice Communication System Panel (VCS). (3) Plasma Screens (Plasma). (2) Generator Remote Status Panels (FPSP). (2) Fire Pump Remote Status Panels (GSP). (2) Automated Control Unit Panels (ACU). (1) Network Command Center Printer (PTR). (1) Network Command Center Panel (NCC). (1) Elevator Status Panel (ESP). Drawing E1-5201, dated 01/23/14, was never updated to be consistent with the changes shown on E1-2202 (Add 4). Please confirm all above listed system panels are to be deleted per E1-2202 (Add 4).	With the exception of the elevator status panel, all other associated system panels in the secondary Fire Command Center (FCC) that are listed in the QBD are deleted. The elevator status panel and associated annunciator equipment at the Security Control Center will remain as identified and required by Specification Section 14 20 00.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-479	8/20/2014	TE1-7001 thru 7006	Para: 3.4.A.1 27 11 23	The specification state, "...innerduct in all backbone conduits and all 4" conduit pathways..." The drawing implies by the sheet notes all conduits intended for backbone to have innerduct, that would be 4" conduit designated CE, CW, E, W, etc. Please clarify the discrepancy as to which one is to be followed.	There is no discrepancy; drawings and specifications are correct. All backbone conduits shall have innerduct per specifications and drawings.
TG10.4-480	8/20/2014		Exhibit F	Just for clarification; the language pertaining to BIM 4D & 5D in Section III Cost & Productivity Data b. & c. were deleted but in VI. Modeling Specification a. states the 3D mode will be used for 4D & 5D purposes. What does this mean? Are the sub-primes still responsible for applying 4D & 5D to the BIM?	The 4D & 5D elements as described in Section III are deleted. Section VI was not correctly edited to reflect Section III deletion, but will be addressed in a future addendum. No, subprimes are not responsible for applying 4D & 5D elements to BIM.
TG10.4-482	8/20/2014	1/A1-7575, 7/A1-7579, & 12/S1-5000,	QBD TG10.4-332	We were originally of the understanding that this QBD went to all the 1/A1-7575, 7/A1-7579, & 12/S1-5000 MEP contractors. The details referenced this C channel support is for the mechanical duct work, are we to assume that this work is being provided by the M.C. doing TG10.3 along TG10.3-027 QBD stating they are responsible to provide additional and supplemental supports and hangars per Div. 22 & 23 as sited in the QBD?	Correct. The miscellaneous iron MEP support identified in QBD TG10.4-332 is included in the TG10.3 Trade Subcontractor scope of work.
TG10.4-484	8/20/2014		Para:2.5.A 26 33 53	The specification says UL924 rating which would include a battery run time of 90 minutes. Paragraph 2.5.A states that the run time shall be 5 minutes. What should be the run time? And at what capacity?	Batteries shall run for 5 minutes at a capacity of 120kVA.
TG10.4-486	8/21/2014	SE1-2106, SE1-6400		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-487	8/21/2014	SE1-2403, SE1-6303		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-489	8/21/2014	SE1-2206, SE1-6402		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-490	8/21/2014	SE1-2207, SE1-6402		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-491	8/21/2014	SE1-2207, SE1-6402		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-492	8/21/2014	SE1-2502, SE1-6408		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-493	8/21/2014	SE1-2607, SE1-6410		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-494	8/21/2014	SE1-2104, SE1-6100		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-495	8/21/2014	SE1-4003		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-499	8/21/2014	SE1-2203		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-500	8/21/2014	SE1-2205		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-501	8/21/2014	SE1-2207		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-503	8/21/2014	SE1-3001	28 23 00 - 51, 2.5, A AND 3.2, B, 2. 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-504	8/21/2014	SE1-3001		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-505	8/21/2014	SE1-3001		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-509	8/21/2014		Part 2 - Products; 2.1,A-6 (Page 5) 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-510	8/21/2014		Para: B, 2.1.C 27 11 16	Substitution Request for Equipment Cabinet. Is it acceptable to substitute the specified manufacturer on spec section 27 11 16, 2.1.C with Cooper B-Line for Equipment Cabinets. Please see the attached substitution form and product data for the same.	Yes, Cooper Industries/B-Line is an acceptable manufacturer.
TG10.4-511	8/21/2014		B.2.2.C 27 11 16	Substitution Request for 4-Post Equipment Rack. Is it acceptable to substitute the specified manufacturer on spec section 27 11 16, Para 2.2.C with Cooper B-Line for 4-Post Equipment Rack. Please see the attached substitution form and product data for the same.	Yes, the proposed substitution to install B-Line Racks and Cabinets is acceptable.
TG10.4-512	8/21/2014		Para: B.2.3.C 27 11 16	Substitution Request for 2 Post Equipment Rack. Is it acceptable to substitute the specified manufacturer on spec section 27 11 16, 2.3.C with Cooper B-Line for 2 Post Equipment Rack. Please see the attached substitution form and product data for the same.	Yes, Cooper Industries/B-Line is an acceptable manufacturer.
TG10.4-513	8/21/2014		Para: B.2.8.C 27 11 16	Substitution Request for Wall Mount Rack. Is it acceptable to substitute the specified manufacturer on spec section 27 11 16, 2.8.C with Cooper B-Line for Wall Mount Rack. Please see the attached substitution form and product data for the same.	Specification Section 27 11 16 has been updated. Cooper Industries/B-Line has been added as an acceptable manufacturer.
TG10.4-514	8/22/2014		Para: 1.1 B, 2.1:A-D 27 11 23	Substitution Request for Vertical Cable Managers. Is it acceptable to substitute the specified manufacturer on spec section 27 11 23, Para 2.1.A-D with Cooper B-Line for Vertical Cable Managers. Please see the attached substitution form and product data for the same.	Yes, Cooper Industries/B-Line is an acceptable manufacturer.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-515	8/22/2014		1.1 B, 2.2:A-D 27 11 23	Substitution Request for Horizontal Cable Managers. Is it acceptable to substitute the specified manufacturer on spec section 27 11 23, Para 1.1.B, 2.2: A-D with Cooper B-Line for Horizontal Cable Managers. Please see the attached substitution form and product data for the same.	Yes, Cooper Industries/B-Line is an acceptable manufacturer.
TG10.4-516	8/22/2014		Para: 2.1:A-D 27 11 19	Substitution Request for Optical Fiber Termination Panels. Is it acceptable to substitute the specified manufacturer on spec section 27 11 19-4, 2.1.A with Leviton Network Solutions for Optical Fiber Termination Panel. Please see the attached substitution form and product data for the same.	Yes, Leviton is an acceptable manufacturer.
TG10.4-517	8/22/2014	SE1-3204	Addendum 2	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-522	8/25/2014	ES-2223, ES-2224, & ES-2225		Drawings ES-2223, ES-2224, & ES-2225 all have sheet note 10 attached to the secondary cables. Sheet note 10 states, "Secondary cables...shall be provided by TJPA." Please confirm the routing of the secondary cables, furnished by others, and the termination of those cables and cable supports to SFPUC's utility transformer is by TJPA and/or SFPUC.	Sheets ES-2223, ES-2224 & ES-2225 are superseded by the Architectural (A), Structural (S) and Electrical (E) drawings. The routing of the secondary cables and termination of these cables and cable supports to SFPUC's utility transformer, as indicated on the architectural, structural and electrical drawings, is included in the TG10.4 scope of work.
TG10.4-524	8/25/2014		26 09 33, Appendix A - Panel Schedules	Riser diagrams and Lighting plans contain contradictory information with regard to panels on the project. Which documents should be utilized in order to determine the panels on the project? See attached document.	Refer to responses TG10.4-70 thru TG10.4-84 in QBD response set #4. Riser diagrams and lighting plans are reconciled and shall be read together.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-525	8/25/2014		26 09 33, Appendix A - Panel Schedules	If the answer to #248 is "Lighting Plans," how do we determine which fixtures are being controlled by the panels? (not all lighting plans are circuited/zoned and the panel schedules are mostly blank). Referenced on the lighting plans are sheet notes that state ALL lighting is to be connected to either a Lutron dimming or Relay panel. On the same sheet there are local line voltage switches. Should these areas with local controls be connected to the Lutron Quantum system? If so, should we include Lutron Seetouch Keypads in place of line voltage switches? See attachment as an example.	Refer to response TG10.4-248 in QBD response set #12–SSI for reconciliation of panel schedules, riser diagrams, and plans. Yes, areas with local controls shall be connected to the lighting control system. Refer to response TG10.4-250 in QBD response set #12–SSI for more information. Provide wall control devices capable of integrating with lighting control system. Refer to response TG10.4-250 in QBD response set #12-SSI for more information.
TG10.4-526	8/25/2014		26 09 33, Appendix A - Panel Schedules	It appears as though as wall control (symbol $H) is shown in areas being controlled by Lutron panels. Are these wall controls expected to be connected to the Quantum system?	Yes, wall controls are to be connected to lighting control system. As noted on Appendix A Panel Schedules, these circuits are controlled via time-clock overrides to comply with Title 24 mandatory lighting control requirements.
TG10.4-527	8/25/2014		26 09 33, Appendix A - Panel Schedules	There are sensors indicated on lighting plans in areas where there is no lighting shown (retail areas for example). Are these sensors expected to be connected to the Quantum system? See attachment for example.	In areas where there is no lighting shown, sensors can be deleted.
TG10.4-528	8/25/2014		26 09 33, Appendix A - Panel Schedules	Panel schedules indicate one panel per panel ID, however the riser diagrams indicate two panels per panel ID for many of the dimming panels. What panel configuration is expected on the project? See attachment for example.	Provide 1 cabinet with quantity of relays as shown on Appendix A Panel Schedules that fits in the wall space shown on the plans.
TG10.4-529	8/25/2014		26 09 33, Appendix A - Panel Schedules	According to the lighting plans, it appears that there are fixtures circuited back to Lutron panels. However there are instances where these areas are noted as "Not In Contract." Are these areas part of the scope of work? Are these Circuits to be included in the panels?	Refer to sheet E-005, General Note I for scope pertaining to "Not in Contract."
TG10.4-531	8/25/2014	E1-2605		The park level electrical plan numbered note which states "Penetrate slab at this location for conduits routing to bus deck panelboards and FATC/FARP'S. Terminate conduits at exterior sidewall of enclosure and ..." is not shown on drawing E1-2605. Where are the conduit penetrations for this area? Please advise.	There are no conduit penetrations for this area. Power will be routed from nearby openings as shown on sheets E1-2204 and E1-2206.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-535	8/25/2014		Exhibit A	Is the TG10.4 contractor to assume the site perimeter is to have electrical light poles around the site perimeter at 50' centers that are to have provisions for this trade packages' temp power connection? Also to assume that temporary power and lighting on the B2 & B1 levels will be installed by the TG06 trade package? If not, please provide details of what they have and will provide as to not have overlap with the TG10.4 contractor.	1. Light poles will not have power outlets for general site use. Power that is currently distributed on light poles are for localized use only (i.e., security cameras, local small tool use, etc.) in the immediate area of pole locations. 2. TG06 is not providing temporary power or lighting for general project distribution at the B2 or B1 levels. The TG06 Trade Subcontractor is providing power and lighting for its work only until the TG10.4 package is awarded and transfer of temporary power skids occurs, per Exhibit A. Other than the temporary perimeter light poles, which the TG10.4 Trade Subcontractor will assume control of, there is no overlap between the TG06 and TG10.4 packages.
TG10.4-538	8/26/2014		ASI 118 drawings	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-16 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): B, 2.1:C

Detail(s): Equipment Cabinet

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: V452442ACVXTSSSB

Product History: ___ New _____ 2-5 years old _____ 5-10 years old _X_ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line cabinet meets the spec requirement with construction, color, load rating.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous cabinet, rack, cable management and runway system from a single manufacturer while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

UCSF Data Center / Minnesota St, San Francisco, CA / Kevin Barney / from 2008 to present. Current project under way.

Proposed substitution affects other parts of the Work: ___X_No__ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

none

Supporting data attached: _X_Product Data _X_Drawings ____Test Reports ____ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

Today's competitive electronic enclosure market requires cost effective products that deliver superior performance and function. Cooper B-Line developed the V-LINE™ cabinet platform to support the growing need for a competitively priced solution.

Many innovative features are designed into the V-LINE cabinet platform, offering valuable benefits for users. The heart of the system, the cabinet frame, has standard features, such as, fully adjustable mounting angles with RMU markings, removable and replaceable cable entry plates, and leveling feet. The frame can be fitted with a range of options including solid or vented side panels, a variety of door styles, and top or bottom panels. The V-LINE cabinet features excellent aesthetic characteristics and is built to the high quality standard our customers have come to expect over the years from Cooper B-Line.

All of these features, good looks and high quality are offered at a competitive price point, making the V-LINE cabinet an excellent choice for anyone needing to house data communications equipment while watching the bottom line.

The V-LINE™ Cabinet Advantage

Removable cable entry knockout plates

Range of single & double door options with a variety of locking choices

Fully adjustable 19" rails. 29½" wide cabinet offer offset and 23" mounting

Square hole or #12-24 tapped hole mounting rail options

Doors can be configured left hand (LH) or right hand (RH) hinged

Open base with infill panel & filter options

Fully configurable top panel assembly

Lockable side panels

Extensive range of mechanical and electronic locking options

Plain & vented side panel options

New ganging knockouts allow cabinets to be ganged with or without side panels

Leveling feet supplied as standard with optional castor availability

Fully welded steel frame structure

UL LISTED

Standard cabinet finish is a Black hard wearing epoxy polyester powder coat paint, color reference RAL 9005. Cabinets are also available finished in Light Gray, reference NCS 1502-Y, but may be subject to increased lead times.

Network Cabinet

Most day to day network installations incorporating low density active equipment, as well as low volume structured cabling systems, can be accommodated into what has evolved to be an industry standard network cabinet.

V-LINE™ Network Cabinets are comprised of the following features:

- Welded frame assembly with open base
- Supplied with four (4) off jacking feet
- Supplied with two pair of fully adjustable 19-inch mounting rails centrally mounted in the cabinet
- Acrylic glazed door with vented styles fitted front, supplied with standard locking swing handle (door right hand hinged)
- Plain steel door fitted at the rear and supplied with standard locking swing handle (door right hand hinged)
- Plain side panels fitted both sides
- Vented top panel
- Supplied with pack of fifty (50) #12/24 cage nuts and screws
- Supplied fully assembled and palletized

If the standard specification cabinets shown do not meet your application requirements, use the "Easy Step Configurator" on page 5.

Accessories and additional options are available as detailed on pages 17 - 26.

B-Line Custom Part No.
V452442ACVXTSSSB

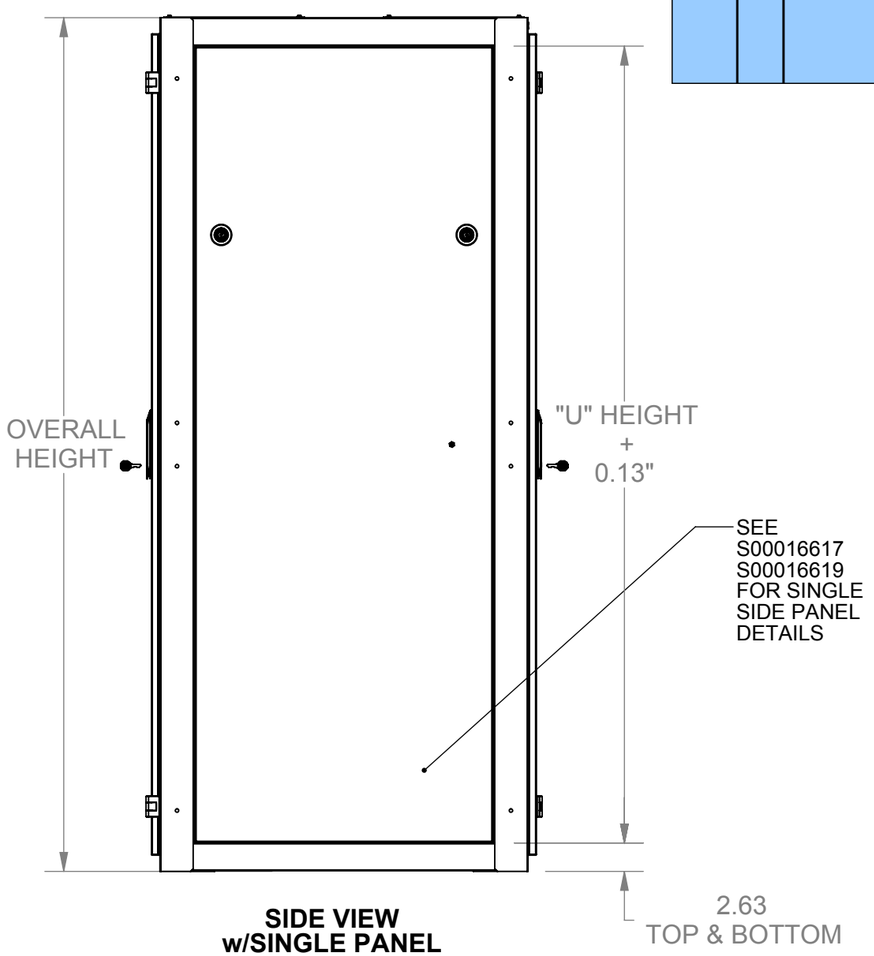
	Cooper B-Line Catalog No.	Side Panel Style	Effective U	Overall Cabinet Height in.	Overall Cabinet Height (mm)	Width In.	Width (mm)	Depth in.	Depth (mm)
EIA Square Hole Mounting Rails	V422424ACDTSSSVB	Full	42U	78.9	2004	24	610	24	610
	V422430ACDTSSSVB	Full	42U	78.9	2004	24	610	30	762
	V422436ACDTSSSVB	Full	42U	78.9	2004	24	610	36	915
	V422442ACDTSSSVB	Full	42U	78.9	2004	24	610	42	1067
	V422448ACDTSTTVB	Split	42U	78.9	2004	24	610	48	1219
	V452424ACDTSSSVB	Full	45U	84.1	2137	24	610	24	610
	V452430ACDTSSSVB	Full	45U	84.1	2137	24	610	30	762
	V452436ACDTSSSVB	Full	45U	84.1	2137	24	610	36	915
	V452442ACDTSSSVB	Full	45U	84.1	2137	24	610	42	1067
	V452448ACDTSTTVB	Split	45U	84.1	2137	24	610	48	1219
	V472424ACDTSSSVB	Full	47U	87.6	2226	24	610	24	610
	V472430ACDTSSSVB	Full	47U	87.6	2226	24	610	30	762
	V472436ACDTSSSVB	Full	47U	87.6	2226	24	610	36	915
	V472442ACDTSSSVB	Full	47U	87.6	2226	24	610	42	1067
	V472448ACDTSTTVB	Split	47U	87.6	2226	24	610	48	1219
#12-24 Tapped Hole Mounting Rails	V422424BCDTSSSVB	Full	42U	78.9	2004	24	610	24	610
	V422430BCDTSSSVB	Full	42U	78.9	2004	24	610	30	762
	V422436BCDTSSSVB	Full	42U	78.9	2004	24	610	36	915
	V422442BCDTSSSVB	Full	42U	78.9	2004	24	610	42	1067
	V422448BCDTSTTVB	Split	42U	78.9	2004	24	610	48	1219
	V452424BCDTSSSVB	Full	45U	84.1	2137	24	610	24	610
	V452430BCDTSSSVB	Full	45U	84.1	2137	24	610	30	762
	V452436BCDTSSSVB	Full	45U	84.1	2137	24	610	36	915
	V452442BCDTSSSVB	Full	45U	84.1	2137	24	610	42	1067
	V452448BCDTSTTVB	Split	45U	84.1	2137	24	610	48	1219
	V472424BCDTSSSVB	Full	47U	87.6	2226	24	610	24	610
	V472430BCDTSSSVB	Full	47U	87.6	2226	24	610	30	762
	V472436BCDTSSSVB	Full	47U	87.6	2226	24	610	36	915
	V472442BCDTSSSVB	Full	47U	87.6	2226	24	610	42	1067
	V472448BCDTSTTVB	Split	47U	87.6	2226	24	610	48	1219

Details subject to change without written notice.

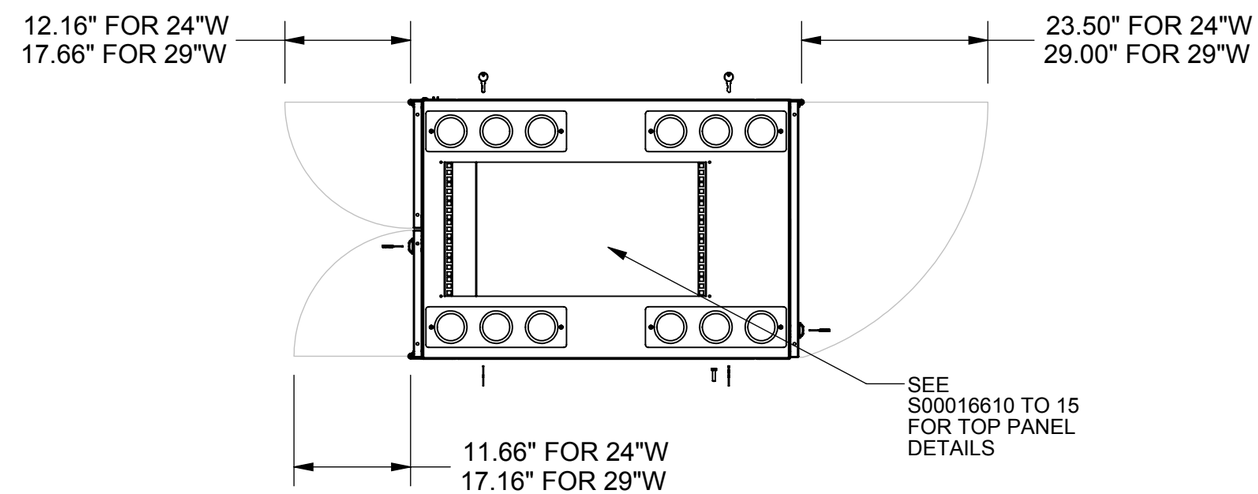
S00016583

B-Line Custom Part No.
V452442ACVXTSSSB

V	45	24	24	A	C	S		U		T		S		T		S	
V-Line	H (U)	Width (in)	D (in)	Rails	Rail position	Front Door		Rear Door		*Door Lock		Left Side Panel		Right Side Panel		Top Panel	
V	24	24 (NA w/B,D rails or L ,R position)	24	A 19" SQ	L left	V	HF Vented L	V	HF Vented L	S	swing single	S	Solid full height (NA for 42UX48"D, 45UX48"D, 47UX48"D)	S	Solid full height (NA for 42UX48"D, 45UX48"D, 47UX48"D)	S	Solid top
	38	29	30	C 19" Tap	C Center	W	HF Vented R	W	HF Vented R	C	combo single	T	Solid split (NA for 24U)	T	Solid split (NA for 24U H)	V	Vented top
	42		36	B 23" SQ	R Right	X	HF Vented Split (NA w/S,C locks)	X	HF Vented Split (NA w/S,C locks)	T	swing 3 point	V	Vented full height (NA for 42UX48"D, 45UX48"D, 47UX48"D)	V	Vented full height (NA for 42UX48"D, 45UX48"D, 47UX48"D)	1	1100 CFM (NA for 24"D)
	45		42	D 23" Tap		S	Solid L	S	Solid L	D	combo 3 point	W	Vented Split (NA for 24U)	W	Vented Split (NA for 24U H)	2	210 CFM
	47		48			T	Solid R	T	Solid R	P	i-pal 2 point	N	None	N	None	4	420 CFM
						U	Solid Split (NA w/S,C locks)	U	Solid Split (NA w/S,C locks)	N	None(If no doors)					5	550 CFM
						A	Acrylic L	A	Acrylic L							N	None
						B	Acrylic R	B	Acrylic R								
						C	Vented Acrylic L	C	Vented Acrylic L		*front and rear doors include same lock						
						D	Vented Acrylic R	D	Vented Acrylic R								
						F	Split Fan Door (NA w/S,C locks)	F	Split Fan Door (NA w/S,C locks)								
						N	None	N	None								



SIDE VIEW w/SINGLE PANEL



TOP VIEW

NOTES:
1. **16GA STEEL CONSTRUCTION**
2. **FINISH : GRAY**
   BLACK

COOPER B-Line
509 West Monroe St.
Highland, IL 62249
Phone (800) 851-7415
FAX (800) 356-1438
www.cooperbline.com

SUBMITTAL DRAWING

TITLE: V LINE CABINET ASSY

EQUIPMENT FURNISHED HAS BEEN FABRICATED IN ACCORDANCE WITH THIS DRAWING.

REFERENCE DWG(S):

MODEL SOURCE FILE: S00016583 REV: 00

SUBMITTAL NO: S00016583

DRAWN BY: SSINGH REV. B

DATE: 05/18/09

SHEET: 1 OF 4

Terms and Conditions

1. Applicable Terms and Conditions

(a) These terms and conditions of sale establish the rights, obligations, and remedies of Buyer and Seller that apply to any order issued by Buyer for the purchase of Seller's products and/or services ("Products"). No additional or different terms or conditions, whether contained in Buyer's purchase order form or in any other document or communication pertaining to Buyer's order, will be binding on Seller unless accepted in writing by an authorized representative of Seller. Seller expressly objects to and rejects any additional or different terms and conditions, which shall be ineffective.

(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

2. Price, Payment Terms, and Title

(a) All prices represent those in effect at the time of quotation and are subject to change without notice. Unless prices are bid or quoted as "firm," Seller reserves the right to invoice at prices in effect at the date of shipment, regardless of any prior bid and whether notice was received by Buyer. Prices are stated in United States dollars unless otherwise indicated, are exclusive of shipping, handling, shipping insurance, duties, and sales, use, excise or similar taxes. Export packaging or any other special handling requested by Buyer will be at Buyer's expense. A service charge of $25 will be assessed for any order less than $100.

(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

(b) Delivery and shipping dates are approximate and represent Seller's best estimate of the time required to make delivery or shipment. Time is not of the essence with respect to the transactions covered by these terms and conditions, except with respect to Buyer's obligation to make all related payments. Seller's obligations under these terms and conditions will be dependent upon Seller's ability to obtain necessary raw materials and components. Seller shall have the right to make partial deliveries and to ship up to forty (40) days in advance of shipping date.

4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

11. Patent Indemnity

In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

13. Software License

Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

17. Choice of Law and Dispute Resolution

Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

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Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-16 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): B, 2.2:C

Detail(s): 4 Post Equipment Rack

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: SB838084BFB

Product History: ___ New _____ 2-5 years old _____ 5-10 years old _X_ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line four post rack meets the specification, load, construction, adjustability, color.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous cabinet, rack, cable management and runway system from a single manufacturer while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Genentech / 1 DNA Way, South San Francisco, CA / David Douglas / 2010 - present

Cisco / 170 W. Tasman DR. San Jose CA / Jack Holt/ from 2005 to present.

Proposed substitution affects other parts of the Work: ___X_No__ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: _X_Product Data ____Drawings ____Test Reports ____ Samples

___X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

COMM/DATA

Adjustable Depth Four-Post Server Rack, Self-Supporting, Customer Premise, 19”

SB838 Series

- Open 4-post frame with 19” EIA square hole 14 gauge steel mounting rails designed to provide nearly 360 degrees of accessibility and unrestricted air flow
- EIA-310-D universal 5/8”, 5/8”, 1/2” hole pattern rails accept M6, #10-32 or #12-24 cage nuts
- Unequal flange design of the rails allows for server rail clearance
- Available in 72” (38RMU), 84” (45 RMU) and 96” (51RMU) heights
- Depth adjustable in 1” increments from 18” to 24”, 24” to 30”, 30” to 36” or 36” to 42” overall depth
- Load Rating: 2000 lb. (907kg) capacity, evenly distributed along rack height
- Ships unassembled in protective carton
- Standard finish: Flat Black Powder Coat (FB). Other finishes available on request
- Upper cross and adjustment members are pre-drilled for runway attachment
- SB838 4-Post kit includes: (4) mounting rails, (2) upper cross members, (2) lower cross members, (2) upper adjustment members, (2) lower adjustment members, (30) #12-24 cage nuts and screws, assembly hardware and installation instructions
- Permanently stamped RMU markings included
- Assembles in about 20 minutes using standard hand tools
- UL Listed to the UL60950 Standard - File Number E171936

Specification Example (available choices are shown between the [ ])

Four-post server equipment open racks shall support 19” rackmount network equipment including servers, switches, patch panels and equipment shelves. The rack shall be compliant to the requirements of EIA-310-D and be UL listed as a communications circuit accessory per the UL60950 standard. The rack shall be made of a combination of 11 and 14 gauge steel and be [72” (1829mm), 84” (2134mm), 96” (2438mm)] in overall height containing [38, 45, 51] 1.75” rack mount units spaces for mounting equipment. Overall width shall be 20 5/16” (516 mm) with 18 5/16” (465mm) of space for panel mounting and 17 3/4“ (451mm) of usable inside width. Depth shall be adjustable in 1” increments from [18” to 24” (457 to 610mm), 24” to 30” (610mm to 762mm), 30” to 36” (762mm to 914mm), 36” to 42” (914mm to 1067mm)] deep. Mounting holes shall be square punched mounting holes and arranged in the 5/8”-5/8”-1/2” (16mm-16mm-13mm) EIA universal hole pattern. Permanent rack mount unit markings shall be provided in the mounting rails showing the position of each of the [38, 45, 51] rack mount unit spaces. The rack shall have a load rating not less than 2,000 lbs. (907 kg) when the load is evenly distributed. The rack shall be provided with a flat black powder coat finish.

New Product Bulletin

COOPER B-Line

Technical Information

Materials				
Overall Construction	14 Gauge Structural Steel Grade 33 (uprights) 11 Gauge Structural Steel Grade 33 (cross members and adjustment members) Bolted assembly			
Mounting Rails	Square punched hole mounting rails Universal 5/8"-5/8"-1/2" mounting hole pattern (compatible with 1 1/4"-1/2" pattern)			
Finish				
Flat Black	Powder coat, flat finish			
Approvals and Certifications				
UL	UL Listed to the UL60950 Standard - File Number E171936			
EIA	Compliant to EIA-310-D			
Equipment Mounting				
1.75" RMU Spaces Available	38,45, or 51 RMU			
RMU markings	Permanent RMU markings stamped into channel; numbered bottom to top			
Shipping				
	SB838084A	SB838084B	SB838084C	SB838084D
Shipping Weight (lbs)	59.9	63.0	66.1	69.3
Packaging	Packaged unassembled in protective carton			

Part Numbers

Depth	Height	Part Number	UPC Number
18" to 24"	72"H with 38 RMU	SB838072AFB	79903837836
	84"H with 45 RMU	SB838084AFB	79903837840
	96"H with 51 RMU	SB838096AFB	79903837844
24" to 30"	72"H with 38 RMU	SB838072BFB	79903837837
	84"H with 45 RMU	**SB838084BFB**	**79903837841**
	96"H with 51 RMU	SB838096BFB	79903837845
30" to 36"	72"H with 38 RMU	SB838072CFB	79903837838
	84"H with 45 RMU	**SB838084CFB**	**79903837842**
	96"H with 51 RMU	SB838096CFB	79903837846
36" to 42"	72"H with 38 RMU	SB838072DFB	79903837839
	84"H with 45 RMU	SB838084DFB	79903837843
	96"H with 51 RMU	SB838096DFB	79903837847

***BOLD** indicates popular item that is always stocked

Cross Reference

Part Number	UPC Number	CPI	Hoffman	Homaco
SB838084BFB	79903837841	15212-703	E4DRS19FM45U	19-84-SSDA2126
SB838084CFB	79903837842	15213-703	E4DRS19FM45U	19-84-SSDA2732

Specification subject to change without notice. For further information, please contact –

Cooper B-Line - USA • 509 West Monroe Street • Highland, IL 62249 • United States
Phone: (800) 851-7415 • Fax: (800) 356-1438 • Email: blineus@cooperindustries.com

COOPER B-Line

Terms and Conditions

1. Applicable Terms and Conditions

(a) These terms and conditions of sale establish the rights, obligations, and remedies of Buyer and Seller that apply to any order issued by Buyer for the purchase of Seller's products and/or services ("Products"). No additional or different terms or conditions, whether contained in Buyer's purchase order form or in any other document or communication pertaining to Buyer's order, will be binding on Seller unless accepted in writing by an authorized representative of Seller. Seller expressly objects to and rejects any additional or different terms and conditions, which shall be ineffective.

(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

2. Price, Payment Terms, and Title

(a) All prices represent those in effect at the time of quotation and are subject to change without notice. Unless prices are bid or quoted as "firm," Seller reserves the right to invoice at prices in effect at the date of shipment, regardless of any prior bid and whether notice was received by Buyer. Prices are stated in United States dollars unless otherwise indicated, are exclusive of shipping, handling, shipping insurance, duties, and sales, use, excise or similar taxes. Export packaging or any other special handling requested by Buyer will be at Buyer's expense. A service charge of $25 will be assessed for any order less than $100.

(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

(b) Delivery and shipping dates are approximate and represent Seller's best estimate of the time required to make delivery or shipment. Time is not of the essence with respect to the transactions covered by these terms and conditions, except with respect to Buyer's obligation to make all related payments. Seller's obligations under these terms and conditions will be dependent upon Seller's ability to obtain necessary raw materials and components. Seller shall have the right to make partial deliveries and to ship up to forty (40) days in advance of shipping date.

4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

11. Patent Indemnity

In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

13. Software License

Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

17. Choice of Law and Dispute Resolution

Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-16 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): B, 2.3:C

Detail(s): 2 Post Equipment Rack

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: SB556084XUFB, SB558084UTFB

Product History: ___ New _____ 2-5 years old _____ 5-10 years old _X_ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line two post rack meets the spec requirements, color, construction, UL listing.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous cabinet, rack, cable management and runway system from a single manufacturer while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Cisco / 170 W. Tasman DR. San Jose CA / Jack Holt/ from 2005 to present.

Dignity Health / 4001 J Street, Sacramento CA / Julie Comstock / 2013

Proposed substitution affects other parts of the Work: ___X_No__ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: _X_Product Data ___Drawings ___Test Reports ___ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

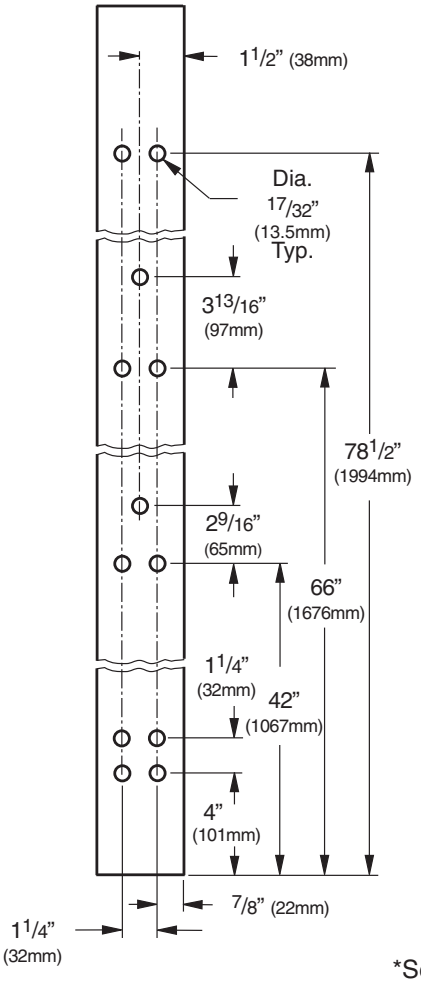
Two-Post Network Equipment Rack

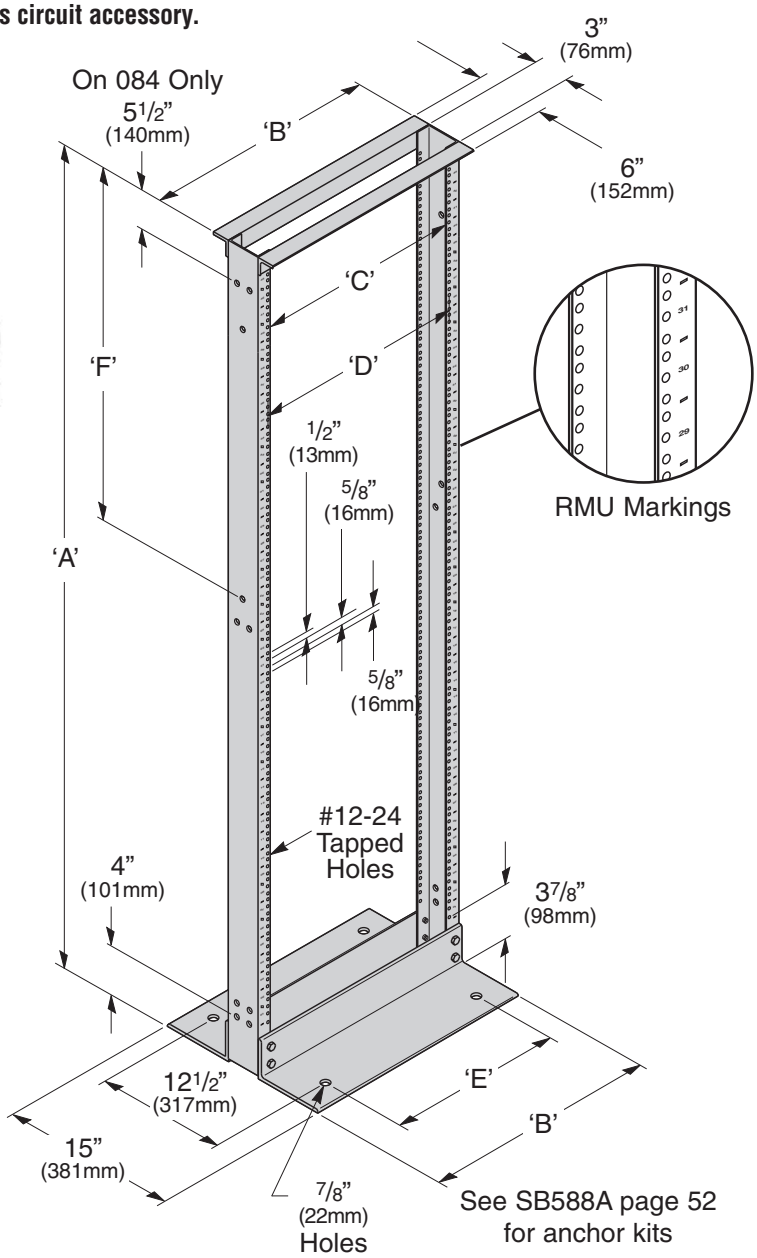
3" Uprights, 19" & 23" Panel Mounting, Customer Premise

- Universal junction hole pattern matches most manufacturers racks.
- #12-24 panel mounting holes.
- Conformance to EIA/ECA-310-E.
- Load Rating: 1200 Lbs. (544kg) weight capacity when evenly distributed for the height of the rack (84" (2133mm) and shorter).
- Permanently stamped rack mount unit (RMU) markings included.
- Packaged unassembled in protective carton suitable for parcel shipment.
- Assembles in about ten (10) minutes using standard hand tools.
- Includes thirty (30) dog point combo head (Phillips and flat blade) mounting screws.
- Double sided universal (5/8" (16mm), 5/8" (16mm) , 1/2" (13mm)) mounting spacing.
- Twin 1 1/2" (38mm) x 1 1/2" (38mm) top angles for rigidity.
- Tapped assembly holes eliminate the need for nuts and simplifies assembly and squaring.
- UL Listed (File No. E171936) as a communications circuit accessory.
- Material: 6061-T6 aluminum alloy
- Finish ___: Brushed (AL) uprights with Silver Powder Coated top & bottom angles
  Telco Gray Powder Coat (TG) or
  Flat Black Powder Coat (FB)
  Other finishes are available upon request

OPA *

Junction Hole Pattern for 84" tall rails





See SB588A page 52 for anchor kits

*See page 344 for OPA details.

Continued on page 15.

Two-Post Network Equipment Rack

3" Uprights, 19" & 23" Panel Mounting, Customer Premise

		Dimensions			
		19" (482mm) Rack Width		23" (594mm) Rack Width	
		In.	(mm)	In.	(mm)
'A'	Overall Height	36" - 108"	(914 - 2743)	36" - 108"	(914 - 2743)
'B'	Overall Width	20 5/16"	(516)	24 5/16"	(617)
'C'	Panel Mounting	18 5/16"	(465)	22 5/16"	(567)
'D'	Usable Inside Width	17 3/4"	(451)	21 3/4"	(552)
'E'	Base Anchor Spacing	16"	(406)	20"	(508)

Universal Spacing [5/8" (16mm), 5/8" (16mm), 1/2" (13mm)]

Part Number	'A' Height		'F' Spacing		Mounting Spaces	Shipping Weight	
	In.	(mm)	In.	(mm)		Lbs.	(kg)
19" (482mm) Rack Width							
SB556036XU___	36"	(914)	6"	(152)	17	22.0	(10.0)
SB556048XU___	48"	(1219)	3 7/16"	(87)	24	24.0	(10.9)
SB556072XU___	72"	(1829)	27 7/16"	(697)	38	27.5	(12.5)
SB556084XU___	84"	(2133)	39 7/16"	(1001)	45	30.0	(13.6)
SB556096XU___	96"	(2438)	51 7/16"	(1306)	51	31.5	(14.3)
SB556108XU___	108"	(2743)	54 3/16"	(1376)	58	33.5	(15.2)
23" (584mm) Rack Width							
SB558036XU___	36"	(914)	6"	(152)	17	24.5	(11.1)
SB558048XU___	48"	(1219)	3 7/16"	(87)	24	26.5	(12.0)
SB558072XU___	72"	(1829)	27 7/16"	(697)	38	30.0	(13.6)
SB558084XU___	84"	(2133)	39 7/16"	(1001)	45	32.0	(14.5)
SB558096XU___	96"	(2438)	51 7/16"	(1306)	51	34.0	(15.4)
SB558108XU___	108"	(2743)	54 3/16"	(1376)	58	36.0	(16.8)

Finish ___: Brushed (AL), Telco Gray Powder Coat (TG) or Flat Black Powder Coat (FB)

FB & AL are popular Bee List items

Terms and Conditions

1. Applicable Terms and Conditions

(a) These terms and conditions of sale establish the rights, obligations, and remedies of Buyer and Seller that apply to any order issued by Buyer for the purchase of Seller's products and/or services ("Products"). No additional or different terms or conditions, whether contained in Buyer's purchase order form or in any other document or communication pertaining to Buyer's order, will be binding on Seller unless accepted in writing by an authorized representative of Seller. Seller expressly objects to and rejects any additional or different terms and conditions, which shall be ineffective.

(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

2. Price, Payment Terms, and Title

(a) All prices represent those in effect at the time of quotation and are subject to change without notice. Unless prices are bid or quoted as "firm," Seller reserves the right to invoice at prices in effect at the date of shipment, regardless of any prior bid and whether notice was received by Buyer. Prices are stated in United States dollars unless otherwise indicated, are exclusive of shipping, handling, shipping insurance, duties, and sales, use, excise or similar taxes. Export packaging or any other special handling requested by Buyer will be at Buyer's expense. A service charge of $25 will be assessed for any order less than $100.

(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

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4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

11. Patent Indemnity

In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

13. Software License

Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

17. Choice of Law and Dispute Resolution

Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-16 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): B, 2.8:C

Detail(s): Wall Mount Rack

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: VLWM3630SB

Product History: ___ New _____ 2-5 years old X___ 5-10 years old ____ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line wall mount cabinet meets the spec requirement with load rating, construction, color.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous cabinet, rack, cable management and runway system from a single manufacturer while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Palo Alto USD / 25 Churchill Ave. Palo Alto CA / Alexey Demyaneko / 2005 - present

Port of Oakland / 530 Water St. Oakland CA / Thomas Lyles / 2008 - Present

Proposed substitution affects other parts of the Work: ___X_No__ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

none

Supporting data attached: _X_Product Data ___Drawings ___Test Reports ___ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

V-LINE™ Dual Hinge Wall Mount Cabinet

- Used to provide a cost effective, versatile and secure means to mount communications cabling, networking gear, and related equipment on a wall.
- Enclosure features fully welded, 16 gauge (1.5mm) cold rolled steel construction.
- Ships ready to mount to the wall as left hinged or right hinged opening.
- Heavy duty, field reversible hinge and lock system.
- Rear section can easily be separated from the cabinet for simple installation onto a wall.
- Rear sections feature removable plates with either multiple knockouts for conduit or bushing installation or a high-density foam gland plate for ease of installing pre-terminated patch panels.
- Provisioned for 16" (406mm) on-center mounting and multiple wire management lances for cable tie points or accessory mounting.
- Available with locking solid steel or smoked Plexiglas insert doors.
- Fully adjustable EIA/ECA-310-E compliant mounting rail system with #12-24 tapped rails.
- UL listed to the UL60950 standard - file number E235184.
- 24" (609mm) and 36" (914mm) high cabinets rated for 200 lb (91kg) load; 48" (1219mm) high cabinets are rated for 300 lb (136kg) load.
- Designed to help keep installed equipment cool with adequate ventilation areas and easy adaptation to available fan kits and intake air filter kits.
- Available in Black and Light Gray powder coat finishes.

Accessories

	Part Number	Description
Thermal Management	VLWMFKB	105 CFM Fan Kit with filter, power cord and blanking plates
Power Management	SB30051020FB	Power strip, 10 outlet, 20 amp
	SB3005815FB	Power strip, 8 outlet, 15 amp
	SB30061015FB	Power strip, 10 outlet, 15 amp, surge protected
Cable Management	SB30051020FB	Power strip, 10 outlet, 20 amp
	79903821893	3" snap bushing kit
	SB87019S1FB	1U horizontal cable manager
	SB87019S2FB	2U horizontal cable manager
	SB30061015FB	Power strip, 10 outlet, 15 amp, surge protected
Accessories	VLWMSMB45B	V-Line 45° equipment mounting bracket
	VLWMSMBH90B	V-Line 90° horizontal equipment mounting bracket
	VLWMSMBV90B	V-Line 90° vertical equipment mounting bracket

V-LINE™ Dual Hinge Wall Mount Cabinet - cont.

Part Number	Panel Units	Height		Width		Depth		Max Usable Depth		Swing Out Body Depth	
		in	(mm)	in	(mm)	in	(mm)	in	(mm)	in	(mm)
VLWM2420 *__	12	24.125	(613)	24.7	(627)	20.00	(508)	18.5	(470)	14.00	(356)
VLWM2425 *__						25.00	(635)	23.5	(597)	19.00	(483)
VLWM2430 *__						30.00	(762)	28.5	(724)	24.00	(610)
VLWM3620 *__	19	36.375	(924)	24.7	(627)	20.00	(508)	18.5	(470)	14.00	(356)
VLWM3625 *__						25.00	(635)	23.5	(597)	19.00	(483)
VLWM3630 *__						30.00	(762)	28.5	(724)	24.00	(610)
VLWM4820 *__	26	48.625	(1235)	24.7	(627)	20.00	(508)	18.5	(470)	14.00	(356)
VLWM4825 *__						25.00	(635)	23.5	(597)	19.00	(483)
VLWM4830 *__						30.00	(762)	28.5	(724)	24.00	(610)

Part Number	Load Capacity		Approx. Weight With Plexiglas Door		Approx. Weight With Solid Door	
	Lbs	(kg)	Lbs	(kg)	Lbs	(kg)
VLWM2420 *__	200	(91)	62	(28)	61	(28)
VLWM2425 *__	200	(91)	69	(31)	70	(32)
VLWM2430 *__	200	(91)	78	(35)	79	(36)
VLWM3620 *__	200	(91)	79	(36)	80	(36)
VLWM3625 *__	200	(91)	89	(40)	90	(41)
VLWM3630 *__	200	(91)	99	(45)	100	(46)
VLWM4820 *__	300	(136)	96	(44)	98	(44)
VLWM4825 *__	300	(136)	108	(49)	111	(50)
VLWM4830 *__	300	(136)	121	(55)	123	(56)

OPA *

*** Door code -** Insert P for Plexiglas door or S for solid steel door.
__ Finish code - Insert A for Light Gray or B for Black

* For the above VLWM cabinets only. See page 8 for OPA details.

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(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

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(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

(b) Delivery and shipping dates are approximate and represent Seller's best estimate of the time required to make delivery or shipment. Time is not of the essence with respect to the transactions covered by these terms and conditions, except with respect to Buyer's obligation to make all related payments. Seller's obligations under these terms and conditions will be dependent upon Seller's ability to obtain necessary raw materials and components. Seller shall have the right to make partial deliveries and to ship up to forty (40) days in advance of shipping date.

4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

11. Patent Indemnity

In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

13. Software License

Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

17. Choice of Law and Dispute Resolution

Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-23 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): 1.1 B, 2.1:A-D

Detail(s): Vertical Cable Managers

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: SB860106D084F, SB8601010D085B

Product History: ___ New _____ 2-5 years old _____ 5-10 years old _X_ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line vertical managers meet the spec requirement and are sized to match the racks.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous cabinet, rack, cable management and runway system from a single manufacturer while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

PUC / 505 Van Ness, San Francisco CA / Jesse Mann / 2013 - present

Rambus / 1050 Enterprise Wy, Sunnyvale CA / Dave Mullen / 2010 - Present

Proposed substitution affects other parts of the Work: ___X_No__ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: _X_Product Data ___Drawings ___Test Reports ___ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

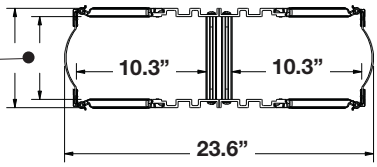
Revision	Date
0	August 11, 2014

RCM+™ Extended Depth Vertical Cable Managers

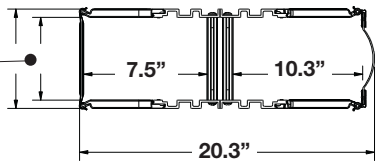
- Used to provide a vertical cabling pathway for two-post and four-post rack applications.
- Constructed of an aluminum frame with UL 94V-0 plastic cable manager fingers.
- Extended finger depth adds 33% more cable carrying capacity compared to the same-sized RCM+ vertical section.
- Stronger plastic fingers are designed for use with heavier, modern, high performance cabling media like CAT6, CAT6A and shielded copper cable or fiber optic cable and have a radius edge on the fingers to help control bend radius.
- Ideal for use with angled patch panels.
- SB860 Series managers feature high density finger sections on both the front and rear side of the cable manager section.
- SB864 Series managers feature high density finger sections on the front of the cable manager and cable retention gates on the rear of the cable manager to accommodate large cable bundles.
- One-piece full length doors, with quarter-turn locking hinges, allow for quick opening from either side or complete removal. (See page 97)
- Open back design allows for free movement of cable from front to rear cable manager sections.
- Doors, cable retention gates, cable retainer bars, cable strap mounts, push-in fasteners and mounting hardware are included.
- Spools are included with 10" and 12" wide versions.
- Available in Black (FB) or Silver (SL) Powder Coat.

Top Views

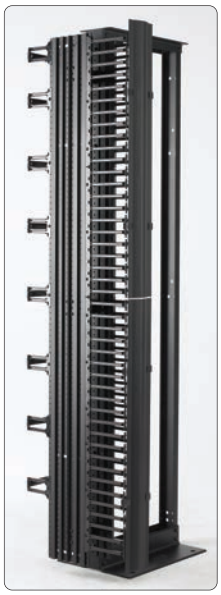
Outside Dim.	Inside Dim.
6.0”	5.0”
10.0”	9.0”
12.0”	11.0”



Outside Dim.	Inside Dim.
6.0”	5.0”
10.0”	9.0”
12.0”	11.0”



SB86010xxD084



SB86410xxD084

Part Number	Height		Depth		Width		Weight	
	In.	(mm)	In.	(mm)	In.	(mm)	Lbs.	(kg)
SB860106D084__	84”	(2133)	23 5/8”	(600)	6”	(152)	47.5	(22.0)
SB8601010D084 __	84”	(2133)	23 5/8”	(600)	10”	(254)	66.3	(30.0)
SB8601012D084 __	84”	(2133)	23 5/8”	(600)	12”	(305)	77.0	(35.0)
SB864106D084 __	84”	(2133)	20 5/16”	(516)	6”	(152)	41.2	(19.0)
SB8641010D084 __	84”	(2133)	20 5/16”	(516)	10”	(254)	47.1	(21.0)
SB8641012D084 __	84”	(2133)	20 5/16”	(516)	12”	(305)	52.9	(24.0)

Terms and Conditions

1. Applicable Terms and Conditions

(a) These terms and conditions of sale establish the rights, obligations, and remedies of Buyer and Seller that apply to any order issued by Buyer for the purchase of Seller's products and/or services ("Products"). No additional or different terms or conditions, whether contained in Buyer's purchase order form or in any other document or communication pertaining to Buyer's order, will be binding on Seller unless accepted in writing by an authorized representative of Seller. Seller expressly objects to and rejects any additional or different terms and conditions, which shall be ineffective.

(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

2. Price, Payment Terms, and Title

(a) All prices represent those in effect at the time of quotation and are subject to change without notice. Unless prices are bid or quoted as "firm," Seller reserves the right to invoice at prices in effect at the date of shipment, regardless of any prior bid and whether notice was received by Buyer. Prices are stated in United States dollars unless otherwise indicated, are exclusive of shipping, handling, shipping insurance, duties, and sales, use, excise or similar taxes. Export packaging or any other special handling requested by Buyer will be at Buyer's expense. A service charge of $25 will be assessed for any order less than $100.

(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

(b) Delivery and shipping dates are approximate and represent Seller's best estimate of the time required to make delivery or shipment. Time is not of the essence with respect to the transactions covered by these terms and conditions, except with respect to Buyer's obligation to make all related payments. Seller's obligations under these terms and conditions will be dependent upon Seller's ability to obtain necessary raw materials and components. Seller shall have the right to make partial deliveries and to ship up to forty (40) days in advance of shipping date.

4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

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In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

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Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

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Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-11-23 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): 1.1 B, 2.2:A-D

Detail(s): Horizontal manager

Proposed Substitution: Eaton B-Line

Manufacturer/Address/Phone: 590 West Monroe St. Highland, IL 62249: 800-361-6604

Trade Name/Model No.: SB87019SX1FB, SB87019SX2FB

Product History: ___ New _____ 2-5 years old _____ 5-10 years old _X_ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

B-Line horizontal managers meet the spec criteria color, construction.

Reason for not providing specified item:

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

CA Public Utility Commission (PUC) / 505 Van Ness, San Francisco CA / Jesse Mann / 2013 - present

Rambus / 1050 Enterprise Wy, Sunnyvale CA / Dave Mullen / 2010 - Present

Proposed substitution affects other parts of the Work: ___ X_No_ Yes: explain

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: _X_Product Data ___Drawings ___Test Reports ___ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

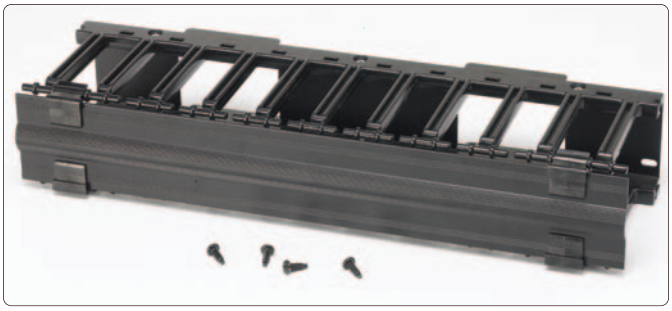
RCM+ Rack Mounted Horizontal Cable Manager With Cover

Plastic Finger Style

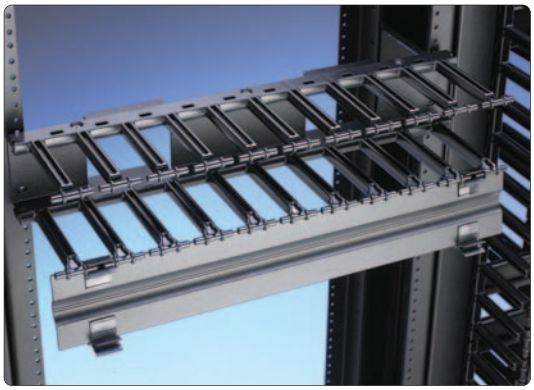
- SB870 Series horizontal manager with snap-on removable hinged door opens past 180°, and remains open in up position for convenient cable access.
- #12-24 mounting hardware is included.
- UL Listed as a Communication Circuit Accessory. File No. E171936.
- Material: Steel - 14 ga. (ASTM A569) with UL 94V-0 black plastic components.
- Finishes___: Flat Black Powder Coat (FB) or Silver Powder Coat (SL)

- SX series managers are used with entended depth vertical cable managers on page 90. Features 2.5" (63mm) longer fingers than the standard manager.

UL LISTED

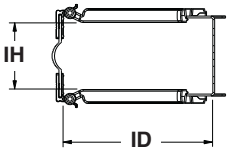


SB87019S2FB



Inside Dimensions of Cable Managers

Style	Height (IH)	Depth (ID)
S1	0.7”	5.5”
S2	2.4”	5.5”
S3	4.2”	5.5”
S4	5.9”	5.5”
SX1	0.7”	8.0”
SX2	2.4”	8.0”
SX3	4.2”	8.0”
SX4	5.9”	8.0”



Catalog Number	Width In.	Width (mm)	Height	Weight Lbs.	Weight (kg)
SB87019S1___	19”	(482)	1U	2.1	(0.9)
SB87023S1___	23”	(584)	1U	2.3	(1.0)
SB87019S2___	19”	(482)	2U	2.5	(1.1)
SB87023S2___	23”	(584)	2U	2.7	(1.2)
SB87019S3___	19”	(482)	3U	2.8	(1.3)
SB87023S3___	23”	(584)	3U	3.1	(1.4)
SB87019S4___	19”	(482)	4U	3.2	(1.4)
SB87023S4___	23”	(584)	4U	3.6	(1.6)
Extended Fingers					
SB87019SX1___	19”	(482)	1U	2.4	(1.1)
SB87019SX2___	19”	(482)	2U	3.1	(1.4)
SB87019SX3___	19”	(482)	3U	3.8	(1.7)
SB87019SX4___	19”	(482)	4U	4.4	(2.0)

FB is a popular Bee List item

Terms and Conditions

1. Applicable Terms and Conditions

(a) These terms and conditions of sale establish the rights, obligations, and remedies of Buyer and Seller that apply to any order issued by Buyer for the purchase of Seller's products and/or services ("Products"). No additional or different terms or conditions, whether contained in Buyer's purchase order form or in any other document or communication pertaining to Buyer's order, will be binding on Seller unless accepted in writing by an authorized representative of Seller. Seller expressly objects to and rejects any additional or different terms and conditions, which shall be ineffective.

(b) If Seller's order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions is found to be an acceptance of an offer, acceptance is expressly made conditional upon Buyer's assent solely to these terms and conditions, and acceptance of any part of Products delivered by Seller shall be deemed to constitute such assent by Buyer. If the order acknowledgement, invoice, other document, or electronic transmittal including or attaching these terms and conditions constitutes an offer, Buyer's acceptance of the offer is hereby limited to the terms of the offer.

2. Price, Payment Terms, and Title

(a) All prices represent those in effect at the time of quotation and are subject to change without notice. Unless prices are bid or quoted as "firm," Seller reserves the right to invoice at prices in effect at the date of shipment, regardless of any prior bid and whether notice was received by Buyer. Prices are stated in United States dollars unless otherwise indicated, are exclusive of shipping, handling, shipping insurance, duties, and sales, use, excise or similar taxes. Export packaging or any other special handling requested by Buyer will be at Buyer's expense. A service charge of $25 will be assessed for any order less than $100.

(b) Buyer acknowledges that the pricing of the Products has been set based on the agreed allocation of risks contained in these terms and conditions. If, notwithstanding the provisions of these terms and conditions, a court of competent jurisdiction determines that Buyer's terms and conditions apply to an order, then Seller shall have the right to either (i) modify the prices (including retroactively) according to the additional level of risk and responsibility that Buyer's terms and conditions require Seller to undertake; or (ii) cancel the order any time after such a determination without liability for the termination other than for the Products already delivered on these terms and conditions.

(c) Unless different credit terms have been extended to Buyer in writing by Seller, payment terms are net 30 days after delivery or date of invoice, whichever first occurs, in the currency invoiced. Seller reserves the right to modify or withdraw credit terms at any time without notice. If Buyer fails to fulfill the terms of payment, Seller may defer further shipments to Buyer or, at its option, cancel the unshipped portions of Buyer's orders. Buyer agrees to pay interest on all past due invoices at the lesser of 18% per annum, compounded monthly, or the highest contractual rate allowable under the law.

(d) Until full payment of all obligations of the Buyer for an order, Seller reserves the title (but not the risk of loss) to all Products furnished under that order. If the Buyer defaults in payment or performance or becomes subject to insolvency, receivership or bankruptcy proceedings or makes an assignment for the benefit of creditors, or without the consent of Seller voluntarily or involuntarily sells, transfers, leases or permits any lien or attachment on the Products, Seller may treat all amounts then or thereafter owing by Buyer to be immediately due and payable and Seller at its election may repossess Products for which Buyer has not paid in full. In the event of repossession of Products under this section, Buyer agrees that Seller may enter the premises where the Products may be located and remove them without notice and without being liable to Buyer for such repossession. Buyer will not set off invoiced amounts or any portion thereof against sums that are due or may become due from Seller, its parents, affiliates, or subsidiaries. Buyer grants Seller a security interest in all Products for which title has passed (including all after-acquired Products) that Seller sells Buyer and all proceeds of Products (including but not limited to all products in which Products are incorporated and any funds and products that Buyer receives in exchange for Products). Buyer consents to Seller's execution of any documents to evidence and perfect this security interest, and agrees to execute the same if requested by Seller.

3. Delivery and Risk of Loss

(a) Unless otherwise agreed in writing, all deliveries of Products will be EXW (Incoterms 2000) Seller's facility. Products will be packed in Seller's standard commercial shipping packages. Charges for shipping may not reflect net transportation costs paid by Seller. Buyer shall reimburse Seller for all costs of storage and handling incurred by Seller after the date that Seller is prepared to make shipment.

(b) Delivery and shipping dates are approximate and represent Seller's best estimate of the time required to make delivery or shipment. Time is not of the essence with respect to the transactions covered by these terms and conditions, except with respect to Buyer's obligation to make all related payments. Seller's obligations under these terms and conditions will be dependent upon Seller's ability to obtain necessary raw materials and components. Seller shall have the right to make partial deliveries and to ship up to forty (40) days in advance of shipping date.

4. Acceptance

Acceptance shall occur, if not before, when Buyer fails to reject within ten (10) days after delivery of the Products. Buyer may rightfully reject only when a reasonable inspection shows that the Products fail to conform substantially to the specifications for the Products. Buyer waives any right to revoke acceptance. Buyer's remedies for any nonconformity detected after acceptance are limited to those expressly provided in these terms and conditions for breach of warranty.

5. Limited Warranty

(a) Seller warrants to each original Buyer of Products that Products are, at the time of delivery to the Buyer, in good working order and conform to Seller's official published specifications, provided that no warranty is made with respect to any Products, component parts, or accessories manufactured by others but supplied by Seller.

(b) Seller's obligation under this warranty for any Product proved not to be as warranted within the applicable warranty period is limited to, at its option, replacing the Product, refunding the purchase price of the Product, or using reasonable efforts to repair the Product during normal business hours at any authorized service facility of Seller. All costs of transportation of any Product claimed not to be as warranted and of any repaired or replacement Product to or from such service facility shall be borne by Buyer.

(c) Seller may require the return of any Product claimed not to be as warranted to one of its facilities as designated by Seller, transportation prepaid by Buyer, to establish a claim under this warranty. The cost of labor for removing a Product and for installing a repaired or replacement Product shall be borne by Buyer. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the Products in which they are installed to the same extent as if such parts were original components. Warranty services provided under these terms and conditions do not assure uninterrupted operations of Products; Seller shall not be liable for damages caused by any delays involving warranty service.

(d) The warranty period for Products is thirty (30) days from the date of shipment unless otherwise agreed by Seller in writing.

(e) EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, SELLER PROVIDES PRODUCTS AS-IS AND MAKES NO OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PARTICULAR PURPOSE, THEIR MERCHANTIBILITY, THEIR QUALITY, THEIR NONINFRINGEMENT, OR OTHERWISE. IN NO EVENT SHALL SELLER BE LIABLE FOR THE COST OF PROCUREMENT OR INSTALLATION OF SUBSTITUTE GOODS.

6. LIMITATION OF LIABILITY

IN NO EVENT WILL SELLER BE LIABLE FOR ANY SPECIAL DAMAGES, CONSEQUENTIAL DAMAGES, INDIRECT DAMAGES, INCIDENTAL DAMAGES, STATUTORY DAMAGES, EXEMPLARY OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF REVENUE, LIQUIDATED DAMAGES, OR LOSS OF USE, EVEN IF INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. SELLER'S LIABILITY FOR DAMAGES ARISING OUT OF OR RELATED TO A PRODUCT SHALL IN NO CASE EXCEED THE PURCHASE PRICE OF THE PRODUCT FROM WHICH THE CLAIM ARISES. TO THE EXTENT PERMITTED BY APPLICABLE LAW, THESE LIMITATIONS AND EXCLUSIONS WILL APPLY WHETHER SELLER'S LIABILITY ARISES OR RESULTS FROM BREACH OF CONTRACT, BREACH OF WARRANTY, TORT (INCLUDING BUT NOT LIMITED TO NEGLIGENCE, GROSS NEGLIGENCE, MALICE, OR INTENTIONAL CONDUCT), STRICT LIABILITY, BY OPERATION OF LAW, OR OTHERWISE.

7. Cancellation and Return of Products

Orders shall not be subject to cancellation or modification either in whole or in part without Seller's written consent and then only with terms that will reimburse Seller for all applicable costs incurred by virtue of the sale, including costs of purchased materials, engineering costs and a reasonable allowance for profit. Seller's written consent must be given in advance of Buyer's return of Products for credit. Seller reserves the right to cancel any sale of Products without liability to Buyer (except for refund of monies already paid), if the manufacture or sale of the goods is or becomes technically or economically impractical.

8. Force Majeure

Seller shall not be liable for any failure to perform or delay in performing its obligations resulting directly or indirectly from or contributed to by any acts of God, acts of Buyer or those under Buyer's control, acts of government or other civil or military authorities, priorities, strikes, or other labor disputes, fires, accidents, floods, epidemics, war, riot, embargoes, delays in transportation, lack of or inability to obtain raw materials, components, labor, fuel or supplies, or other circumstances beyond Seller's reasonable control ("Force Majeure Event"). If Seller elects, the time for performance shall be extended by a period of time equal to the time lost because of any delays caused by reasons of a Force Majeure Event. Should Seller be prevented from completing Buyer's order or any part thereof because of any Force Majeure Event, then Buyer agrees promptly upon request and upon receipt of invoice therefor, to pay Seller for any Product or Products then completed.

9. Work Product

"Work Product" shall include, without limitation, all designs, discoveries, creations, works, devices, masks, models, work in progress, service deliverables, inventions, products, special tooling, computer programs, procedures, improvements, developments, drawings, notes, documents, business processes, information and materials made, conceived or developed by Seller alone or with others that result from or relate to the Products. All Work Product shall at all times be and remain the sole and exclusive property of Seller. Buyer hereby agrees to irrevocably assign and transfer to Seller and does hereby assign and transfer to Seller all of its worldwide right, title and interest in and to the Work Product including all associated intellectual property rights. Buyer hereby waives any and all moral and other rights in any Work Product or any other intellectual property created, developed or acquired in respect of the Products. Seller will have the sole right to determine the treatment of any Work Product, including the right to keep it as trade secret, execute and file patent applications on it, to use and disclose it without prior patent application, to file registrations for copyright or trademark in its own name or to follow any other procedure that Seller deems appropriate. All tools and equipment supplied by Buyer to Seller shall remain the sole property of Seller.

10. Confidentiality

(a) Buyer may acquire knowledge of Seller Confidential Information (as defined below) in connection with Products and/or its performance hereunder and agrees to keep Seller Confidential Information in confidence during and following termination or expiration of this Agreement. "Seller Confidential Information" includes but is not limited to all information, whether written or oral, in any form, including, without limitation, information relating to the research, development, products, methods of manufacture, trade secrets, business plans, customers, vendors, finances, personnel data, Work Product, and other material or information considered proprietary by Seller relating to the current or anticipated business or affairs of Seller that is disclosed directly or indirectly to Buyer. In addition, Seller Confidential Information means any third party's proprietary or confidential information disclosed to Buyer in the course of providing Products to Buyer.

(b) Buyer agrees not to copy, alter or directly or indirectly disclose any Seller Confidential Information. Additionally, Buyer agrees to limit its internal distribution of Seller Confidential Information to Buyer's employees who have a need to know, and to take steps to ensure that the dissemination is so limited. In no event will Buyer use less than the degree of care and means that it uses to protect its own information of like kind, but in any event not less than reasonable care to prevent the unauthorized use of Seller Confidential Information. Buyer may disclose Seller Confidential Information that is required to be disclosed pursuant to a requirement of a government agency or law but only after Buyer provides prompt notice to Seller of such requirement and gives Seller the opportunity to challenge or limit the scope of the disclosure.

(c) Buyer further agrees not to use Seller Confidential Information except in the course of performing hereunder and will not use such Seller Confidential Information for its own benefit or for the benefit of any third party. All Seller Confidential Information is and shall remain the property of Seller. Upon Seller's written request, Buyer shall return, transfer or assign to Seller all Seller Confidential Information, including all Work Product, and all copies containing Seller Confidential Information.

11. Patent Indemnity

In the event any Product is made in accordance with drawings, samples or manufacturing specifications designated by Buyer, Buyer agrees to indemnify, defend, and hold Seller harmless from any and all damages, costs and expenses (including attorney's fees) relating to any claim arising from or relating to the design, distribution, manufacture, marketing, sale, or use of the Product or arising from or relating to a claim that such Product furnished to Buyer by Seller, or the use thereof, infringes any claim of any patent, foreign or domestic, and Buyer agrees at its own expense to undertake the defense of any suit against Seller brought upon such claim or claims.

12. Changes in Product Design or Manufacture

Seller shall have the right to change, discontinue or modify the design and construction of any of its products and to substitute material equal to or superior to that originally specified.

13. Software License

Software, if included with a Product, is hereby licensed and not sold. The license is nonexclusive, and is limited to use with the Product with which it is included. No other use is permitted and Seller retains for itself (or, if applicable, its suppliers) all title and ownership to any software delivered hereunder, all of which contains confidential and proprietary information and which ownership includes without limitation all rights in patents, copyrights, trademarks and trade secrets. Buyer shall not attempt any sale, transfer, sublicense, reverse compilation or disassembly (save to the extent expressly permitted by law) or redistribution of the software. Buyer shall not copy, disclose or display any such software, or otherwise make it available to others.

14. Compliance with Laws

Buyer shall comply with all laws and regulations applicable to Products, including but not limited to all applicable import and export laws and regulations. Buyer and Buyer's Agent shall provide all information requested by Seller relating to Seller's voluntary or mandatory compliance with any law or regulation, and Buyer shall indemnify Seller for any losses incurred by Seller arising from Buyer's or Buyer's Agent's failure to provide the information requested by Seller.

15. Waiver

No waiver of any provision of these terms and conditions (or any right or default hereunder) shall be effective unless in writing and signed by an authorized representative Seller. Any such waiver shall be effective only for the instance given, and shall not operate as a waiver with respect to any other rights or obligations under these terms and conditions or applicable law in connection with any other instances or circumstances.

16. Language

The parties have expressly required that these terms and conditions be prepared in the English language. *Les parties aux présentes ont expressément exigé que les présents termes et les bons de commandes émis aux termes des présentes soient rédigés en langue Anglaise.*

17. Choice of Law and Dispute Resolution

Except as set forth below, these terms and conditions shall be governed by and construed in accordance with the laws of the State of Texas, without reference to its choice of law rules. If both Seller and Buyer are incorporated under the laws of Canada or a province of Canada, these terms and conditions shall be governed by and construed in accordance with the laws of the Province of Ontario and the federal laws of Canada. If Buyer is incorporated in the United States, any claim or litigation arising out of or relating to Products shall be brought exclusively in a court of competent jurisdiction in Harris County, Texas. If Buyer is incorporated outside of the United States, any dispute will be resolved by arbitration in Houston, Texas, by three arbitrators and under the International Chamber of Commerce Rules of Arbitration. The language of the arbitration will be English. In all cases, Buyer and Seller expressly exclude from application the United Nations Convention on Contracts for the International Sale of Goods.

18. Assignment

Buyer may not assign, transfer or subcontract the performance of its services, or any of its rights and/or obligations hereunder, without Seller's prior written consent.

19. Severability

If any provision of these terms and conditions is determined to be illegal, invalid, or unenforceable, the validity and enforceability of the remaining provisions of these terms and conditions will not be affected and, in lieu of such illegal, invalid, or unenforceable provision, there will be added, as part of these terms and conditions, one or more provisions as similar in terms as may be legal, valid and enforceable under applicable law.

CBL 022311

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27 11 19 Date: 08/20/14

Drawing Sheet: _____ Paragraph(s): 2.1:A-D

Detail(s): Optical Fiber Termination Panels

Proposed Substitution: Leviton Network Solutions

Manufacturer/Address/Phone: 2222 222nd Street S.E. Bothell, WA 98021 (800) 722-2082

Trade Name/Model No.: 5R4UM-F12, 5R2UM-S06, 5R1UM-S03

Product History: ___ New X 2-5 years old _____ 5-10 years old X More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

Leviton Optical Fiber Enclosures meet the specification criteria, color, and construction.

Reason for not providing specified item:

The intent of using this alternate item is to provide a value engineered solution and a homogeneous Structured Cabling System under a Single Lifetime System Warranty for both the optical fiber and copper cable and connectivity on this project from Leviton Manufacturing with the use of Berktek Optical Fiber Cable which is already listed under specification 27 13 23 while meeting the requirements of the project specifications

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

CA Public Utility Commission (PUC) / 505 Van Ness, San Francisco CA / Jesse Mann / 2013 - present

E-Bay / 2065 Hamilton Ave. San Jose, CA/ 2010 - Present

Proposed substitution affects other parts of the Work: ___ No ___ X_Yes: explain

All associatedoptical fiber adapters, splice trays, connectors, pigtails and optical fiber accessories will also be changed to Leviton.

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

~~All associated optical fiber adapters, splice trays, connectors, pigtails and optical fiber accessories will also be~~ changed to Leviton.

Supporting data attached: _X_Product Data ___Drawings ___Test Reports ___ Samples

_X_ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments _____

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

Opt-X® 1000i Rack-Mount Enclosures

1RU, 2RU, 3RU & 4RU

APPLICATION

The Opt-X 1000i Rack-Mount Enclosure allows for inter-connect or cross-connect between backbone cable and active equipment while using minimum rack space in a frame or cabinet setting. The enclosure's features and design allows for easy field termination of connectors, splicing, or pre-terminated plug-n-play solutions. The enclosure is primarily used in fiber applications such as data centers, equipment rooms, telecommunication rooms, etc.

SPECIFICATION

Fiber enclosure shall be available in 1RU, 2RU, 3RU, and 4RU versions to accommodate termination and splicing of fiber. A removable sliding tray shall also be available in 1RU and 2RU enclosures. Adapter bulkhead shall accept SC, LC, ST, and MTP® adapters, and plug-n-play MTP modules/cassettes. 4RU enclosures shall accommodate up to 15 adapter plates for 360 fiber connections. Fiber cable management for routing, storage, and protection shall accept patch cords, tight-buffer fiber, and backbone cables. Rear fiber cable management rings shall be stackable and configurable in ¼, ½, or full ring arrangements. Enclosure shall be constructed of 16-gauge steel with a powder-coated black finish and be mountable in either a 19" or 23" rack or cabinet frame. An optional locking door feature shall be available. Country of origin for product shall be United States of America.

FEATURES

- Sliding tray (in 1RU & 2RU) removes completely from enclosure for ease of field terminations and splicing
- Sliding tray glides (with stop) forward and backward, providing accessibility to front and rear bulkhead after installation
- 15" depth for high density fiber termination and/or splicing
- Stackable and adjustable fiber rings simplify cable organization
- Front saddles pivot for improved patch cord routing
- Removable front and rear covers for better access to interior of enclosure
- Removable rubber grommet allows for pre-terminated fiber trunk install, protects cable, and minimizes dust build-up
- Constructed of 16-gauge steel, powder-coated black
- Retrofit Sliding Tray, sold separately, allows for higher density applications using HDX MTP® Cassettes or HDX Adapter Plates (sliding tray does not accommodate splice trays)

DESIGN CONSIDERATIONS

- Enclosures are sold empty (unloaded)
- Accepts Opt-X adapter plates and/or modules/cassettes
- Optional cable strain relief mounting kit (for installation on side of enclosure or on rack post)
- 19" or 23" enclosure rack mount option (23" 1RU mounting bracket sold separately)
- Protrudes 4.5" from mounting ears to align with Leviton Versi-Duct® Cable Management System
- Capable of storing up to 3 meters of 900 µm tight buffered fiber per adapter
- Adapter plate on 3RU/4RU orients horizontally or vertically for optimal density
- Door lock option available on front, rear, or both
- Enclosure can be preconfigured to customer specifications (see page two)
- Enclosure includes an accessory kit consisting of cable ties, mounting screws, ID label, and spiral wrap (for cable protection on units with a sliding tray)

STANDARDS COMPLIANCE

Meets or exceeds all TIA-568-C.3 requirements

PHYSICAL SPECIFICATIONS

Capacity and dimensions: See page two.

Materials: Constructed of 16-gauge steel, powder-coated black. Plastic parts made using self-extinguishing ABS and polycarbonate materials rated UL 94V-2. Grommet material made of Santoprene®, a thermoplastic rubber elastomer.

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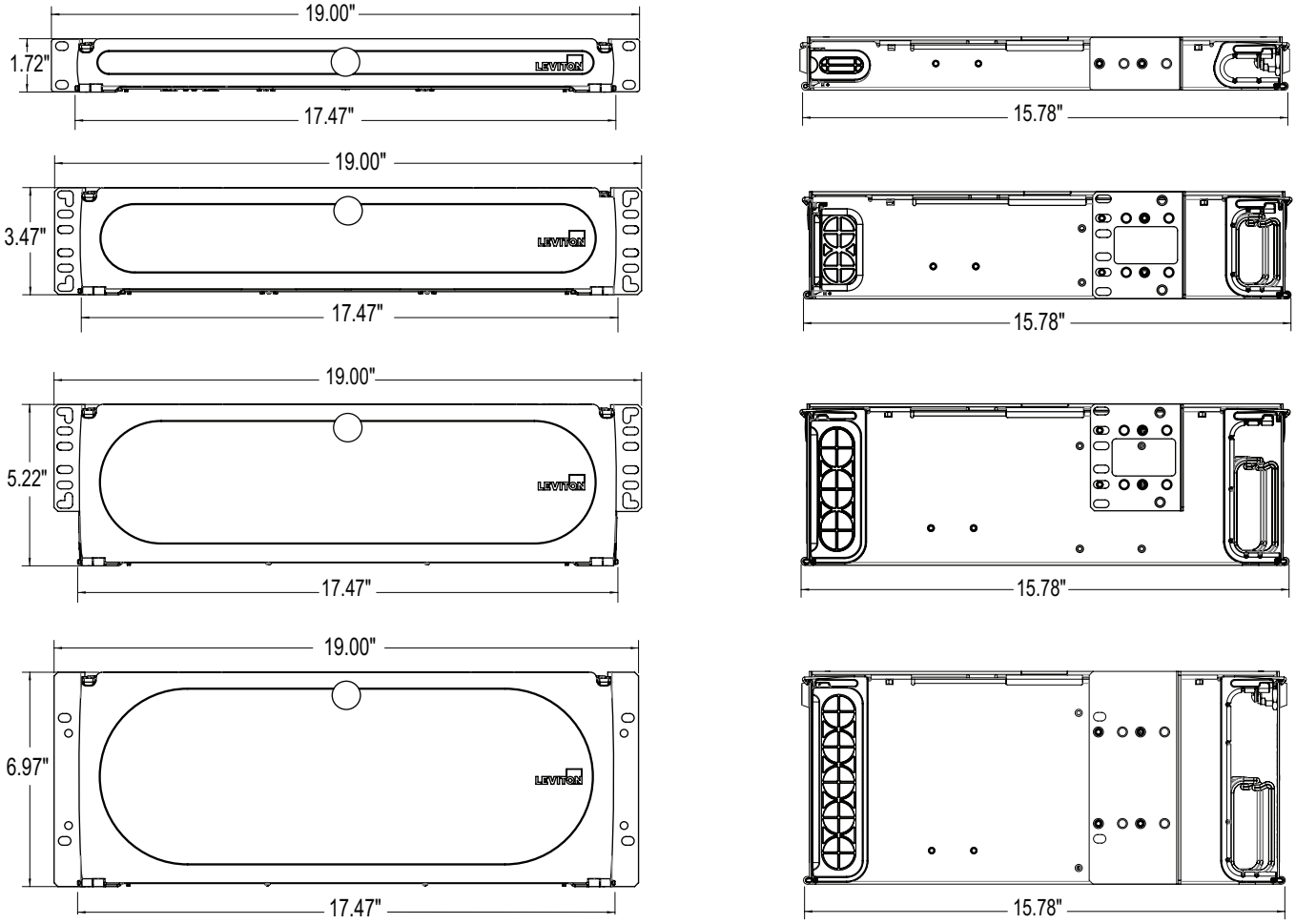
Revised November 2013

WARRANTY INFORMATION

For warranty information, go to leviton.com or call 800.722.2072.

ELECTRONIC FILES

For CAD files, typical specs, or technical drawings (.DXF, .DWG, Visio), visit www.leviton.com.



DENSITY			
Rack Unit	Fibers	Adapter Plate or MTP Cassette	Splice trays
1RU	72	Up to 3	Up to 3
2RU	144	Up to 6	Up to 6
3RU	216	Up to 9 (horizontal adapter plate/module orientation)	Up to 12
3RU (non-standard)	288	Up to 12 (vertical adapter plate/module orientation)	Up to 12
4RU	288	Up to 12 (vertical adapter plate/module orientation)	Up to 12
4RU (non-standard)	360	Up to 15 (horizontal adapter plate/module orientation)	Up to 12

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LEVITON

DENSITY USING RETRO-FIT SLIDING TRAY

Rack Unit	Fibers	Adapter Plate or MTP Cassette (HDX)
1RU	96	Up to 8
2RU	192	Up to 16

Make-to-Order! Opt-X 1000i Rack-Mount Enclosure Options

ENCLOSURE STYLE	ADAPTER PLATES OR MTP® CASSETTE SELECTION	NUMBER OF ADAPTER PLATES	FIBER TYPE	ADAPTER TYPE & PIGTAIL SELECTION	SPLICE TRAY STYLE	NO. OF SPLICE TRAYS	SECURITY OPTIONS	MOUNTING EAR POSITION
• 1RU Opt-X • 2RU Opt-X • 1RU or 2RU Opt-X w/ tray • 3RU or 4RU Opt-X w/ horizontal adapter plates • 3RU or 4RU Opt-X w/ vertical adapter plates	• 6 fibers (SC, ST) • 8 fibers (SC, ST) • 12 fibers (LC, SC, ST only) • 16 fibers (LC only) • 24 fibers (LC only) • MTP - 12 fibers (LC, SC, ST) • MTP - 24 fibers (LC only)	• 1 -15	• OM1 • OM2 • OM3 • OM4 • OS2	• LC • LC + pigtail • SC • SC/APC • SC + pigtail • SC/APC + pigtail • ST • ST + pigtail	• Heatshrink, foam holders, up to 12 fibers (molded tray) • Heatshrink, plastic holders, up to 12 fibers (molded tray) • Bare fusion, plastic holders, up to 12 fibers (metal tray) • Heatshrink, plastic holders, up to 24 fibers (molded tray)	• 1-12 • None	• Locking front door • Locking rear door • Both doors • None	• 19" or 23"

For assistance customizing your enclosures, please visit leviton.com/configurator or call Tech Support at 800.824.3005.

OPT-X® 1000i RACK-MOUNT ENCLOSURES

DESCRIPTION	PART NO.
Opt-X 1000i, 1RU Enclosure, Empty	5R1UM-F03
Opt-X 1000i, 1RU Enclosure, Empty, with sliding tray	5R1UM-S03
Opt-X 1000i, 2RU Enclosure, Empty	5R2UM-F06
Opt-X 1000i, 2RU Enclosure, Empty, with sliding tray	5R2UM-S06
Opt-X 1000i, 3RU Enclosure, Empty	5R3UM-F09
Opt-X 1000i, 3RU Enclosure, Empty	5R3UM-F12
Opt-X 1000i, 4RU Enclosure, Empty	5R4UM-F12
Opt-X 1000i, 4RU Enclosure, Empty	5R4UM-F15

Enclosure includes an accessory kit which consists of cable ties, mounting screws, ID label, and spiral wrap (for cable protection on units with sliding tray)

ACCESSORIES

DESCRIPTION	PART NO.
Retrofit Sliding Tray, 2U (for use with HDX Cassettes/Plates)	5R2UR-TRY
Retrofit Sliding Tray, 1U (for use with HDX Cassettes/Plates)	5R1UR-TRY
Universal Opt-X Clamp Kit (for enclosure mounting)	5RCMP-KIT
Universal Opt-X Clamp Kit (for rack post mounting)	5RCMR-KIT
Fiber Cable Management ¼ Ring Kit (Bag of four ¼ rings)	5R100-14R*
1RU Enclosure 23" Rack and Cabinet Mounting Bracket	5R1RU-023
Lock and Key	5L000-KAL

* Not for use in Retrofit Sliding Tray

K13 4699

ISO 9001 REGISTERED Quality Manufacturer

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Revised November 2013

Limited Lifetime System Warranty Statement

Subject to the limitations and conditions set forth herein, Berk-Tek and Leviton (the "Manufacturers") warrant to the end-user that the structured cabling and connectivity hardware products (the "Products") comprising the Berk-Tek Leviton structured cabling system (the "System") installed at the indicated project site will:

- **Be free from defects in material or manufacturing workmanship for the life of the System.**
- **Meet or exceed applicable ratified TIA/EIA and ISO/IEC link/channel transmission performance standards in effect at the time of installation.**
- **Support and current or future application which is designed for transmission over a structured cabling system as defined by the above referenced standards in effect at the time of installation.**

Warranty Exclusions

- Products used in the System which were not specifically designated as being eligible for coverage under this warranty.
- Products used in the System which were not supplied directly by the Manufacturers or through channels approved by the Manufacturers.
- Products used in the System which were falsely or incorrectly represented as being in compliance with the warranty registration requirements of this warranty, or were not included in the registration documents that were submitted to obtain coverage under this warranty.
- Defects resulting from non-Berk-Tek Leviton work area, patching or equipment cords, or from moves, additions, and changes by parties other than a Certified Integrator / Installer, or an authorized contractor of the Manufacturers, or Manufacturers authorized personnel.
- Defects resulting from non-compliant or improper System design, installation, use, repair or System alterations, misuse, neglect, accident or abuse.
- Defects or System failures caused by events beyond reasonable control of the Manufacturers including, without limitation, act or omissions of customer, acts of God or government, natural disasters or storms, fire, flood, water damage, paint or chemical exposure, political strife, labor disputes, failure or delay of transportation, or unavailability of parts or personnel.

Warranty Remedy

- For valid warranty claims, the Manufacturers will, at their option, using a Certified Integrator / Installer or an authorized contractor or personnel of the Manufacturers choosing replace, repair, or provide credit for any qualified System products found to be non-compliant and cover reasonable costs of labor to effect necessary work.

Warranty Limitations

- **THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, INCLUDING, BUT NOT BY WAY OF LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, NON-INFRINGEMENT OR ANY OTHER MATTER. THE REMEDIES PROVIDED FOR IN THE PRECEDING PARAGRAPHS SHALL CONSTITUTE THE SOLE RECOURSE OF END-USER AGAINST THE MANUFACTURERS FOR BREACH OF ANY OBLIGATIONS TO END-USER, WHETHER THE CLAIM IS MADE IN TORT OR IN CONTRACT, INCLUDING CLAIMS BASED ON WARRANTY, NEGLIGENCE, STRICT LIABILITY, FRAUD, MISREPRESENTATION, OR OTHERWISE.**
- In no event shall Manufacturers be liable for special, indirect, incidental or consequential damages (regardless of the form of action, whether in contract or in tort, including negligence), including without limitation, lost profits, lost data, System downtime, System outages, loss of use of the System or economic damage arising out of the failure of the System or the Products that form part of the System. The maximum aggregate liability of the Manufacturers for any claims for damage arising out of or connected with this warranty of the manufacture, sale, delivery, installation or use of the Products shall not exceed the price paid for the Products giving rise to a claim.
- This warranty is non-transferable and shall not benefit any party or parties other than the stated System end-user, and is subject to the individual Product warranty Terms & Conditions of each Manufacturer.
- This warranty does not cover Systems which are no longer in use or which are no longer used for their originally intended purpose.

Warranty Claims

- Proper System design, installation, use and maintenance must be demonstrated to the Manufacturers.
- System documentation and maintenance records, all of which are the responsibility of the end-user, must be made available upon request.
- End-user shall provide free access to the System to original Certified Integrator/Installer, and the Manufacturers authorized personnel.

Claim Procedure

- Prior to making a claim, and for the claim to be valid, the end-user must first resolve all non-connectivity hardware and non-cable related causes.
- Warranty claims shall initially, and promptly be made to the original Certified Integrator / Installer or the local representative of one of the Manufacturers.
- System repair or replacement due to component failure will be performed only after the Manufacturers have reviewed and verified the System prior to removal, replacement, or repair of any defective System Products.
- Any disputes under this warranty shall be subject to the jurisdiction of the courts of the State of New York and the federal courts therein, regardless of the location of the installation.

TG10.4 – Electrical, Communications, Security, Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-507	8/21/2014		General	At the Pre-Bid SSI Q&A Work Session on 8/7/14, it was confirmed that the PSIM is no longer integral to this security package at this time, however it was repeatedly requested that an Interface Matrix be provided for all systems that must communicate with the security system. Please advise how soon this Interface Matrix will be issued.	Due to the removal of ECS/MNS scope from this package, this information will not be available in this phase of bidding.
TG10.4-519	8/22/2014		28 13 00 , Part 2 - Products, 2.1 ACS Head EndReplace	Substitution Request for ACS Head End Replace. Is it acceptable to substitute the specified manufacturer on spec section 28 13 00-37, 2.1 Part 2- Products i.e., with Lenel OnGuard A&E Specification for ACS Head End Replace. Please see the attached substitution form and product data for the same.	Yes, Lenel is an acceptable manufacturer.
TG10.4-520	8/25/2014		28 23 00 Video Surveillance Part 2 Products , 2.1 Video Surveillance System Head End	Substitution Request for Video Surveillance System. Is it acceptable to substitute the specified manufacturer on specification section 28 23 00, Part 2- Products 2.1 VSS Head End with XProtect Corporate from Milestone Systems. Please see the attached substitution form and product data for the same.	Yes, Milestone is an acceptable manufacturer.
TG10.4-523	8/25/2014		Para: 2.2 28 23 00	You stated that all cameras will have video analytics, but you did not provide clarification as to which video analytics (behaviors) are to be provided. Can you please advise?	All analytics described in Specification Section 28 23 00, paragraphs 2.1.D.2.o and 2.2 shall be applied to all cameras.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-533	8/25/2014		26 33 53, Para: Part 1, 1.1D; & 1.6.A.5	Above paragraph says UPS to be rated at .9 pf which is usually indicative of the kW capacity of the UPS. Generally the battery run time is sized accordingly to the kW capacity. This specification covers the UPS's rated at 500kVA and 150kVA. The end of battery life is to be shown at 450kW and 100kW. It seems contradictory that the 150kVA is not being sized at .9pf (135kW), like the 500 (450kW). Please confirm that the battery run time should be calculated at 100kW.	There are two specific levels of battery run time required; both apply to the UPS-B1-B and UPS-B1-D which are rated for 500kVA/450 KW. See Specification Section 26 33 53, paragraphs 2.5.A.1 and 2.5.A.2. Each UPS shall support a total load of 450kW for a total of twenty minutes. Each UPS must support a partial load of 100kW for a total of four hours. The batteries need to be designed to support both load duration requirements and the battery curves shall demonstrate the capacity ratings. The UPS-B1-A SOC (80 kVA/72kW) shall be provided with ten minutes of battery time for 72kW load.
TG10.4-536	8/26/2014		01 91 00 - General Commissioning	Please clarify whether division 01 91 00 General Commissioning requirements apply to division 28 Security systems.	Division 01 91 00 General Commissioning requirements do not apply to Division 28 security systems.
TG10.4-539	8/26/2014		28 13 00	Access Control specification is almost verbatim A&E specification of vendor X, but vendor Y is named as approved manufacturer. Please confirm that vendor Y will not be expected to have the identical software modules or architecture of vendor X, although it fulfills the intent of the specification.	The specification is performance-based and allows "or equal" substitutions as long as they fulfill the intent of the specification.
TG10.4-543	8/26/2014		28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-545	8/28/2014	E1-2203		Lower center note refers to “EMERGENCY ELECTRICAL ROOM B1480, UON”. Should this be “EMERGENCY ELECTRICAL ROOM B1325” on sheet E1-2204?	Yes. Refer to the attached sketches SKE-TG10.4-545-1 and SKE-TG10.4-545-2 for the revised notes.
TG10.4-546	8/28/2014	E1-2205		Question: Note in lower center note refers to “EMERGENCY ELECTRICAL ROOM B1560, UON”. Should this be “EMERGENCY ELECTRICAL ROOM B1563”?	Yes. Refer to the attached sketches SKE-TG10.4-546-1 and SKE-TG10.4-546-2 for the revised notes.
TG10.4-548	8/28/2014	A1-4302-TO-4507		Reflected ceiling plans do not include ceiling types or heights. Where can we find ceiling type and height information?	Original reflected ceiling plans did provide information on ceiling types and heights, above finished floor (AFF). Drawings A-0009 and A1-8500 provided additional information regarding dimensional control for W-14 ceiling types. For the most current ceiling information refer to RCPs issued as part of ASI 0124 dated 08/18/2014.
TG10.4-550	8/29/2014		26 09 33 Appendix A	We were unable to confirm if the F16 fixture is equipped with a 0-10V dimming driver/ballast. The basis of design for dimming on the project is primarily 0-10V. If that fixture is dimmed with something other than a 0-10V ballast/driver we will have to include an interface or use another means to control that fixture type. Please advise.	Fixture type F16 is no longer part of the project.
TG10.4-562	8/29/2014		All of Division 27	Please confirm that all of Division 27 is to comply with the requirements of Specification Section “01 80 50 - Seismic Design Criteria For Nonstructural Components?	Confirmed.
TG10.4-566	8/29/2014	E1-0050	26 05 35 . Para 3.1.A	The specification is inconsistent with the wiring schedule on E1-0050; whereas the specification requires the conduit to be a 3/4" minimum and the wiring schedule allows for 1/2". Which takes precedence for the TG10.4 package?	The 3/4" conduit is to take precedence.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-569	8/29/2014		25 30 20 Para: 2.16 & 2.17	These 2 paragraphs mention CO and CO2 sensors; 1) is there supposed to be a CO and a CO2 system? 2) If so, who is responsible to provide these systems? 3) If so please provide specification and sequence as applicable to the mechanical, electrical and BMS.	1) No, there is not a CO and CO2 "system". There are CO and CO2 sensors called out in the drawings that are used for certain types of control. The BMCS drawings have sequences of operation that explain in detail how the CO and CO2 sensors are used. 2) These are sensors, not "systems", and they should be provided by the TG10.4 Trade Subcontractor. 3) The sequences of operation where the CO and CO2 sensors are used are shown on the BMCS drawings.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 28 13 00 (Issue for Construction)
Date: July 18, 2014
Drawing Sheet: N/A
Paragraph(s): Part 2 - Products, 2.1 ACS Head EndReplace
Detail(s): N/A

Proposed Substitution: Replace existing specifications with current Lenel OnGuard A&E specification
Manufacturer/Address/Phone:
Trade Name/Model No.:

Product History: ___ New ___ 2-5 years old ___ 5-10 years old ___ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

The approved product (Lenel OnGuard) is being provided. The bid spec section contains specs for a different manufacturer's product. Lenel OnGuard A&E specs are attached. This is to avoid conflicts during acceptance while completing the Security Systems Readiness Checklist. Please confirm OnGuard specs are acceptable.

Reason for not providing specified item:

The approved product (Lenel OnGuard) is being provided. The bid spec section contains specs for a different manufacturer's product. Lenel OnGuard A&E specs are attached. This is to avoid conflicts during acceptance while completing the Security Systems Readiness Checklist. Please confirm OnGuard specs are acceptable.

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

N/A

Proposed substitution affects other parts of the Work: ___ No ___ Yes: explain

No impact.

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None.

Supporting data attached: ☑ Product Data ☐ Drawings ☐ Test Reports ☐ Samples

☐ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Lenel OnGuard A&E specification

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 28 23 00 Video Surveillance

Date: August 21, 2014

Drawing Sheet:

Paragraph(s): Part 2 - Products

Detail(s): 2.1 Video Surveillance System (VSS) Head End

Proposed Substitution: XProtect Corporate

Manufacturer/Address/Phone: Milestone Systems/8905 SW Nimbus Ave Ste 400 Beaverton OR 97008 503-350-1100

Trade Name/Model No.: XProtect

Product History: ☐ New ☐ 2-5 years old ☐ 5-10 years old ☑ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

Please see Milestone vs OnSSI comparison

Reason for not providing specified item:

All OnSSI VMS solutions are OEM versions of Milestone XProtect.

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Utah Transit Authority, 3600 South 700 West, Salt Lake City, UT. Installed 2011, 900 Cameras, XProtect Corporate

Proposed substitution affects other parts of the Work: ☑ No ___ Yes: explain

Milestone XProtect Corporate should support the proposed OnSSI servers and network infrastructure

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: ___ Product Data ___ Drawings ___ Test Reports ___ Samples

___ Manufacturer's Standard Form of Warranty or Guarantee

Other: Milestone vs. OnSSI comparison

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Milestone vs. OnSSI comparison and Milestone Transportation Customer List

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

Milestone is the number one VMS developer worldwide and has a history of pushing innovations into the market. Milestone has been releasing new versions of it software regularly at least once per year.

All OnSSI VMS solutions are OEM versions of Milestone XProtect.

New features in XProtect 2014 (available immediately in XProtect) include:

- Evidence Lock
- Dual Authorization
- Automatic Motion Detection Sensitivity
- Camera/View search by name

- OnSSI has access to the most recent versions of XProtect, but new functionalities will not immediately be available in OnSSI for a few months.

Milestone is leading the market:

- Milestone is introducing technologies like 64-bit applications, video push, encryption, failover servers, edge storage, multistage archiving with data thinning, MF/Interconnect, digital signing, rules system
- Milestone will continue to lead in
- Milestone is the #1 global VMS provider.

As the owner and developer of the base code, Milestone can make customizations to accommodate a particular feature set for a customer.

- If an OnSSI customer requires new features, special integrations, or bug fixes they will not be able to get these implemented or developed by going to the vendor (OnSSI). A Milestone customer would have that possibility.

- OnSSI client has a more difficult camera selection method for setting up views and doesn't allow a simple drag and drop method such as the Smart Client

- OnSSI client installation requires Windows Media Player and the installation will fail if it isn't included. XProtect Smart Client installs all pre-requisites with the installation package.

- OnSSI client help files require Adobe Reader instead of creating simple and more highly functional html based help files, such as those available with the XProtect Smart Client.

- OnSSI client has much higher requirements than the XProtect Smart Client, without any significant upgrades in functionality.

- The OnSSI client has a limited set of features when logged into an NVR or recording server, and the full feature set is only available when logged into an Ocularis Base Server.

- Evidence Lock feature is not available with OnSSI (Corporate only)
- Dual Authorization will not be available with OnSSI (C-Code only)
- Automatic Motion Detection Sensitivity will not be available with OnSSI

Milestone
2014 Transportation Customer List

Austin Bergstrom Int'l Airport	Airports
Billings Logan Airport	Airports
Bradford Airport Logistics	Airports
Columbia Metropolitan Airport	Airports
Des Moines International Airport	Airports
Eastern Iowa Airport	Airports
Jackson Hole Airport	Airports
JFK Airport	Airports
Laredo Int. Airport	Airports
Lima Airport Partners	Airports
Lincoln Airport Authority	Airports
Logan Airport	Airports
Martin County Airport	Airports
Minot Int Airport	Airports
Montréal-Pierre International Airport	Airports
Oakland Airport (recent award, installation Q4 2014)	Airports
Palm Springs Airport	Airports
Phoenix Sky Harbor Airport	Airports
Pierre Regional Airport	Airports
Range Regional Airport	Airports
Shelbyville Municipal Airport	Airports
Smyrna Airport - Smyrna/Ruther	Airports
South Bend Airport	Airports
St Augustine Airport	Airports
Ted Stevens Anchorage Int'l Airport	Airports
Titusville Cocoa Airport Authority	Airports
Tri Cities Regional Airport	Airports
VA Highlands Airport	Airports
Vernon Airport	Airports
Viracopos Airport	Airports
Akron RTA Intermodal Transcent	Transport. Traffic Monitoring
Alabama Department of Transportation	Transport. Traffic Monitoring
Burlington County Bridge Commission	Transport. Traffic Monitoring
Cardinal Travel Center, Petro	Transport. Traffic Monitoring
Central Transport	Transport. Traffic Monitoring
Champaign-Urbana Mass Transit District	Transport. Traffic Monitoring
Chesapeake Expressway	Transport. Traffic Monitoring
City of San Jose Dept of Transportation	Transport. Traffic Monitoring
Federal Aviation Administration	Transport. Traffic Monitoring
Kingsport Area Transit System	Transport. Traffic Monitoring
LA Department of Transportation	Transport. Traffic Monitoring
Maryland Transportation Author	Transport. Traffic Monitoring

METRO RTA Intermodal Transit S	Transport. Traffic Monitoring
Ministry of Highway & Transportation	Transport. Traffic Monitoring
Minnesota Department of Transportation	Transport. Traffic Monitoring
Municipio de Santa Catarina	Transport. Traffic Monitoring
NADC Logistics	Transport. Traffic Monitoring
New Brunswick Parking Authorit	Transport. Traffic Monitoring
North Carolina Department of Transportation	Transport. Traffic Monitoring
Nova Scotia Department of Transportation	Transport. Traffic Monitoring
Ohio Department of Transportation	Transport. Traffic Monitoring
Oklahoma Turnpike Authority	Transport. Traffic Monitoring
Powhite Parkway	Transport. Traffic Monitoring
Santa Cruz Metropolitan Transit	Transport. Traffic Monitoring
Spokane Transit Authority	Transport. Traffic Monitoring
Texas Emergency Network, LLC	Transport. Traffic Monitoring
The Illinois State Toll Highway	Transport. Traffic Monitoring
Transurban	Transport. Traffic Monitoring
Utah Transit Authority	Transport. Traffic Monitoring
Virginia Department of Transportation	Transport. Traffic Monitoring
Bombardier Capital, Inc.	Transportation Railways
CP Rail	Transportation Railways
CSX	Transportation Railways
CUMTD, Champaign-Urbana Mass Transit District	Transportation Railways
Norfolk Southern/SCSI	Transportation Railways
VIA Rail Canada	Transportation Railways
VIA Rail Canada	Transportation Railways
Wahsington Metro Transit Autho	Transportation Railways
West Burlington RailRoad	Transportation Railways

SHEET NOTES

A. THIS DRAWING INCLUDES SCOPE OF WORK FOR FUTURE BID PACKAGES. EARLY BELOW GRADE (EBG) SCOPE OF WORK ON THIS SHEET IS LIMITED ONLY TO GROUNDING ELECTRODE CONDUCTORS EMBEDDED IN SLAB AND MAIN GROUNDING BUS (MGB) IN THE MAIN ELECTRICAL ROOM. SEE GENERAL NOTES ON SHEET E-0006 FOR COMPLETE TG.06 BELOW GRADE SCOPE OF WORK.

B. ALL RECEPTACLES, FIRE ALARM DEVICES AND EQUIPMENT SHOWN HALFTONE AND LABELED (F) ARE FOR REFERENCE ONLY, TO BE INSTALLED IN PHASE 2. ALL DEVICES AND EQUIPMENT SHOWN FULLTONE ARE TO BE INSTALLED IN PHASE 1, CONSTRUCTION SCOPE.

SHEET NOTES CON'T.

C. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

D. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

E. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

F. PROVIDE REDUNDANT CONDUIT PATH FOR ALL PHASE 1 FIRE ALARM DEVICES CLASS A WIRING AS REQUIRED PER NFPA 130 AND NFPA 72.

SHEET E1-2203

NUMBERED NOTES

1. UNDER EARLY BELOW GRADE (EBG) SCOPE OF WORK PROVIDE GROUNDING ELECTRODE CONDUCTOR (GEC) EMBEDDED IN THE LOWER CONCOURSE FLOOR SLAB STUBBED UP AT EACH CORNER OF THE PG&E VAULTS FOR EXTENSION BY PG&E.

NUMBERED NOTES CON'T.

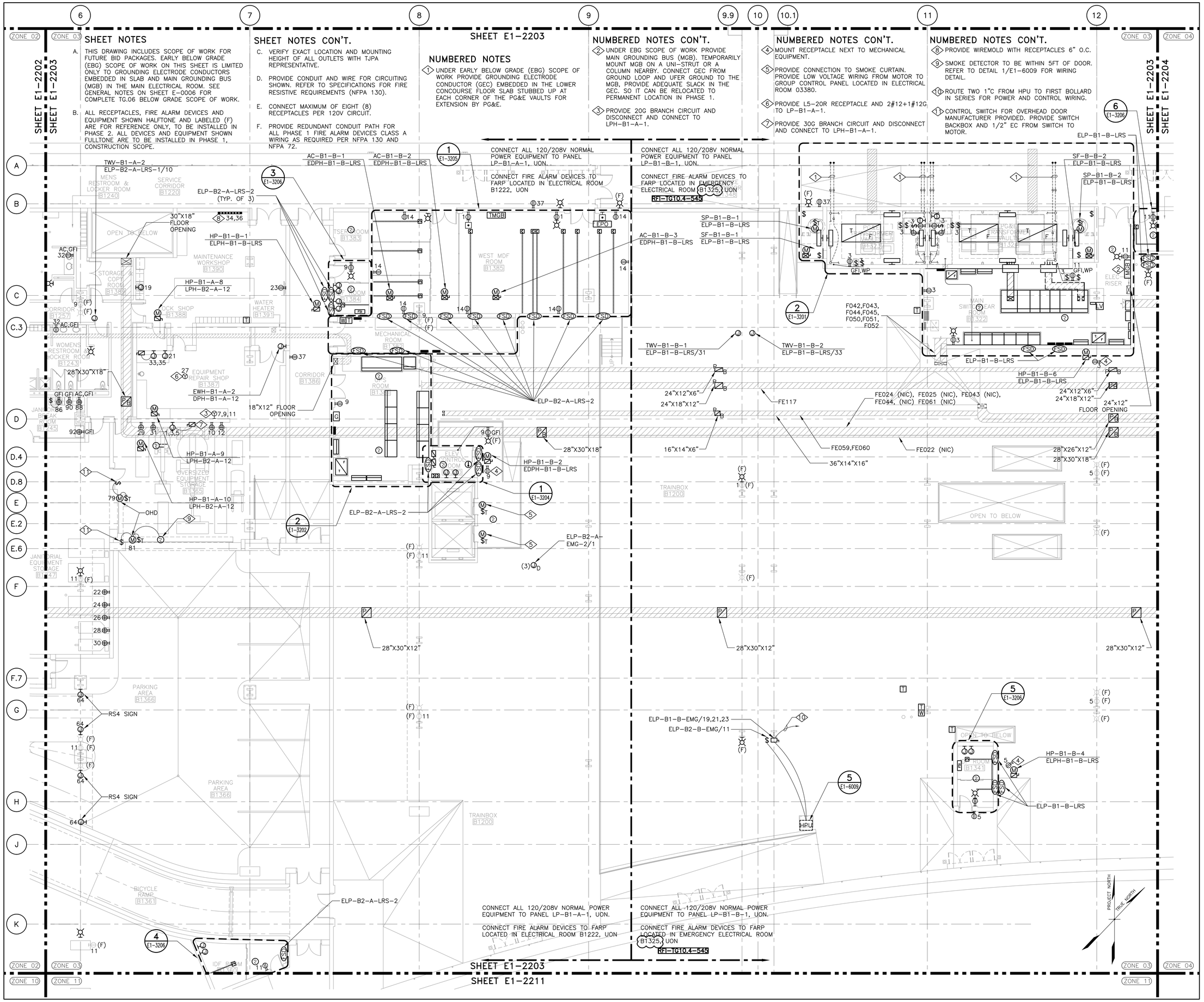
2. UNDER EBG SCOPE OF WORK PROVIDE MAIN GROUNDING BUS (MGB). TEMPORARILY MOUNT MGB ON A UNI-STRUT OR A COLUMN NEARBY. CONNECT GEC FROM GROUND LOOP AND UFER GROUND TO THE MGB. PROVIDE ADEQUATE SLACK IN THE GEC. SO IT CAN BE RELOCATED TO PERMANENT LOCATION IN PHASE 1.
3. PROVIDE 20G BRANCH CIRCUIT AND DISCONNECT AND CONNECT TO LPH-B1-A-1.

NUMBERED NOTES CON'T.

4. MOUNT RECEPTACLE NEXT TO MECHANICAL EQUIPMENT.
5. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03380.
6. PROVIDE L5-20R RECEPTACLE AND 2#12+1#12G TO LP-B1-A-1.
7. PROVIDE 30G BRANCH CIRCUIT AND DISCONNECT AND CONNECT TO LPH-B1-A-1.

NUMBERED NOTES CON'T.

8. PROVIDE WIREMOLD WITH RECEPTACLES 6" O.C.
9. SMOKE DETECTOR TO BE WITHIN 5FT OF DOOR. REFER TO DETAIL 1/E1-6009 FOR WIRING DETAIL.
10. ROUTE TWO 1"C FROM HPU TO FIRST BOLLARD IN SERIES FOR POWER AND CONTROL WIRING.
11. CONTROL SWITCH FOR OVERHEAD DOOR MANUFACTURER PROVIDED. PROVIDE SWITCH BACKBOX AND 1/2" EC FROM SWITCH TO MOTOR.



1 E1-2000 LOWER CONCOURSE LEVEL ZONE 03 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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Transbay Transit Center
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San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	08/30/12	ISSUED FOR CONSTRUCTION - BELOW GRADE PACKAGE	CFH
2	05/31/13	100% CONSTRUCTION DOCUMENTS	CFH
3	06/10/13	PER ASI No. 0104	CFH
4	01/23/14	ISSUED FOR BID	CFH
5	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
6	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
7	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH
8	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO.
08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ZONE 03 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER FENLON - HARDING
No. E20580
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: C. GRANT
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: 6
SHEET NUMBER: SKE-RFI-TG10.4-545-1
SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

C. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

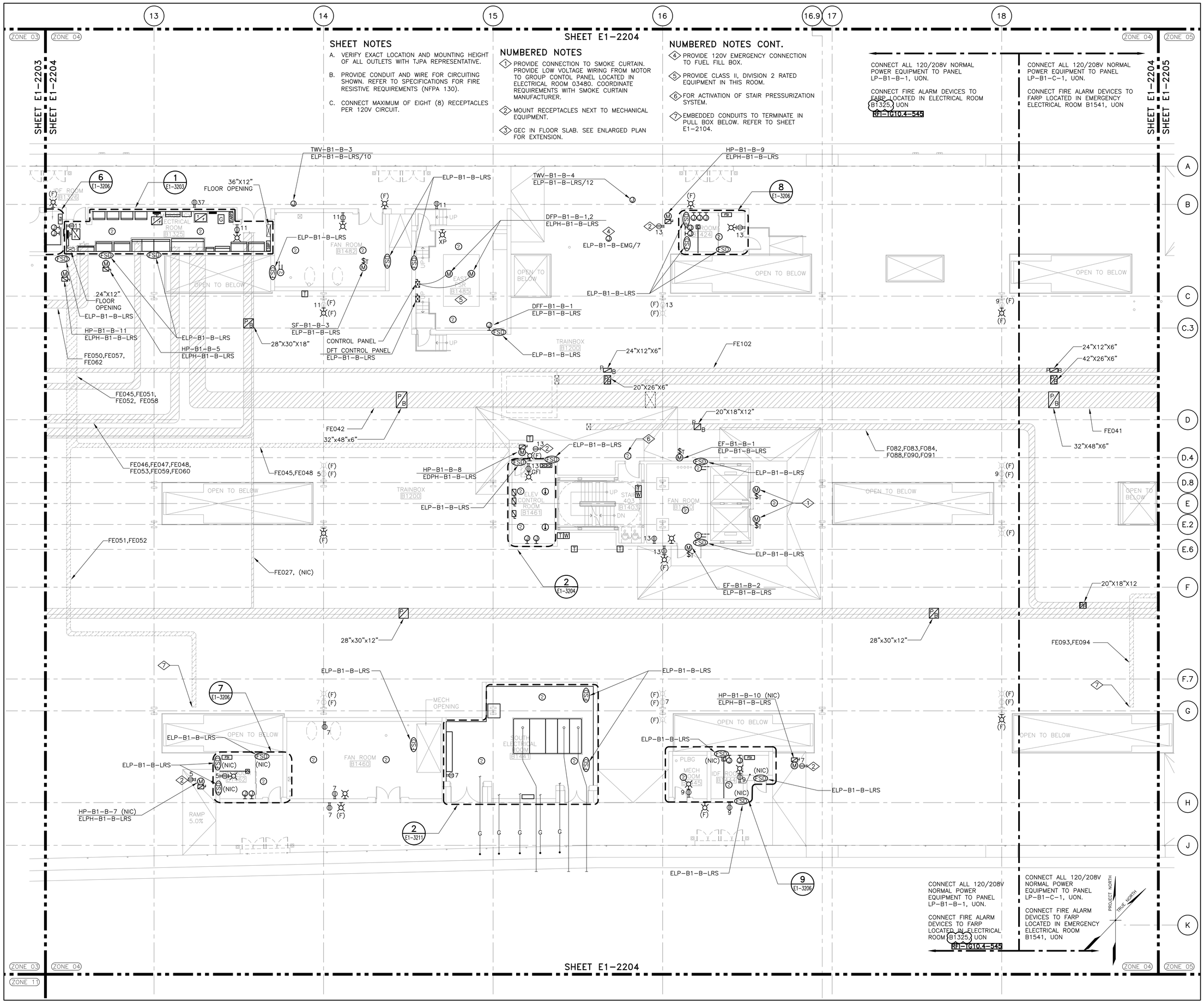
SHEET E1-2204

NUMBERED NOTES

1. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTOL PANEL LOCATED IN ELECTRICAL ROOM 03480. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.
2. MOUNT RECEPTACLES NEXT TO MECHANICAL EQUIPMENT.
3. GEC IN FLOOR SLAB. SEE ENLARGED PLAN FOR EXTENSION.

NUMBERED NOTES CONT.

4. PROVIDE 120V EMERGENCY CONNECTION TO FUEL FILL BOX.
5. PROVIDE CLASS II, DIVISION 2 RATED EQUIPMENT IN THIS ROOM.
6. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.
7. EMBEDDED CONDUITS TO TERMINATE IN PULL BOX BELOW. REFER TO SHEET E1-2104.



1 E1-2000 LOWER CONCOURSE LEVEL ZONE 04 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

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5	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: LOWER CONCOURSE LEVEL ZONE 04 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E 20560
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE E · FACILITY NO. 140 · REVISION E
SHEET NUMBER SKE-RFI-TG10.4-545-2	SEQUENCE NUMBER ___ of ___

ISSUED FOR CONSTRUCTION

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SHEET NOTES

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B. ALL RECEPTACLES, FIRE ALARM DEVICES AND EQUIPMENT SHOWN HALFTONE AND LABELED (F) ARE FOR REFERENCE ONLY, TO BE INSTALLED IN PHASE 2. ALL DEVICES AND EQUIPMENT SHOWN FULLTONE ARE TO BE INSTALLED IN PHASE 1, CONSTRUCTION SCOPE.

SHEET E1-2205

SHEET NOTES CON'T.

C. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

D. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

E. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

F. PROVIDE REDUNDANT CONDUIT PATH FOR ALL PHASE 1 FIRE ALARM DEVICES CLASS A WIRING AS REQUIRED PER NFPA 130 AND NFPA 72.

NUMBERED NOTES

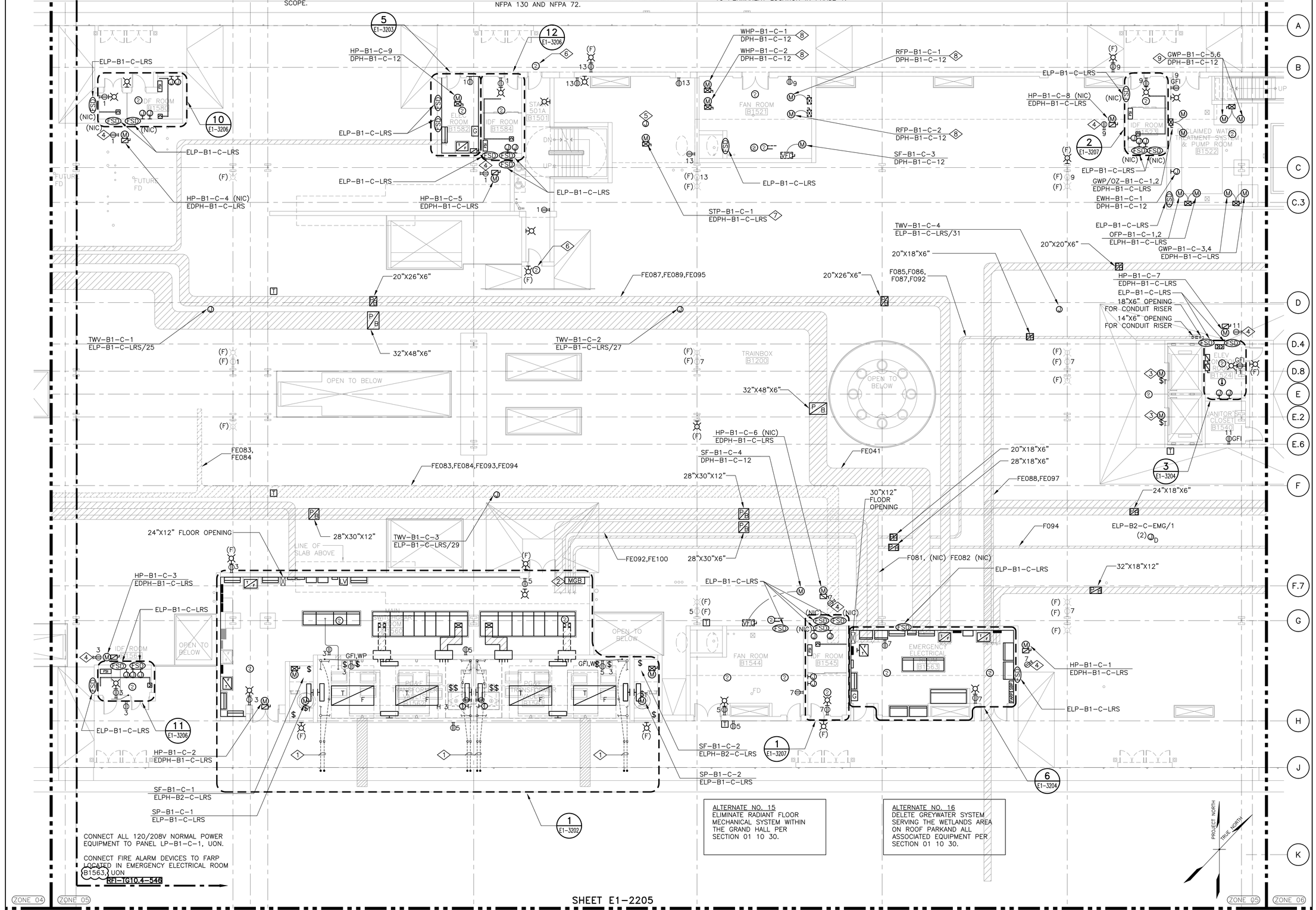
1. UNDER EARLY BELOW GRADE (EBG) SCOPE OF WORK PROVIDE GROUNDING ELECTRODE CONDUCTOR (GEC) EMBEDDED IN THE LOWER CONCOURSE FLOOR SLAB STUBBED UP AT EACH CORNER OF THE PG&E VAULTS FOR EXTENSION BY PG&E.
2. UNDER EBG SCOPE OF WORK PROVIDE MAIN GROUNDING BUS (MGB). TEMPORARILY MOUNT MGB ON A UNI-STRUT OR A COLUMN NEARBY. CONNECT GEC FROM GROUND LOOP AND UFER GROUND TO THE MGB, PROVIDE ADEQUATE SLACK IN THE GEC. SO IT CAN BE RELOCATED TO PERMANENT LOCATION IN PHASE 1.

NUMBERED NOTES CON'T.

3. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03520. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.
4. MOUNT RECEPTACLES NEXT TO MECHANICAL EQUIPMENT.
5. CONNECT DAMPER END SWITCH TO FIRE ALARM SYSTEM.
6. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.

NUMBERED NOTES CON'T.

7. BRANCH CIRCUITS FOR THIS EQUIPMENT SHALL BE EMBEDDED IN THE CONCRETE SLAB FROM THE ELECTRICAL ROOM TO THE PROTECTED STAIRWELL ENCLOSURE.
8. SEE DEDUCT ALTERNATE D.1.7 FOR ELIMINATION OF RADIANT FLOOR AND ALL ASSOCIATED EQUIPMENT FOR THE GRAND HALL.
9. SEE DEDUCT ALTERNATE D.1.8 FOR ELIMINATION OF GREYWATER SYSTEM AND ALL ASSOCIATED EQUIPMENT FOR WET LANDS AREA AT ROOF PARK LEVEL.



SHEET E1-2205

1 / E1-2000 LOWER CONCOURSE LEVEL ZONE 05 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

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CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

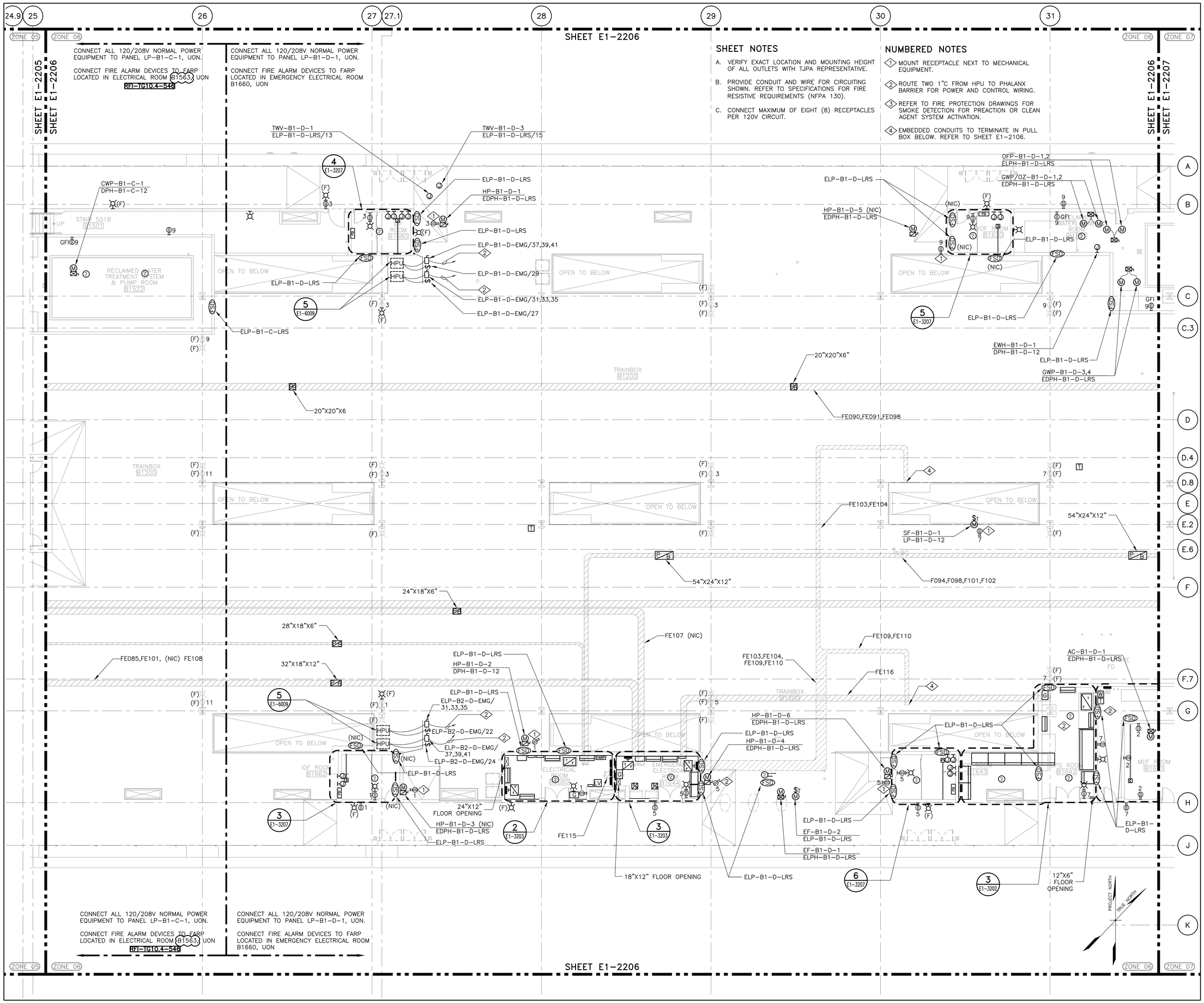
SHEET TITLE: LOWER CONCOURSE LEVEL ZONE 05 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING

DESIGNED BY: J. TILLS	CHECKED BY: C. GRANT
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: 6
SHEET NUMBER: SKE-RFI-TG10.4-546-1	SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION



SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN. REFER TO SPECIFICATIONS FOR FIRE RESISTIVE REQUIREMENTS (NFPA 130).

C. CONNECT MAXIMUM OF EIGHT (8) RECEPTACLES PER 120V CIRCUIT.

NUMBERED NOTES

1. MOUNT RECEPTACLE NEXT TO MECHANICAL EQUIPMENT.
2. ROUTE TWO 1"C FROM HPU TO PHALANX BARRIER FOR POWER AND CONTROL WIRING.
3. REFER TO FIRE PROTECTION DRAWINGS FOR SMOKE DETECTION FOR PREACTION OR CLEAN AGENT SYSTEM ACTIVATION.
4. EMBEDDED CONDUITS TO TERMINATE IN PULL BOX BELOW. REFER TO SHEET E1-2106.

1 (E1-2000) LOWER CONCOURSE LEVEL ZONE 06 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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Key Map

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5	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ZONE 06 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-19820
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: E
SHEET NUMBER: SKE-RFI-TG10.4-546-2	SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

XREFS: XAGRID.dwg\ XAGRID-96.dwg\ XAZONES.dwg\ XAFLRB1PH1.dwg\ XEFLRB1PH1.dwg\ TJPA-TB 34x44E.dwg\ CFH-STAMP.dwg

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TG10.4 – Electrical, Communications, Security, Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-222	7/16/2014		28 40 00-20, 2.2 28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-225	7/16/2014		Page 20, 2.2 28 40 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-309	7/21/2014		1.1D 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-336	7/23/2014		Para B.5. 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-376	7/31/2014		ECS 28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-377	7/31/2014		28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-379	7/31/2014		ECS/PA 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-380	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-381	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-382	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-383	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-384	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-385	7/31/2014		MNS 28 31 76	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-411	8/4/2014		28 31 76/APA	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-485	8/20/2014		Para: 2.8.A Spare Parts 26 33 53	What does this mean? Level 25 Spare Parts.	Provide a basic package of spare parts to replace 25% of the components that could fail, including all fuses.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-498	8/21/2014	SE1-4001, SE1-6001,	Para: 10, Detail: SE1-4001/12 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-518	8/22/2014		28 23 00-37, Para 2.2D 28 23 00	Substitution Request for Video Analytics System. Is it acceptable to substitute the specified manufacturer on specification section 28 23 00-37, 2.2.D i.e., BRS System with Agnet VI System for Video Analytics System. Please see the attached substitution form and product data for the same.	The proposed substitution does not meet the requirements in Specification Section 28 23 00 paragraph 2.1.D.2.o.
TG10.4-521	8/25/2014		Para 2.5 , A,B,C,D, Video Modular Matrix 27 41 17	Substitution Request for Video and Application Processor. Is it acceptable to substitute the specified manufacturer on specification section 27 41 17, Paragraph 2.5- A,B,C,D with Galileo Digital Video and Application Processor by RGB Spectrum. Please see the attached substitution form and product data for the same.	Yes, this substitution is acceptable, provided model GO56, which allows the higher input/output channel count, is selected.
TG10.4-530	8/25/2014	E-0011		1) Is there a specification sheet for the "combination camera/occupancy sensor ceiling mounted" as called for on sheet E-0011 and as shown on the lighting plans? 2) Are these devices expected to be connected to the Quantum system? 3) What is the expected control with regard to the camera portion of the sensor?	1) Please refer to Specification Section 26 09 33 paragraph 1.3.A.2.a.2 for system description of lighting controls in Public Circulation Areas and Transit Bus Facility. 2) Per Specification Section 26 09 33 paragraph 1.3.A.2.a.2, Trade Subcontractor can provide internet based occupancy sensor node and/or video sensor nodes for load shedding. 3) Devices will be connected to the Lighting Control System.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-532	8/25/2014		26 33 53 or 26 33 54 , Para : 1.10 Warranty	The battery warranty is clearly defined. With regard to the UPS and lighting inverter warranty coverage, there are additional details that need further clarification: With a warranty in place, what are the expectations? On site service - Yes or No? Response time to trouble call: 8hrs or 24hrs? Availability of on site technician: 7x24, Next Day, or Next Business Day? Are Preventative Maintenance visits required - Yes or No? If yes, Annual or Semi-Annual? If yes, 7x24 or M-F (8am - 5pm)?	Provide the full 10 year battery warranty as specified. No on-site service is required.
TG10.4-540	8/26/2014		28 13 00, page 20, Access Control	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-541	8/26/2014		28 13 00, Page 48, Access Control	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-559	8/29/2014		28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-560	8/29/2014		28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-561	8/29/2014		28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-563	8/29/2014	E1-4404 & E1-5005 Dimming Panel EDHM-2-B-1	26 09 33/APA	1) Plan view drawing E1-4404 shows Dimming Panel EDMH-2-B-1 located at column lines 14/E.6 in "Electric Room" B #02465. 2) Dimming Panel EDMH-2-B-1 does not show up on the single line drawings, nor is any schedule provided for it in specification section 26 09 33/APA. Please provide missing panel schedule for Dimming Panel EDMH-2-B-1. 3) Please also provide electrically engineered single line drawings, revised to include a feeder supplying power to Dimming Panel EDMH-2-B-1.	1) Panel EDMH-2-B-1 should be labeled EDMH-2-B-EMG. Please refer to attached sketch SKE-TG10.4-563 for revision. 2) Please refer to sheet E1-5005 for power feeder information. 3) Please refer to panel schedule for EDMH-2-B-EMG, most recently issued on 07/22/2014 as part of MEP Addendum 4.
TG10.4-564	8/29/2014	E1-4400 Series, E1-5005, Dimming Panel EDHM-2-B-EMG	26 09 33/APA (Pg 42)	Specification Section 26 09 33/APA (Pg 42) is the schedule for Dimming Panel EDMH-2-B-EMG. Dimming Panel EDMH-2-B-EMG is shown on single line drawing E1-5005, but is not shown on the plan view drawings (E1-4400 Series). Please identify the location of Dimming Panel EDMH-2-B-EMG.	Please refer to response to QBD TG10.4-563.
TG10.4-565	8/29/2014	TE1-2602 & SE1-2602	27 00 00 & 28 00 00	The door at column line 1-D on the security drawing shows this door as requiring a door contact. The telecom drawing then should show the conduit and wire for this door controller, but nothing is shown. In order to determine the project's design intent which drawing takes precedence, SE or TE? Or provide coordinated TE and SE drawings for consistency of equipment, conduit, and cable in order to be able to price a complete system.	The information in the referenced SE and TE-series drawings is accurate and complete. All IP connectivity and associated infrastructure for security is shown on the TE drawings. Door contacts do not require IP connection, therefore no IP outlet is to be shown on TE drawings. Infrastructure requirements for non-IP security devices are provided in the SE details sheets.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-567	8/29/2014	Drawing :E1-4604	26 50 02 , Para: 1.4 (Type E18)(Add 1)(Pg 8	Light Fixture Type E18 is specified as a Deductive Alternate in specification section 26 50 02(1.4)(E18) of the Addendum 1 specs. Please specify which Bid Item this Deductive Alternate is to be associated with.	Fixture E18 is associated with Alternate #17, listed in Specification Section 01 10 30/APD "Schedule of Alternates For MEP", paragraph D.1.9., issued 06/20/14 MEP Addendum 4.
TG10.4-570	8/29/2014	E1-5010(Add1), Detail 1 , 2, 3		Details 1, 2, & 3 on drawing E1-5010(Add1) show the following switchboards being fed from the PG&E vault with conduit only: RMS-B1-A, RMS-B1-B, RMS-B1-C, and MS-FP-B1. Please confirm provision, installation, and termination of feeder wiring for these switchboards in not to be included in Bid Package TG10.4.	TG10.4 Trade Subcontractor is to supply and install conduit with pull string. SFPUC is to supply and install feeder wiring.
TG10.4-572	8/29/2014		27 05 24 Para: 3.3. D	Is the intent of this specification statement "...from the TGB ground bar in each of the IDF rooms to the TGMB ground bus in the MDF room." to have an individual ground run from each IDF room to the MDF room or in and out from each IDF room with the end point being in the MDF room?	Please see attached sketch TSK-0047 for an illustration of the bonding system.
TG10.4-573	8/29/2014	E1-4302, 4303, 4304	26 09 33 Para: 1. 3. A. 4 a.	The retail spaces shown on E1-4302, 4303, 4304 and similar locations, show having lighting control devices in each retail space; please confirm these lighting control devices are to be furnished and installed with final connection to the central lighting control system by the future tenant. Note: as shown currently there are no light fixtures to control or panels to connect.	Confirmed, the photocells and occupancy sensors shown in the retail spaces on the Ground Floor and Second Floor are to be furnished and installed with the final connection to the central lighting control system by the future tenant. Refer to plans for current provisions for temporary emergency lighting. Switched fixture F6 and illuminated exit signs are connected to emergency circuit via emergency dimming panel as described on drawings E1-4302, 4303 and 4304.
TG10.4-586	9/3/2014		28 23 00 Video Surveillance, Paragraph(s): 2.3.A.7 Exterior CCTV Camera Enclosure - a / b / c	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-587	9/3/2014	SE1-3001	28 23 00 Video Surveillance, Paragraph(s): 2.2 Video Analytics System (VAS)	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-588	9/3/2014	SE1-3001	28 23 00 Video Surveillance, Paragraph(s): 2.1.D.7 Standby Archiver	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-595	9/5/2014	E1-2202		The Fire Alarm Strobe layout as shown on Electrical drawing fail to meet CBC 907.5.2.3.1 requirements in certain areas. Should the contractor add required strobes in pricing or should the pricing only include devices shown on drawings?	Yes, TG10.4 Trade Subcontractor is to include devices as required to meet code for all occupied spaces. Specification Section 28 30 02 is performance based.
TG10.4-601	9/5/2014		28 23 00, PG 34, Para: 6 - USP Capacity	Specification Section 28 23 00 Video Surveillance, page 34, paragraph 6 USP Capacity, b. The USP shall be capable of storing 30 days of archived video from all cameras. Please provide the following information to assist in the required storage space: Codec, resolution, frames per second, compression, and hours of recording for each camera.	Calculate storage using maximum allowable resolution for each specified camera; frames per second for the areas described in Specification Section 28 23 00 paragraph 2.1, A, 2; H.264 compression codec; continuous recording.
TG10.4-602	9/5/2014		28 23 00, PG 16, 17, & 18	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-604	9/8/2014	SE1-2203(SKS-1007)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-605	9/8/2014	SE1-2205 (SKS-1009)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-606	9/8/2014	SE1-2250 (SKS-1013)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-607	9/8/2014	SE1-6302 (SKS-045)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-608	9/8/2014		SE1-4000, detail 12, Note 11	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-609	9/8/2014		SE1-4003, Detail 6 (corresponds to AC10)	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 2.2 Video Analytics
Date: August 18,2014
Drawing Sheet:
Paragraph(s): 2.4 Option
Detail(s): A. Camera Resident Video analytics

Proposed Substitution: Agnet Vi
Manufacturer/Address/Phone: Agent Video Intellignce 405 Lexington Av., 26th Floor, New York, NY 101
Trade Name/Model No.: savVi Version 5.0

Product History: ☐ New ☐ 2-5 years old ☐ 5-10 years old ☑ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

Agent Vi uses a deterministic rules based analytics engine that achieves similar or superior probability of
to BRS. The BRS system relies on computer generated rules that are unpredictable and computationally
configuration, certainty of performance, and a dramatic improvement in hardware utilization. The net resu

Reason for not providing specified item:

Section 2.1.D.2.o describes a rules/behavior based Video Analytics package as opposed to Section 2.2 which is a
behavioral recognition based Video analytics package. The BRS Labs System specified in Section 2.2 does not explicitly
provide for the list of behaviors listed in section 2.1.D.2.o

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

North Texas Transit Authority 5900 W. Plano Parkway Plano, TX 75093 installed in 2009.
Agent Vi has over 1000 deployments world wide

Proposed substitution affects other parts of the Work: ☑ No ___ Yes: explain

No

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

None

Supporting data attached: ☑ Product Data ☐ Drawings ☐ Test Reports ☐ Samples

☑ Manufacturer's Standard Form of Warranty or Guarantee

Other:_____

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Agent Vi Data Sheet, Agent Video Intelligence End-User License Agreement

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

savVi™ Version 5.0

savVi™ is a unified video analytics software solution that offers a wide variety of analytics functionalities through a single, easy to use platform that integrates with existing or new surveillance systems. Featuring real-time event detection, video search and business intelligence applications, savVi provides a complete solution to the diverse video analytics requirements of multiple vertical markets.

The tables below list the major technical features and functionalities of savVi. The data presented can be used to assist in responses to bids, preparation of proposals or as a general source of information for design purposes.

Product Characteristics

Architecture	Distributed analytics, Server analytics
Minimal Hardware Requirements	Intel i5 or comparable CPU, 8GB RAM, 20 GB of free disk space, Graphic card compatible with HD hardware acceleration such as Intel HD Graphics or any of the NVIDIA and ATI Radeon HD cards
Supported Operating Systems	Windows 2012 (64-bit), Windows Server 2008 R2 SP1 (64-bit), Windows 7 SP1 (64-bit)
Supported Databases	MS SQL Server Express Edition (bundled with savVi), MS SQL Server 2012 (Standard and Enterprise editions), MS SQL Server 2008 R2 (Standard and Enterprise editions)
Supported Camera Form Factors	Fixed, PTZ
Supported Camera Sensor Types	Color, Thermal
Supported Cameras & Encoders for Optimized Offering	Axis, Cisco, IQinVision, Verint, Vivotek For complete and up-to-date information on supported devices, click here
Supported Video Management Systems (VMSs)	Cisco, Genetec, Milestone, Verint For complete and up-to-date information on supported VMSs, click here

Management & Administration

Enterprise Grade Features		
Centralized Management		All configuration and setup is performed on a single central server
High Availability		Complete high availability and failover support of all server components
Automatic Set-up & Calibration		Automatic calibration and camera configuration via the Automatic Scene Learning tool (ASL)
Bulk Camera Management		Cameras can be configured as a group
Automatic Camera Discovery		Cameras can be automatically added to the server without manually specifying their IP address
Automatic Mapping to VMS Cameras		Cameras with embedded Vi-Agents can be automatically linked to the corresponding cameras within the VMS
Camera Tampering Detection		
Obscuring		Automatic alert when the video feed is obscured
Camera Shifted		Automatic alert when the camera's field of view (angle) is changed
Saturation		Automatic alert when the saturation of the camera increases to a specified grey level for a specified percentage of the field of view for a specified time period
Low Light		Automatic alert when the light decreases to a specified grey level for a specified percentage of the field of view for a specified time period
Camera Disconnection		Automatic alert when communication with the camera is lost or there is no live video stream
Database		
Redundancy / Failover		Deploy redundant servers to eliminate any single point of failure
Backup & Restore		Ability to backup the database and restore the database from a backup when required
Automatic Archiving		Automatically archives the database and frees space when it reaches a predefined size
API		
Web Service Interface		Offers a web service interface that enables third party video viewing and management applications to integrate with savVi
License Information		
SKU	License	Description
VIRDNT	Redundant Server & VAP License	Redundancy package with failover support for analytics server (per server) and/or VAP

Real-Time Detections & Alerts

savVi delivers highly accurate real-time event detections, eliminating the need to rely on the alertness or response discipline of the surveillance system's operator. Users define potential events of interest in advance and receive alerts when such events occur, enabling rapid responses to incidents, as they emerge.

Licensing Options for Real-Time Detections & Alerts		
SKU	License	Description
SAVRT1	Real-Time Events License – 1 Rule	Enables 1 rule type for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVRT2	Real-Time Events License – 2 Rules	Enables 2 rule types for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVENT	Real-Time Events License – Enterprise	Enables all rule types for real-time events (per camera) – see list of "Real-Time Detection Rules" below
SAVSET	Real-Time Events License – PTZ Presets	Enables multiple rule types for real-time events on PTZ presets (per camera) – see "Real-Time Detections on Presets" below
SAVPTZ	Real-Time Events License – PTZ Enterprise	Enables multiple rule types for real-time events on PTZ presets and target tracking (per camera) – see "Real-Time Detections on Presets" & "Autonomous Tracking" below
SAVCOR	Real-Time Events + Video Search License – Corporate	Enables all rule types for real-time events and video search (per camera)
Real-Time Detection Rules		
Moving in an Area (Person / Vehicle)		Detects a person / vehicle moving in a predefined area
Crossing a Line (Person / Vehicle)		Detects a person / vehicle crossing a predefined line
Tailgating (Person / Vehicle)		Detects a person / vehicle that crosses a predefined line within a predefined time interval after the person / vehicle that crossed previously
Loitering		Detects a person sojourning inside a predefined area for longer than a predefined time period
Crowding		Detects a crowd if the density of people in a predefined area exceeds a predefined threshold (%) for a predefined time period
Occupancy		Detects a group if the number of people in a predefined area exceeds a predefined threshold (number) for longer than a predefined time period
Stopped Vehicle		Detects a vehicle that stops in a predefined area for longer than a predefined time period
(Vehicle) Speed Analysis		Detects if the average vehicle speed in a predefined area drops below a predefined threshold for longer than a predefined time period
Suspicious Object		Detects a static object that has been left unattended in a predefined area for longer than a predefined time period
Asset Protection		Detects a predefined static object removed or obscured from a camera's field of view for longer than a predefined time period; Up to 20 static objects can be defined in a camera's field of view
Lighting Detection		Detects a light (signal) appearance in a predefined area of the camera's field of view for longer than a predefined time period
Real-Time Detections on PTZ Cameras		
Real-Time Detections on Presets		Enables detections on the following rules on preset positions of a PTZ camera's virtual tour: - Person / vehicle moving in an area - Person / vehicle crossing a line - Stopped vehicle - Suspicious object
Autonomous Tracking		Locks a PTZ camera onto a detected moving target (person / vehicle) by controlling the camera's Pan Tilt Zoom, and tracks that target

Performance	
Number of Rules per Camera	Unlimited
Number of Detected Targets	Unlimited
Number of Detection Areas	Unlimited
Number of Rule Schedules	Unlimited
Rule Management	
Rule Scheduling	Activate / deactivate rules according to predefined schedules
Configurable Rule Parameters	Wide range of advanced parameters to suit various scenarios and environments including: Interval between Events, Camera Type (CCD/Thermal), Masking Level and Video Quality Monitoring settings
Rule Testing & Optimization	Improves the detection and performance of a selected analytics rule by analyzing its previous detections, comparing rule settings and selecting the optimized configuration
Rule Chaining	Ability to create a sequence of detection rules by configuring a specific rule to activate / deactivate other rule/s
Event on Non-Detection	Alert when an activated rule does not detect the target after a specific time threshold
Deploy in Any Environment	All analytics rules can be used both indoors and outdoors
Configurable Sensitivity	Determines the sensitivity of detection according to the physical conditions of the scene; Set to a higher value to improve probability of detection if no events are being generated; Set to a lower value if too many false alarms are being generated

Video Search

savVi boasts automatic and effortless retrieval and analysis of recorded video, replacing cumbersome, labor-intensive, manual searches. Users define parameters regarding the event / object of interest and receive matching search results within seconds, enabling rapid access to specific video segments buried in the stored video.

Licenses for Video Search		
SKU	License	Description
SAVVSQ	Video Search License	Enables video search queries (per camera) – includes all the capabilities listed below
SAVCOR	Real-Time Events + Video Search License – Corporate	Enables all rule types for real-time events and video search (per camera)

Search Criteria	
Camera Selection	Apply search on selected / all cameras
Time Period Specification	Search according to specific time period or recurring time periods
Target Type	Search for specific target type (Person / Vehicle / Static Object)
Target Behavior	Search according to the specific behavior / state of the target

Target Type	Behavior
Person	Moving in an area for a specified duration, Crossing a line, Occupancy, Crowding
Vehicle	Moving in an area for a specified duration, Crossing a line Stopping in a specified area
Static Object	Suspicious object, Asset removed

Target Color	Search according to specific target color
Target Size	Filter according to specific target size
Dwell Time	Search according to interval of dwell time
Similar Targets	Select a vehicle or person and then search for similar looking targets
Search Sensitivity	Controls the tolerance of the search query by selecting the sensitivity level to include / exclude similarities / proximities
Search Results - Viewing Options	
Thumbnails	Displays each search query result in a thumbnail image showing the found target (person / vehicle / object). Users can play back the results. Provides automatic zoom in on the detected target based on the available recorded video resolution.
Video Summary	Displays all search query results in a single clip, as segments, allowing quick review of the video footage for all detected events.
Target Path / Location	Displays the motion paths of found moving targets (persons or vehicles). Alternatively, a graphical overlay is displayed indicating the locations of found targets (static objects) that were added to or removed from a field of view or to / from a predefined area within a field of view. Users can play back each motion path / found target.
Site Map	Visualization of motion data gathered from individual cameras deployed at one site onto a complete site map. By using "Site Map" view, a user can see the "Target Path / Location" on a larger map, showing multiple camera displays in one view.
Search Query / Results Management	
My Queries	Save a search query definition as a preset for future use
My Search Results	Save selected items from the search results for future use
Video Clip Export	Export selected event footage from the search results as an independent video file
Performance	
Number of Cameras for Simultaneous Search	Unlimited
Number of Detected Targets	Unlimited
Number of Detection Areas	Unlimited
Query Time	~5 seconds per camera per 24 hours of recorded video

Business Intelligence

savVi offers automated statistical analysis to present traffic volumes, movement trends and motion patterns, enabling effortless extraction of operational data from surveillance video. Equipped with such information, facility managers, marketing leaders and business owners can make educated decisions regarding various operational and resource allocation aspects at their facility.

License for Business Intelligence		
SKU	License	Description
SAVVBI	Business Intelligence License	Enables business intelligence rule types and generation of statistical information (per camera) – includes all the capabilities listed below
Business Intelligence Rules for Statistical Reports		
Counting (People / Vehicles)		Counts people / vehicles crossing a predefined line (bidirectional), with such data available for extraction to dynamic reports
Speed Analysis (Vehicles)		The vehicle speed data is continuously gathered and available for extraction to dynamic reports
Occupancy (People)		The occupancy information is continuously gathered and available for extraction to dynamic reports
Crowding (People)		The crowding information is continuously gathered and available for extraction to dynamic reports
Query Results – Viewing Options		
Statistics Analysis		Presents graphs showing count results, obtained after performing a search, per camera and / or per timeframe.
Target Path / Location		Displays the motion paths of found moving targets (persons or vehicles). Users can play back each motion path.
Heat Map		Displays visualization of traffic areas ("hot zones") within the camera's field of view. Users can play back each heat map value to show the customer traffic at that location.
Site Map		Projects motion data (pulled from "Target Path / Location" view or "Heat Map" view) from individual cameras at one site onto a complete site map.

The tables above refer to the product version specified at the beginning of this document, and do not contain the full features and functionalities of savVi, or design aspects that may affect or limit some of the features or functionalities. Additional information is available on Agent Vi's website www.agentvi.com, including in the savVi Product Brochure, or in Agent Vi's extended documentation and manuals which are available to Agent Vi's partners. For specific queries, please contact sales@agentvi.com

AGENT VIDEO INTELLIGENCE
END-USER LICENSE AGREEMENT

IMPORTANT - READ CAREFULLY: This Agent Vi Software End-User License Agreement ("EULA") is a legal agreement between you (either an individual or a single entity) and Agent Video Intelligence, Ltd. ("Agent Vi"), with regard to software accompanying this EULA, which includes computer software and may include associated media, printed materials, and on-line or electronic documentation (the "Software"). Upon exercising your rights to install and use copies of the Software, you agree to be bound by the terms of this EULA which shall become a legally binding agreement as of the date of installing the Software ("Effective Date").

If you do not agree to the terms of this EULA, do not install or use the Software.

The Software is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. The Software is licensed, not sold.

Agent Vi reserves the exclusive right to periodically update this EULA at its discretion at any time, by posting the new EULA at the following URL: www.agentvi.com (within the "Support" section).

1. GRANT OF LICENSE.

1.1 Installation and Use. Agent Vi grants you a non-exclusive right to install and use copies of the Software on your computers running validly licensed copies of the operating system for which the Software was designed [e.g., Microsoft Windows® XP; Microsoft Windows® 2000].

1.2 Backup Copies. You may also make up to two (2) copies of the Software as may be necessary for backup and archival purposes.

2. DESCRIPTION OF OTHER RIGHTS AND LIMITATIONS.

2.1 Pre-release Software. If any component of the Software or any of its components is marked "Pre-release" or "Beta", the component of the Software constitutes pre-release code and may be changed substantially before commercial release. Agent Vi strongly recommends against using such pre-release software in a live operating environment where it may be relied upon to perform in the same manner as a commercially released product or with data that has not been sufficiently backed up.

2.2 Installation and Use. You must purchase a license for each camera that uses the Software and for any other components of the Software which are subject to payment. Concurrent use of the Software is not permitted.

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Agent Video Intelligence

Attn: Agent Vi Legal Counsel
info@agentvi.com

This Agreement constitutes the entire agreement between Agent Vi and you with respect to the subject matter of this Agreement. Sections 4, 5, 8, 9, 10 and 11 will survive the termination of this Agreement.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec. Section: 27-41-17
Date: August 18, 2014
Drawing Sheet: 2.5
Paragraph(s): A, B, C, D
Detail(s): Video Modular Matrix

Proposed Substitution: Galileo Digital Video and Application Processor
Manufacturer/Address/Phone: RGB Spectrum, Alameda, CA 510-263-0601
Trade Name/Model No.: Galileo GO-56-E5

Product History: ☑ New ☐ 2-5 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):

See attached. Galileo is a replacement for both the digital matrix switch and the well processor. It also can provide control functions replacing a control system.

Reason for not providing specified item:

Price, simplicity and expanded capability.

Similar installation where proposed substitution has been used (Project/Address/Architect/Owner/Date Installed):

Lockheed Martin installation for Navy Surface Warfare Demo Center; Facebook corporate security center.

Proposed substitution affects other parts of the Work: ☑ No ☐ Yes: explain

Enables full IP, or digital video architecture. May eliminate the need for additional PC systems.

Changes or modifications needed to coordinate other parts of the Work that will be necessary to accommodate the proposed substitution:

Supporting data attached: ☑ Product Data ☐ Drawings ☐ Test Reports ☐ Samples

☐ Manufacturer's Standard Form of Warranty or Guarantee

Other: Demonstration available at RGB Spectrum Headquarters, Alameda CA

The Bidder certifies that

- The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- The proposed substitution conforms in all respects to the requirements of the Contract Documents and all applicable regulatory requirements and is appropriate for the application intended.
- The same warranty or guarantee for the specified product will be furnished for the proposed substitution.
- The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Attachments Technical reference manual; CSI specification; data sheet.

END OF SECTION 00 04 41

SPECIFICATION ISSUE LOG

Revision	Date
0	August 11, 2014

SECTION 27 41 16 - Audiovisual Systems and Equipment

INTEGRATED AUDIO-VIDEO SYSTEMS AND EQUIPMENT

Specifier: The Specifier/Design Professional is responsible for the accuracy of all project specifications, including system application and coordination with related sections. This guide specification is provided as a convenience and may require editing to match actual project requirements. RGB Spectrum shall not be liable for any damages arising out of the use of any of its guide specifications.

For design assistance and/or design review, please contact RGB Spectrum Technical Support at (510) 814-7000, Option 1, or email tech@rgb.com.

Basis-of-Design Product: Galileo 12 / 32 / 56 Display Processor

PART 1 GENERAL

1.1 SECTION INCLUDES

A. A controllable PC-based real-time display processor that accepts digital, analog and/or IP inputs and provides unlimited windowing capabilities.

B. Remote hardware adapters that enable remote desktop capabilities.

C. Simplified user GUI that offers live thumbnails of sources and drag-and-drop operation.

PART 2 PRODUCT(S)

A. The product is a PC-based real-time display processor with up to fifty-six (56) digital or up to two hundred and seventy-six (276) analog direct input channels; fifty-six (56) direct outputs; and the ability to decode and display up to sixteen (16) high-resolution IP inputs (or more at lower resolutions).

B. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of RGB Spectrum, Alameda, CA 94501, phone (510) 714-8000, FAX (510) 814-7026 [or comparable products from a single manufacturer approved by Architect prior to bidding], with the following components and characteristics.

2.1 SYSTEM ARCHITECTURE — THE SYSTEM SHALL BE COMPOSED OF THE FOLLOWING ELEMENTS:

A. The display processor shall incorporate a real-time driver to prevent image tearing when processing high resolution content across up to 56 outputs.

B. The display processor shall have the ability to run PC-based applications (i.e. VMS, SCADA, video-conferencing) natively on the video wall.

C. The display processor shall accept IP inputs natively without additional hardware.

1. The processor shall accept many IP camera/video inputs and decode/display up to sixteen (16) 1080p30 IP camera/video inputs or a greater number of lower resolution streams without image tearing artifacts.

2. The processor shall accept IP inputs in a range of formats including H.264, MPEG2, MPEG4 and MJPEG.

D. The display processor shall be compatible with remote hardware adapters that enable remote desktop capabilities.

E. The display processor shall accept up to fifty-six (56) digital direct video inputs, two hundred and seventy-six (276) analog direct inputs, or a combination thereof depending on the input cards selected.

F. The display processor shall be able to configure an unlimited number of inputs or applications in windows of any size and located anywhere on the video wall.

G. A single display processor chassis shall be able to support video wall arrays of up to fifty-six (56) display devices arranged in any horizontal, vertical or rectangular configuration.

H. The display processor shall enable video wall display devices to be arranged in portrait or landscape orientation.

I. The display processor shall provide a range of control options: basic user GUI, advanced user GUI, tablet interface, a scripting interface, telnet and serial control.

2.2 GALILEO PROCESSING

A. Basis-of-design Product(s): Galileo 12 / 32 / 56 Display Processor

Depending on system requirements, choose a display processor with appropriate input and output capabilities. Galileo processor capabilities are summarized by model in the following chart:

Processor	Chassis	Max Inputs	# of Windows	Max Outputs	Max Displays
Galileo 12	2RU	12 digital or 52 analog	Unlimited	12	12
Galileo 32	5RU	32 digital or 148 analog	Unlimited	32	32
Galileo 56	5RU	56 digital or 276 analog	Unlimited	56	56

A. Chassis

1. The processor shall have a rugged, stand-alone 2RU (Galileo 12) or 5RU (Galileo 32 / Galileo 56) steel chassis.

2. The chassis shall be fan cooled, with user washable/replaceable filters.

3. The chassis shall have mounting holes for a standard 19” rack.

B. Input Capacities

1. The display processor shall support the display of up to fifty-six (56) digital inputs or two hundred and seventy-six (276) analog inputs (or a combination of digital and analog inputs), and up to 16 IP inputs (1080p30; more at lower resolutions).
    a. Each input shall be routable to an associated window on the display wall.
2. The display processor shall have a modular system of inputs.
3. Modular input cards for the display processor shall be available in 2-channel, 4-channel, 8-channel (analog only) or 16-channel (analog only) formats.
4. A variety of modular cards shall enable the display processor to support a range of input and output signal types.
5. The display processor's input modules shall be available in the following three (3) formats:
    a. DVI/HDMI
    b. Analog
    c. 3G/HD-SDI
6. The display processor shall support input video resolutions up to 1080p for SDI and 1920x1200 for DVI/HDMI.
7. The display processor shall be able to accept computer resolutions up to 3840x2160p15 (4K).
8. The display processor shall support all VESA-compatible timing formats for analog and digital inputs.
9. The display processor shall enable direct and computer application inputs to be selected and controlled via the system's graphical user interface.
10. The display processor shall enable the free rotation of all input signals.

C. Output Capacities

1. The processor shall provide up to fifty-six (56) DVI/HDMI or VGA output connections.
2. The display processor shall support output resolutions up to 2560x1600p30 (DVI/HDMI) and 2048x1536p60 (VGA).
3. The display processor shall support all VESA-compatible timing formats for analog and digital outputs.
4. The display processor shall have a modular system of outputs.
5. Modular output cards for the display processor shall be available in 2-channel or 4-channel formats.
6. Each of the display processor's fifty-six (56) output connectors shall support one (1) display device.
7. The display processor shall output signals to video wall arrays of up to fifty-six (56) display devices, arranged in any horizontal, vertical or rectangular

configuration.

8. The display processor shall output signals to video wall display devices with either portrait or landscape orientation.
9. The display processor shall support HDCP encryption on any number of inputs and outputs on up to fifty-six (56) display devices.

D. Real-time Performance Capabilities

1. The display processor shall incorporate a real-time driver to ensure that HD content is processed and displayed with no image tearing artifacts.
2. The display processor shall maintain full frame rate capability for all windows simultaneously, including high definition video and graphics, regardless of the input resolution or frame rate of the source.

E. PC System Capabilities

1. The display processor shall have either an Intel® Core i7 or dual Intel Xeon E5 CPU.
2. The display processor shall provide between 8 GB DDR3 to 32 GB DDR3 of internal memory.
3. The display processor shall incorporate a 500 GB solid state drive for enhanced reliability.
4. The display processor shall provide a RAID option for redundancy.

F. Window and Image Manipulation Capacities

1. The display processor shall be able to configure and display an unlimited number of windows on the video wall.
2. The display processor shall be able to display any direct input (analog or digital), IP input, or PC application in a single window or duplicated in multiple windows on the video wall.
3. The display processor shall be able to stretch windows both horizontally and vertically to any aspect ratio.
4. The display processor shall be able to maintain the input source's aspect ratio when resizing the associated window.
5. The display processor shall be able to independently position windows anywhere on the display wall, including across mullions (monitor bezels), and scale inputs to any size.
6. The display processor shall provide dynamic scaling, pan and zoom capabilities for every window.
7. The display processor shall enable the free rotation of all inputs.
8. The display processor shall be able to move windows on or off screen.
9. The display processor shall provide move-to-nearest-edge and lock-in-place capabilities for every window.
10. The display processor shall support transitions and animations for live video

windows.

11. The display processor shall enable color keying on input sources.
12. The display processor shall be able to independently adjust color, brightness, contrast and sharpness for each window.
13. The display processor shall be able to overlap windows.
14. The display processor shall be able to compensate for monitor mullions (bezels), and provide negative mullion compensation to account for projector edge blending.
15. The display processor shall allow users to save preferred window layout configurations as presets for easy recall.
16. The display processor shall provide a comprehensive scripting interface to program and edit window layouts, animations and transitions.

G. System Control Capabilities

1. The display processor shall provide a browser-based graphical user interface (GUI) to simplify operation of the system.
2. The display processor's GUI shall provide a representation of the video wall array and allow users to "click and drag" to display inputs and applications as well as change window positioning and sizing.
3. The GUI shall enable user profiles/custom access settings for multiple users to allow/restrict access to system functions.
4. The GUI shall provide a customizable log of events (including user) related to system control, window configuration and layouts, script modification, etc.
    a. The system administrator shall be able to select which types of events are logged.
    b. The event log shall identify which user was responsible for each event.
5. The display processor shall provide a scripting interface.
    a. The scripting interface shall be able to control the functions of the display that can be used to control both the processor and external third-party devices.
6. The display processor shall enable telnet or serial control of the system.
7. The display processor shall offer the option of control though a tablet interface.
8. The display processor GUI shall provide an API to enable system control through third-party devices.
9. The display processor shall be able to schedule and recall scripts and layouts over a specific duration which can be set in seconds, minutes, hours, days, and/or weeks, and be able to repeat this script on a regular schedule.

H. Power Supply

1. The display processor shall utilize dual redundant power supplies.
2. The display processor's power supplies shall be hot-swappable.

3. Depending on the model, the display processor shall utilize a maximum of 600W (Galileo 12), 1000W (Galileo 32), or 1485W (Galileo 56).

I. Supported Resolutions / Timings

1. The display processor shall support video resolutions up to 1920 x 1080p60 for SDI and 1920x1200p60 for DVI/HDMI.
2. The display processor shall be able to accept computer resolutions up to 3840x2160p15 (4K).
3. The display processor shall support all VESA-compatible timing formats for analog and digital inputs and outputs.

J. Physical Specifications

1. 2RU Chassis (Galileo 12):
   a. Size (h x w x d): 3.5” x 19.0” x 15.0” (8.9 x 48.3 x 38.1 cm)
   b. Weight: 26 lb / 11.8 kg
   c. Power: 100-240 VAC, 50/60 Hz; dual-redundant power supplies
   d. Power consumption (max): 600W
   e. Operating temperature range: 0-50°C
   f. Operating humidity: 20% to 80% non-condensing
2. 5RU Chassis (Galileo 32/56):
   a. Size (h x w x d): 7.0” x 19.0” x 20.0” (17.8 x 48.3 x 50.8 cm)
   b. Weight: 35 lb / 15.9 kg
   c. Power: 100-240 VAC, 50/60 Hz; dual-redundant power supplies
   d. Power consumption (max): 1000W (508) / 1485W (514)
   e. Operating temperature range: 0-50°C
   f. Operating humidity: 20% to 80% non-condensing

2.3 REMOTE DESKTOP CAPABILITIES

A. Basis-of-design product(s): RGB Spectrum’s VDA Remote Desktop Adapters (herein referred to as remote hardware adapters).

B. The display processor shall be compatible with remote hardware adapters that enable remote desktop capabilities.

1. Using remote hardware adapters, the display processor shall be able to input and display signals from remotely located computers and equipment over a LAN and/or WAN.
2. Remote hardware adapters shall provide operators with low latency KVM control over remote systems and equipment.
3. Remote hardware adapters shall enable remote control of source computers and equipment over a LAN and/or WAN.
4. Remote hardware adapters shall extend shared KVM control to all connected local and remote source computers.
5. Remote hardware adapters shall encode video signals and keyboard and

mouse control commands using AES 256-bit encryption and NSA Suite B cryptography to provide secure transmission of signals over network connections.

6. Remote hardware adapters shall utilize adaptive compression technology to optimize encoding, transmission and decoding of all content types (including 3D graphics, video, animation, and text) at any available bandwidth.
7. Remote hardware adapters shall enable the contents of the video wall to be encrypted and sent to remote destinations for viewing.
8. Remote hardware adapters shall enable video and graphics transmission at 1 Mbps.
9. Remote hardware adapters shall enable operators at multiple sites to work collaboratively and share control of system resources.

2.4 SIMPLIFIED USER GUI

A. Basis-of-design product: RGB Spectrum's VIEW Controller for Galileo

B. General

1. The simplified user GUI shall provide users with an enhanced interface that streamlines system operation.
   a. The GUI shall be used to operate all components of the video wall system.
   b. The GUI shall display live thumbnail images, as selected, of each source computer's output.
   c. The GUI shall provide live previews of selected sources.
   d. The GUI shall allow users to select thumbnail images and "drag and drop" to assign them to one or more of the video wall processor's outputs.
   e. The GUI shall allow users to "drag and drop" sources to auxiliary displays.
   f. The GUI shall allow users to recall preset signal routing configurations.
   g. The simplified user GUI shall be designed to restrict user access to the set-up/admin functionality of the controller.
   h. When multiple operators access the system, the GUI shall support a control arbitration scheme based on permissions and priorities (set by the administrator) to determine a user's level of access to system resources.

END OF SECTION

NEW

Galileo Display Processor

High Performance PC-based Video Wall System

Overview

RGB Spectrum is well-known for its purpose-built video wall solutions. The new Galileo™ Display Processor adds the benefits of a PC-based system, including IP inputs and the ability to run applications, while maintaining the 24/7 reliability and real-time performance of all of RGB Spectrum's solutions.

A Breakthrough in PC Walls

The Galileo display processor sets a new standard for PC-based video walls, with enhanced performance and reliability:

Proprietary Driver

This enables the system to deliver real-time throughput and superb image quality, unlike other PC-based systems that can drop frames or cause image tearing.

Input Flexibility

The system accepts a full range of signal types including IP, analog, DVI/HDMI and/or 3G-SDI, and supports resolutions up to 3840x2160 (4K).

Robust HDCP

The processor's HDCP handling prevents screen flashing and delivers HDCP protected content to up to 56 displays. Other PC-based systems either do not support HDCP at all or impose severe limitations on wall size.

Enhanced Reliability

The processor's solid state drive and dual-redundant power supplies add an extra level of reliability.

Key Features

- IP camera/video compatibility (MPEG2, MPEG4, MJPEG and H.264)
- Inputs up to 3840x2160 (4K)
- Advanced remote desktop technology
- Up to 56 inputs and 56 displays
- Real-time processing
- Bezel compensation and edge-blending
- Dynamic scaling, panning and zooming
- Scripting interface for system control
- Transitions and animations
- HDCP support across all outputs
- Tablet-based control interface

IP and Remote Desktop Support

The Galileo processor supports H.264 decodes for motion video. In addition, our exclusive VDA™ remote desktop technology, with integrated KVM capabilities, provides operators with low-latency control of remote systems via a LAN or WAN. System performance is demonstrably superior to the industry standard VNC, particularly at low bandwidth or with high motion graphics and video.

Advanced User GUI

The Galileo system is easy to set-up and control. An advanced GUI allows users to “drag and drop” inputs and applications, such as VMS, SCADA, and videoconferencing, to the video wall. A convenient tablet interface is also available.

An API allows operators to monitor remote alarms and create advanced scripts to recall layouts and control third-party equipment.

Experience the Power

RGB Spectrum’s new PC-based Galileo display processor combines enhanced reliability with the flexibility of a PC system. It’s ideal for a range of applications, from mission-critical control rooms and operations centers to spectacular boardroom and lobby video wall displays. With its real-time processing, powerful features and input flexibility, the new Galileo display processor is **a PC wall done right.**

Specifications

	Model 201	Model 401	Model 501
Inputs			
Format	2-ch, 4-ch, 8-ch, 16-ch (modular)	2-ch, 4-ch, 8-ch, 16-ch (modular)	2-ch, 4-ch, 8-ch, 16-ch (modular)
Signal Type	DVI/HDMI, 3G-SDI, Analog	DVI/HDMI, 3G-SDI, Analog	DVI/HDMI, 3G-SDI, Analog
Maximum	12 digital, 48 analog	40 digital, >100 analog	56 digital, >100 analog
Outputs			
Format	2-ch, 4-ch (modular)	2-ch, 4-ch (modular)	2-ch, 4-ch (modular)
Signal Type	DVI/HDMI, Analog	DVI/HDMI, Analog	DVI/HDMI, Analog
Maximum	12	40	56
Processor			
CPU	Intel® Core™ i7 or Dual Intel® Xeon® E5		
Memory	16 GB, DDR3		
Hard Disk	500 GB - 1000 GB Solid State Drive (SSD)		
Physical			
Size (H x W x D)	3.5 x 19.0 x 15.0 inches (2RU)	7.0 x 19.0 x 20.0 inches (4RU)	8.75 x 19.0 x 23.0 inches (5RU)
	89 x 483 x 381 mm	178 x 483 x 508 mm	222 x 483 x 584 mm
Weight	26 lbs/11.8 kg	35 lbs/15.9 kg	49 lbs/22.2 kg
Environmental			
Power Supply	100-240 VAC; 50/60 Hz, 400 W max	100-240 VAC; 50/60 Hz, 800 W max	100-240 VAC; 50/60 Hz, 1100 W max
	Dual redundant	Dual redundant	Dual redundant
Operating Temp.	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)	+32 to +122 °F (0 to +50 °C)
Storage Temp.	-40 to +158 °F (-40 to +70 °C)	-40 to +158 °F (-40 to +70 °C)	-40 to +158 °F (-40 to +70 °C)
Humidity	10% to 90%, non-condensing	10% to 90%, non-condensing	10% to 90%, non-condensing
Certifications	UL, CE, CCC, FCC, NERC/CIP	UL, CE, CCC, FCC, NERC/CIP	UL, CE, CCC, FCC, NERC/CIP

Specifications subject to change.

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decision support systems™
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RGB SPECTRUM
VISUAL RESOURCE MANAGEMENT™

Galileo™ Display Processor Technical Reference Guide

Installation and Configuration

RGB Spectrum
950 Marina Village Parkway
Alameda, CA 94501

DOCUMENT

- Galileo Display Processor Technical Reference Guide
- P/N 350-11606-01 v1.0
- August 2014

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COMPANY CONTACT INFORMATION

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RGB Spectrum ("RGB") warrants that this product will be free from defects in material and workmanship, under normal use and service, and when correctly installed and maintained, for a period of one (1) year from date of shipment. RGB's liability under this warranty is limited solely to replacing, repairing or issuing credit for any product which is shown to be defective during the warranty period.

Purchaser shall: (i) notify RGB Spectrum promptly in writing of any claims, and (ii) provide RGB Spectrum with an opportunity to inspect and test the product claimed to be defective.

Warranty does not cover misuse, abuse, improper installation or application, improper maintenance or repair, alteration, accident or negligent use, improper temperature, humidity or other environmental condition during storage, transportation or handling. RGB Spectrum shall have no obligations under this warranty with respect to any defect unless it receives notice and a description of such defect no later than five (5) business days following the expiration of the warranty period.

THE WARRANTIES STATED HEREIN ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING (BUT NOT LIMITED TO) ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT SHALL RGB SPECTRUM BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOSS, DAMAGE OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE PURCHASER'S INABILITY TO USE THE PRODUCT EITHER SEPARATELY OR IN COMBINATION WITH ANY OTHER EQUIPMENT OR FACILITIES, OR FROM ANY OTHER CAUSE.

EXTENDED WARRANTY

An annual extended warranty may be purchased from RGB Spectrum. Should the product fail to operate properly during the covered period, RGB Spectrum will repair the product and restore it to normal operation without charge for labor and parts. For further information on obtaining an extended warranty, email **tech@rgb.com** or call (510) 814-7000.

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CHAPTER 1 INTRODUCTION

The innovative Galileo Display Processor is a powerful and economical video wall control system with remote desktop capabilities designed around a PC-based architecture. The video wall processor adds the benefits of PC-based systems, such as IP inputs and the ability to run applications natively, to the 24/7 level of reliability and real-time performance of all of RGB Spectrum's solutions.

The Galileo system supports a full range of input and output types (IP, analog, DVI/HDMI, 3G/HD-SDI) with input resolutions up to 3840 × 2160/15 (4K). The video wall processor can also deliver HDCP-protected content to up to 56 displays, while other PC-based systems either do not support HDCP at all or impose severe limitations on video wall size.

A proprietary driver enables the Galileo Display Processor system to deliver real-time throughput and superb image quality, unlike other PC-based systems that can drop frames or cause image tearing. The video wall controller's solid state drive and dual-redundant power supplies add an extra level of reliability.

Galileo supports H.264 IP decodes for motion video. In addition, our exclusive VDA remote desktop technology with integrated KVM over IP capabilities provides operators with low-latency control over remote systems via a LAN or WAN. VDA remote desktop performance is demonstrably superior to the industry standard VNC, particularly at low bandwidth or with high-motion graphics and video.

Galileo is easy to set up and control. Its advanced GUI allows you to "drag and drop" inputs and applications, such as VMS, SCADA and videoconferencing, to the video wall. For details on this interface, refer to the *Galileo Video Wall Control Software User's Guide*. In addition, an API allows operators to monitor remote alarms and create advanced scripts to recall layouts and control third-party equipment. A convenient tablet interface is also available.

The Galileo Display Processor is ideal for a range of applications including mission-critical operations centers, command centers and control rooms, as well as boardroom video walls, corporate lobby displays, and large-scale digital signage. Combining enhanced reliability with the flexibility of a PC system, the new IP-enabled Galileo Display Processor is a PC wall done right.

1.1 Key Features

- IP camera/video compatibility (MPEG2, MPEG4, MJPEG and H.264)
- Inputs up to 3840 × 2160/15 (4K)
- Advanced remote desktop technology
- Up to 56 displays
- Real-time processing
- Bezel compensation and edge blending
- Dynamic scaling, panning and zooming
- Scripting interface for system control
- Transitions and animations
- HDCP support across all outputs
- Tablet-based control interface

1.2 System Overview

The Galileo Display Processor system consists of the following hardware and software components.

1.2.1 Hardware

BASE PLATFORM

The Galileo hardware platform is a rack-mount computer available in two sizes, 2RU (3.5 in. high) and 5RU (8.75 in. high).

The 2RU chassis houses two (2) power supplies, solid state drive (SSD), backplane, and motherboard that accepts a single-board computer (SBC) and up to four (4) input/output (I/O) cards.

The 5RU chassis houses two (2) power supplies, SSD, and backplane that accepts a single-board computer (SBC) and up to 17 I/O cards.

Table 1-1 lists the available Galileo base system configurations.

Table 1-1 Galileo Base System Configurations

Model Number	Chassis Height	Maximum Output Count (Note 2)	Processor	Available I/O Card Slots	
				Digital	Analog
GO 12	2RU	12	Intel® Core™ i7	3	1
GO 12-E5			Dual Intel® Xeon® E5		
GO 32	5RU	32	Intel® Core™ i7	8	2
GO 56		56		14	3
GO 32-E5		32	Dual Intel® Xeon® E5	8	2
GO 56-E5		56		14	3

Notes:

1. All base configurations include 8 GB of RAM, a 500 GB SSD, the Galileo Server software and a single-user Galileo Client software license.
2. The number of installed I/O cards determines the output count. **Base configurations do not include I/O cards.** These must be purchased separately.

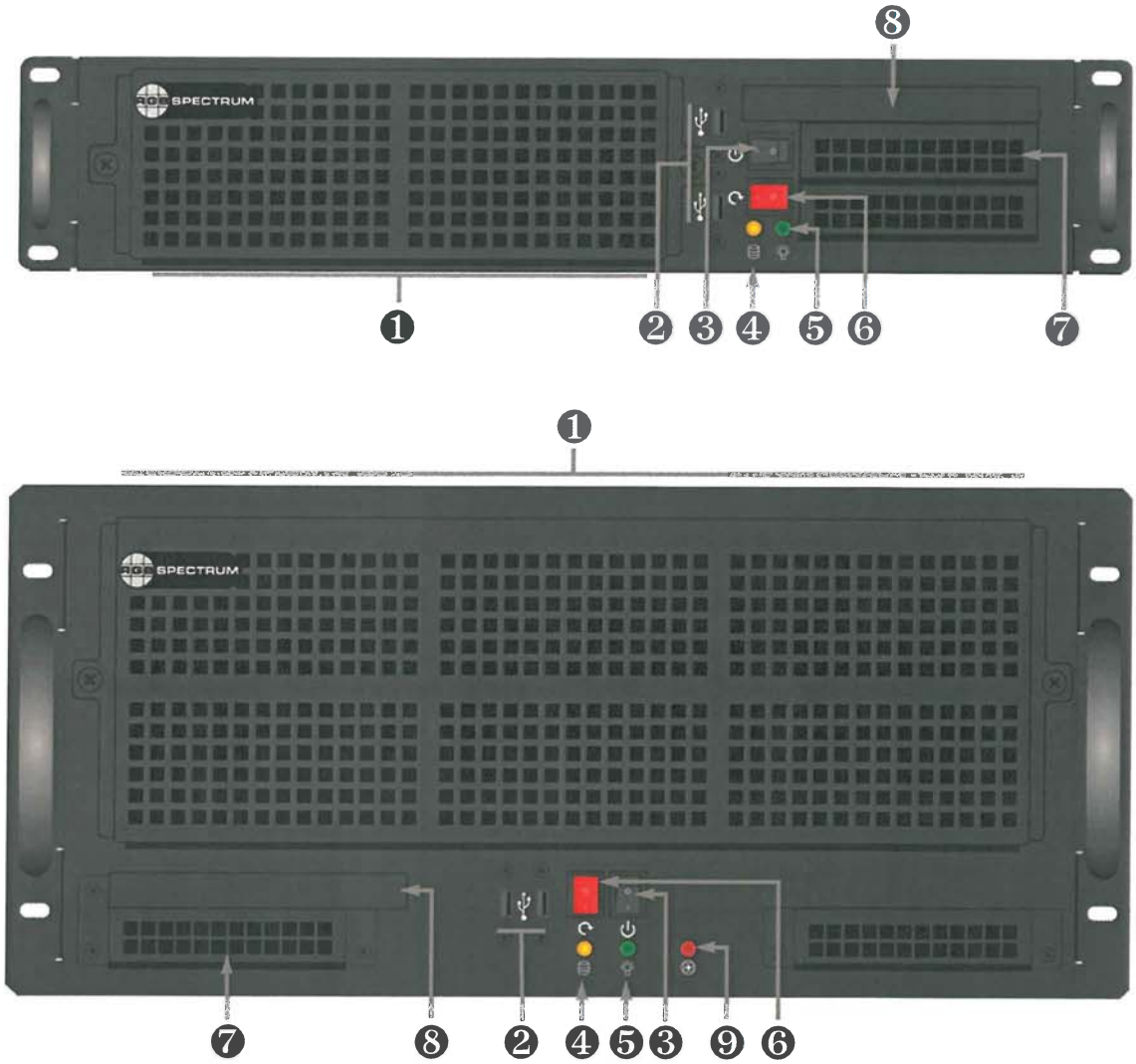


Figure 1-1 Galileo 2RU and 5RU Chassis – Front View

1. **Air Intake Vents and Filter**

   Fans behind these vents draw cool air into the chassis. To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis.

   To prevent overheating the Galileo Display Processor, check the front panel filter once a month. If the Galileo is used where dust and dirt are an issue, it is recommended that you inspect the filter more frequently.

2. **USB Ports**

   Two USB 2.0 ports are provided on the front panel for connecting a keyboard, mouse or other USB device.

3. **Power Switch**

   Use this switch to turn the display processor on or off.

4. **Drive Activity LED**

   Blinks yellow to indicate that data is being written to or read from the SSD.

5. **Power Status LED**

   Lights green to indicate that adequate power is being provided to the system.

6. **System Reset Switch**

   Press and momentarily hold this switch to reset the display processor.

7. **Drive Bay**

   A 3.5-inch bay housing the SSD. A second SSD and RAID support are available as options.

8. **Optical Drive Bay (empty)**

9. **Fan Status LED**

   Lights red to indicate a failure of one or more system fans.

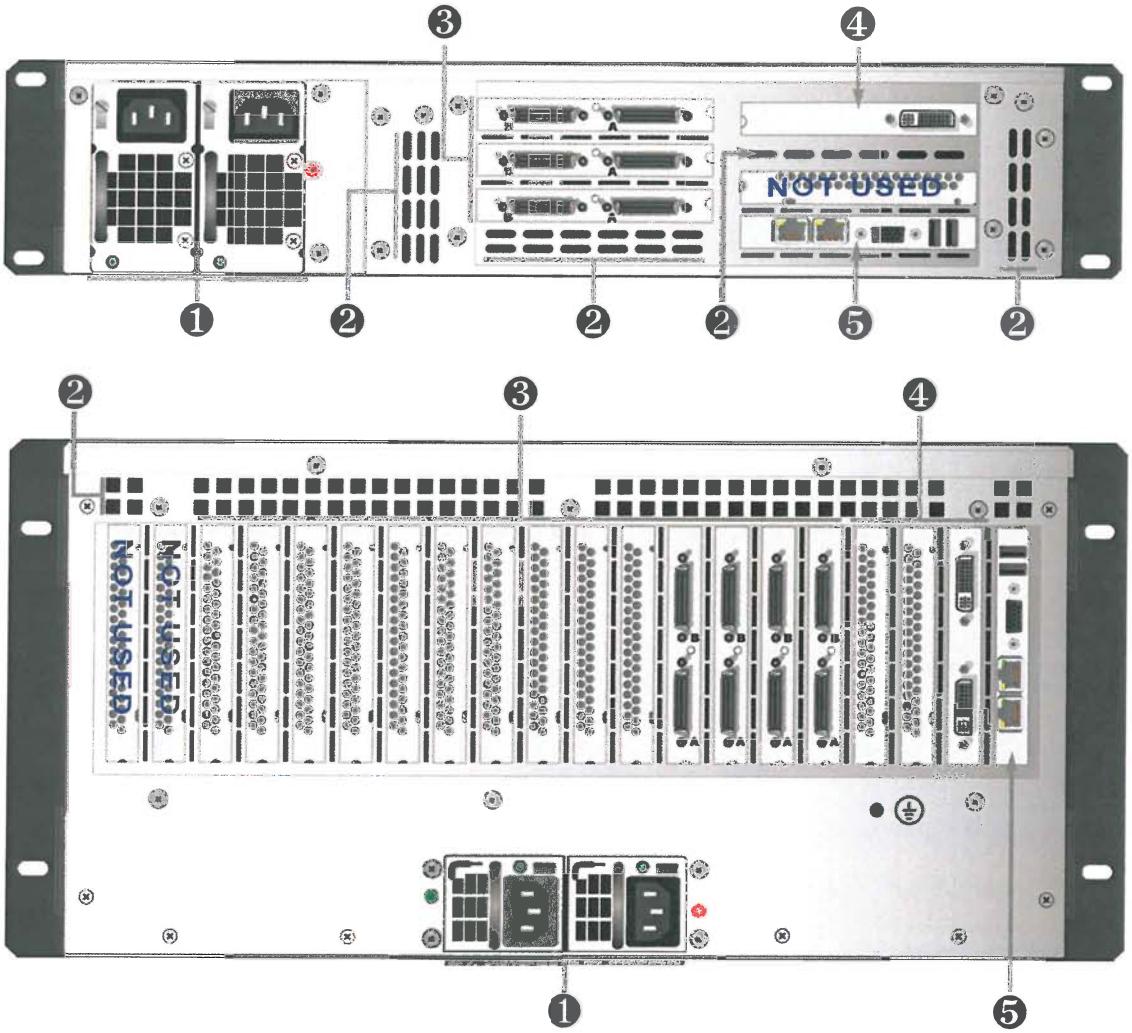


Figure 1-2 Galileo 2RU Chassis and 5RU Chassis – Rear View

1. **Power Supplies**

   Connect both power supplies to AC power sources to provide redundancy should one of the power supplies fail.

2. **Exhaust Vents**

   Warm air exits the chassis through these vents. To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis.

3. **Digital (PCIe ×16) I/O Card Slots**

4. **Analog I/O Card Slots**

Note The GO 32 and GO 32-E5 5RU chassis models are identical to that shown in Figure 1-2, but have eight (8) digital and two (2) analog card slots.

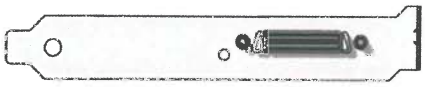
5. **Single-Board Computer (SBC)**

   The SBC is the heart of the Galileo Display Processor system. It contains the CPU, RAM and other system components, and provides two 10/100/1000BaseT Ethernet ports and two USB 2.0 ports. (The VGA output cannot be used.)

INPUT AND OUTPUT CARDS

Table 1-2 lists the available I/O cards for Galileo.

Table 1-2 Galileo I/O Cards

	Model Number	Inputs (number × type)	Outputs (number × type)	Included Cables (refer to Table 1-3)
	GO D44	4 × DVI/Analog (RGB, YPbPr, S-Video or Composite)	4 × DVI/VGA	2 × GO ACD4
	GO D24	2 × DVI/Analog (RGB, YPbPr, S-Video or Composite)	4 × DVI/VGA	1 × GO ACD4 1 × GO ACD2
	GO D04	None	4 × DVI/VGA	1 × GO ACD4
	GO A08	8 × Analog (S-Video or Composite)	None	1 × GO ACA8
	GO A16	16 × Analog (S-Video or Composite)		2 × GO ACA8
	GO S22	2 × 3G-SDI	2 × DVI/VGA	1 × GO ACD2

CABLES AND ACCESSORIES

Table 1-3 lists the available cables and accessories for Galileo.

Table 1-3 Galileo Cables, Accessories, Upgrades, and Replacement Parts

Model Number	Description
GO ACD4	Video Breakout Cable, KX-20 (HDI) male to 4 × DVI female, for Galileo Inputs or Outputs
GO ACD2	Video Breakout Cable, KX-20 (HDI) male to 2 × DVI female, for Galileo Inputs or Outputs
GO ACA8	Analog Breakout Cable, DVI-I male to 8 BNC pairs for Galileo Analog Inputs
GO RS20	20" Rack slide set for Galileo chassis
GO RS24	24" Rack slide set for Galileo chassis
GO GUI	Additional Single-User Client Control Software allowing an additional user to control the same Galileo chassis.
GO SWM	One Year Software Maintenance Agreement fee for years 2 and beyond.
GO HWM	One Year Extended Hardware Warranty for years 2 and 3.
GO D44S	Spare GO D44 I/O Card
GO D24S	Spare GO D24 I/O Card
GO D04S	Spare GO D04 I/O Card
GO A08S	Spare GO A08 I/O Card
GO A16S	Spare GO A16 I/O Card
GO S22S	Spare GO S22 I/O Card

1.2.2 Galileo Software

Galileo Video Wall Control Software consists of three components:

GALILEO SERVER

Galileo Server runs under Microsoft® Windows® 7 Professional (64-bit), on the Display Processor. It starts automatically when Windows starts. Galileo Server manipulates windows and other video wall elements in response to commands it receives from Galileo Client. It also logs system and user activity, and controls access to Display Processor features and functions based on user/group privileges defined by a Galileo Client operator.

GALILEO CLIENT

The Galileo Client can be installed on any Windows PC and controls all aspects of the Video Wall operation. A Galileo base configuration includes a single-user Client license. You may purchase as many additional Client licenses as you require.

Note System Requirements in Chapter 5 describes the hardware and software environment required to run Galileo Client and Galileo Remote Host.

GALILEO REMOTE HOST

Galileo Remote Host runs in the taskbar of any source computer you would like to display on the video wall, and/or control from other clients. The Remote Host has no user interface and cannot be used to control the video wall directly.

1.2.3 Third-Party Software

In addition to the Galileo Video Wall Control Software suite, your Galileo system includes PowerDesk software for configuring your I/O cards according to the requirements of your video wall application.

1.3 Product Specifications

Table 1-4 lists the Galileo Display Processor specifications.

Table 1-4 Galileo Specifications

Parameter	Specification
Inputs	
Format	2-channel, 4-channel, 8-channel, 16-channel (modular)
Signal Type	DVI/HDMI, 3G-SDI, Analog
Resolutions	1920 × 1200 @60 Hz, 2560 × 1600 @30Hz, 3840 × 2160 @15Hz
Capacity (maximum)	**2RU Chassis:** 12 Digital, 48 Analog **5RU Chassis:** 56 Digital, >100 Analog
Outputs	
Format	2-channel, 4-channel (modular)
Signal Type	DVI/HDMI, VGA
Resolution	2560 × 1600 @30Hz
Capacity (maximum)	**2RU Chassis:** 12 **5RU Chassis:** 56
Processor, Memory, Storage and Connectivity	
CPU	Intel® Core™ i7 or Dual Intel® Xeon® E5
Memory	8 GB (2 × 4 GB) DDR3, expandable to 32 GB
Storage	500 GB SSD
USB	4 × USB 2.0 Type A
Network	2 × 10/100/1000 Base-T Ethernet
Power	
Power Supply	Universal 100-240 VAC, 50-60 Hz, dual redundant
Power Consumption (maximum)	**2RU Chassis:** 600 Watts **5RU Chassis:** 1,485 Watts
Environmental	
Cooling	**2RU Chassis:** Three (3), 80mm ball bearing fans, 67 CFM each **5RU Chassis:** Four (4), 92mm ball bearing fans, 102 CFM each

Table 1-4 Galileo Specifications (Continued)

Parameter	Specification
Operating Temperature	+32 to +122 °F (0 to +50 °C)
Storage Temperature	-40 to +158 °F (-40 to +70 °C)
Humidity	10% to 90%, non-condensing
Physical	
Dimensions (h × w × d)	**2RU Chassis:** 3.5 × 19.0 × 18.0* in. (88.8 × 482.6 × 457.2* mm) **5RU Chassis:** 8.75 × 19.0 × 18.0* in. (222.5 × 482.6 × 457.2* mm) * Excludes handles
Weight**	**2RU Chassis:** 23.8 lbs. (10.81 kg) **5RU Chassis:** 34.8 lbs. (15.78 kg) ** Excludes I/O cards and storage
Specifications are subject to change without notice.	

CHAPTER 2 INSTALLATION

This chapter provides installation and initial setup information for the Galileo Display Processor. The following topics are discussed:

- Shipment Contents
- Installation Considerations
- Mounting the Display Processor
- Connections to the Galileo Display Processor
- Applying Power to the Galileo Display Processor

2.1 Shipment Contents

Your Galileo shipment includes the following items:

- Display Processor Chassis, equipped with one or more I/O Cards
- AC Power Cord, 10 ft. (3.05m) (2)
- Cables and adapters for installed I/O Cards, per each of the following card types:
  - GO D04: KX20-to-quad DVI cable, DVI-to-HD15 adapter (4)
  - GO D24: KX20-to-quad DVI cable, KX20-to-dual DVI cable, DVI-to-HD15 adapter (6)
  - GO D44: KX20-to-quad DVI cable (2), DVI-to-HD15 adapter (8)
  - GO A08: DVI-to-16 × BNC cable
  - GO A16: DVI-to-16 × BNC cable (2)
  - GO S22: KX20-to-dual DVI cable, DVI-to-HD15 adapter (2), DIN-to-BNC adapter (2)
- *Galileo Display Processor Technical Resources* CD

2.2 Installation Considerations

Proper installation of your Galileo Display Processor will enhance product performance and extend the life of the product. Consider the following when planning and carrying out your video wall installation.

2.2.1 Ventilation

To ensure adequate air flow and maintain a proper operating temperature, provide a minimum of 4 to 6 inches (101 to 152mm) of free air space around the chassis. Any front cabinet doors or access aisles must accommodate a front chassis clearance of at least 4 inches (101mm) in order to provide proper cable clearances for any front-panel USB port connections, and allow access to the system air filter for maintenance. Ideally, a chassis clearance of 0.5-1.5 inches (13 to 38mm) above the Display Processor is desirable, but not required.

2.2.2 Ambient Heat

Keep the ambient temperature constant and below 35 °C (95 °F). Keep the Display Processor away from heating and/or air conditioning vents.

2.2.3 Ambient Light

In general, minimize or eliminate light sources directed at the video wall. Contrast ratio will be noticeably reduced if light directly strikes a screen, such as when a shaft of light from a window or floodlight falls on the image. Images may then appear washed out and less vibrant.

2.3 Mounting the Display Processor

The Galileo Display Processor can be placed on any flat, stable surface such as a shelf or table, or it can be rack-mounted. Place it in a location that provides easy access to the power connectors.

RGB Spectrum offers an optional Rack Slide Kit for mounting your Galileo Display Processor in a standard, 19-inch equipment rack. The Rack Slide Kit includes the following items:

Table 2-1 Optional Rack Slide Kit Parts List

Description	Quantity
Slide Rail, 20 in. **– OR –** Slide Rail, 24 in.	2
Rail Frame	4
Rail Frame Mounting Bracket (optional)	4
Mounting Hardware:	
• Screw for attaching mounting rail to chassis	10
• Screw for attaching Rail Frame to rack	36
• Nut	10
• Washer	10

To mount the Galileo Display Processor in a standard, 19-inch equipment rack:

1. Confirm that your kit includes all of the items listed in Table 2-1.
2. Take one of the Slide Rails and slide the inside section of the rail completely out until you hear an audible click.
3. On the inside of the rail is a rail stop hook. Push the hook up to release and detach the inside section of the Slide Rail completely from the outside section of the rack slide. See Figure 2-1.

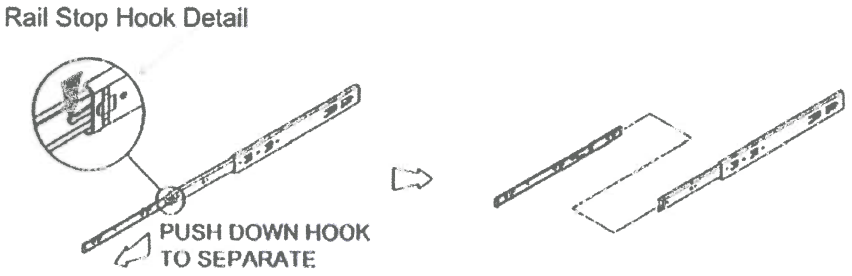


Figure 2-1 Rail Stop Hook Detail

4. Set aside this inside section of the Slide Rail.
5. Repeat Steps 3 and 4 for the other Slide Rail.
6. Using four mounting screws from hardware bag S-047-0, attach an inside Slide Rail section to the left side of the Display Processor chassis, as shown in **Figure 2-2**.

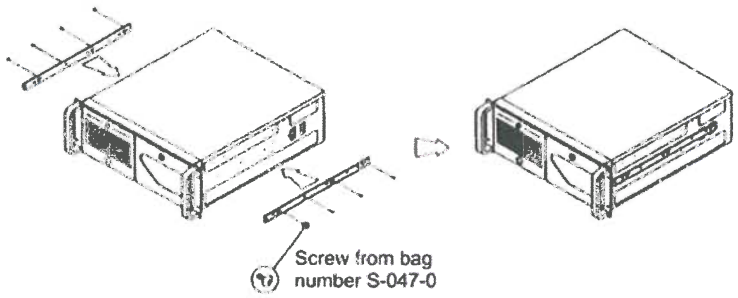


Figure 2-2 Mounting the Inside Rails

Note

The rubber bumper on the inside Slide Rail section needs to face the front of the Display Processor chassis. The cut-out portion of the rail release latch should be pointing downward indicating that the slide rail has been properly mounted to the correct side of the chassis.

7. Repeat Step 6 for the right side of the Display Processor chassis.

Standard 19-inch equipment racks have a wide variety of mounting hole types. Some mounting holes are threaded. Some mounting holes are located on side flanges rather than the front and back of the rack supports. Holes may be either round or rectangular.

The following steps assume that your equipment rack has round, non-threaded mounting holes for the slide rail frames. The optional Rail Frame Mounting Brackets accommodate side-flange rack-mount hole placements. If your rack has other mounting hole types or placements, you may need to consult with your rack supplier to obtain the correct slide rail mounting hardware.

8. The rubber bumper on the outside section of the Slide Rails must face the rear of the equipment rack.

9. Attach two Rail Frames to the outside section of each Slide Rail using the supplied hardware. See Figure 2-3.

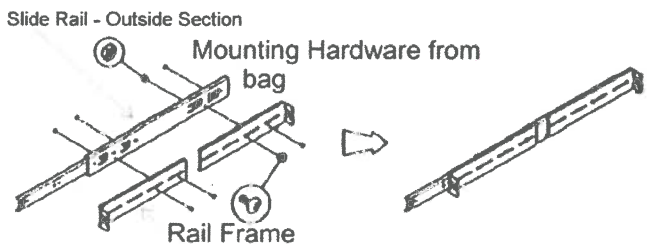


Figure 2-3 Outside Rail and Frame Assembly

10. If the mounting holes are on the inside surface of your rackmount supports, mount each assembly directly to the rackmount supports as shown in Figure 2-4.

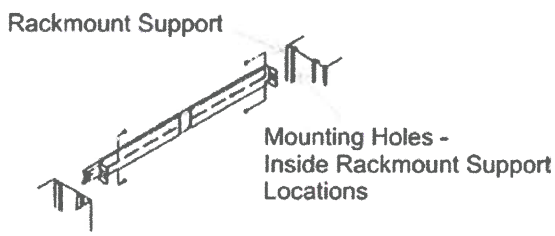


Figure 2-4 Rail Frame Mounting – Inside Rackmount Hole Locations

If the mounting holes are on side flanges, you will need to use the optional Rail Frame Mounting Brackets. Attach the optional brackets to the Slide Rails as shown in Figure 2-5 and attach the completed assembly to the rackmount supports.

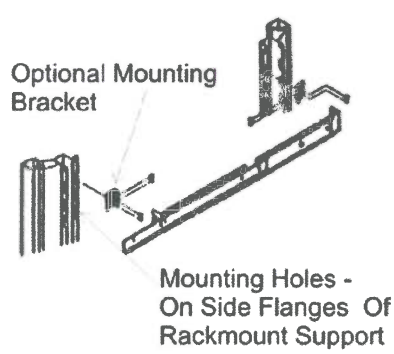


Figure 2-5 Rail Frame Mounting – Side Flange Rackmount Hole Locations

Note You will need to supply the hardware necessary to secure your completed Slide Rail/ Rail Frame assemblies to the rackmount supports.

CAUTION When mounting the completed Slide Rail/Rail Frame assemblies to the rack, ensure that the left and right assemblies are the same distance from the top or bottom of the rack. Failure to align the slide rails properly will result in the Display Processor not being level inside the rack. If the slides are grossly misaligned, you may not be able to slide the chassis into the slide rails.

11. **With the help of an assistant,** lift the chassis and slide the chassis into the rails attached to the rackmount supports. See **Figure 2-6**. You should hear a "click" when the rail stop hooks on the slide engage with the chassis stops inside the rails attached to the rackmount supports.

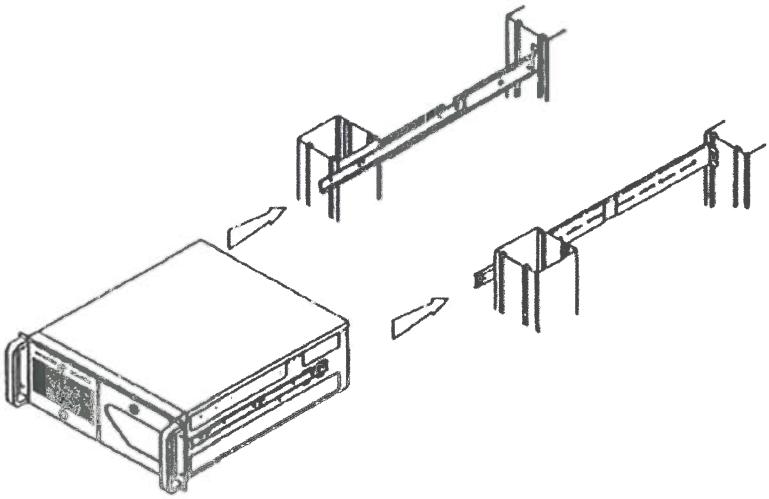


Figure 2-6 Chassis Installation

12. Push up on the rail stop hooks and push the chassis completely into the rack.
13. Each Galileo Display Processor chassis has two through holes on each chassis-mounting flange. Use these holes to secure your chassis to the rackmount supports.

Note You must supply the hardware necessary to secure the chassis to the rackmount supports.

14. Contact RGB Spectrum if you require additional assistance.

2.4 Connections to the Galileo Display Processor

Proceed as follows to connect the Galileo Display Processor to your sources, displays, network and AC power.

Note

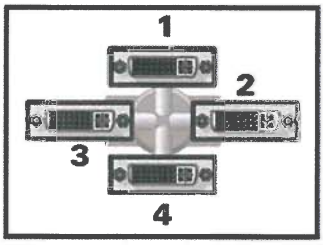
To make some of the connections described in this section, you will need one or more of the following items, in addition to what is provided with your Galileo Display Processor:

- BNC-to-Composite (RCA®) adapter
- BNC-to-S-video adapter
- DVI cable (male-to-male)
- DVI-to-Component adapter
- DVI-to-Composite (RCA) adapter
- DVI-to-S-video adapter

When connecting your equipment:

- **Turn off all equipment** before making any connections.
- Use the correct signal cables for each source.
- For best performance and to minimize cable clutter, **use high-quality cables** that are only as long as necessary to connect two devices. (Don't use a 20-foot cable when a 6-foot cable will suffice.)
- **Ensure that the cables are securely connected.** Tighten the thumbscrews on connectors that have them.

You can connect up to four (4) displays at a time to each Galileo I/O card, depending on the model. Displays are numbered consecutively based on the connector to which each is attached. For example, the monitor attached to the connector labeled **1** on the cable is identified as **1**, the monitor attached to the connector labeled **2** on the cable is identified as **2**, and so on.



Tip

To facilitate the setup of your video wall, we recommend connecting your monitors consecutively and arranging your displays in pairs.

2.4.1 Understanding Your Multi-Card Setup

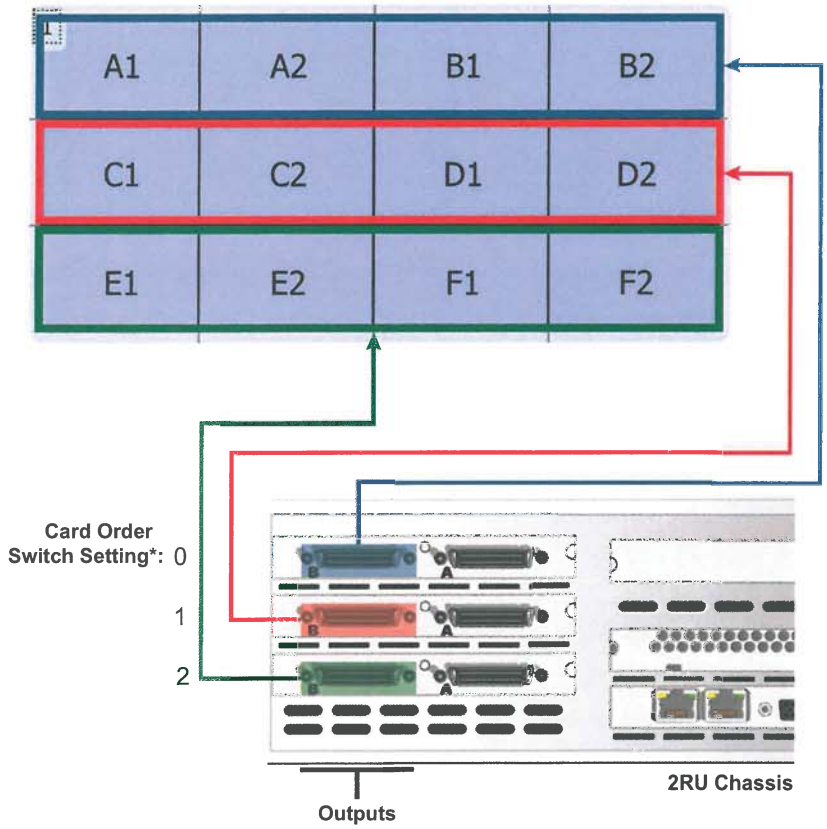
The Galileo Display Processor system includes PowerDesk software, a set of tools for configuring your I/O cards.

When used with Galileo, PowerDesk assigns letters to each Graphics Processing Unit (GPU) on the card and numbers to the outputs associated with that GPU. Quad-output cards (GO D04, GO D24, and GO D44) have two (2) GPUs; the dual-output card (GO S22) has one GPU. The first GPU on the first quad-output card is labeled **A** and its first output is labeled **A1**. The second GPU on the first quad-output card is labeled **B** and its first output is labeled **B1**.

In the examples that follow, only quad-output I/O cards are used.

VIDEO WALL DISPLAY NUMBERING – EVEN NUMBER OF COLUMNS

Figure 2-7 shows a 4 × 3 video wall. In this case, monitors are paired and follow each other sequentially from left to right and top to bottom.

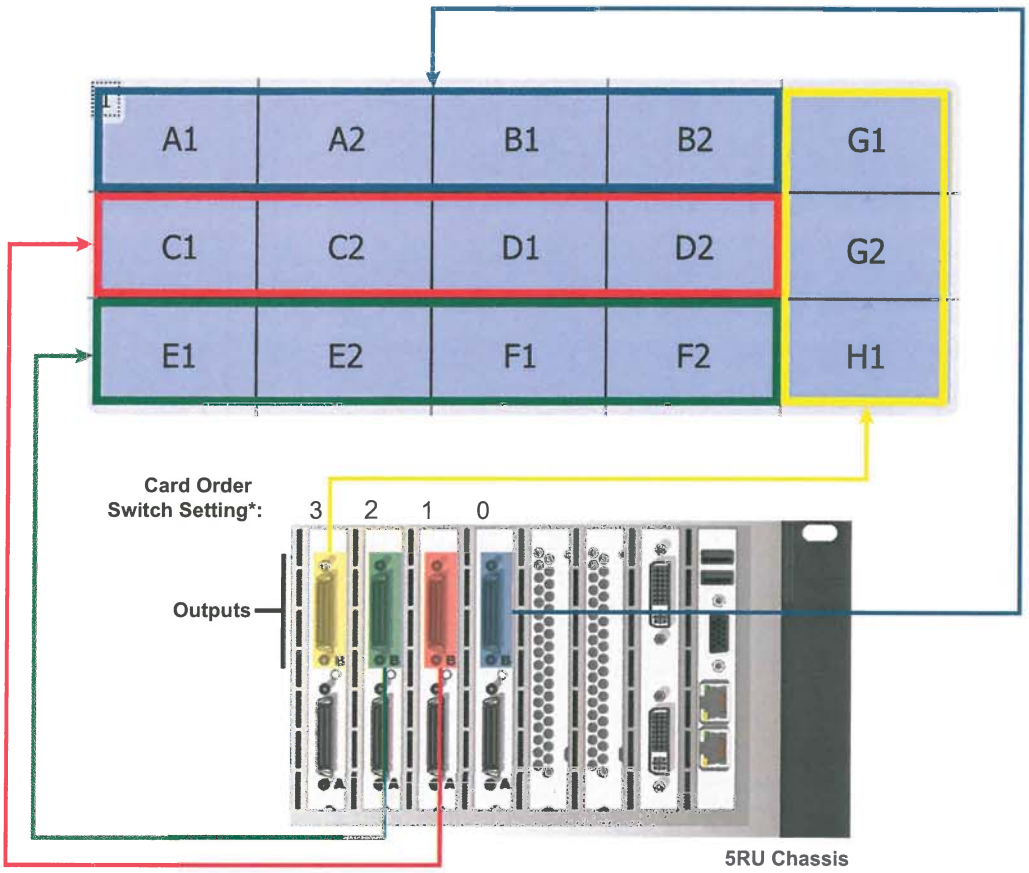


* Factory-configured; starting from 0 and ascending from top to bottom

Figure 2-7 Display Numbering with an Even Number of Columns

VIDEO WALL DISPLAY NUMBERING – ODD NUMBER OF COLUMNS

Figure 2-8 shows a 5 × 5 video wall. In this case, monitors in columns 1 through 4 are paired and follow each other sequentially from left to right and top to bottom. The GPUs associated with the last two cards are placed in the last column of the layout.



* Factory-configured, starting from 0 and ascending from right to left

Figure 2-8 Display Numbering with an Odd Number of Columns

You may need to manually rearrange the outputs of your multi-display layout in PowerDesk to match the physical layout of your video wall.

Chapter 3, Configuring Your Video Wall and I/O Cards, provides detailed instructions for setting up your video wall, changing certain display settings and accessing other PowerDesk features.

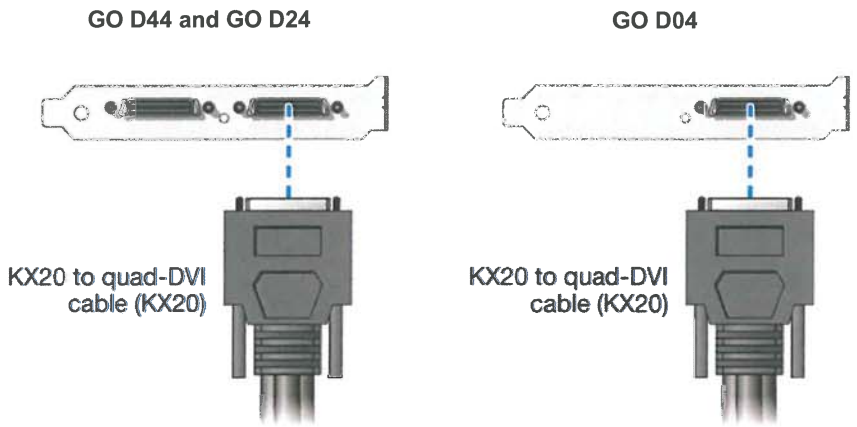
2.4.2 Connections to the GO D44, GO D24, and GO D04 I/O Cards

Proceed as follows to connect your displays and image sources to your GO D44, GO D24 or GO D04 I/O card.

CONNECTING DISPLAYS

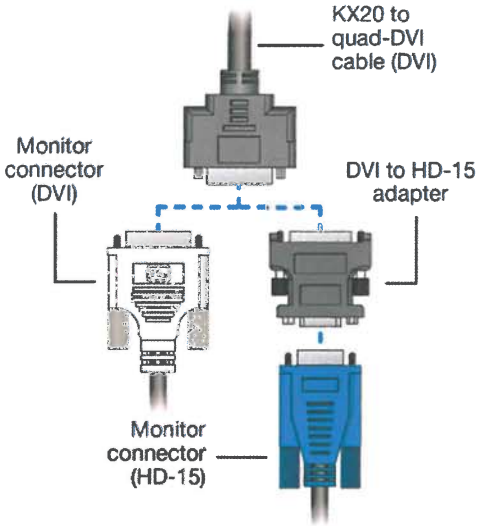
1. **GO D44 and GO D24:** Connect the KX20-to-quad DVI cable to connector **B** on the bracket of the card.

   GO D04: Connect the KX20-to-quad DVI cable to the connector on the bracket of the card.



2. If your display has a DVI connector, connect your display cable directly to your KX20-to-quad DVI cable.

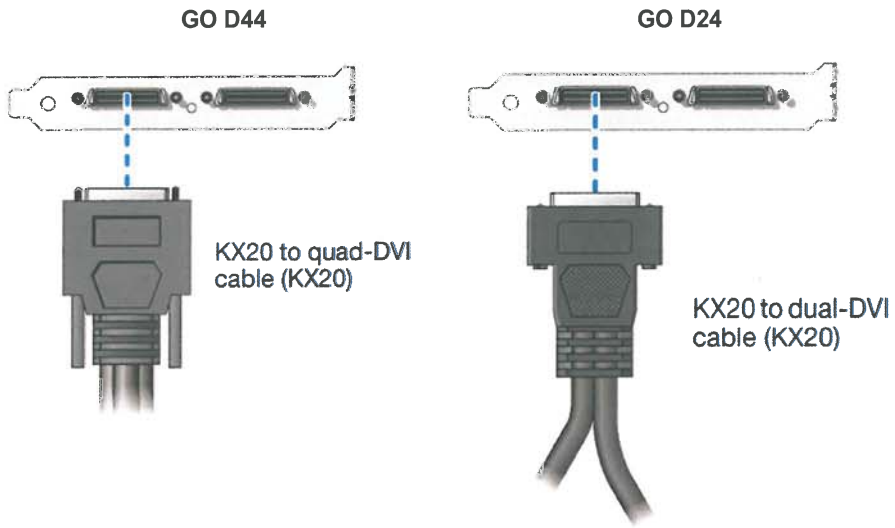
   If your monitor has an HD-15 connector, use a DVI-to-HD-15 adapter to connect your monitor cable to your KX20-to-quad DVI cable.



CONNECTING SOURCES

1. **GO D44:** Connect the KX20-to-quad DVI cable to connector **A** on the bracket of the card.

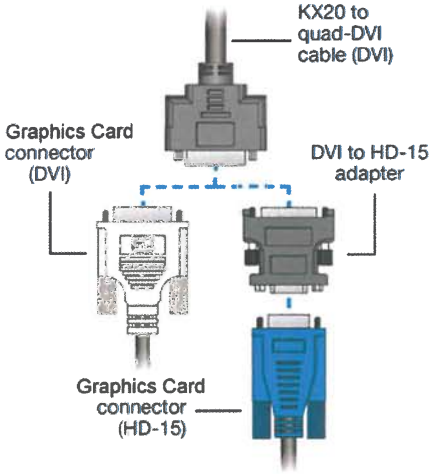
   GO D24: Connect the KX20-to-dual DVI cable to connector **A** on the bracket of the card.



2. If your source is a graphics card with a DVI connector, connect your graphics card cable directly to your KX20-to-quad DVI cable.

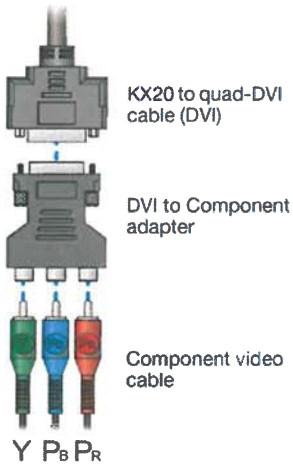
   If your source is a graphics card with an HD-15 connector, use a DVI-to-HD-15 adapter to connect your graphics card cable to your KX20-to-quad DVI cable.

   For video sources, refer to the following steps.



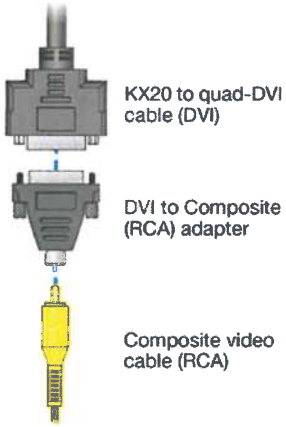
3. For connecting **component** video sources, you need a DVI-to-component video (RCA) adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the Y, Pb and Pr (RCA) connectors on the adapter.



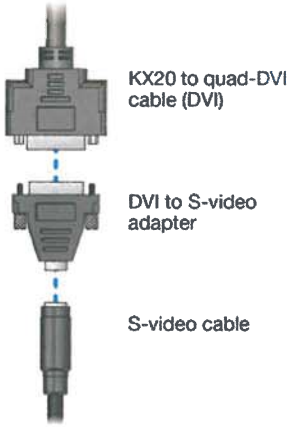
4. For connecting **composite** video sources, you need a DVI-to-composite video (RCA) adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the composite connector on the adapter.



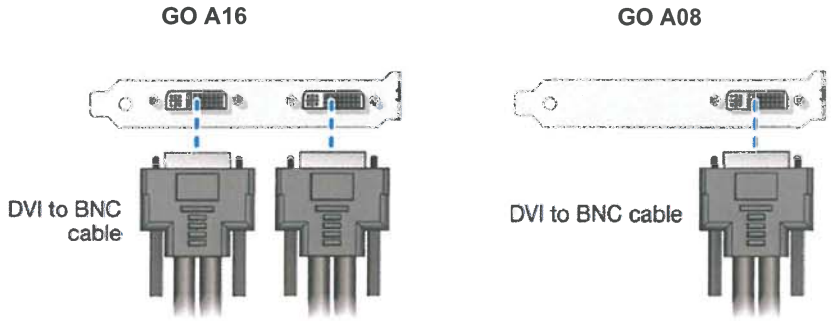
5. For connecting **S-video** sources, you need a DVI-to-S-video adapter.

   Connect the adapter to a DVI connector on your KX20-to-quad DVI (or KX20-to-dual DVI) cable. Connect your source to the S-Video connector on the adapter.



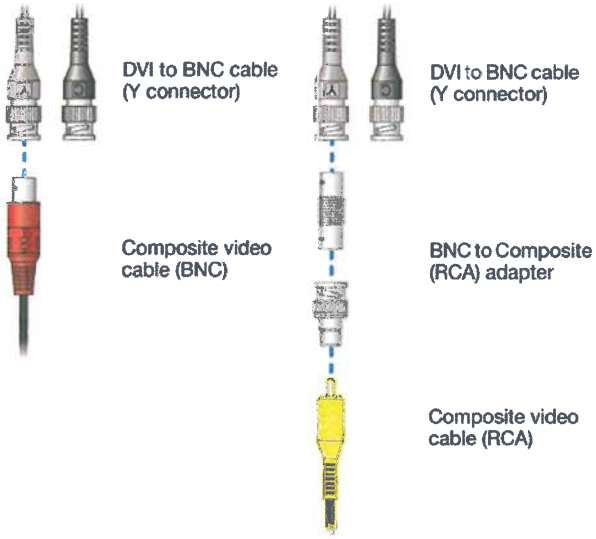
2.4.3 Connections to the GO A16 and GO A08 I/O Cards

1. Connect the DVI-to-BNC cable(s) to the connector(s) on the bracket of the card.

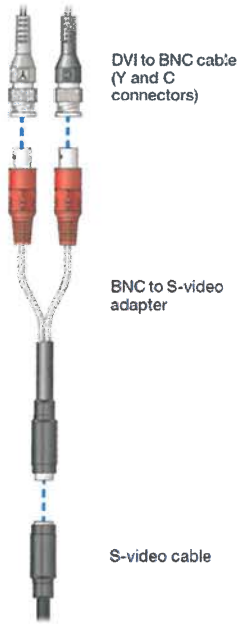


2. Connect a **composite** video source to a **Y** connector on the DVI-to-BNC cable.

   If the Composite video cable has RCA connectors, you need a BNC-to-composite video (RCA) adapter. Connect the adapter to a **Y** connector on the DVI-to-BNC cable. Connect your source to the RCA connector on the adapter.



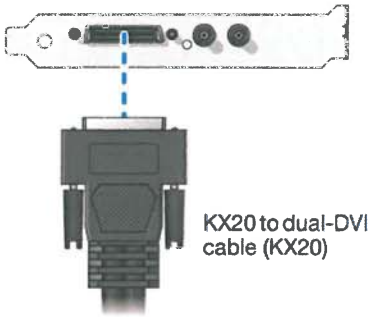
3. For an **S-video** source, connect a BNC-to-S-video adapter to a **Y/C** connector pair on the DVI-to-BNC cable. Connect your source to the S-video (mini-DIN) connector on the adapter.



2.4.4 Connections to the GO S22 I/O Card

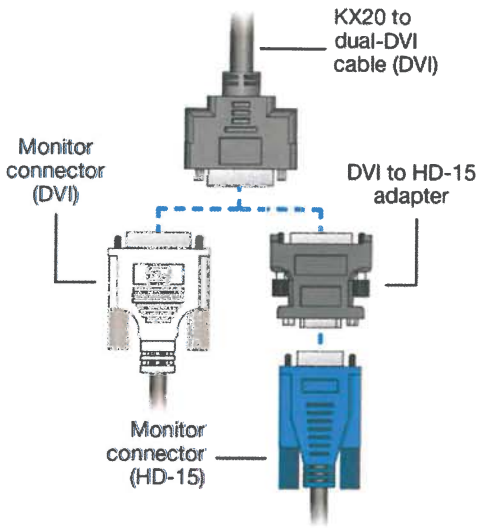
CONNECTING DISPLAYS

1. Connect the KX20-to-dual DVI cable to the connector on the bracket of the card.



2. If your display has a DVI connector, connect your display cable directly to your KX20-to-dual DVI cable.

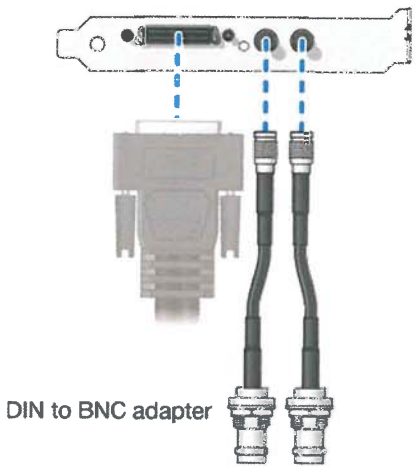
   If your monitor has an HD-15 connector, use a DVI-to-HD-15 adapter to connect your monitor cable to your KX20-to-dual DVI cable.



CONNECTING SOURCES

Connect DIN-to-BNC adapters to the DIN connectors on the bracket of the card.

Connect your SDI sources to the BNCs on the adapters.



Note

To disconnect an SDI source from the GO S22 I/O card, firmly hold the adapter, pull back the metal ring around the DIN connector on the cable, then carefully remove the adapter. This will prevent damage to the DIN connector on the DIN-to-BNC adapter or on the I/O card.

2.4.5 Connection to a Network

Use a standard, Cat 5 or Cat 6 network cable with an RJ-45 plug to connect a network hub, router or gateway to an Ethernet port on the SBC in the Display Processor; see **Figure 2-9**.

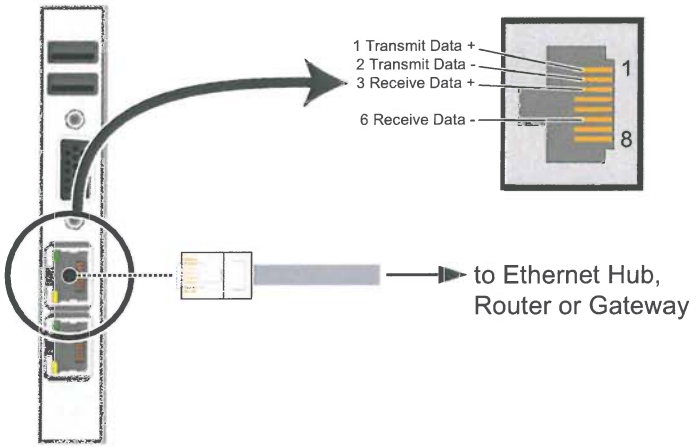


Figure 2-9 Connecting the Display Processor to a Network

2.5 Applying Power to the Galileo Display Processor

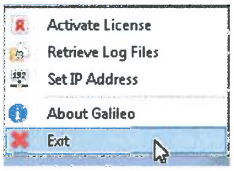
Important Whenever you turn on or reset the Display Processor, make sure your monitors are already turned on. Otherwise, the system may have difficulty detecting your monitors.

1. Turn on your displays.
2. Turn on your source components.
3. Plug the female end of one of the supplied power cords into an AC receptacle at the rear of the Display Processor (AC 100V ~ 240V). See **Figure 1-2**.
4. Connect the other end to an AC power source.
5. Repeat Steps 3 and 4 for the second power supply.
6. Press the power (black) switch on the front of the Display Processor (see **Figure 1-1**). The power indicator lights green.
7. After a brief period, the Display Processor should display the Windows log-on screen.
8. Log on to Windows as user `rgb`, with the password `spectrum`.

CHAPTER 3 CONFIGURING YOUR VIDEO WALL AND I/O CARDS

Because the configuration utility provided with Galileo requires exclusive access to the graphics cards, you must first end all other processes that access them. On the Display Processor, these processes are **GalileoServer.exe** and **WindowsManager.exe**.

On the right side of the Windows Taskbar, right-click the Galileo Server icon and select **Exit**. This will also end the **WindowsManager.exe** process.



3.1 Accessing PowerDesk

To launch PowerDesk, click **Start > All Programs** (or **Programs**) **> Matrox® Graphics > Matrox PowerDesk**. Or, right-click anywhere on the Windows desktop and select **Launch Matrox PowerDesk**.

Figure 3-1 PowerDesk Home Screen

3.2 Setting Up Your Video Wall Layout

Setting up your video wall layout with PowerDesk involves entering the number of columns and rows for your layout and adjusting certain output settings, such as rotation, resolution, color palette, and refresh rate.

To set up your video wall layout:

1. From the home screen, select **Multi-Display Setup**.

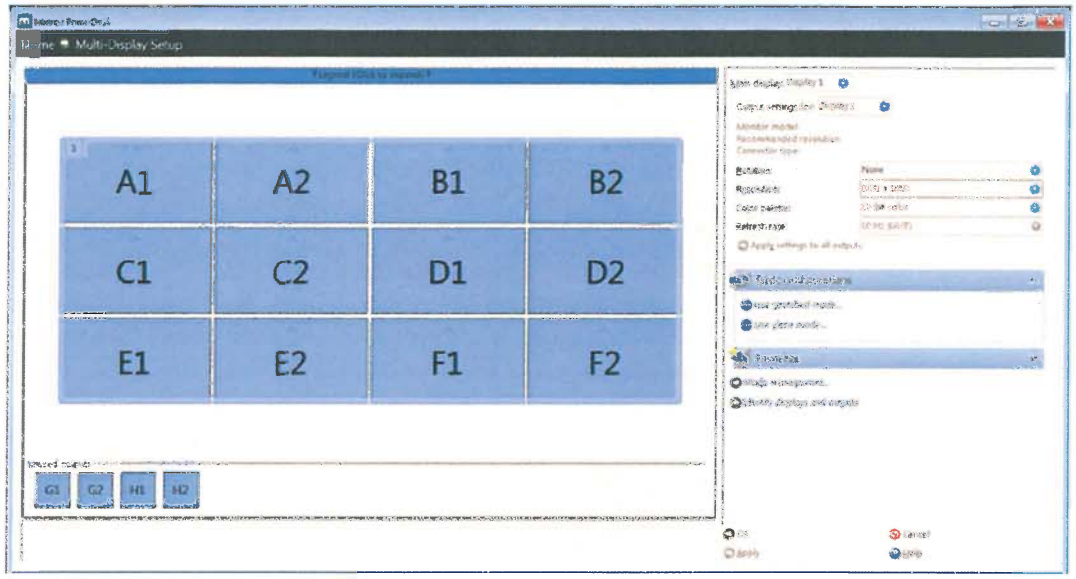


Figure 3-2 Multi-Display Setup

2. Under **Basic configurations**, select **Use stretched mode...**

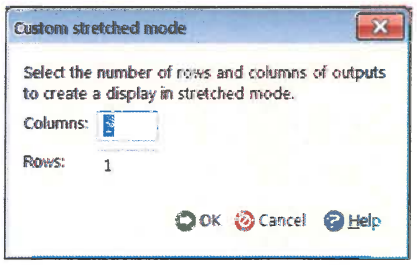


Figure 3-3 Stretched Mode Settings

3. Enter the number of **Columns** and **Rows** in your video wall, then click **OK**.
4. Preview your setup in the work area. If you're satisfied, click **OK** or **Apply** to apply your video wall layout. Otherwise, click **Cancel**.

You may need to manually rearrange the outputs of your multi-display layout in PowerDesk to match the physical layout of your video wall. Or, use the suggested PowerDesk layout to configure your wall.

Use the **Rotation**, **Resolution**, **Color palette**, and **Refresh rate** controls to change those output settings. In most cases, PowerDesk will automatically set these to the correct values.

3.3 Bezel Management and Edge Overlap

When using a multi-display stretched desktop, the image can sometimes appear misaligned and distorted due to the space between your monitors.

3.3.1 Bezel Management

With bezel management, you can adjust the image to compensate for the physical space created by the bezels of your monitors.

The result is an image that appears seamlessly across your monitors. This feature is available only while using stretched mode.

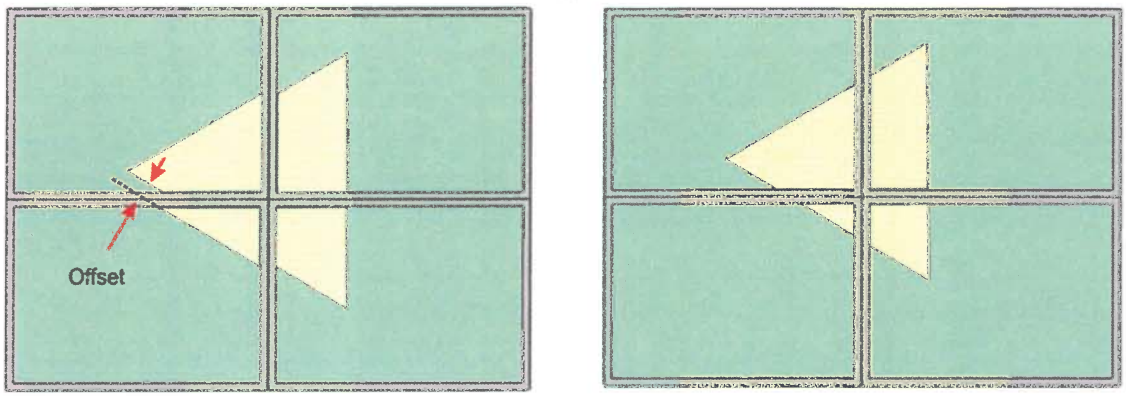


Figure 3-4 Bezel Management

3.3.2 Edge Overlap

Using Bezel Management, you can correct a distortion in the final image due to the offset caused by the bezel surrounding individual display devices. An opposite issue can occur when implementing walls using front or rear projection. This requires a feature known as Edge Overlap.

With Edge Overlap, you can adjust the number of overlapping pixels between displays to create a seamless transition between the images from adjacent projectors.

Figure 3-5 Edge Overlap

3.3.3 Bezel Management/Edge Overlap Settings

Tip	To show the display numbers on your wall, click **Identify displays** before creating an adjustment.

To apply bezel management or edge overlap to your video wall:

1. From the home screen, select **Edge Overlap and Bezel Management**.
2. Select the display to be adjusted, then click **Modify...**. A square appears in the selected display and all areas are highlighted in green.
3. Select **Bezel management** to adjust the number of hidden pixels or **Edge overlap** to create an overlap between displays.

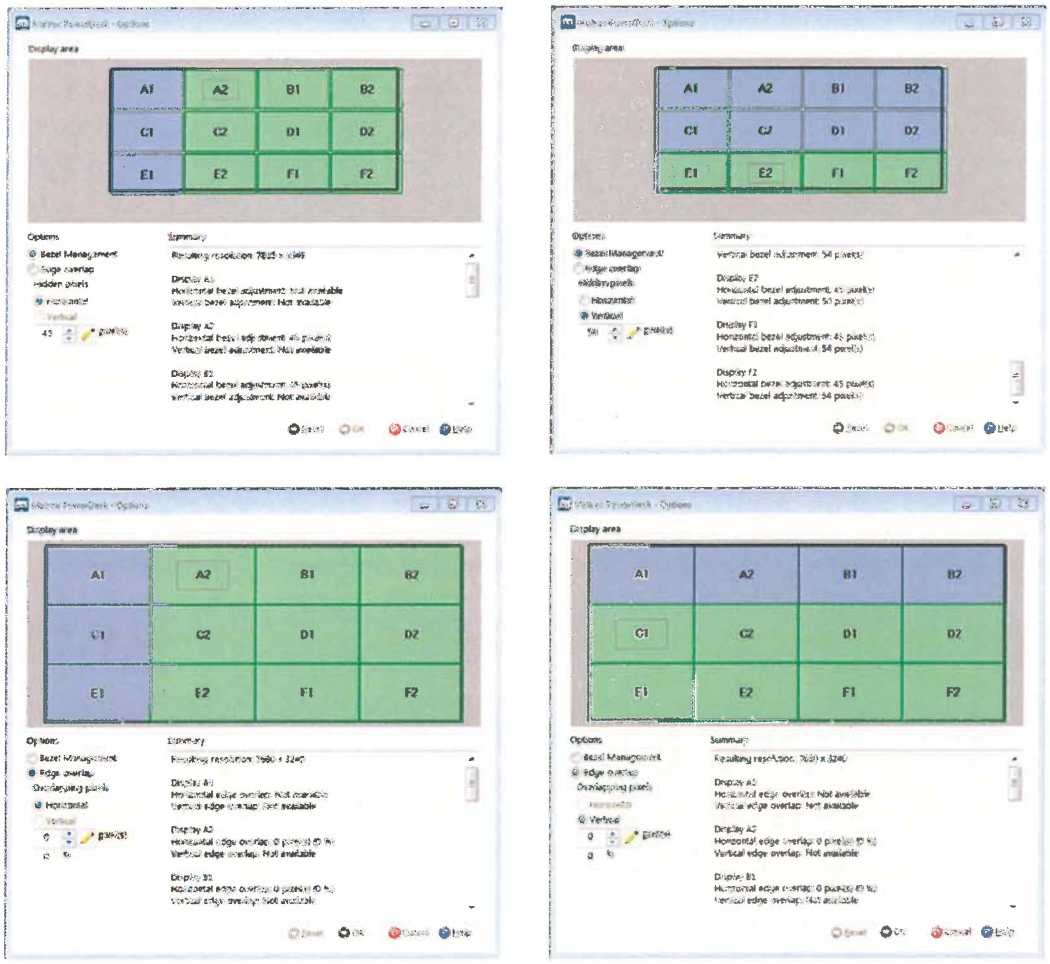
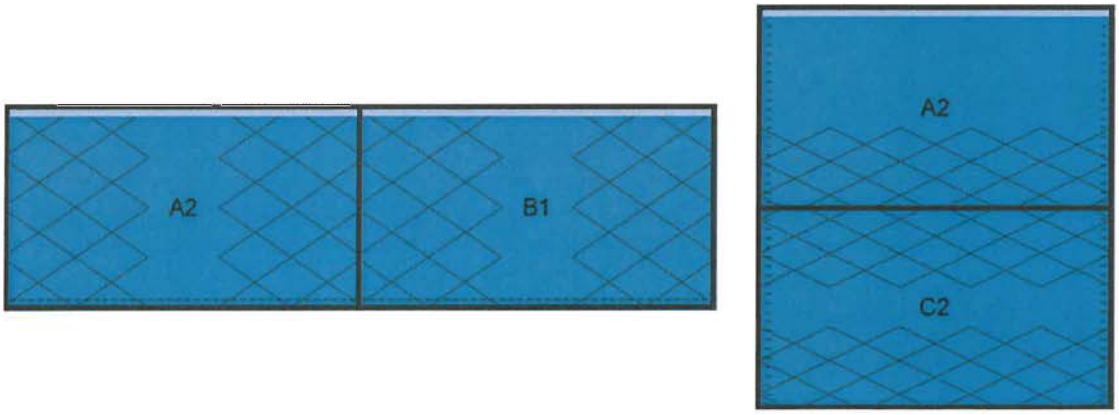


Figure 3-6 Bezel Management and Edge Overlap Controls

4. Use the adjustment options to increase the vertical and/or horizontal seams, or click ( ) to specify the number of pixels. As you do this, the lines move to form a perfectly aligned grid.

Note	For bezel management, the maximum adjustment is 25% of your display resolution. For example, on a 1920 × 1080 display, the maximum settings are 480 pixels (horizontal) and 270 pixels (vertical). For an overlap, you can adjust the position of your display up to 25% of your display resolution.



5. When you're done, click **OK**.

3.4 Restarting the Display Processor

After you have finished setting up PowerDesk, **restart Windows on the Display Processor** and Galileo Server will restart automatically.

Note	For more help using PowerDesk, please refer to the help file included with the software.

CHAPTER 4 WINDOWS FIREWALL SETTINGS

Depending on the restrictions enforced by your current Firewall configuration, you may need to perform the following steps to allow Galileo to communicate over the network. These instructions are intended for Windows 7.

4.1 Ports

Galileo uses the TCP port numbers listed in **Table 4-1** for communication between the client and the server, and with the Network API.

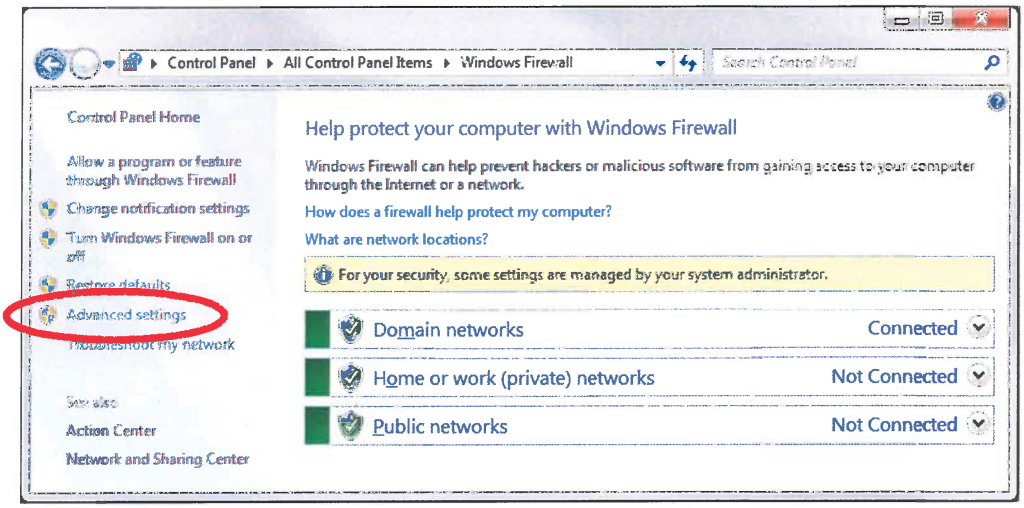
Table 4-1 TCP Ports Used by Galileo

TCP Port	Description
Galileo Server	
50000	Galileo Services
50001	Network Command Interface (TCP/IP Command)
50002	Virtual MousePad Image Receiver (Clients being displayed on the video wall)
50004	Virtual MousePad Keyboard / Mouse Control and Remote View
23	Network API
Galileo Client	
50005	Virtual MousePad Image Receiver (Clients being displayed locally)
50006 and Above	Concurrent Video Wall Connections. This is for connecting to multiple video walls from the same Client PC. Each new Video Wall (opened in tabs) requires its own TCP port in order to connect.
Galileo Lightweight Client	
50004	Virtual MousePad Keyboard / Mouse Control and Remote View

4.2 Galileo Server

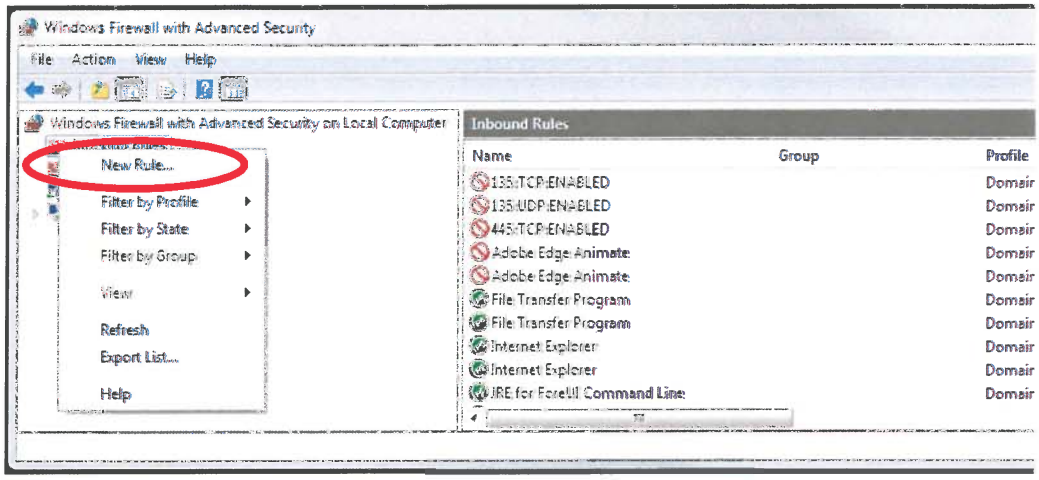
To modify your Windows Firewall settings on the Display Processor for Galileo Server:

1. From the Windows Start Menu, choose **Control Panel**.
2. If your Control Panel is in "Category" view, select the **System and Security** category.
3. Select **Windows Firewall**.
4. On the left-hand side menu, select **Advanced Settings**.

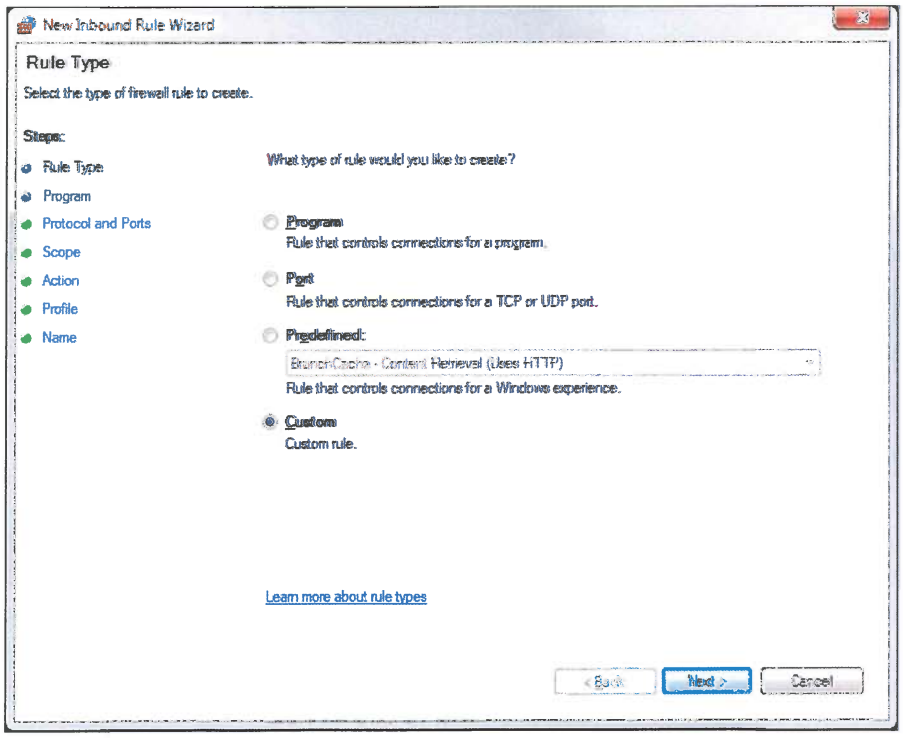


5. Another window opens, titled **Windows Firewall with Advanced Security**.
6. On the left-hand side, under the heading **Windows Firewall with Advanced Security on Local Computer**, click **Inbound Rules**.

7. Right-click **Inbound Rules** and select **New Rule...**



8. On the first screen of the **New Inbound Rule Wizard**, select **Custom** as the type of rule to create.



9. Click **Next**.

10. Select **This Program Path** and browse to, or type, the installation directory of Galileo Server:
    C:\Program Files (x86)\RGB Spectrum\Galileo Server\GalileoServer.exe.
11. Click **Next**.
12. Set the **Protocol type to TCP**.
13. For **Local port,** select **Specific Ports**.
14. In the text field just below, type all the ports required by Galileo Server:
    - Port **50000** is required by all features.
    - Port **50001** is required by the Network Command Interface feature, to control Galileo from third party applications.
    - Port **50002** is required by the Remote Clients feature, to display remote captures of network computers on the video wall.
    - Port **50004** is required by the Virtual Mouse Pad feature, to view the video wall's desktop remotely and to control it with remote mouse and keyboard.

    For example, for every feature the text field should contain: **50000,50001,50002,50004**.
15. For **Remote port**, select **All ports**.
16. Click **Next**.
17. Select **Any IP address** for both the **local IP addresses** and the **remote IP addresses**.
18. Click **Next**.
19. Select **Allow the connection**.
20. Click **Next**.
21. Check the **Domain** and **Private** boxes. Un-check the **Public** box.
22. Click **Next**.
23. Give a name for this Firewall rule. We suggest **Galileo Server**.
24. Click **Finish**.

This will allow every computer on the local network or domain to connect to Galileo Server on the Video Wall controller.

4.3 Galileo Client

To modify your Windows Firewall settings on Galileo Client PCs:

1. Follow Steps 1 through 9 above for creating a new, custom firewall rule.
2. Select **This Program Path** and browse to, or type, the installation directory of Galileo Client:
   C:\Program Files (x86)\RGB Spectrum\Galileo Client\GalileoClient.exe.
3. Click **Next**.
4. Set the **Protocol type to TCP**.
5. For **Local port,** select **Specific Ports**.
6. In the text field just below, type all the ports required by Galileo Server:
   - Port **50005** is required by the Virtual MousePad Image Receiver.
   - Ports **50006** and above are required for concurrent Video Wall connections. This is for connecting to multiple video walls from the same Client PC. Each new Video Wall (opened in tabs) requires its own TCP port in order to connect.

   For example, for every feature the text field should contain: **50005,50006**.
7. For **Remote port**, select **All ports**.
8. Click **Next**.
9. Follow Steps 17 through 24 above for creating a new, custom firewall rule.

CHAPTER 5 INSTALLING GALILEO CLIENT AND GALILEO REMOTE HOST

This chapter describes the installation procedures for Galileo Client and Galileo Remote Host.

5.1 System Requirements

Galileo Client and Galileo Remote Host require the following software and hardware to operate correctly:

- Windows XP SP3, Windows 7 or Windows 8
- .NET 4 Runtime Extended
- Recommended CPU: Intel Core i5 or above
- Recommended RAM: 4 GB or more

Note Windows XP 64-bit requires the "Windows Imaging Component" for the .NET 4 Runtime to install.

5.2 Client Installation

To install the Galileo Client on the computer(s) from which you want to control the video wall:

1. Locate the Galileo Client Setup program, **Galileo Client Installer - x.x.x.x.exe** (where **x.x.x.x** is the version number) on the *Galileo Display Processor Technical Resources* CD. (Optionally, copy the Setup program to your desktop or other convenient location.)
2. Double-click on the Setup program file.

Figure 5-1 **Galileo Client Setup – Welcome**

3. Click **Next**.

Figure 5-2 **Galileo Client Setup – License Agreement**

4. Click **I accept the agreement**, then click **Next**.

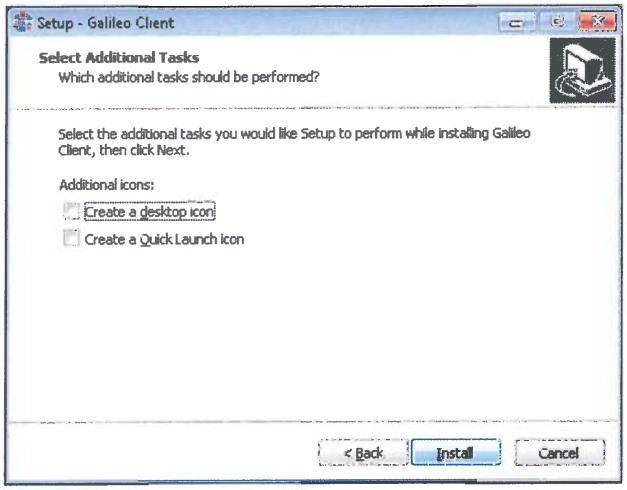


Figure 5-3 Galileo Client Setup – Create Icons

5. If you would like Setup to create desktop and/or Quick Launch icons, check the boxes so labeled. Then, click **Install**.

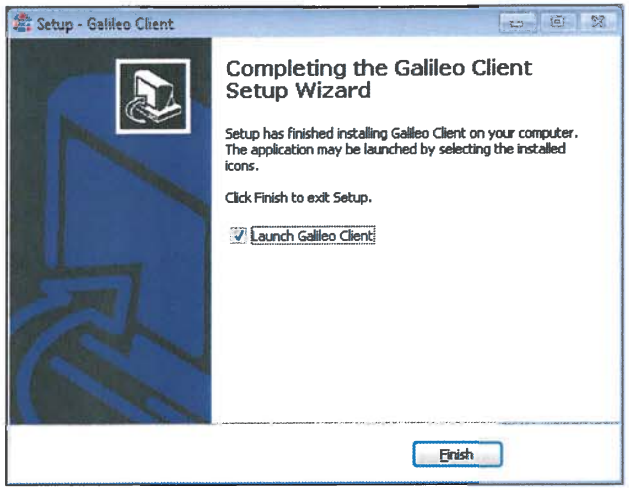


Figure 5-4 Galileo Client Setup – Installation Successful

6. Click **Finish** to exit the Setup program.
7. Repeat Steps 2 through 6 as needed, on other Client PCs.

5.3 Remote Host Installation

The Galileo Remote Host enables control of a computer by other Galileo Clients on the network, and display of its output on the Video Wall.

To install the Galileo Remote Host on a computers you want to be "seen" on the network by the server:

1. Locate the Galileo Remote Host Setup program, **Galileo Remote Host Installer - x.x.x.x.exe** (where **x.x.x.x** is the version number) on the *Galileo Display Processor Technical Resources* CD. (Optionally, copy the Setup program to your desktop or other convenient location.)
2. Double-click on the Setup program file.

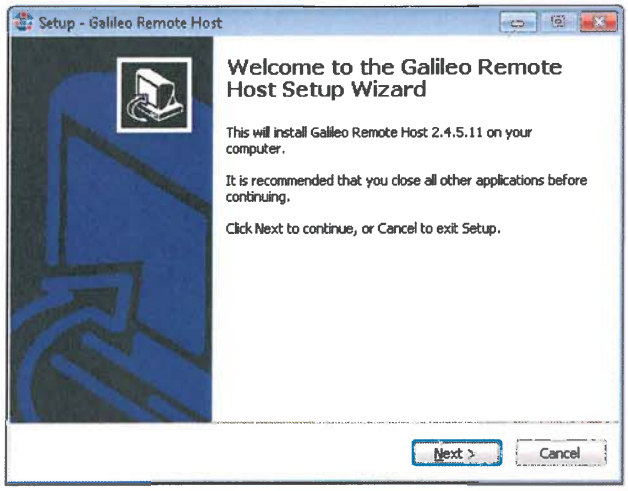


Figure 5-5 Galileo Remote Host Setup – Welcome

3. Click **Next**.

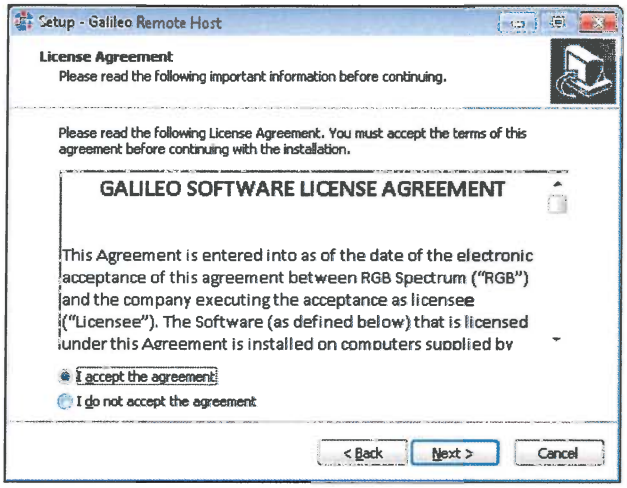


Figure 5-6 **Galileo Remote Host Setup – License Agreement**

4. Click **I accept the agreement**, then click **Next**.

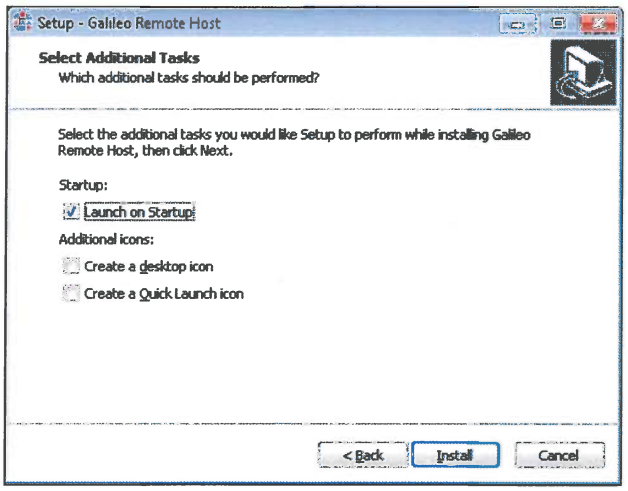


Figure 5-7 **Galileo Remote Host Setup – Additional Tasks**

5. If you would like Galileo Remote Host to launch when Windows starts (recommended), check the **Launch on Startup** box.

   If you would like Setup to create desktop and/or Quick Launch icons, check the boxes so labeled.

   Then, click **Install**.

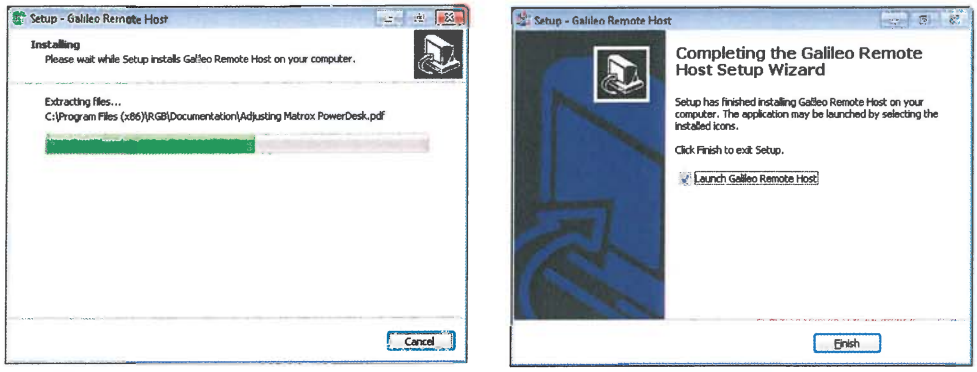
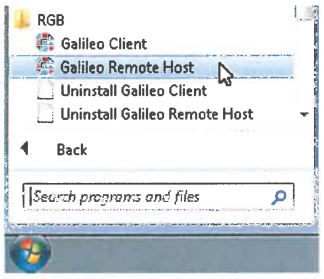


Figure 5-8 Galileo Remote Host Setup – Installation Successful

6. Click **Finish** to exit the Setup program.
7. Repeat Steps 2 through 6 as needed, on other Remote Host PCs.

To launch Galileo Remote Host (if it does not do so automatically), choose **Start > All Programs > RGB >** Galileo Remote Host.



To configure Galileo Remote Host, right-click on its taskbar icon ( ). For instructions on how to connect and configure a Remote Host, refer to the chapter entitled "Managing Remote Clients" in the *Galileo Video Wall Control Software User's Guide*.

CHAPTER 6 SCRIPTING COMMANDS

Galileo Client allows operators to manipulate the Video Wall or an external device programmatically, to simplify common tasks. This section provides a complete list of scripting commands and their usage. For instructions on how to organize, use, and create scripts using Galileo Client, refer to the *Galileo Video Wall Control Software User's Guide*.

6.1 Layout Commands

6.1.1 GetLayoutNames

Use the GetLayoutNames command to read the names of the layouts that are currently saved on the video wall controller.

```
Result : { Text }
```

A sequence containing all layout names.

Examples	
	`Names = GetLayoutNames;` `# Names = { "Layout 1", "Layout 2" }`

6.1.2 Open Layout:

Note	Opening a layout on the video wall will automatically close all the windows on the video wall.

Use the Open Layout command to open a layout across the whole video wall.

```
Layout : Text
```

The layout is identified by its name, as it appears in the Layouts list in the Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example	`Open Layout: "Scenario 1"`

6.2 Window Commands

6.2.1 Open Window: Source:

Use the Open Window Source command to put a source in a specific window.

```
Window : Number
```

The window is identified by its number, as seen on the Galileo interface.

```
Source : < input : Text, client : Text, application : Text >
```

The source opened in the window can be any of the sources types supported by Galileo, that is hardware inputs, remote clients connected to the video wall, and local applications on the video wall controller.

The text used to identify an input is its name, as it appears in the Inputs list of Galileo.

The text used to identify a remote client is its name, as it appears in the Clients list of Galileo. That is, its given name or its IP address.

The text used to identify an application is the path of the executable on the video wall controller.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples	`Open Window: 1 Source: input("Camera 1");`
	`Open Window: 2 Source: client("192.168.1.27");`
	`Open Window: 3 Source: application("C:/Program Files/Acme/Tool.exe");`

6.2.2 Open Window: Layout:

Use the Open Window Layout command to put a layout in a specific window.

```
Window : Number
```

The window is identified by its number, as seen on the Galileo interface.

```
Layout : Text
```

The layout opened in the window is identified by its name, as it appears in the Layouts list of Galileo.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
Open Window: 1 Layout: "Layout 2";
Open Window: 2 Layout: "Layout 1";
```

6.2.3 CreateWindow Monitor:

Use the CreateWindow command to create a new empty window on the layout visible to Galileo clients. This window can later be filled with any source available to the operators.

```
Monitor : { Number }
```

Two numbers which represent the position of the monitor to cover with the new window. The first is the horizontal position and the second is the vertical position.

```
Result : Number
```

The number assigned to the newly created window. It can be used in subsequent commands to modify the content of the window.

Examples

```
Number = CreateWindow Monitor: { 3, 2 };
Open Window: Number Source: layout("Morning Scenario");
```

6.2.4 CreateWindow Horizontal: Vertical:

Use the CreateWindow command to create a new empty window on the layout visible to Galileo clients. This window can later be filled with any source available to the operators.

```
Horizontal : { Number }
```

Two numbers which represent the horizontal extent covered by the new window. The first is leftmost position (included) and the second is the rightmost position (excluded).

```
Vertical : { Number }
```

Two numbers which represent the vertical extent covered by the new window. The first is topmost position (included) and the second is the bottommost position (excluded).

```
Result : Number
```

The number assigned to the newly created window. It can be used in subsequent commands to modify the content of the window.

Examples

```
Number = CreateWindow Horizontal: { 0, 1920 } Vertical: {
0, 1280 };
Open Window: Number Source: layout("Morning Scenario");
```

6.2.5 CloseWindows SourceType:

Use the CloseWindows command to close all the windows on the video wall. You can optionally give the type of sources to close. By default, the command will close all windows.

```
SourceType : all | inputs | applications | clients
```

The type of sources to remove from the video wall. If the SourceType is not given, it is equivalent to all.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
CloseWindows SourceType: all;
CloseWindows SourceType: inputs;
CloseWindows SourceType: applications;
CloseWindows SourceType: clients;
CloseWindows;  # Same as CloseWindows SourceType: all;
```

6.2.6 Clear Window:

Use the Clear command to close a single window on the video wall. The window will become empty on the Galileo interface and can be manipulated again.

```
Window : Number
```

The window is identified by its number, as seen in the Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example	`Clear Window: 3;`

6.3 Other Commands

6.3.1 Execute Script:

Use the Execute command to run a script that has been saved on the video wall controller.

```
Script : Text
```

The script is identified by its name, as it appears in the Scripts list in Galileo Client.

```
Result : ()
```

The command is only used for its effect on the video wall.

Example	`Execute Script: "Script 1";`

6.3.2 ExecuteProgram Path: Arguments:

Use the ExecuteProgram command to launch an application installed on the Galileo Display Processor.

```
Path : Text
```

The path of the executable to launch on the video wall controller.

```
Arguments : Text
```

The arguments for the program to execute.

```
Result : ()
```

The command is only used for its effect on the video wall.

Examples

```
ExecuteProgram Path: "C:/Program Files (x86)/Mozilla
Firefox/firefox.exe";
ExecuteProgram Path: "C:/Program Files (x86)/Mozilla
Firefox/firefox.exe" Arguments: "www.rgb.com";
```

6.3.3 Connect IP: Port:

Use the Connect command to communicate with an external service over a TCP/IP connection.

```
IP : Text
```

The IP address of the external service, in dotted quad notation.

```
Port : Number
```

The port of the external service.

```
Result : [ Send : Text ] -> ()
```

A function that can be used to send text messages to the external service.

Examples

```
GalileoNCI = Connect IP: "127.0.0.1" Port: 50001;
GalileoNCI Send: "Clear Window: 2\n";
```

6.3.4 ConnectTelnet IP: Port:

Use the ConnectTelnet command to communicate with an external service over a Telnet connection.

```
IP : Text
```

The IP address of the external service, in dotted quad notation.

```
Port : Number
```

The port of the external service.

```
Result : [ Send : Text ] -> ()
```

A function that can be used to send text messages to the external service.

Examples

```
GraphicsCardAPI = ConnectTelnet IP: "127.0.0.1" Port: 23;
GraphicsCardAPI Send: "AddWindow \"Galileo\"
100,100,2000,2000";
```

(Note that the inner set of quotation marks is escaped with the backslash character.)

6.3.5 StartTransition Name: Windows: Repeat:

Use the StartTransition command to run a transition with a given set of windows.

```
Name : Text
```

The name of the transition to start.

```
Windows : { Number }
```

A comma-delimited list of numbers corresponding to windows open on the video wall.

```
Repeat (optional) : true | false
```

Specifies if the transition will only execute once, or if it will repeat itself after its assigned duration.

Examples

```
StartTransition Name: "Transition 1" Windows: {1, 3, 5};
StartTransition Name: "Transition 2" Windows: {2, 4}
Repeat: true;
```

CHAPTER 7 GALILEO JAVASCRIPT API

This chapter describes how to use the Galileo JavaScript API. This API allows you to modify the Video Wall by starting scripts, saving the current state of the desktop as a layout, moving windows on the video wall, and more.

Please contact us at **tech@rgb.com** with the subject line "JavaScript API" with any questions, comments, or suggestions relating to the API or this document.

7.1 Before You Start

1. Ensure that the Galileo Server is running with the Web Server installed.
2. Make sure you can access the website from another computer. The Galileo Display Processor web site address is `http://[display_processor_IP_address]:81/galileo`; for example, `http://192.168.3.16:81/galileo`.

Figure 7-1 shows the Galileo Web Client control interface.

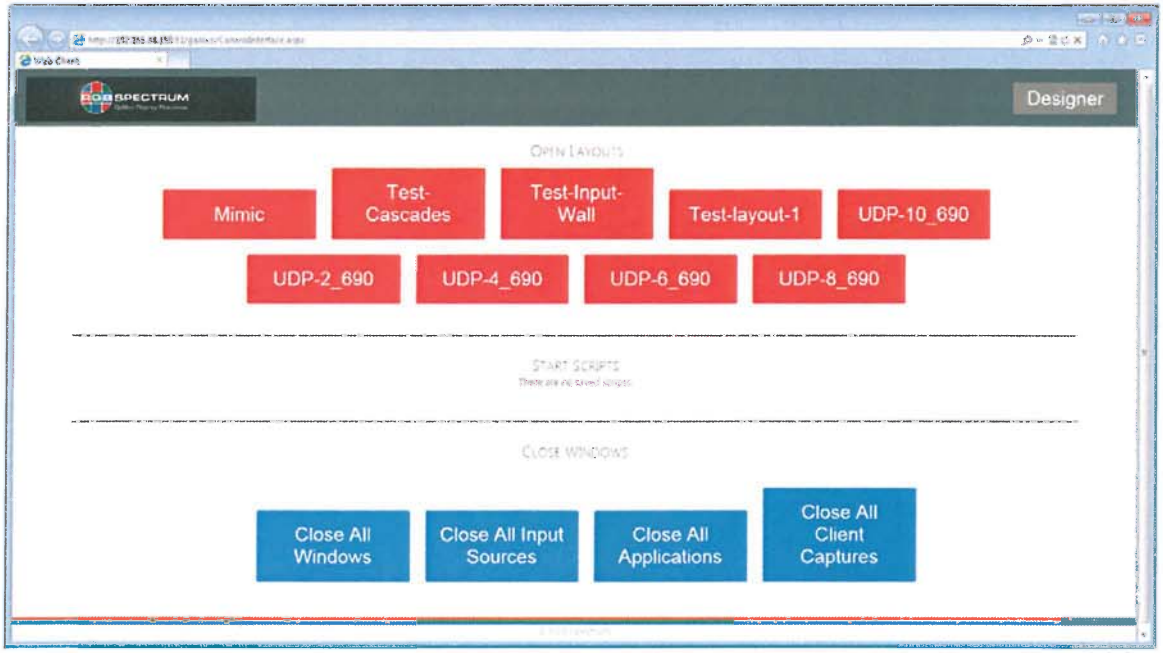


Figure 7-1 Galileo Web Client

7.2 Limitations and General Behavior

The Galileo JavaScript API works asynchronously with the Video Wall. Depending on the speed of your network, the speed of your Web Server, and other factors, commands you send to the Video Wall can take a couple of seconds to be executed. For this reason, you must always send to the API a function that executes when the command you sent is successful, and another function that executes if the command fails. They are called *functionOnSuccess* and *functionOnFail* throughout this document and in the JavaScript API. These two functions must always receive a single variable, which will be returned by the API. The content of these variables is described throughout this document.

This document makes references to both IDs and GUIDs. IDs are used to identify inputs that can be displayed on the video wall. IDs are used by the **GetInputs**, **OpenInput**, **CropInput**, and **GetCroppingArea** methods.

GUIDs are used when an input is opened and displayed on the Video Wall. GUIDs are used by the **ModifyWindow**, **GetSingleWindowState**, and **CloseWindow** methods.

All dimensions in the JavaScript API are values between 0 and 1 inclusive, and start from the top-left corner of the video wall desktop. For example, a point located in the center of the bottom-right part of the desktop would be represented as *X=0.75, Y=0.75.*

The Galileo JavaScript API includes various levels of security. Depending on the settings selected in the **Manage Browser Control** (refer to the *Galileo Video Wall Control Software User's Guide* for more information about the Browser Control), you will be asked to provide to the JavaScript API either the password you set in the Browser Control, a valid Galileo Username and Password or no password. Also, for security reasons, you need to call the *Authenticate* method of the API at least once every 24 hours, or every command you send will return an error.

If your Galileo Users have limited working areas, the API will only allow you to manipulate windows within the user's working area.

In this document:

- The ↳ symbol means there is another variable encapsulated in the parent variable. For example, the Error Code variable in the following code can be accessed using `variable_name.Code`.

  ↳ **Response**

  ↳ **Message** – Description of Message

  ↳ **Type** – Description of Type

  ↳ **Code** – Description of Code

- The ➢ symbol means a variable can have any value mentioned in the list.
- **0, 1, 2, 3 … n** means the current variable is an array that contains a variable number of entries. They can be counted using `Object.keys(variable_name.Data).length`.

7.3 Constructors

7.3.1 VideoWallConnection

The `VideoWallConnection` constructor is used in two contexts: when attempting to connect to the video wall for the first time and after a connection has been established.

Signature

```
VideoWallConnection(videoWallIP, functionOnSuccess, functionOnFail)
```

Description

Constructor used when attempting to connect for the first time to the video wall. This constructor validates the connectivity.

Inputs

`videoWallIP`	The IP address of the Galileo Display Processor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

Signature

`VideoWallConnection(userKey, videoWallIP)`

Description

Constructor used when you already connected and have the User Key fetched from the `getUserKey` function. This constructor does not validate connectivity and is useful when accessing the Galileo JavaScript API from a page other than the login page.

Inputs

`userKey`	The User Key returned by the `getUserKey()` function
`videoWallIP`	The IP address of the Galileo Display Processor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.4 Authentication Methods

7.4.1 GetAuthentiecationMethod

Signature

```
GetAuthenticationMethod (functionOnSuccess, functionOnFail)
```

Description

Gets the authentication method you selected in the **Manage Browser Control** option of the Galileo Server. Various authentication methods require different information.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

↳ **Data**

↳ **AuthenticationMethod** – The authentication type set under **Manage Browser Control** option of the server; one of the following:

➢ **UsernamePasswordAuthentication** – Requires a valid username/ password combination registered in the Galileo User Management Database. Can be compared using *VideoWallConnection.UsernamePasswordAuthentication*.

➢ **SinglePasswordAuthentication** – Requires a single password for logging. Can be compared using *VideoWallConnection.SinglePasswordAuthentication.*

➢ **NoAuthentication** – Requires no type of authentication. You can skip the *Authenticate* method and call manipulation functions directly. Can be compared with *VideoWallConnection.NoAuthentication.*

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.4.2 Authenticate

Signature

```
Authenticate (username, password, functionOnSuccess, functionOnFail)
```

Description

Authenticates the user to the Galileo Server. It inserts the User Key inside the Galileo JavaScript API, which allows you to run every other command below. You can skip authenticating if the authentication method is *VideoWallConnection.NoAuthentication.*

Inputs

`username`	➢ The username of a user in the Galileo Users Database if the authentication method is equal to *VideoWallConnection.UsernamePasswordAuthentication.* ➢ Otherwise, it can be an empty string (""").
`password`	➢ The password of the user mentioned if the authentication method is equal to *VideoWallConnection.UsernamePasswordAuthentication.* ➢ The password entered in the *"Manage Browser Control"* option on the server if the authentication method is equal to *VideoWallConnection.SinglePasswordAuthentication.* ➢ An empty string ("") if the authentication method is equal to *VideoWallConnection.NoAuthentication.*

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison. Error code 101 is returned in case of a wrong password if the authentication method is *VideoWallConnection.SinglePasswordAuthentication*. Error code 102 is returned in case of a wrong username/password combination if the authentication method is *VideoWallConnection.UsernamePasswordAuthentication*.

7.4.3 getUserkey

Signature

```
getUserKey()
```

Description

Gets the User Key. This User Key is a series of encrypted characters only useful to identify the user on the server side. It is automatically sent to Galileo with every request, and its value changes every day. For security reasons, you must not re-use this key for more than two days.

This method is local to the Galileo JavaScript API and does not have the same structure than the other methods. It simply returns the User Key.

Inputs

– None –

Return Value

The User Key.

7.5 Utility Methods

7.5.1 ExecuteScript

Signature

```
ExecuteScript (script, functionOnSuccess, functionOnFail)
```

Description

Executes a series of script commands.

Note	This method does not take the name of a script, but the script itself. To specify the name of a script to run, use **StartScript**.

Refer to the *Galileo Scripting Commands Reference* and *Galileo Scripting Language Specification* documents to learn how to write Galileo scripts.

`script`	The script you want to execute as plain text. Note that you must escape any backslashes used in the commands you would normally execute in the Script Editor.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.2 GetScreenResolution

Signature

```
GetScreenResolution (functionOnSuccess, functionOnFail)
```

Description

Gets the resolution of the video wall's desktop in pixels.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Resolution**
    - **Horizontal** – The horizontal resolution in pixels.
    - **Vertical** – The vertical resolution in pixels.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.3 GetScripts

Signature

```
GetScripts (functionOnSuccess, functionOnFail)
```

Description

Gets the saved scripts on the server.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - ↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - ↳ **Code** – The success code (000).
- ↳ **Data**
  - ↳ **0, 1, 2, 3 … n** (where n = Number of inputs available).
    - ↳ **Name** – The name of the script.

Outputs of Function functionOnFail

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - ↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - ↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.4 StartScript

Signature

```
StartScript (scriptName, functionOnSuccess, functionOnFail)
```

Description

Starts the specified script on the server.

Inputs

`scriptName`	The name of a script saved on the server.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.5 GetNumberOfMonitors

Signature

```
GetNumberOfMonitors (functionOnSuccess, functionOnFail)
```

Description

Gets the number of screens of the video wall in terms of horizontal and vertical monitors.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - ↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - ↳ **Code** – The success code (000).
- ↳ **Data**
  - ↳ **HorizontalMonitors** – The numbers of monitors horizontally.
  - ↳ **VerticalMonitors** – The numbers of monitors vertically.

Outputs of Function functionOnFail

An enum containing the following values:

- ↳ **Response**
  - ↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - ↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - ↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.6 SaveLayout

Signature

```
SaveLayout (layoutName, functionOnSuccess, functionOnFail)
```

Description

Saves all the sources being displayed on the desktop (Inputs, Applications, Client Capture and other layouts) into a layout.

Inputs

`layoutName`	The name of the layout.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.7 DeleteLayout

Signature

```
DeleteLayout (layoutName, functionOnSuccess, functionOnFail)
```

Description

Delete a layout.

Inputs

`layoutName`	The name of the layout.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.8 GetWorkingArea

Signature

```
GetWorkingArea (functionOnSuccess, functionOnFail)
```

Description

Gets the area of the video wall the currently logged in user is allowed to manipulate.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Position**
    - **Top** – The Y coordinate of the top border of the user's working area on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the user's working area on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the user's working area on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the user's working area on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.5.9 GetLicenseInformation

Signature

```
GetLicenseInformation (functionOnSuccess, functionOnFail)
```

Description

Returns information regarding the license: available features, whether or not you're authorized to use the JavaScript API et cetera.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **JavascriptAPIVersionNumber** – The version of the JavaScript API on the server-side.
  - **AllowedToHaveClientCapture** – "True" if your license allows you to use and manipulate Client Capture windows, "False" otherwise.
  - **AllowedToHaveInputs**– "True" if your license allows you to use and manipulate Input windows, "False" otherwise.
  - **AllowedToHaveApplication**– "True" if your license allows you to use and manipulate Application windows, "False" otherwise.
  - **AllowedToCrop** – "True" if your license allows you to get the cropping area and crop inputs, "False" otherwise.
  - **AllowedToUseJavascriptAPI**– "True" if your license allows you to use the Javascript API, "False" otherwise.
  - **HasMatroxNetworkAPI** – "False" if you have Matrox graphics cards and the Matrox Network API is not installed, "True" otherwise.
  - **LicenseVersionType** – A value representing your license type. Can be:
    - **Pro** – Galileo Pro Edition
    - **Normal** – Galileo Normal Edition
    - **WebClient** – Galileo Web Client Edition
    - **MobileFree** – Galileo For Mobile Edition
  - **VersionNumber** – The version of the Galileo software you have installed.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6 Wall Modification Methods

7.6.1 GetInputs

Signature

```
GetInputs (functionOnSuccess, functionOnFail)
```

Description

Gets the list of inputs that are available on the server.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **0, 1, 2, 3 … n** (where n = Number of inputs available).
    - **Name** – The human-readable name of the input that is identical to the one in Galileo Clients
    - **ID** – The ID used to identify the Input. This ID must be sent to *OpenInput* in order to open the input
    - **Type** – The type of input. This type must be sent to *OpenInput* in order to open the input; one of the following:
      - **Matrox** – Video/graphics inputs. Can be compared to *VideoWallConnection.MatroxWindowsID.*
      - **Layout** – Layouts. Can be compared to *VideoWallConnection.LayoutWindowsID.*
      - **Application** – Software windows. Can be compared to *VideoWallConnection.ApplicationWindowsID*.
      - **ClientCapture** – Galileo Client Capture inputs. Can be compared to *VideoWallConnection.ClientCaptureWindowsID*.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.2 OpenInput

Signature

```
OpenInput (ID, type, top, left, bottom, right, functionOnSuccess,
functionOnFail)
```

Description

Opens an input fetched from the **GetInputs** method.

Inputs

`ID`	The ID fetched from **GetInputs**. Even through it is not recommended, you can use a hard-coded ID if you are sure it won't change.
`type`	The type of input you want to open fetched from **GetInputs**; one of the following: ➢ *VideoWallConnection.MatroxWindowsID* – Video/graphic input windows ➢ *VideoWallConnection.LayoutWindowsID* – Layouts ➢ *VideoWallConnection.ApplicationWindowsID* – A software window ➢ *VideoWallConnection.ClientCaptureWindowsID* – Client Capture windows.
`top`	The Y coordinate of the top border of the input you want to display on a [0, 1] scale
`left`	The X coordinate of the left border of the input you want to display on a [0, 1] scale

`bottom`	The Y coordinate of the bottom border of the input you want to display on a [0, 1] scale
`right`	The X coordinate of the right border of the input you want to display on a [0, 1] scale

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **GUID** – The GUID of the new window opened on the video wall.

Outputs of Function functionOnFail

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.
  - **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.
  - **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.3 ModifyWindow

Signature

```
ModifyWindow (GUID, top, left, bottom, right, maximize,
functionOnSuccess, functionOnFail)
```

Description

Use this method to minimize, maximize or modify the position of a window. This method also automatically puts it in front of the others. Note that video/graphic input windows can only be ordered between themselves and not with any other type of windows and is beyond Galileo's control.

Inputs

`GUID`	The GUID of a window. This GUID cannot be copied or hard-coded.
`type`	The type of the input you want to open fetched from **GetInputs**.
`top`	The Y coordinate of the top border of the window you want to modify on a [0, 1] scale
`left`	The X coordinate of the left border of the window you want to modify on a [0, 1] scale
`bottom`	The Y coordinate of the bottom border of the window you want to modify on a [0, 1] scale
`right`	The X coordinate of the right border of the window you want to modify on a [0, 1] scale
`maximize`	A JavaScript boolean containing "true" if you want the window maximized and "false" if you want it minimized

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.4 GetWindowState

Signature

```
GetWindowState (functionOnSuccess, functionOnFail)
```

Description

This gets the state of all windows displayed on the video wall, including Input, Application, Client Capture, and Layout windows.

Inputs

– None –

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **0, 1, 2, 3 … n** (where n = Number of windows displayed).
    - **GUID** – The GUID of the current window.
    - **Name** – The human readable name of the window that is identical to the one in Galileo Client.
    - **Color** – The hexadecimal color of the window. The color returned is the same color as displayed on Galileo Client.
    - **ZOrder** – The Z Order of the window. 0 represents the bottom-most window.
    - **Visible** – "True" if the window is maximized, "False" otherwise.
    - **Position**
      - **Top** – The Y coordinate of the top border of the window on a [0, 1] scale.
      - **Left** – The X coordinate of the left border of the window on a [0, 1] scale.
      - **Bottom** – The Y coordinate of the bottom border of the window on a [0, 1] scale.
      - **Right** – The X coordinate of the right border of the window on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.5 GetSingleWindowState

Signature

```
GetSingleWindowState (GUID, functionOnSuccess, functionOnFail)
```

Description

Returns the state of a single window as specified by the included GUID.

Inputs

`GUID`	The GUID of a window. This GUID cannot be copied or hard-coded.

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **GUID** – The GUID of the current window.
  - **Name** – The human readable name of the window that is identical to the one in Galileo Client.
  - **Color** – The hexadecimal color of the window. The color returned is the same color as displayed on Galileo Client.
  - **ZOrder** – The Z Order of the window. 0 represents the bottom-most window.
  - **Visible** – "True" if the window is maximized, "False" otherwise.
  - **Position**
    - **Top** – The Y coordinate of the top border of the window on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the window on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the window on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the window on a [0, 1] scale.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.6 CloseWindow

Signature

```
CloseWindow (GUID, functionOnSuccess, functionOnFail)
```

Description

Closes a single Galileo Window.

Inputs

`GUID`	The GUID of a window. This GUID cannot be copied or hard-coded.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.7 CloseAllWindows

Signature

```
CloseAllWindows (windowType, functionOnSuccess, functionOnFail)
```

Description

Closes all windows of a specific type, or all windows of every type depending on the value of the argument.

Inputs

`windowType`	The type of the windows you want to close; one of the following: ➢ *VideoWallConnection.MatroxWindowsID* – Video/graphic input windows ➢ *VideoWallConnection.LayoutWindowsID* – Layouts ➢ *VideoWallConnection.ApplicationWindowsID* – Application windows ➢ *VideoWallConnection.ClientCaptureWindowsID* – Client Capture windows. ➢ *VideoWallConnection.AllWindowsID* – All windows.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.8 GetCroppingArea

Signature

```
GetCroppingArea (ID, type, functionOnSuccess, functionOnFail)
```

Description

Gets the cropping area and resolution of an input. **Only Input windows can be cropped**. Use this method to show only a portion of the input image.

Inputs

`ID`	The ID of the input.
`type`	The type of window for which you want to get the cropping area (always *VideoWallConnection.MatroxWindowsID*).

Outputs of Function functionOnSuccess

An enum containing the following values:

- **Response**
  - **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.
  - **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.
  - **Code** – The success code (000).
- **Data**
  - **Position**
    - **Top** – The Y coordinate of the top border of the cropping area on a [0, 1] scale.
    - **Left** – The X coordinate of the left border of the cropping area on a [0, 1] scale.
    - **Bottom** – The Y coordinate of the bottom border of the cropping area on a [0, 1] scale.
    - **Right** – The X coordinate of the right border of the cropping area on a [0, 1] scale.
  - **Resolution**
    - **Horizontal** – The horizontal resolution of the input.
    - **Vertical** – The vertical resolution of the input.

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

7.6.9 CropInput

Signature

```
CropInput (ID, type, top, left, bottom, right, functionOnSuccess,
functionOnFail)
```

Description

Crops an input to the desired size, to show only a portion of the input image. **Only Input windows can be cropped.** Cropping affects every window displaying that input.

Inputs

`ID`	The ID of the input.
`type`	The type of window you want to crop (always *VideoWallConnection.MatroxWindowsID*).
`top`	The Y coordinate of the top border of the cropping area on a [0, 1] scale.
`left`	The X coordinate of the left border of the cropping area on a [0, 1] scale.
`bottom`	The Y coordinate of the bottom border of the cropping area on a [0, 1] scale.
`right`	The X coordinate of the right border of the cropping area on a [0, 1] scale.

Outputs of Function functionOnSuccess

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message saying no error occurred. This success message is translated and should not be used for comparison.

↳ **Type** – "ACK" because the command executed successfully. You can use *VideoWallConnection.AcknowledgementMessage* for comparison.

↳ **Code** – The success code (000).

Outputs of Function functionOnFail

An enum containing the following values:

↳ **Response**

↳ **Message** – A human-readable message that explains the error. This error message is translated and should not be used for comparison.

↳ **Type** – "ERR" because it is an error. You can use *VideoWallConnection.ErrorMessage* for comparison.

↳ **Code** – The error code. This error code is specific to an error and can be used for comparison.

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Author: Mikhail Tsennykh
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CHAPTER 9 CONTACT INFORMATION

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Phone: +1-510-814-7000, option 1

Web: **http://www.rgb.com/support/**

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Galileo Competitive Analysis

Rev 01 • August 2014

Galileo vs Christie Phoenix

Feature	Galileo	Christie Phoenix
Architecture	Single chassis with direct and IP inputs	Multiple nodes Input: 2x DVI in; H.264 out Output: H.264 in; 2x DVI out
IP camera/video inputs (MPEG2, MPEG4, MJPEG, H.264)	12x HD, 60x SD	12x HD per node
Inputs up to 4K (3840x2160)	Yes, single link 15fps	No
High Frame Rate Remote Desktop	Yes – VDA	No – VNC, RDP
Configuration Size	Up to 56 outputs in single chassis	2 outputs per node, 128 outputs max
Output rotation (portrait/landscape)	Yes	Yes
HDCP support across all outputs	Yes	Yes

Galileo vs Christie Phoenix

Feature	Galileo	Christie Phoenix
Scripting interface for internal or external system control	Yes	Yes
Real-time processing – no artifacts	Yes	Yes
Transitions and animations	Yes	No
Dynamic scaling, pan & zoom	Yes	Yes
Free rotation of inputs	Yes	No
Bezel compensation & edge overlap	Yes	Yes
Tablet/Web – based control interface	Yes	Yes
Active Directory Support	Yes	No

Christie Phoenix – Weaknesses

- All direct (baseband) inputs forced to be IP
  - Scaling across wall may accentuate H.264 artifacts
  - Not as many inputs at higher frame rates can be processed
  - Lag time (input to output) of several frames from H.264 decoding
  - Slow to switch between inputs (vs baseband switching on Galileo)
  - Puts more strain on network
- No applications can be run on processor
- Costly
  - $7800/node ; $3900/port
    - each node has 2 DVI in or 2 DVI out based on their recommendations
- Granularity of 2 video in/out not optimal
  - Each additional 2 baseband inputs requires another node (unused additional processor, outputs, chassis etc.)

Christie Phoenix – Strengths (& Response)

- All IP architecture
  - Baseband inputs costly
- Supports multiple walls and single outputs
  - Galileo supports multiple walls via sub-regions/layouts
- Decodes 12 IP streams (1080p/30) per node
  - Baseband inputs costly, no analog inputs
- Desktop decoder client
  - Galileo has decoder client with KVM
- Audio support in control application
  - Galileo can control an external audio mixer/switcher
- DL-DVI 2560x1600p60 outputs
  - Galileo does 2560x1600p30, but it is not cost effective to build walls out of such expensive displays. There are plenty of pixels in the wall with HD displays.

RGB SPECTRUM®

Galileo Competitive Analysis

Rev 01 • August 2014

Galileo vs Jupiter

Feature	Galileo	Jupiter FC4000
IP camera/video inputs (MPEG2, MPEG4, MJPEG, H.264)	16x HD, 60x SD (no input card required)	192x HD (Requires Decoder Cards)
Inputs up to 4K (3840x2160)	Yes, single link 15fps	No
Low Bandwidth Remote Desktop	Yes - VDA	No – High BW PixelNet
Up to 56x56 in a single chassis	Yes	No, 32 in OR out 96 in OR out (3 chassis)
Output rotation (portrait/landscape)	Yes	No?
Scripting interface for internal or external system control	Yes	Yes
Real-time processing – no artifacts	Yes	Yes (single chassis)
HDCP support across all outputs	Yes	No
Transitions and animations	Yes	No

Galileo vs Jupiter

Feature	Galileo	Jupiter FC4000
Dynamic scaling, pan & zoom	Yes	No
Free rotation of inputs	Yes	No
Bezel compensation & edge overlap	Yes	Yes
Tablet-based control interface	Yes	No (requires Canvas)
Active Directory Support	Yes	Yes

Jupiter Catalyst FC4000 – Weaknesses

- PCIe x4 slots (Galileo PCIe x16) and multiple chassis create I/O bottleneck
  - Limited video bandwidth causing image tearing or dropped frames
- Outdated processor
  - can’t handle applications as well, slow response time
- No 4K input support
  - Dual-link 2560x1600 max
- No input or output rotation
- No HDCP support
- No transitions/animation
- No built-in tablet interface

Jupiter Catalyst FC4000 – Strengths

- Dual-link in/out
- Large # of streaming inputs (with additional cards)
- Large # of I/O (with additional chassis, and limited performance)

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
Video			
	Switcher	56x56 DVI/HDMI, plus 48 inputs of Analog Compsite, plus IP inputs, plus VDA remote control desktops, plus MS Windows Application Support	64x64 digital matrix
	Input Signal Types	Plug in blades supporting 56 DVI/HDMI/Display Port, plus 48 inputs of Analog Compsite BNC, plus IP inputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Plug-in blades supporting HDMI, DisplayPort Multimode, DVI, HDBaseT®, DM 8G+™, DM 8G® Fiber, and DM 8G SM Fiber, No IEEE Ethernet
	Output Signal Types	Plug in blades supporting 56 DVI/HDMI, plus IP outputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Plug-in blades supporting HDMI, DVI, HDBaseT, DM 8G+, DM 8G Fiber, and DM 8G SM Fiber
	Formats	SL-DVI,HDMI,Display Port, any IP codec supported by MS Windows 7, VDA remote control, VNC, RDP, any MS Windows Application Support. 3D, 4K, HDCP	HDMI, HDBaseT, or DM 8G w/Deep Color, 3D, & 4K; DVI; HDCP content protection support
	Input Resolutions	1920x1200 @ 60 Hz (SL-DVI, RGB/VGA) 2048x1536 @ 47 Hz (RGB/VGA) 2560x1600 @ 30 Hz (SL-DVI) 1920x1080i (Component) NTSC/PAL/SECAM (S-Video, Composite)	Up to 2048x1152@60Hz
	Maximum Output Resolutions	2048x1152 @ 60 Hz (SL-DVI) 2048x1536 @ 60 Hz (RGB/VGA)	2048x1152@60Hz
Audio			
	Switcher	Audio switching is not embedded in video. Switching is available out of band.	64x64 digital multi-channel audio-follow-video matrix switching, monitor output;
		Audio breakaway is not applicable	Note: Audio breakaway is not supported
	Input Signal Types	Line input, IP encoded audio	Configurable via modular plug-in blades supporting HDMI, DisplayPort Multimode[10], HDBaseT[2], analog (stereo 2-channel)[1], DM 8G+[2], DM 8G Fiber, and DM 8G SM Fiber
	Output Signal Types	Line input, IP encoded audio	Configurable via modular plug-in blades supporting HDMI[1], HDBaseT, analog (stereo 2-channel)[1], DM 8G+, DM 8G Fiber, and DM 8G SM Fiber
	Formats	Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby® TrueHD, DTS®, DTS-ES, DTS 96/24, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM	Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby® TrueHD, DTS®, DTS-ES, DTS 96/24, DTS-HD High Res, DTS-HD Master Audio™, up to 8ch PCM
Communications			
	Ethernet	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation
	USB	USB 2.0 and 3.0	USB signal routing via select transmitters, receivers, and extenders; USB service port for computer console
	DigitalMedia	SL-DVI, SM and MM Fiber via Tranceiver, HDBaseT vis Transceiver, HDCP management, EDID format management, CEC	DM 8G+ (HDBaseT compliant)[2], DM 8G Fiber, DM 8G SM Fiber, HDCP management, EDID format management, CEC
Ethernet Switch			
		2 ea 10Base-T/100Base-TX/1000Base-T LAN	19-port switch with Private Network Mode;
USB Switch			
		USB over IP delivered using RGB Spectrum VDA	64x64 matrix, follow video or breakaway
Blade Slots			
	INPUT	14 slots for DVI/HDMI input and output. Each card supports 4 inputs and 4 outputs Slots support 16 lane PCIe and can be populated with standard PCIe boards as well for	8 slots proprietaryDM switcher input blade slots, hot-swappable; Each slot accepts (1) DMB-I series input blade
	OUTPUT	14 slots for DVI/HDMI input and output. Each card supports 4 inputs and 4 outputs	8 slots proprietary DM switcher output blade slots, hot-swappable; Each slot accepts (1) DMB-O series output blade

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
	CPU	i7 (8GB RAM, 500GB SSD) Processor or Dual Xeon E5 (8GB RAM, 500GB SSD) Processor	Accepts (1) DMB-CPU-64 CPU blade - specification unknown
Connectors – CPU			
	LAN	2 ea 10Base-T/100Base-TX/1000Base-T LAN ports, expandable using plug in expansion modules to support 4x10Gbps uplinks: Copper 10Gigabit Ethernet, 10GBASE-T, IEEE 802.3an,Gigabit Ethernet, 1000Base-T,100 Mb Ethernet: 100BASE- TX; 20 Gb/s, 2000Mb/s and 200	(1) 8-wire RJ45 female;
			10Base-T/100Base-TX/1000Base-T Ethernet port
	SERVICE	USB 2.0	(1) 8-wire RJ45 female;
			Computer console port
	STORAGE	1 500GB HDD installed 4 – 3.5" drive bays support up to eight 2.5" HDD carriers, removable and hot swap are available upon request. 1 – Slim-line device bay for optical drive media. Other drive bay configurations are available upon request.	(1) SD memory card slot;
			Accepts one SD™ or SDHC™ card up to 32 GB for memory expansion (2 GB SD card included);
			For save/load of configuration and EDID settings, and firmware update
	AUDIO OUT	Option via Audio Line Out card	(1) 5-pin 3.5mm detachable terminal block;
		Balanced/unbalanced stereo line-level output;	Balanced/unbalanced stereo line-level output;
		Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;	Output Impedance: 200 Ohms balanced, 100 Ohms unbalanced;
		Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced	Maximum Output Level: 4 Vrms balanced, 2 Vrms unbalanced
Connectors – Main Chassis			
	100-127V~50/60Hz 16A,	(2) IEC 60320 C-20 main power inlets;	(2) IEC 60320 C-20 main power inlets;
	200-240V~50/60Hz 8A	Mate with removable power cords, included	Mate with removable power cords, included
	G	(1) 6-32 screw, chassis ground lug	(1) 6-32 screw, chassis ground lug
	COMPUTER (front)	(1) USB Type B female;	(1) USB Type B female;
		USB computer console port (6 ft cable included)	USB computer console port (6 ft cable included)
Touch Screen			
		Not required. System is supported with IP	15 inch (381 mm) diagonal TFT active matrix
			Provides signal routing, video input preview,
Controls & Indicators			
	Touch Screen Hard Key	Not applicable	(1) pushbutton, not used
	POWER SUPPLIES, 1 – 2	Amber LED, indicates healthy power supply	(2) green LEDs, indicate when each corresponding supply is functioning
	POWER SUPPLIES, FAULT	LED flashes RED indicates a fault with either supply	(1) red flashing LED, indicates a fault with either supply
	HW-R	Recessed miniature pushbutton for hardware reset, reboots the switcher	(1) recessed miniature pushbutton for hardware reset, reboots the switcher
	ACT (rear, CPU)	Green LED, indicates CPU activity	(1) green LED, indicates CPU activity
	MSG (rear, CPU)	Green LED, indicates HDD activity	(1) red LED, indicates CPU has generated an error message
	CPU RESET (rear, CPU)	Recessed miniature pushbutton, reboots the CPU and front panel	(1) recessed miniature pushbutton, reboots the CPU and front panel
	LAN (rear, CPU)	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity
	SERVICE (rear, CPU)	NA	(2) LEDs, green LED indicates Ethernet link status, amber LED indicates Ethernet activity
	OK (rear, power supplies)	NA	(2) green LEDs, indicate when each corresponding supply is powered and functioning
	! (rear, power supplies)	NA	(2) amber LEDs, each indicates a fault with the corresponding supply
Power Requirements			

		RGB Spectrum Galileo GO-56-E5	**Crestron DM-MD64X64**
	Main Power	16 Amps @ 100-127 Volts AC or 8 Amps @ 200-240 Volts AC, 50/60 Hz;	16 Amps @ 100-127 Volts AC or 8 Amps @ 200-240 Volts AC, 50/60 Hz;
		Requires (2) 20 Amp @ 100-127V, or (2) 10 Amp @ 200-240V, AC circuits	Requires (2) 20 Amp @ 100-127V, or (2) 10 Amp @ 200-240V, AC circuits
Redundant Power Supplies			
	Quantity/Type	2 ea 1485W, N + 1	(2) high efficiency (>90%), hot-swappable, variable speed fan cooled, Crestron model DM-MDA-64-PWS (included)
	Demonstrated MTBF	>500,000 hours per power supply	>500,000 hours per power supply
	Redundancy	Complete unit continues to operate at full capacity on one or more functioning power supplies	Complete unit continues to operate at full capacity on one or more functioning power supplies
Environmental			
	Temperature	32° to 104°F (0° to 40°C)	32° to 104°F (0° to 40°C)
	Humidity	10% to 90% RH (non-condensing)	10% to 90% RH (non-condensing)
	Heat Dissipation	TBD	5460 BTU/hr maximum, 3000 BTU/hr typical, with all blade slots occupied
Enclosure			
	Chassis	Metal with black finish, integrated rack ears, vented sides and rear, fan-cooled	Metal with black finish, integrated rack ears, vented sides and rear, fan-cooled
	Faceplate	Metal, black finish	Metal, black finish with polycarbonate label overlay, plastic touch screen bezel
	Mounting	5U 19-inch rack mountable	14U 19-inch rack-mountable (rack ears built in)
Dimensions			
	Height	8.75 in	24.44 in (621 mm)
	Width	19 in	19.00 in (483 mm)
	Depth	23 in	16.26 in (413 mm) without I/O blades
Weight			
		34.8 lbs without I/O cards	49.0 lb (22.3 kg) without I/O blades

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
Main Chassis		
CPU Board		
Processor		
	i7 (8GB RAM, 500GB SSD) Processor or Dual Xeon E5 (8GB RAM, 500GB SSD) Processor	2 Intel Quad Core Xeons
System memory		
	8GB RAM; Optional 16, 32, 64GB	FC8000 & FC4000: 8GB RAM; Optional 16, 32, 64GB
Expansion slots		
	14 PCI Express 2.0 x 16 lane slots, 3 PCI Express 2.0 x 1 lane slots. 10 Slot expansion chassis expected Q1 2014	FC4000: 16 PCI Express 2.0 x4 slots (48 max with two 16-slot FC4000 Expansion Chassis)
PCI Express 2.0 Switch		
	Non-blocking architecture, PCI Express 2.0 16 lane. PCI Express 3.0 expected Q1 2014	Non-blocking architecture, PCI Express 2.0
Disk Storage		
Hard disk		
	1 500GB HDD installed 4 – 3.5" drive bays support up to eight 2.5" HDD carriers, removable and hot swap are available upon request. 1 – Slim-line device bay for optical drive media. Other drive bay configurations are available upon request.	FC4000: 2 hot-swap 500GB HDD, RAID 1 (3rd drive, RAID 5, 256GB SSD optional)
Optical Storage		
	DVD-RW/CD-RW optional on request	DVD-RW/CD-RW
Network Interface		
Ethernet		
	10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web server for remote configuration and operation	Dual 10/100/1000 Mbps RJ45 ports; more optional
Input Devices (USB)		
	USB 2.0 and 3.0	FC1000 & FC4000: Wired 104-key keyboard & mouse
Touch Panel Support	Not required. System is supported with IP based control software as well as user interface on wall which can be used for configuration	
IP control protocols		
Connection to External Chassis		
	10 Slot expansion chassis expected Q1 2014	FC4000: 2 x8 slots for links to Expansion Chassis
PCI Express Input		
	16-lane PCI Express 2.0 inter-chassis connection	16-lane PCI Express 2.0 inter-chassis connection
Expansion slots		
	14 PCI Express 2.0 x 16 lane slots, 3 PCI Express 2.0 x 1 lane slots. 10 Slot expansion chassis expected Q1 2014	20 slots in each Switch Fabric Chassis
Graphis Input		

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
	Plug in blades supporting 56 DVI/HDMI/Display Port, plus 48 inputs of Analog Compsite BNC, plus IP inputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	Dual-Link DVI-I Input Card
Graphics memory		
	2 GB Per Card, Shares between Input and Output	256 MB per card
Output channels supported		
	56 in base chassis, 40 in expansion chassis.	FC4000: Up to 96
Resolution		
Input	1920x1200 @ 60 Hz (SL-DVI, RGB/VGA) 2048x1536 @ 47 Hz (RGB/VGA) 2560x1600 @ 30 Hz (SL-DVI) 1920x1080i (Component) NTSC/PAL/SECAM (S-Video, Composite)	Digital: 640x480 to 2560x1600 pixels per output Analog: 640x480 to 2048x1536 pixels per output
Output	2048x1152 @ 60 Hz (SL-DVI) 2048x1536 @ 60 Hz (RGB/VGA)	Match to input
	Custom output modes possible in both analog and digital	Custom output modes possible in both analog and digital
Color Depth		
	24 bits per pixel	32 bits per pixel
Output signal		
	Plug in blades supporting 56 DVI/HDMI, plus IP outputs 10Gbps Ethernet, plus VDA remote control desktops, plus MS Windows Application Support. Fiber and HDBaseT support through transceivers	DVI-I connector (supports single-link and dual-link DVI, and analog VGA with adapter)
		Dual DVI/RGB/HD Input Card (Optional)
Input channels supported		
	56 HDMI/DVI in base chassis, 40 in expansion chassis. 48 analog channels in base chassis	FC4000: Up to 94
Format		
	Dual-Link DVI up to 2560x1600, Single-Link DVI up to 2048x1200, progressive scan component HD (480p, 720p, 1080p), and analog RGB with any sync type (composite, separate, sync on green) up to 2048x1200	Dual-Link DVI up to 2560x1600, Single-Link DVI up to 2048x1200, progressive scan component HD (480p, 720p, 1080p), and analog RGB with any sync type (composite, separate, sync on green) up to 2048x1200
Pixel rate		
	165 MHz	Digital: Up to 270 MHz
		Analog: Up to 210 MHz
Pixel format		
	24 bits per pixel	32 bits per pixel
Windows		
	Unlimited destinations per card	4 destination windows per card
Octal SD Video Input Card (Optional)		
Input channels supported		
	Up to 272 in base chassis	FC4000: Up to 328

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
Input format		
	NTSC, PAL	NTSC, PAL
Windows		
	Unlimited destinations per card	16 destination windows per card
Octal Video Connection Module		
	BNC-F connectors support S-Video or Composite	Dual BNC-F connectors support S-Video or Composite on 1RU 19” rackmount panel with 2 BNC sub-panels
	No subpanel required	Each sub-panel has 16 BNC connectors for 8 Composite or 8 S-video signals
Quad HD Decoder Input Card (Optional)		
	Integrated HD and SD video decoding on processor board	Integrated HD & SD video decoding
	2 ea 10Base-T/100Base-TX/1000Base-T LAN ports, expandable using plug in expansion modules to support 4x10Gbps uplinks: Copper 10Gigabit Ethernet, 10GBASE-T, IEEE 802.3an,Gigabit Ethernet, 1000Base-T,100 Mb Ethernet: 100BASE- TX; 20 Gb/s, 2000Mb/s and 200 Mb/s in full duplex mode per port. Automatic bypass on failure: 3,276,800 mSec (3,276.8 Sec): Maximum 100 mSec (0.1 Sec) : Minimum WDT Interval = (2^wdt_interval_parameter)*(0.1) sec. wdt_interval_parameter: { Valid Range: 0-15}	4 GigE connections, 1 per decoder
	Decodes H.264, MJPEG, MPEG-2, H.265 over RTP, RTSP, HTTP. Support ONVIF	Supports most popular IP cameras and encoders
	Supports hi res, real-time decoding of computer streams	Supports hi res, real-time decoding of computer streams
Input channels supported		
	Up to 480 SD streams (total decode capacity is 16x1080p30)	FC4000: Up to 164, HD or SD streams
CatalystLink Input Card (Optional)		
	NA	For PixelNet integration
	NA	Each CatalystLink card features 4 PixelNet ports and supports up to 8 PixelNet Input Nodes
	NA	Support for most PixelNet input types
	NA	4 destination windows per card
Other		
Rackmount Chassis		
Dimensions	8.75 in x 19 in x 23 in	7” H x 19” W x 22” D (17.8 cm x 48.3 cm x 55.9 cm)
Weight		
	34.8 lbs without I/O cards	51 lbs. (23.1 kg.)
Shipping weight		
	60 lbs	All chassis: 72 lbs. (32.7 kg.)
Operating Range		
Temperature		

	RGB Spectrum Galileo GO-56-E5	**Jupiter Fusion Catalyst 4000**
	Operating: 32°F – 104°F (0°C – 40°C)	Operating: 32°F – 104°F (0°C – 40°C)
	Non-operating: 14°F – 150°F (-10°C – 66°C)	Non-operating: 14°F – 150°F (-10°C – 66°C)
Humidity		
	10-90% non-condensing	10-90% non-condensing
Altitude		
	Up to 10,000 feet (3,048.0 m)	Up to 10,000 feet (3,048.0 m)
Electrical Requirements		
Input voltage		
	100-240 VAC, auto-ranging power supply	100-240 VAC, auto-ranging power supply
Line frequency		
	50-60 Hz	50-60 Hz
Power consumption		
	1485 W per chassis	FC8000 & FC4000: 600 Watts, maximum per chassis
Regulatory		
United States		
	UL 60950 listed, FCC Class A	UL 60950 listed, FCC Class A
Canada		
	cUL CSA C22.2, No. 60950	cUL CSA C22.2, No. 60950
International		
	CE Mark, CB Certificate and Mark, IEC 60950, CCC, VCCI	CE Mark, CB Certificate and Mark, IEC 60950, CCC, VCCI

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHTS OF LIGHTING FIXTURES AND SWITCHES WITH TJPA REPRESENTATIVE. ARCHITECTURAL DRAWINGS TAKE PRECEDENCE OVER ENGINEERING DOCUMENTS FOR EXACT LOCATIONS, MOUNTING HEIGHTS, FINISHES AND SUSPENSION LENGTHS OF ALL ELECTRICAL EQUIPMENT AND DEVICES, LIGHT FIXTURES AND SWITCHES.

B. PROVIDE CONDUIT AND WIRE FOR COMPLETE SYSTEM PER CIRCUITING AND SWITCHING SHOWN.

SHEET NOTES CON'T.

C. FIELD COORDINATE EXACT ROUTING OF ALL FEEDERS AND BRANCH CIRCUITS.

D. MOUNT ALL REMOTE TRANSFORMERS, BALLASTS, DRIVERS, ETC. ABOVE CEILING IN ACCESSIBLE LOCATION. REFER TO ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS FOR CEILING ACCESS LOCATIONS. WIRE ALL TRANSFORMERS, BALLASTS, DRIVERS, ETC. PER MANUFACTURER'S RECOMMENDATION.

E. COORDINATE WORK WITH RELATED TRADES TO ALLOW THE WORK OF RELATED TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE CONFLICT OR DELAY.

SHEET E1-4404

SHEET NOTES CON'T.

F. WHEREVER WORK INTERCONNECTS WITH WORK OF OTHER TRADES, COORDINATE WITH OTHER TRADES TO INSURE THAT THEY HAVE THE INFORMATION NECESSARY SO THAT THEY MAY PROPERLY INSTALL THE NECESSARY CONNECTIONS AND EQUIPMENT.

G. CONNECT ALL SWITCHED NORMAL CIRCUITS TO LRC-2-B-1.

H. CONNECT ALL NORMAL 277V DIMMED CIRCUITS TO DMH-2-B-1, UON.

SHEET NOTES CON'T.

I. CONNECT ALL NORMAL 120V DIMMED CIRCUITS TO DML-2-B-1, UON.

J. CONNECT ALL EMERGENCY 277V DIMMED AND SWITCHED CIRCUITS TO EDMH-1-C-EMG LOCATED IN ELEC RM 01421, UON. (D)

K. PROVIDE UNSWITCHED "HOT" LEG TO ALL ILLUMINATED EXIT SIGN AND NIGHT LIGHT "NL" FIXTURES. CONNECT TO NEAREST ADJACENT EM CIRCUIT, UON.

L. REFER TO SHEET E1-4001 FOR CIRCUITING ORIENTATION PLAN.

NUMBERED NOTES

(1) PROVIDE FIXTURE WITH INTEGRAL BATTERY PACK 90-MINUTE MINIMUM RUN TIME.

(2) LOCATE LOCKABLE SWITCH +48" ABOVE LOWEST LANDING FLOOR LEVEL NEXT TO THE ACCESS LADDER. COORDINATE EXACT LOCATION WITH ELEVATOR MANUFACTURER PRIOR TO ROUGH-IN.

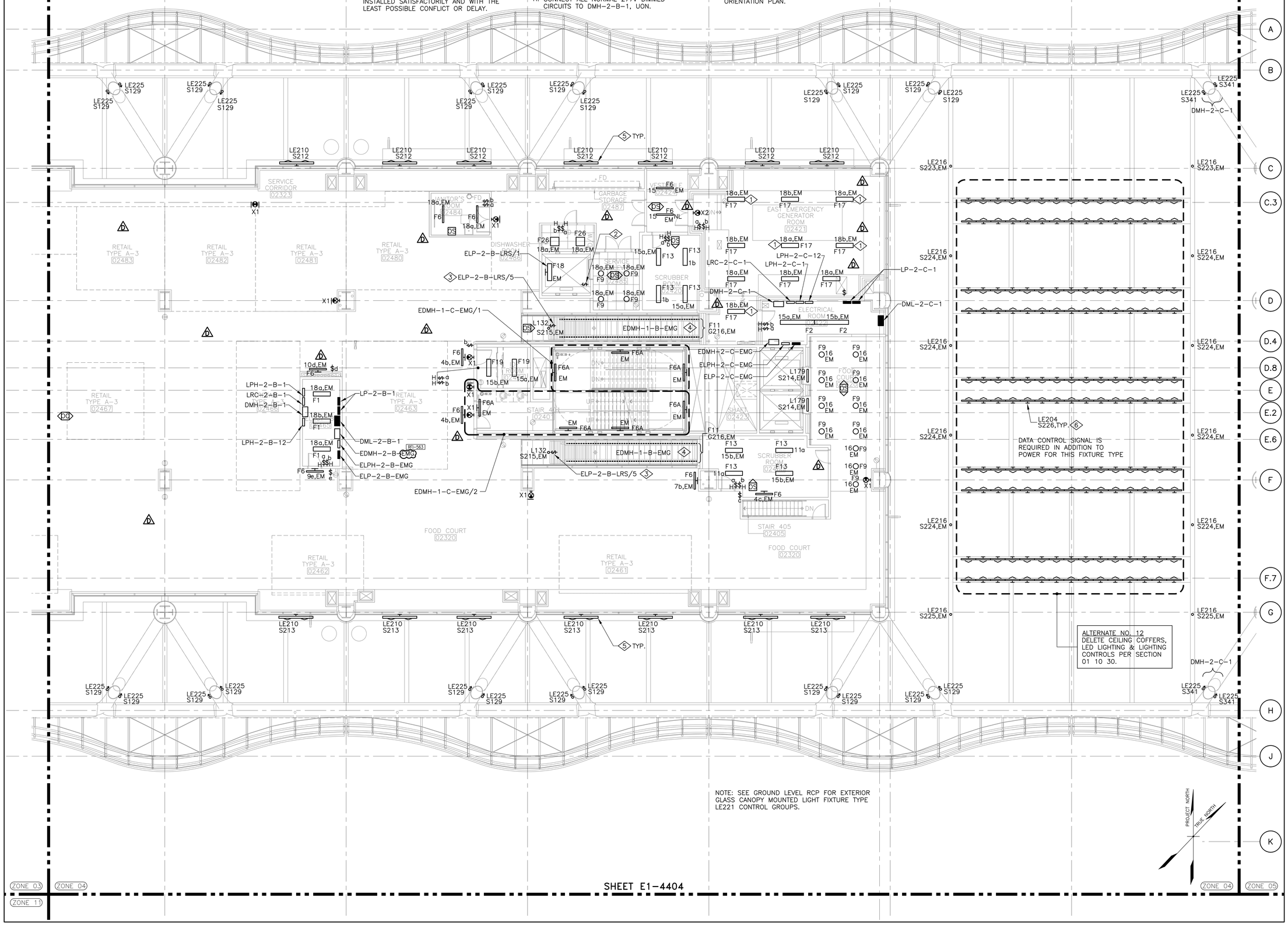
(3) POWER DISCONNECT TO ESCALATOR LIGHT AND RECEPTACLE. COORDINATE MOUNTING WITH ESCALATOR MANUFACTURER PRIOR TO ROUGH-IN.

NUMBERED NOTES CON'T.

(4) CONNECT ALL ESCALATOR HANDRAIL LIGHTS TO CIRCUIT INDICATED. REFER TO SHEET E1-4404 FOR CONTINUATION OF CIRCUIT.

(5) COORDINATE WORK WITH DESIGN/BUILD GLAZING SYSTEM SCOPE OF WORK, UON.

(6) CONNECT TO LRC-2-C-1. LOCATE LED DRIVERS IN ELEC RM 02422.



2 / E1-2001 SECOND LEVEL ZONE 04 LIGHTING PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID – ADDENDUM #2	CFH
4	04/23/14	ISSUED FOR BID – ADDENDUM #3	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
SECOND LEVEL
ZONE 04 LIGHTING PLAN

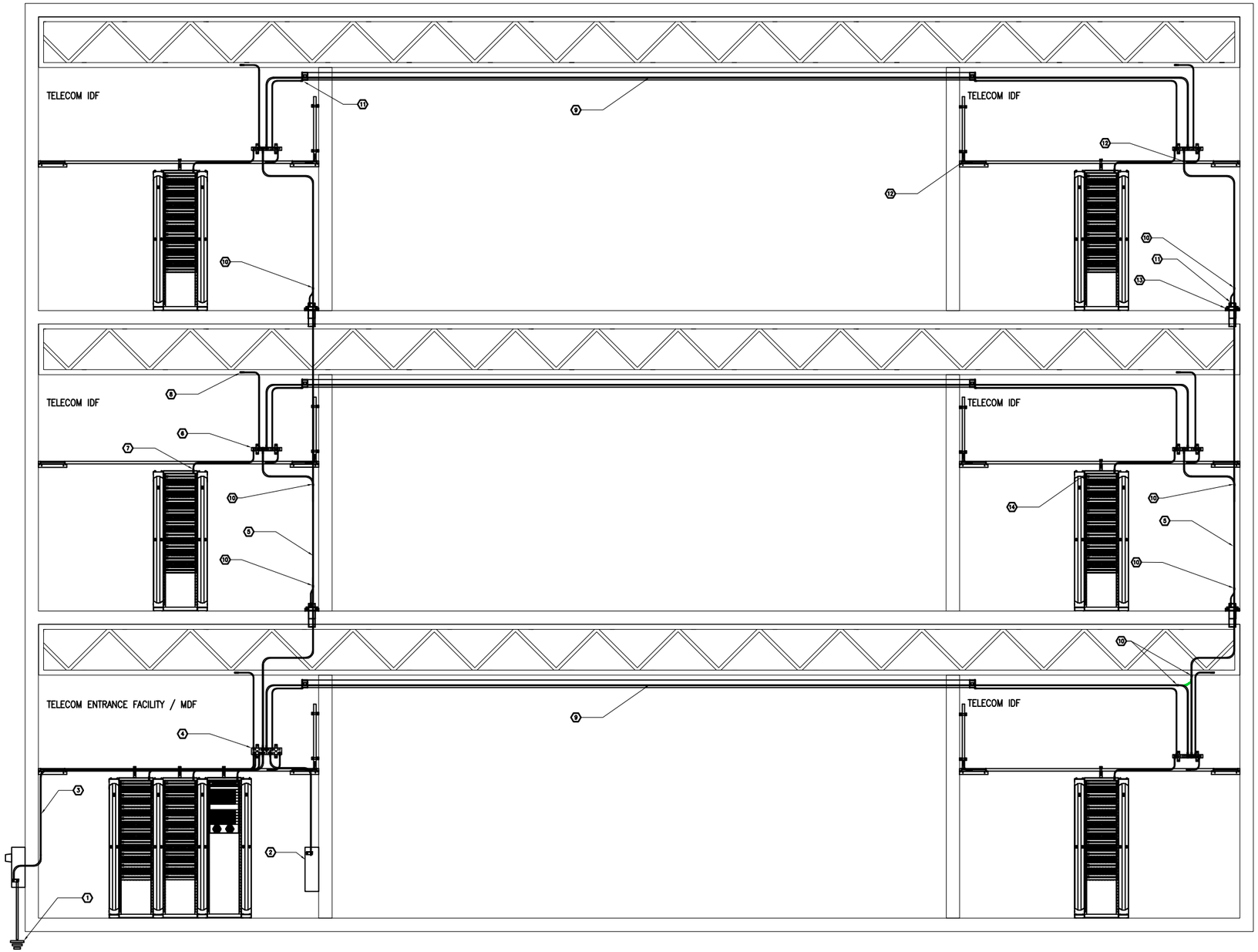
ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E 20360
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: L. SERRANO
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 04/23/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: D
SHEET NUMBER: SKE-TG10.4-RFI-563
SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

XREFS: XAGRID.dwg\ XAGRID-96.dwg\ XAZONES.dwg\ XAFLR02PH1.dwg\ XERCP02PH1.dwg\ XARCP02PH1.dwg\ TJPA-TB 34x44E.dwg\ CFH-STAMP.dwg



TELECOM KEY NOTES:

1. BUILDING GROUNDING ELECTRODE
2. PRIMARY PROTECTOR
3. BONDING CONDUCTOR FOR TELECOMMUNICATIONS (BCT)
4. TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TMGB)
5. TELECOMMUNICATION BONDING BACKBONE (TBB)
6. TELECOMMUNICATIONS GROUNDING BUSBAR (TGB)
7. TELECOMMUNICATIONS EQUUIPMENT BONDING CONDUCTOR (TEBC) TO RACK
8. BUILDING STEEL BONDING CONNECTION (TYP)
9. GROUNDING EQUALIZER – FIRST, TOP, AND EVERY THIRD FLOOR
10. IRREVERSIBLE C–TYPE COMPRESSION TAP CONNECTION TO TBB (TYP)
11. BONDING CONDUCTOR CONNECTION TO PATHWAY (TYP)
12. BONDING METALLIC COMPONENTS (TYP)
13. EZ–PATH FIRE RATED PATHWAY (TYP)
13. STAR WASHER TO BOND COMPONENTS TO RACK (TYP)

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33 NEW MONTGOMERY STREET, SAN FRANCISCO, CA 94105
TEL: 415–391–7610 FAX: 415–391–0171

PROJECT:
TRANSBAY TRANSIT CENTER

TITLE:
TELECOM BONDING AND GROUND INFRASTRUCTURE

DRAWN BY:	RA
SCALE:	NTS
DATE:	9/9/2014
JOB NO.	08285
SHEET NO.	TSK-0047

TG10.4 – Electrical, Communications, Security and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-478	8/20/2014	ES-2223, ES-2224, & ES-2225		Drawings ES-2223, ES-2224, & ES-2225 all have sheet note 10 attached to the secondary cables. Sheet note 10 states, "Secondary cables...shall be provided by TJPA." Please confirm the routing of the secondary cables, furnished by others, and the termination of those cables and cable supports to SFPUC's utility transformer is by TJPA and/or AFPUC.	There is no scope of work for the TG10.4 Trade Subcontractor on drawings ES-2223, ES-2224, and ES-2225. These drawings will be removed from the ES Drawings. Please refer to revised Field Order No. T-00029R1 (to be issued with Addendum #8) for updated list of included ES drawings.
TG10.4-481	8/20/2014		General	What will constitute substantial completion? Is TG10.4 completion of the base contract and proof of their working systems considered substantial completion? On the systems side this is an expensive part of the manufacturers cost being passed onto the contractor so in evaluating cost and risk they are requesting guidance on a time frame and also how the 1.5 pending contract may extend the start date for substantial completion.	Substantial Completion(s) is defined in Specification Sections 00 07 00, 01 17 00, 01 17 40 and 01 91 00 and will only include base contract work as bid under the TG10.4 package. The earliest Substantial Completion(s) may occur is the 3rd quarter 2017, depending on when areas are tested, inspected, punched and accepted by the TJPA per specified terms. Phase 1.5 is not considered relevant for Substantial Completion of the base bid scope of work at this time.
TG10.4-496	8/21/2014	SE1-2250		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-497	8/21/2014	SE1-3700		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-502	8/21/2014	SE1-6000, SE1-6001	Para: 2.1,A,5. 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-508	8/21/2014	SE-2000,SE1-2000-SE1-0050	28 13 00	Substitution Request for Access Control System. Is it acceptable to substitute Lenel Access Control System with JCI P2000 Access Control System. Please see the attached substitution form and product data for the same.	It is our understanding that a Johnson Controls P2000 installation of this nature can only be installed and serviced by Johnson Controls, which limits competitive initial pricing as well as alternatives for future service contracts. Installation and service must meet requirements. We also understand that the nearest Johnson Controls office is in San Diego, CA. The TG10.4 Trade Subcontractor must meet the installation, service and response requirements listed in Specification Section 28 13 00, paragraph 1.6.A. From the nature of previous QBDs, it seems that the P2000 may require additional IP connectivity over what is currently in the design. If the proposed substitution requires additional IP connectivity, costs and installation shall be the responsibility of the TG10.4 Trade Subcontractor . TG10.4 Trade Subcontractor must identify substitution effects on other parts of the work.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-534	8/25/2014		General	We have recently been notified of an Addendum 6 of which we have not yet received the 3 packages of ASI drawings. With that in mind we would like to request a 2 - 3 week bid extension in order to review and make QBD clarifications on the pending package.	Please see TG10.4 Addendum # 7 for the revised QBD and Bid dates.
TG10.4-538	8/26/2014		ASI 118 drawings	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-542	8/26/2014		28 13 00, page 14 : Access Control	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-547	8/28/2014	E1-2502 and E1-2503		On the Bus Deck level we have Sheet Notes C. "ALL ELECTRICAL EQUIPMENT INSTALLED OUTSIDE ROOMS SHALL BE WEATHERPROOF AND RECEPTACLES SHALL BE GFI STYLE." 1) Does "EQUIPMENT" include Fire Alarm Devices as Weatherproof? Example, Visual Alarms, (FSD's), Smoke Detectors, and Heat Detectors? 2) Should this sheet note be on the other bus deck level enlarged plans, E1-2504, 2505, 2506 and 2507.	1) "Equipment" shall include all fire alarm devices that can be manufactured as weatherproof. This includes visual alarms and heat detectors. 2) Yes, refer to attached sketches: SKE-RFI-TG10.4-547-1, SKE-RFI-TG10.4-547-2, SKE-RFI-TG10.4-547-3, and SKE-RFI-TG10.4-547-4.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-549	8/29/2014		ASI 120-125	1) Exhibit A refers to ASI 117-119 multiple times for scope modifications. 2) With the recent release of ASI 120-125 but no mention of them for scope modifications in Addendum 6 Exhibit A, is the bidder to assume that the most updated ASI drawing/documents supersede all previous revisions of the bid package? If so, many of the ASI drawings do not clearly indicate which revision they are and which drawing sheet they are replacing beyond the bidder matching up drawing sheet titles. 3) With the amount of changes on the project and changes via ASI and addenda, bidder requests a conformed set of drawings.	1) Confirmed. 2) All documentation issued through ASIs represents the most current state of each sheet, with the most current sheet superseding all previous issues. For example, sheet A1-2305 issued with ASI-0125 would supersede all sheets numbered A1-2305, requiring no additional matching of the titles. However, all Secondary Mitigation VE items have been documented as redlined mark-ups, and issued as sketches in ASI-0119, dated 07/02/2014, ASI-0122, dated 07/23/2014 and ASI-0124, dated 08/18/2014. These sketches, all bearing their own identifiable numbers are clearly correlated to the sheet that they intend to supplement (and not supersede), again not requiring matching of titles. All drawing sheets issued through ASIs clearly indicate revisions through revision index, revision clouding and the revision narrative. All Secondary Mitigation VE sketches are accompanied with a revision narrative, clearly identifying the intended changes. 3) Delivery of a conformed set of drawings incorporating all Secondary Mitigation VE items is scheduled for December 2014. Until all Secondary Mitigation and Alternates have been consolidated into an updated set, a completed conformed set of drawings will not be available.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-552	8/29/2014		00.05.20 & 00.05.20A	Please verify for the following permits as they apply to TG10.4: Description Required Reimburseable 1) Electrical Permit 2) Fire Alarm Permit 3) AQM Permit(Generator) 4) SFPUC Permit 5) Excavation Permit 6) Caltrans	All permits noted in the question are required except for Caltrans. The SFPUC permit will require a DPW permit (SFPUC will not directly issue permits) for offsite street work but all permits noted are reimbursable.
TG10.4-553	8/29/2014	E1-4000 & 2000 Drwgs		Confirm that TG10.4 has no work on the Restaurant Terrace Level other than the elevator machine room lighting on E1-4652.	Correct. Per Addendum #4 drawing dated 6/20/2014 all lighting except the machine room and a few fixtures by the egress stairs is Not In Contract (NIC).
TG10.4-554	8/29/2014		Project Bidding Manual 20&29 of 50, Inspections and Testing, #7. a.	Confirm and/or clarify the intent of the inspection process in that rough-in of electrical requires 4 inspections, trim out & finish will require 4 inspections, testing will require 4 inspections and then the final totaling 13 inspections to meet document requirements. Then once this is completed a commissioning process will be implemented. Please clarify this process because as it stands it has a tremendous impact on cost of work.	The Project Bidding Manual (PBM) states to assume a minimum of 4 inspections. Each Trade Subcontractor must determine the number of inspections based upon its own industry standards, agency requirements and special inspections as required and/or specified. As a general rule, the PBM does not supersede specified or agency requirements; it is a suggested requirement when specified inspection and testing requirements are unclear or unknown.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-555	8/29/2014		Exhibit "F", "Cost & Productivity Data, Modeling Specification "	Confirm that BIM 4D & 5D are not required for this project. If so please remove references to the 4D & 5D modeling on page 3 of 8 under Cost and Productivity Data along with the references in Modeling Specification on page 6 of 8.	Please see Exhibit F Rev. 2 dated 08/22/2014. 4D and 5D requirements were deleted.
TG10.4-556	8/29/2014		Project Bidding Manual (35 of 50)	States "...schedule activities shown may change sequence and start plus or minus 90 calendar days...". This is a significant swing in schedule that will result in a major impact to labor, equipment delivery and installation and material orders. To minimize cost impact to this proposal consider reducing this to 30 calendar days. There is also a significant amount of equipment and lighting on this that will be affected by the +/- 90 days that will result in higher costs by manufacturer's covering warranty risks.	Due to the size and complexity of the project 90 days was deemed appropriate for re-sequencing where and when necessary. As for warranties, all warranties will start near or at the project scheduled completion. Warranties may be initiated earlier depending on the date of Substantial Completion but the +/- 90 day schedule shift within the project timeline should have no bearing on final warranty coverage.
TG10.4-557	8/29/2014		TG18.1	Please make available for coordination with bid package TG10.4 the submittals for bid package TG18.1 Bus Ramp; Division 27 and 28.	Many TG18.1 submittals are currently in process and are not available prior to TG10.4 bidding. Therefore, submittals will be made available post award of the TG10.4 package.
TG10.4-558	8/29/2014		Exhibit A, Temporary Power, SL-001	Per the site logistics plan there are 4 material/manlift hoists for this project; 1) How many of them have power to date? 2) Exhibit A states for this trade subcontractor to provide OSHA compliant lighting only for the train platform and lower concourse, other then that on the upper levels temp lighting for enclosed areas. Confirm this is correct if not please provide other requirements for the upper levels.	1) Hoist #'s 2, 3 & 4 are currently energized. Hoist #1 is scheduled to be energized in November 2014 prior to the time the TG10.4 package bids. 2) OSHA lighting standards apply throughout the entire project. Please see Addendum #7, Exhibit A, page 12.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-568	8/29/2014	E1-2502 & E1-5001 Detail: FCP		Fountain Control Panels (FCP) are shown on the plan view drawings (Ref. E1-2502) and the single line drawings (Ref. E1-5001). If the controls, pumps, and solenoids on the load side of the FCP, are to be included in Bid Package TG10.4, please provide complete electrical engineered drawings for pricing.	Connection of fountain control panels and equipment were deleted from the TG10.4 package in Addendum #4. The scope is limited to providing power and data to the fountain pump rooms as shown in preparation of future fountain system installation.
TG10.4-571	8/29/2014	E1-3201 Detail: 1 & 2 and Num. Note 4		Details 1 & 2 on drawing E1-3201 show bus duct feeds from PG&E vaults to switchboards marked with "Numbered Note" 4 which specifies that these "dual supply" feeds are not required for an alternate PG&E service. Is PG&E providing 2 circuits so that we don't need dual feeds?	This note has been modified. Please refer to ASI-118 (Addendum #4) for the updated note.
TG10.4-574	8/29/2014		Division 1	Are the sub-primes responsible for paying any utility usage fees on this project? If so, provide which usage fees they will be responsible for?	The TG10.4 Trade Subcontractor is only responsible for temp water usage and any power usage beyond small tools, safety lighting and distributed power to other trades.
TG10.4-575	8/29/2014		13 12 15	Is the Electrical/Control Contractor mentioned in this specification the same as the TG10.4 contractor?	Yes, the Electrical/Control Contractor mentioned in this specification section is the TG10.4 Trade Subcontractor; however, the Water Feature Electrical scope was deleted from the TG10.4 package (see Addendum #4). All that is required of the TG10.4 package is setting panels, J-boxes and stub-ins for future power and data in empty water feature pumps rooms as currently shown in the Contract Documents.
TG10.4-576	8/29/2014	E1-3201 Detail : 1 & 2 and Num. Note 4		Details 1 & 2 on drawing E1-3201 show bus duct feeds from PG&E vaults to switchboards marked with "Numbered Note" 4 which specifies that the electrical contractor is to provide cable feeders to the tap boxes. Is the intent of Numbered Note 4 that the electrical contractor is to provide and terminate the cable feeders at the bus duct tap boxes and the PG&E switchgear?	This note has been modified. Please refer to ASI-118 (Addendum #4) for the updated note.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-578	8/29/2014	E1-3201, Detail: 1 & 2 and Num. Note 4		Details 1 & 2 on drawing E1-3201 show bus duct feeds from PG&E vaults to switchboards marked with "Numbered Note" 4 which refers the TG10.4 Trade Subcontractor to an "Alternate Riser Diagram". 1. Is this an alternate? 2. If so, how should this be handled? 3. Please provide the "Alternate Riser Diagram".	This note has been modified. Please refer to ASI-118 (Addendum #4) for the updated note.
TG10.4-579	8/29/2014	TE1 Drawings		TE1 drawings show DAS devices; is the TG10.4 Trade Subcontractor to provide cable, devices equipment for a complete DAS system? If so please provide cable and equipment specifications including the provider's and user's requirements.	The DAS as shown on TE1 drawings will not be bid as part of the TG10.4 package. Only infrastructure pathways should be included. DAS system, cables, equipment specifications and user requirements will either be bid under a separate package or added to an existing contract via change order in the near future.
TG10.4-583	9/3/2014	A1-7848A	Exhibit A/Sect 01 10 30APD Paragraph(s): D.1.10 Additive Spec Alt #19	1. Can you direct us to the written specification that describes the Audio Visual System (AV) for Roof Park Amphitheater?	The AV system for the Roof Park areas is deleted, refer to Addendum #4. The only requirement for AV is to stub conduit from the associated IDF room into the open Roof Park space for future installation.
TG10.4-584	9/3/2014	A1-7848A	Exhibit A/Sect 01 10 30APD Paragraph(s): D.1.10 Additive Spec Alt #20	1. Can you direct us to the written specification that describes the Audio Visual System for Grand Hall?	The written specification for the AV System is Specification Section 27 51 16 Public Address and Paging Systems.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-585	9/3/2014		28 23 00 Video Surveillance, Paragraph(s) : 2.1.G.7.f	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-589	9/5/2014		28 23 00	Regarding Video Analytics, do they need to be edge based or server based?	Please refer to Specification Section 28 23 00, paragraph 2.2 for server based analytic requirements. Please refer to Specification Section 28 23 00, paragraph 2.4 for camera resident analytic requirements.
TG10.4-592	9/5/2014	ES-2223, 2224,& 2225		Who's providing the power transformer and vacuum fault interrupter as shown on drawings ES-2223, ES-2224, and ES-2225?	SFPUC is providing the power transformer and vacuum fault interrupter.
TG10.4-593	9/5/2014	ES-2108, ES-2109, ES-2110, ES-2111, & ES-2112		Per the drawing numbered note, it states to provide extra loop of 12KV and communication conductors in each manhole. These conductors are usually provided by the Utility. Are we to assume providing all 12KV cables?	All conductors for electrical service will be installed by the service provider. The TG10.4 Trade Subcontractor is not responsible for 12kV loops.
TG10.4-594	9/5/2014	ES-2223		Per drawing ES-2223, sheet note number 1 reference drawings ES-0011 and ES-0110. These drawings are not included in Addenda #4 package. Please provide these drawings, as they are required for notes, and conduit and cable schedules.	There is no scope of work for the TG10.4 Trade Subcontractor on drawing ES-2223. Please refer to revised Field Order No. T-00029R1 (to be issued with Addendum #8) for updated list of included ES drawings.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-597	9/5/2014	S1-3500, Detail:#1 & #2	Exhibit A, General Information-Supplemental Ins	1) Exhibit A implies that embeds are being installed in the TG06 package; are embeds being installed? 2) We assume that this is for conduit racks to be hung from the bottom side of the lower concourse in the train platform area? 3) If not how are the racks to be supported when the concrete reinforcement only allows for drilling anchors to a depth of 3/4" that will not provide adequate support?	1) No embeds for the TG10.4 Trade Subcontractor will be installed by the TG06 Trade Subcontractor. 2) The TG06 Trade Subcontractor is NOT installing embeds specifically for conduit racks within the underside of the Lower Concourse deck. 3) Post anchoring shall conform with requirements as set forth in the structural design documents, in particular see sheet S-0008.
TG10.4-598	9/5/2014	S1-3500, Detail:#1 & #2	Exhibit A, General Information-Supplemental Ins	Exhibit A implies that embeds are being installed in the TG06 package, then Exhibit A goes on to say that this Trade Subcontractor will assume no prior embeds for horizontal systems; what embeds are being installed in the TG06 package that are a benefit to the TG10.4 package?	The TG06 Trade Subcontractor is installing sleeves 4" in diameter and greater and associated framing for sump basins as shown in the Contract Documents and items requiring installation prior to TG10.4 package bid award.
TG10.4-599	9/5/2014	S1-3500, Detail:#1 & #2	Exhibit A, General Information-Supplemental Ins	The detail shows the rebar being installed to within 3/4" of concrete slab surface, this is not enough to provide for proper anchoring of devices, equipment and conduit. Exhibit A goes on to imply that to avoid drilling into the reinforcements that the TG10.4 Trade Subcontractor will need to test and scan, then provide a report before installing the anchors. This will have a tremendous schedule and cost impact having to scan locations, file a report and wait for approval before proceeding with the install of what will be thousands of anchors. Please provide a viable alternative for supports and anchoring.	Beyond the post installed anchoring directives within the Contract Documents, in particular sheet S-0008, there are no alternatives to post anchoring procedures at this time.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-610	9/8/2014		Floor Plan Drawings	Floor plan drawings contain a total of 10 ECP (Elevator Control Panel) callouts, but only 4 AC5 (elevator biometric reader) callouts. An ECP should not be necessary unless the elevator car is to be controlled by the biometric reader. Please confirm that there should be a total of 10 AC5 callouts.	ECP's are only required in the four locations where elevator cars are to be controlled by biometric reader. The number of AC5 callouts is accurate on the floorplans.
TG10.4-613	9/16/2014		Project Bidding Manual	The PBM states that the CM/GC will provide a roof top crane for hoisting, this implies that a crane will be on site for hoisting equipment to facilitate placement in the Transit Center. In review of Schedule I the crane on the roof will not be available until later, after the roof deck is poured and the crane rail system is installed. Also to be taken into account there is only one major opening from the roof to the lower concourse. 1) Will there be another crane source? 2) Is there a heavy equipment access plan? 3) Will there be openings in the steel structure for access?	1) No, there is no other crane source provided by the CM/GC. 2) Outside of current logistic plans there is no heavy equipment access plan; these will require development once the TG10.4 package is awarded. 3) Other than the manhoist openings there are no other temporary structural steel openings currently being planned.
TG10.4-614	9/16/2014		Exhibit "I" Schedule	In order to finalize labor and general condition costs please provide an updated Exhibit I (Schedule).	A revised Exhibit I will be issued in the upcoming Addendum#8.
TG10.4-615	9/16/2014	ES-2110		From the Type 7 Manhole shown on First Street that sheet note #3 references; who is responsible for the continuation of the ductbank extending from this manhole to the south? If the TG10.4 is responsible for this ductbank extending south of the manhole past where it is abruptly cut off please provide ductbank details and where this Utility is to terminate.	PG&E is responsible for installing the 12kV source power duct bank into the EMH. The TG10.4 Trade Subcontractor is only responsible for EMH installation, everything downstream of the EMH, and coordination with PG&E for 12kV installation through and within the EMH.

TG10.4-547

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

C. ALL ELECTRICAL EQUIPMENT INSTALLED OUTSIDE ROOMS SHALL BE WEATHERPROOF AND RECEPTACLES SHALL BE GFI STYLE.

RFI-TG10.4-547

NUMBERED NOTES

1. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL FOR ACCESS TO PULLBOX.
2. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL ADJACENT TO ELECTRICAL ROOM FOR ACCESS TO CONDUITS.
3. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03480. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.

SHEET E1-2504

NUMBERED NOTES CON'T.

4. PROVIDE RECEPTACLE IN CEILING FOR CONNECTION TO BIRD-SHOCK FLEX-TRACK 120V PLUG-IN CHARGER. PLUG-IN CHARGER TO CONTROL FLEX-TRACK INSTALLED ON ROOF PARK LEVEL, GFCR CLADDING ON BUS DECK LEVEL AND STRUTS ON BUS DECK LEVEL.
5. PROVIDE 120V HARDWIRED CONNECTION TO ELECTRIC DRYER.

NUMBERED NOTES CON'T.

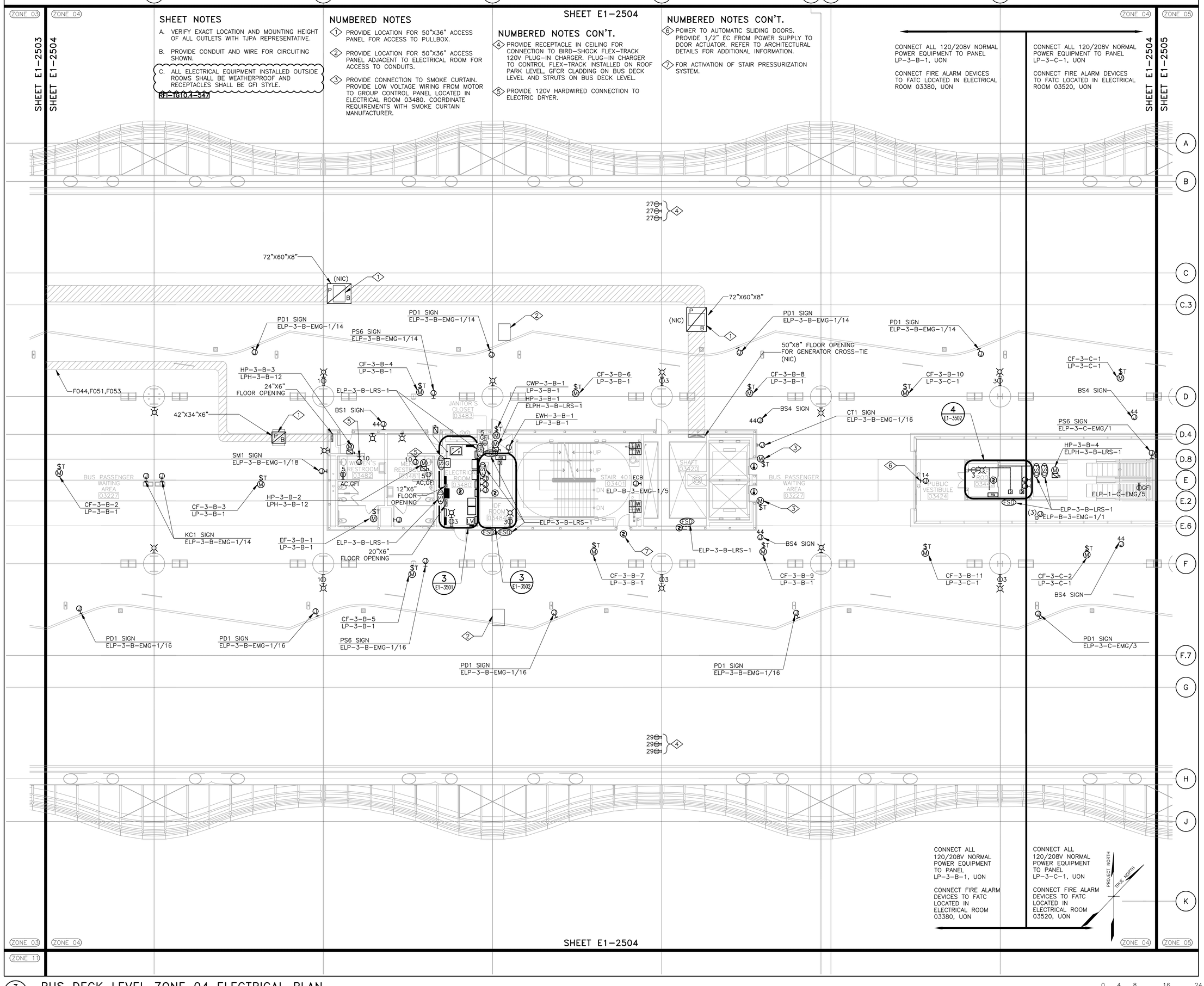
6. POWER TO AUTOMATIC SLIDING DOORS. PROVIDE 1/2" EC FROM POWER SUPPLY TO DOOR ACTUATOR. REFER TO ARCHITECTURAL DETAILS FOR ADDITIONAL INFORMATION.
7. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.

CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-B-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03380, UON

CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-C-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03520, UON



3 / E1-2001 BUS DECK LEVEL ZONE 04 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

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SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
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Key Map

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1	01/23/14	ISSUED FOR BID	CFH
2	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BUS DECK LEVEL
ZONE 04 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHARLENE FENLON - HARDING
No. E15560
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING
DESIGNED BY: J. TILLS
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/8" = 1'-0
SIZE: E
FACILITY NO.: 140
REVISION: B
SHEET NUMBER: SKE-RFI-TG10.4-547-1
SEQUENCE NUMBER: ___ of ___

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TG10.4-547

SHEET E1-2505

CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-C-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03520, UON

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

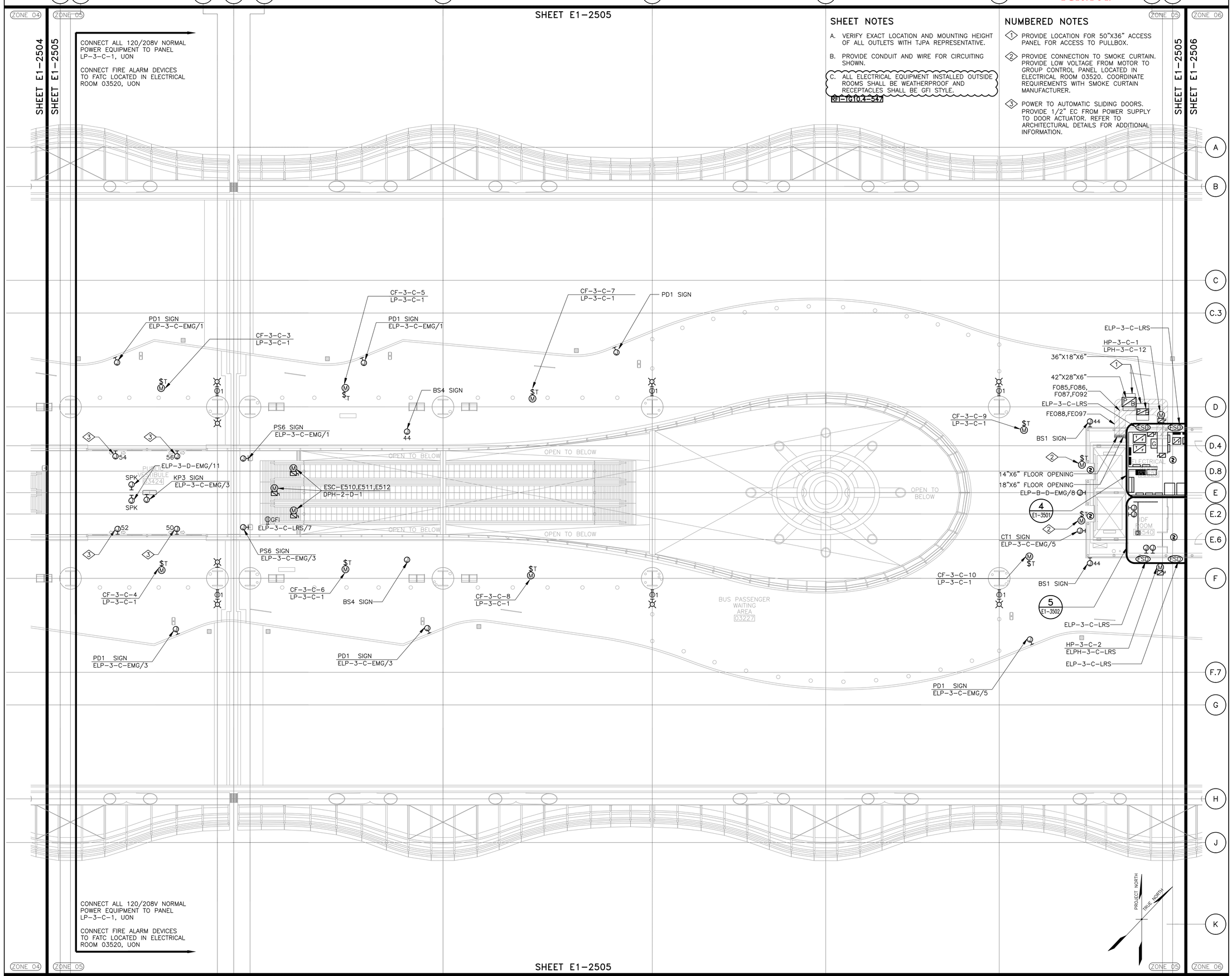
B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

C. ALL ELECTRICAL EQUIPMENT INSTALLED OUTSIDE ROOMS SHALL BE WEATHERPROOF AND RECEPTACLES SHALL BE GFI STYLE.

RFI-TG10.4-547

NUMBERED NOTES

1. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL FOR ACCESS TO PULLBOX.
2. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03520. COORDINATE REQUIREMENTS WITH SMOKE CURTAIN MANUFACTURER.
3. POWER TO AUTOMATIC SLIDING DOORS. PROVIDE 1/2" EC FROM POWER SUPPLY TO DOOR ACTUATOR. REFER TO ARCHITECTURAL DETAILS FOR ADDITIONAL INFORMATION.



CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-C-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03520, UON

SHEET E1-2505

3 / E1-2001 BUS DECK LEVEL ZONE 05 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

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SCALE IN FEET

Transbay Transit Center
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Key Map

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1	01/23/14	ISSUED FOR BID	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: BUS DECK LEVEL
ZONE 05 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-19520
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STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 01/23/2014
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TG10.4-547

SHEET NOTES

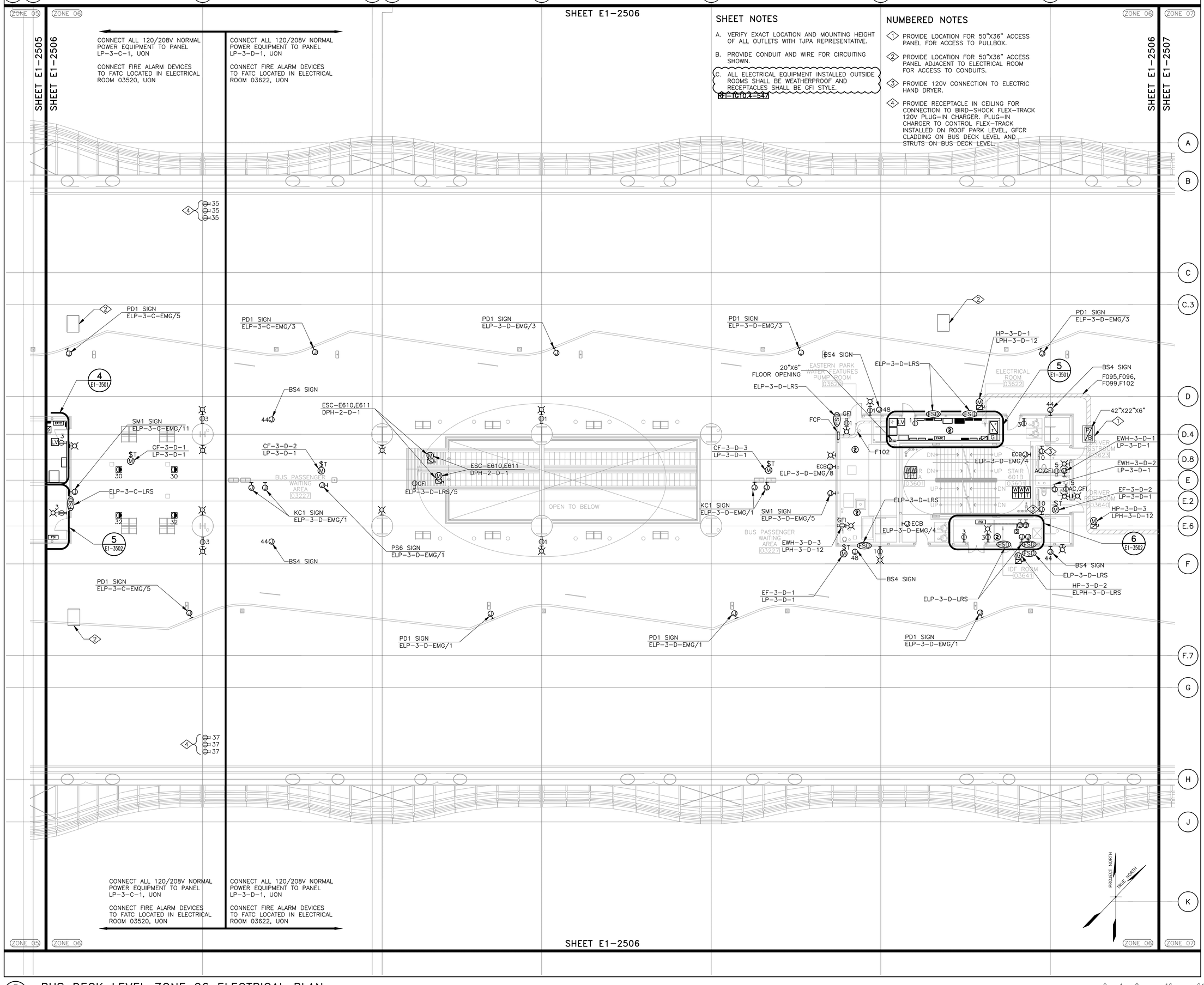
A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

C. ALL ELECTRICAL EQUIPMENT INSTALLED OUTSIDE ROOMS SHALL BE WEATHERPROOF AND RECEPTACLES SHALL BE GFI STYLE.
RFI-TG10.4-547

NUMBERED NOTES

1. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL FOR ACCESS TO PULLBOX.
2. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL ADJACENT TO ELECTRICAL ROOM FOR ACCESS TO CONDUITS.
3. PROVIDE 120V CONNECTION TO ELECTRIC HAND DRYER.
4. PROVIDE RECEPTACLE IN CEILING FOR CONNECTION TO BIRD-SHOCK FLEX-TRACK 120V PLUG-IN CHARGER. PLUG-IN CHARGER TO CONTROL FLEX-TRACK INSTALLED ON ROOF PARK LEVEL, GFCR CLADDING ON BUS DECK LEVEL AND STRUTS ON BUS DECK LEVEL.



3 / E1-2001 BUS DECK LEVEL ZONE 06 ELECTRICAL PLAN

SCALE: 1/8" = 1'-0"

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SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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1	01/23/14	ISSUED FOR BID	CFH
2	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
4	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: BUS DECK LEVEL
ZONE 06 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER CHRISTINE FENLON-HARDING No. E15660 ELECTRICAL STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
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SHEET NUMBER: SKE-RFI-TG10.4-547-3	SEQUENCE NUMBER: ___ of ___

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TG10.4-547

31.7 | 32 | 32.4 | 33 | 33.2 | 33.5 | 34 | 34.8 | 35 | 36 | 37 | 38

ZONE 06 | ZONE 07 | ZONE 08

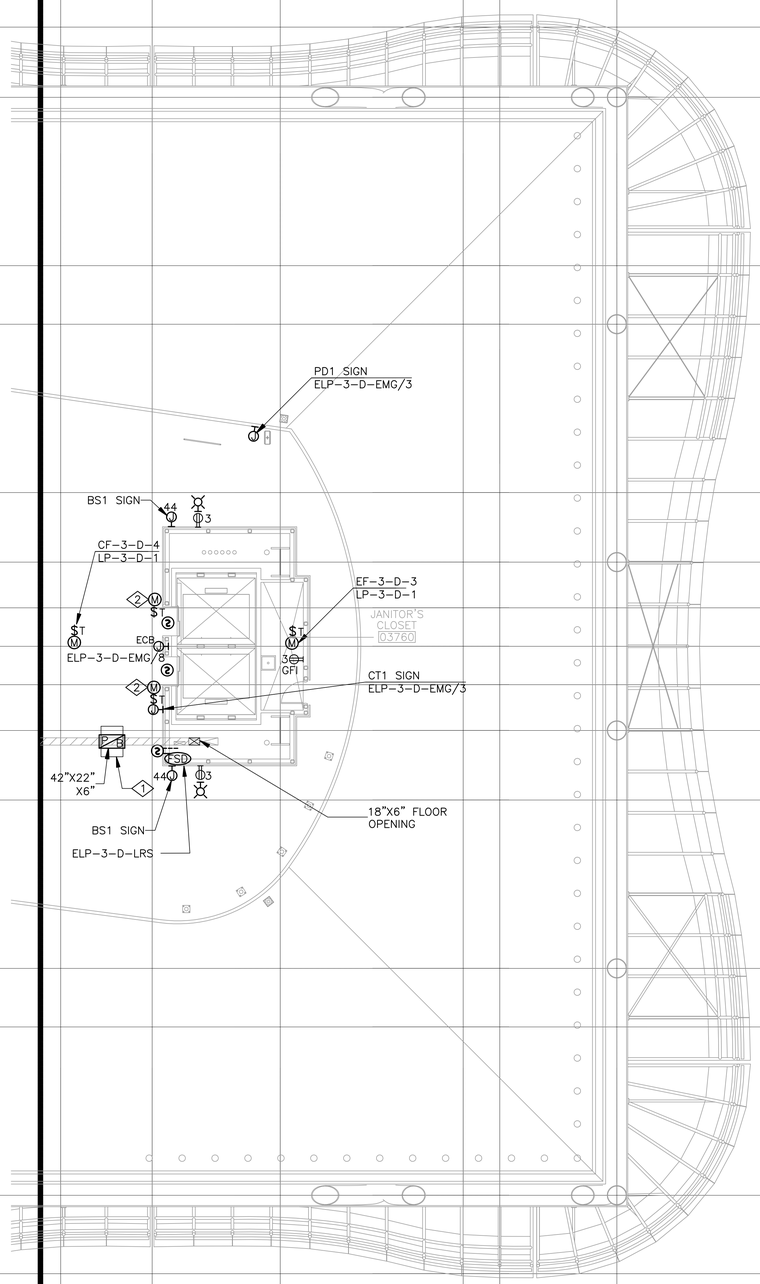
SHEET E1-2506

SHEET E1-2507

SHEET E1-2507

CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-D-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03622, UON



CONNECT ALL 120/208V NORMAL POWER EQUIPMENT TO PANEL LP-3-D-1, UON

CONNECT FIRE ALARM DEVICES TO FATC LOCATED IN ELECTRICAL ROOM 03622, UON

SHEET E1-2507

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

C. ALL ELECTRICAL EQUIPMENT INSTALLED OUTSIDE ROOMS SHALL BE WEATHERPROOF AND RECEPTACLES SHALL BE GFI STYLE.
RFI-TG10.4-547

NUMBERED NOTES

1. PROVIDE LOCATION FOR 50"X36" ACCESS PANEL FOR ACCESS TO PULLBOX.
2. PROVIDE CONNECTION TO SMOKE CURTAIN. PROVIDE LOW VOLTAGE WIRING FROM MOTOR TO GROUP CONTROL PANEL LOCATED IN ELECTRICAL ROOM 03622. COORDINATE REQURIEMENTS WITH SMOKE CURTAIN MANUFACTURER.
3. PROVIDE RECEPTACLE IN CEILING FOR CONNECTION TO BIRD-SHOCK FLEX-TRACK INSTALLED ON ROOF PARK LEVEL, GFCR CLADDING ON BUS DECK LEVEL AND STRUTS ON BUS DECK LEVEL.
4. ~~PROVIDE 120V HARDWIRED CONNECTION TO ELECTRIC HAND DRYER.~~

A | B | C | C.3 | D | D.4 | D.8 | E | E.2 | E.6 | F | F.7 | G | H | J | K

PROJECT NORTH
TRUE NORTH

ZONE 06 | ZONE 07 | ZONE 08

SHEET E1-2507

3 / E1-2001 BUS DECK LEVEL ZONE 07 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

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01 | 02 | 03 | 04 | 05 | 06 | 07 | 08
09 | 10 | 11 | 12 | 13 | 14 | 15 | 16
Key Map
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NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
BUS DECK LEVEL
ZONE 07 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
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No. E15850
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 01/23/2014
SCALE: 1/8" = 1'-0	SIZE: E / FACILITY NO.: 140 / REVISION: A
SHEET NUMBER: SKE-RFI-TG10.4-547-4	SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

TG10.4 – Electrical, Communications, Security, and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-446	8/19/2014		2.13,D Access Control Card 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-544	8/26/2014	SE1-6000, 6001, 6002		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-580	9/3/2014		28 13 00, QBD Answer TG10.4-189	Are all card readers in the contract drawings to be FICAM-FIPS 201-2 licensed, and supported by FICAM approved middleware? Please indicate on the Security Schedule which readers are to employ FICAM FIPS 201-2 approved middleware.	All readers are to employ FIPS 201-2 middleware.
TG10.4-591	9/5/2014	ES-2110		Per the response to TG10.4-308, a total of 6-2" conduits and 6-6" conduits are required. Per the legend, the ductbank conduit routing through profile C call out are transfer 1(2-6",2-2") and main/bus tie 2 (2-6", 2-2"). Where does the remaining (2-6",2-2") from the south electrical room terminate?	See sheet A1-9244 detail D/A1-3010 for elevated view of all 6 x 6" & 6 x 2" conduit arrays. Be advised there are two duct profiles on ES-2110 that feed the electrical room.
TG10.4-603	9/8/2014	SE1-2014(SKS-1002)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-611	9/10/2014	A1-2302,A1-9711, E12302,(A1-9711-Detail 2)		A1-9711(Overhead Door/Overhead Grill Door Schedule) calls for Door No-01461B to be a motorized Overhead Door but E1-2302 doesn't depict a motor for that door. Please see attached and confirm that power is to be provided for the above mentioned door.	Please see sketches SKE RFI-TG10.4-611-1 and SKE RFI-TG10.4-611-2, attached. The power source has been revised to accommodate the 120V connection. In SKE-RFI-TG10.4-611-2, the bi-fold door connection was also removed.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-616	9/19/2014		Exhibit "A" Pgs 37-39	Items #26-29 refer to general trenches; 1) are they just for generic pricing with no associated length? 2) What are the assumed trench depths?	1) The Bid Form requires linear foot pricing. 2) Assume minimum coverage for trench depths.
TG10.4-617	9/19/2014		Exhibit "A" Pgs 37-39	1) On the pages referenced Item #2 and #18-31; are they just the ES drawings? 2) If so please provide clarification between what is SFPUC and what is PG&E. Also please provide which of the utility's regulations takes precedence.	1) ES drawings are to be used in conjunction with "A", "C" and "U" drawings for coordination but the primary scope for pricing is the "ES" set of documents. 2) SFPUC is using PG&E standards for underground Electrical Service installation but both entities may be involved with inspections.
TG10.4-618	9/19/2014		Exhibit "A" Pgs 37-39, ES drawing ES-2108	On page 38 of 66 Item #18 reference ES-2108 to provide a PG&E manhole per note #1. Note #1 on this sheet does not reference PG&E, please clarify what this bid item is referencing, possibly a different drawing.	All Conduit Plans and section sheets ES-2108 thru ES-2112 are to reference sheet notes on ES-2107 for general conduit and trench notes. ES-2107 sheet notes set the standard for Type 7 EMH size. The other Conduit Plans and section sheets ES-2108 thru ES-2112 sheets notes have additional requirements for each EMH as identified under 'Number Notes'. The EMH on ES-2108 was selected for representative unit pricing because it reflects street installed EMH conditions.
TG10.4-619	9/19/2014		Exhibit "A" Pgs 37-39	On the pages referenced above for items 19-24 ask to exclude shoring removal at linear and perpendicular penetrations but does not for it to be excluded on ES-2108-2110 and 2112. Why is part of the linear shoring being excluded in one area at 2111 but not the others for the same conduit run? Can we assume excluding all shoring removal?	Trenching, shoring wall removal and trench recompaction and paving are deleted from the TG10.4 Trade Package. The TG10.4 Trade Subcontractor will only install the SFPUC duct bank with associated encasement and identification tap per PG&E standard. The TG10.4 Trade Subcontractor is to coordinate all activity with another Trade Subcontractor. Exhibit A scope of work will be revised in Addendum #8.
TG10.4-620	9/19/2014		Exhibit "A" Pgs 37-39	Item #2 on page 37 is the ES package as a whole, how does Items #18-25 become adders when it appears to be included in Item #2 of page 37 of 66?	Unit LS pricing is per SFPUC request for potential future revisions that may involve additional or deductive work.
TG10.4-621	9/19/2014		ES Drawings	How is TG10.4 to deal with the spoils from the ES drawings? How is TG10.4 to deal with the spoils from the ES drawings?	Please refer to response to TG10.4-619.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-622	9/19/2014		"Exhibit ""A"" Pgs 37-39 ES drawings"	We assume the shoring around the Transit Center will be cut and removed below grade; can they be cut and removed below grade to a point where TG10.4 will not have to cut them a second time to make provisions for the utility duct banks? This would save the owner having to pay twice for removal, once the contractor removing it now and further removal by TG10.4. Can the removal by the other trade package be to a depth of at least 6' or 7' below grade?	Please refer to response to TG10.4-619.
TG10.4-623	9/19/2014		ES drawings	Is the TG10.4 Trade Package contractor responsible for relocating the K-rail and fence for the installation of the utility duct banks?	No. Trenching and associated K-rail management will be done by others. Please see TG10.4-619 for more detail.
TG10.4-624	9/19/2014		Exhibit "A"	When performing a site survey on 9/17/14 we noted temporary power cords, spider boxes and lighting at the Train platform level; please confirm that this is to remain and may be used in reconfiguring the temporary power under TG10.4.	Assume all temporary power cords and spider boxes as currently used are nonexistent. Other trade subcontractors will remove their material when demobilizing. Only general site/safety lighting shall remain for TG10.4 Trade Subcontractor use.
TG10.4-625	9/19/2014		ES drawings	Along Minna and Natoma where the utility duct banks are to be installed there are a number of loading docks, if this work creates an issue limiting after hour access and deliveries, how is this impact to be handled?	The Electrical Service installation will be done after hours and will have minimal, if any, impact to loading dock areas.
TG10.4-627	9/19/2014		Exhibit "A" Bid Items, ES drawings	Item #20 referencing Section "A" on ES-2111; Please confirm that this Item is only for that section of duct bank breaking away from Section "H" to where it enters the building?	Correct. Section A represents the flattened transition of Section H from sheet ES-2110 as it enters the building while traversing under Section B duct bank installation with one caveat: Section A on ES-2111 requires 2 additional 2" conduits stubbed from the shoring wall per the section note.
TG10.4-628	9/19/2014		Exhibit "A" Bid Items, ES drawings	Confirm Item #21 & 23 referencing duct bank Section "B" and "D" on ES-2017 is referring to only the section of duct bank breaking away from Section "C" to where they enter the building? If not provide clarification.	Confirmed.
TG10.4-629	9/19/2014		Exhibit "A" Bid Items, ES drawings	Please clarify the scope of work for Item #22 & 24 shown on ES-2111 for adding duct bank Section "C" & "E" ; as this adder cannot be implemented without affecting duct bank Section "B".	For unit price purposes consider profiles "C" & "E" as wholly independent of Profile B. Unit pricing is to reflect only the profiles of "C" & "E" without traversing any other profile.
TG10.4-630	9/19/2014		Exhibit "A" Bid Items, ES drawings	Please clarify the scope of work for Item #25 as shown on ES-2112. Are we to assume that this item is to the point for where the duct bank splits north at Minna and south at Natoma?	Correct. Profiles change at the north/south split; therefore, unit pricing for ES-2112 profiles beyond the split are not applicable.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-631	9/19/2014		Exhibit "A" Bid Items, ES drawings	The details as related to the scope of work for Item #25 as shown on ES-2112 for details for Section "A", "B", and "C" are not accurate for this application. The details show dirt excavation and backfill but this duct bank is located in a bridge above the lower concourse; please provide details for the appropriate installation.	The details are accurate. Duct Bank installation will occur within a coordinated temporary bridge removal and permanent road installation process. The TG10.4 Trade Subcontractor will only be responsible for the actual duct bank and associated encasement. Please see TG10.4-619 for more detail.
TG10.4-633	9/19/2014		ES Drawings	The trench details and specification call for asphalt to be patched and/or replaced with hot mix, we are assuming that the roads circumnavigating the Transit Center will be completely resurfaced as part of project completion; for the TG10.4 asphalt repair will cold patch be acceptable?	The patching and repairing of roads for primary Electrical Service installation is deleted from the TG10.4 scope of work. Please see TG10.4-619 for more detail.
TG10.4-634	9/22/2014		2.1 Access Control, Paragraph 6 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-635	9/22/2014		Para: 2.2.D.1 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-636	9/24/2014		ES Drawings	Are the elevations shown on the ES drawings accurate for determining the point of entry required through the foundation wall? If not, for pricing duct bank and shoring wall demo please provide the elevations to be used.	The combination of the 'ES' and 'A' slab edge and elevation drawings provide the necessary information for bidding purposes.
TG10.4-637	9/24/2014		Exhibit A	Per addenda #7 Exhibit A - TG10.4 package, the schedule of bid and steel plating per PG&E Standards for shallow duct bank installation prices item numbers 26 through 29 states to furnish and install red concrete information regarding steel plating for shallow duct bank. Provide PG&E electric and gas service requirements manual 2014 does not have any information to accurately price these bid items.	The LS price request is only for the addition of steel plating and red concrete for any trench where profiles noted cannot achieve required minimum depths. Assume 1/2" steel plating and red concrete as that required for direct conduit encasement per the PG&E standard.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-638	9/24/2014		ES Drawings Exhibit A	It is our understanding that the shoring wall may be removed to a depth low enough that TG10.4 would be able to perform the work shown on the ES drawings without any shoring wall obstruction. This would have substantial impact on cost reduction for the utility duct bank. In order to incorporate removal of this scope of work in the TG10.4 bid package please confirm this change as soon as possible.	Please refer to response to TG10.4-619.

SKE-RFI-TG10.4-611-1

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

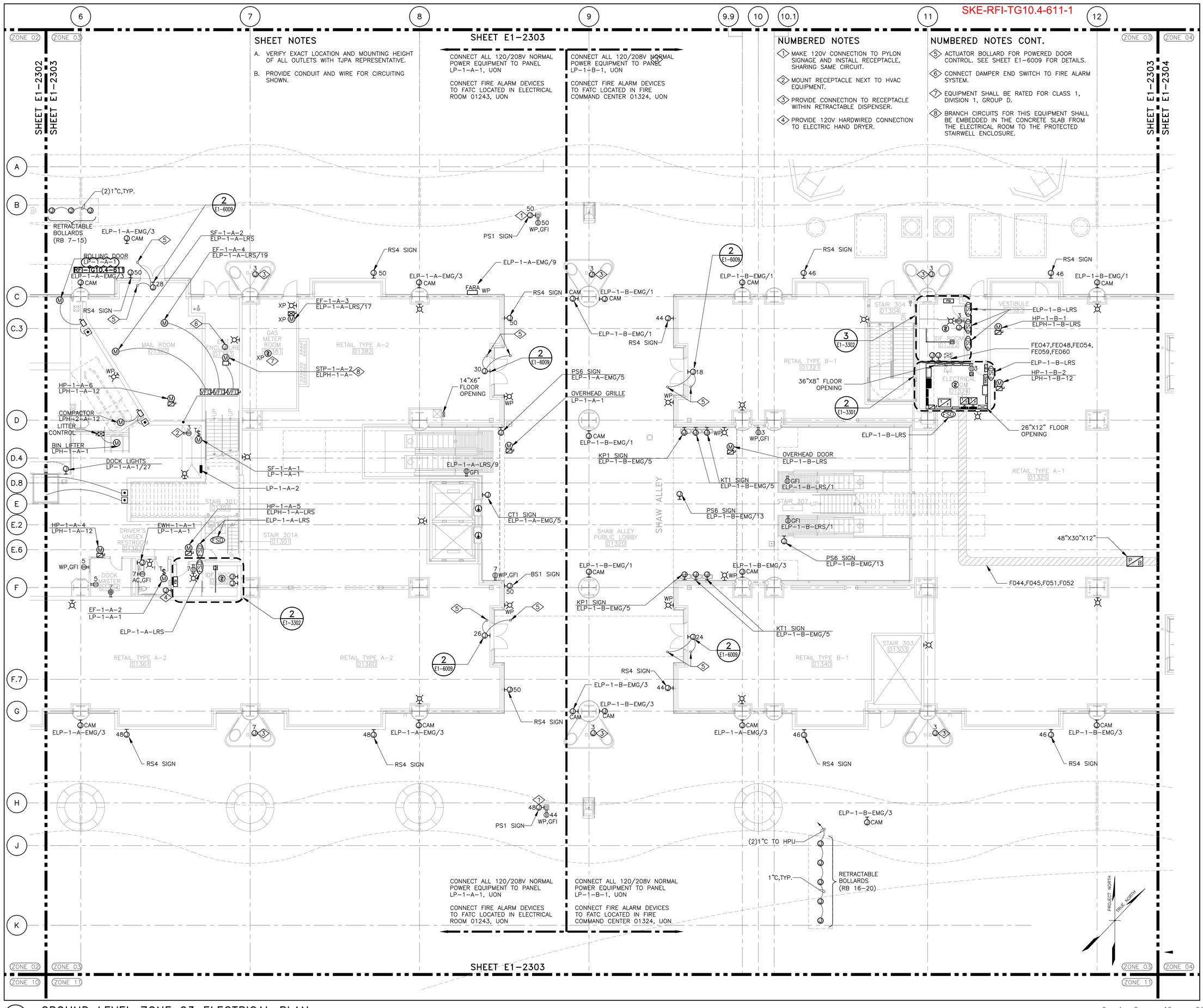
B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. MAKE 120V CONNECTION TO PYLON SIGNAGE AND INSTALL RECEPTACLE, SHARING SAME CIRCUIT.
2. MOUNT RECEPTACLE NEXT TO HVAC EQUIPMENT.
3. PROVIDE CONNECTION TO RECEPTACLE WITHIN RETRACTABLE DISPENSER.
4. PROVIDE 120V HARDWIRED CONNECTION TO ELECTRIC HAND DRYER.

NUMBERED NOTES CONT.

5. ACTUATOR BOLLARD FOR POWERED DOOR CONTROL. SEE SHEET E1-6009 FOR DETAILS.
6. CONNECT DAMPER END SWITCH TO FIRE ALARM SYSTEM.
7. EQUIPMENT SHALL BE RATED FOR CLASS 1, DIVISION 1, GROUP D.
8. BRANCH CIRCUITS FOR THIS EQUIPMENT SHALL BE EMBEDDED IN THE CONCRETE SLAB FROM THE ELECTRICAL ROOM TO THE PROTECTED STAIRWELL ENCLOSURE.



1 / E1-2001 GROUND LEVEL ZONE 03 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH
4	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: GROUND LEVEL
ZONE 03 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-6560
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: C. GRANT
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: D
SHEET NUMBER: SKE-RFI-TG10.4-611-1	SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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SKE-RFI-TG10.4-611-2

SHEET E1-2304

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. MAKE 120V CONNECTION TO PYLON SIGNAGE AND INSTALL RECEPTACLE, SHARING SAME CIRCUIT.
2. PROVIDE WALL MOUNTED PLASMA SCREENS FOR GRAPHIC DISPLAY OF FIRE ALARMS.
3. NOT USED.
4. NOT USED.

NUMBERED NOTES CON'T.

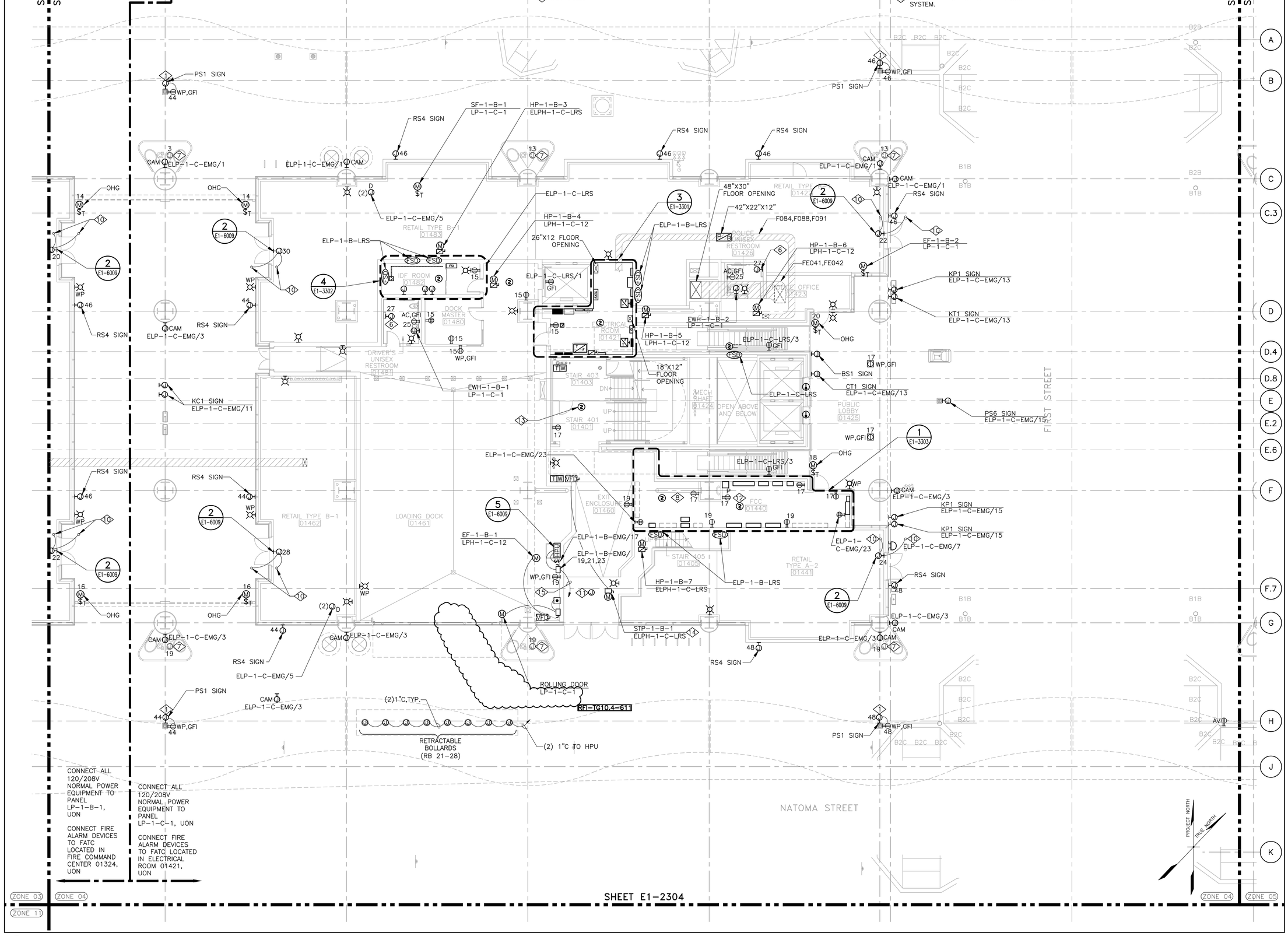
5. NOT USED.
6. PROVIDE 120V HARDWIRED CONNECTION FOR ELECTRIC HAND DRYER.
7. PROVIDE CONNECTION TO RECEPTACLE WITHIN RETRACTABLE DISPENSER.
8. NOT USED.

NUMBERED NOTES CON'T.

9. NOT USED.
10. ACTUATOR BOLLARD FOR POWERED DOOR CONTROL. SEE SHEET E1-6009 FOR DETAILS.
11. CONNECT DAMPER END SWITCH TO FIRE ALARM SYSTEM.
12. LOCATE WITHIN 5' OF FIRE ALARM PANEL.
13. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.

NUMBERED NOTES CON'T.

14. BRANCH CIRCUITS FOR THIS EQUIPMENT SHALL BE EMBEDDED IN THE CONCRETE SLAB FROM THE ELECTRICAL ROOM TO THE PROTECTED STAIRWELL ENCLOSURE.
15. ROUTE TWO 1"C FROM HPU TO FIRST BOLLARD IN SERIES FOR POWER AND CONTROL WIRING.



1 E1-2001 GROUND LEVEL ZONE 04 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
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Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
4	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
GROUND LEVEL
ZONE 04 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRONE FENLON - HARDING
No. E-9650
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING

DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE E · FACILITY NO. 140 · REVISION D
SHEET NUMBER SKE-RFI-TG10.4-611-2	SEQUENCE NUMBER ___ of ___

ISSUED FOR CONSTRUCTION

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RFI-TG10.4-611

E

PANEL: LPH-1-A-12 (SECTION 1 of 1) — 277/480V, 3 PHASE-4 WIRE — SURFACE MOUNTED

MAIN: 225A MCB — BUS AMPACITY: 225A — 65,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	HP-1-A-3	20/3	1	2,989			581			2	20/3	LOADING DOCK LEVELER	M
M	"	"	3		2,989			581		4	"	"	M
M	"	"	5			2,989			581	6	"	"	M
M	EF-1-A-1	20/3	7	1,993			581			8	20/3	LOADING DOCK LEVELER	M
M	"	"	9		1,993			581		10	"	"	M
M	"	"	11			1,993			581	12	"	"	M
M	HP-1-A-2	20/1	13	914						14	~~20/3~~**20/1**	~~LOADING DOCK ROLLING DOOR~~ **SPARE**	~~M~~
M	HP-1-A-4	20/1	15		914					16	"	" **SPARE**	~~M~~
M	HP-1-A-6	20/1	17			2,271				18	"	" **SPARE**	~~M~~
	SPARE	20/1	19				443			20	20/3	SF-B1-A-4	M
	SPARE	20/1	21					443		22	"	"	M
	SPARE	20/1	23						443	24	"	"	M
M	EF-B1-A-5	15/3	25	941			3,880			26	25/3	LOADING DOCK COMPACTOR	M
M	"	"	27		941			3,880		28	"	"	M
M	"	"	29			941			3,880	30	"	"	M
M	EF-B1-A-6	15/3	31	581			3,880			32	25/3	LOADING DOCK COMPACTOR	M
M	"	"	33		581			3,880		34	"	"	M
M	"	"	35			581			3,880	36	"	"	M
M	HP-1-A-7	20/1	37	2,271			442			38	15/3	EF-B1-A-4	M
	SPACE		39					442		40	"	"	M
	SPACE		41						442	42	"	"	M
SUBTOTAL (VA)				9,689	7,418	8,775	9,807	9,807	9,807	SUBTOTAL (VA)			

TOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES (AMPS)
55,303	19,496	17,225	18,582	67

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	0 VA	1.00	0 VA
H = ELECTRIC HEAT	0 VA	1.00	0 VA
K = KITCHEN EQUIPMENT	0 VA	1.00	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	16,026 VA	0.25	4,007 VA
m - ALL MOTORS	55,303 VA	1.00	55,303 VA
R = RECEPTACLE	0 VA	NEC DEMAND	0 VA

CONNECTED LOAD SUMMARY
55,303 VA
67 AMPS

NEC LOAD SUMMARY
59,309 VA
71 AMPS

E

E D C B

PANEL:	LP-1-A-1 (SECTION 1 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	400A MCB	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
R	EQMT RM RECPT, GENERAL RECPT	20/1	1	1,440			3,000			2	20/2	EWH-1-A-1	H
R	EQMT RM RECPT, GENERAL RECPT	20/1	3		1,440			3,000		4	"	"	H
R	EQMT RM RECPT, GENERAL RECPT	20/1	5			1,440			**1,920**	6	20/1	~~SPARE~~ **LOADING DOCK ROLLING DOOR**	**M**
R	EQMT RM RECPT, GENERAL RECPT	20/1	7	1,260						8	20/1	SPARE	
M	EF-1-A-2	20/1	9		696					10	20/1	SPARE	
M	SF-1-A-3	20/1	11			1,176				12	20/1	SPARE	
M	SF-1-A-1	20/1	13	696						14	20/1	SPARE	
E	01363 DRIVER RR HAND DRYER	20/1	15		510					16	20/1	SPARE	
E	WEATHER STATION	20/1	17			100			901	18	20/3	RM 01320 - OVERHEAD GRILLE	M
E	WEATHER STATION	20/1	19	100			901			20	"	"	M
E	VEHICLE RESTRAINT SYSTEM	20/1	21		500			901		22	"	"	M
E	VEHICLE RESTRAINT SYSTEM	20/1	23			500			1,656	24	20/1	RM 01260 - OVERHEAD GRILLE	M
M	EF-1-A-5	20/1	25	696			1,656			26	20/1	RM 01220 - OVERHEAD GRILLE	M
L	DOCK LIGHTS	20/1	27		600			1,656		28	20/1	RM 01260 - OVERHEAD GRILLE	M
	SPARE	20/1	29						1,656	30	20/1	RM 01245 - OVERHEAD GRILLE	M
	SPARE	20/1	31							32	20/1	SPARE	
	SPARE	20/1	33							34	20/1	SPARE	
	SPARE	20/1	35							36	20/1	SPARE	
	SPARE	20/1	37							38	20/1	SPARE	
	SPARE	20/1	39							40	20/1	SPARE	
	SPARE	20/1	41							42	20/1	SPARE	
SUBTOTAL (VA)				4,192	3,746	3,216	5,557	5,557	6,133	SUBTOTAL (VA)			

SUBTOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	SUBTOTAL ALL PHASES (AMPS)
28,401	9,749	9,303	9,349	34

RFI-TG10.4-611

PANEL:	LP-1-A-1 (SECTION 2 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	MLO	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	EF-1-A-2	20/1	43	696			960			44	20/1	SIGNAGE (4)	E
M	EF-1-A-3	20/1	45		696			1,440		46	20/1	SIGNAGE (6)	E
M	SF-1-A-1	20/1	47			696			1,440	48	20/1	SIGNAGE (6)	E
M	RM 01220 - DB DOOR ACTUATOR	20/1	49	528			1,440			50	20/1	SIGNAGE (6)	E
M	RM 01221 - DB DOOR ACTUATOR	20/1	51		528					52	20/1	SPARE	
	SPARE	20/1	53							54	20/1	SPARE	
M	RM 01245 - DB DOOR ACTUATOR	20/1	55	528						56	20/1	SPARE	
M	RM 01260 - DB DOOR ACTUATOR	20/1	57		528					58	20/1	SPARE	
M	RM 01260 - DB DOOR ACTUATOR	20/1	59			528				60	20/1	SPARE	
	SPACE	20/1	61							62	20/1	SPARE	
	SPACE	20/1	63							64	20/1	SPARE	
	SPACE	20/1	65							66	20/1	SPARE	
	SPACE		67							68		SPACE	
	SPACE		69							70		SPACE	
	SPACE		71							72		SPACE	
	SPACE		73							74		SPACE	
	SPACE		75							76		SPACE	
	SPACE		77							78		SPACE	
	SPACE		79				0			80	100/3	DML-1-A-1	L
	SPACE		81					0		82			L
	SPACE		83						0	84			L
SUBTOTAL (VA)				1,752	1,752	1,224	2,400	1,440	1,440	SUBTOTAL (VA)			

TOTAL ALL PHASES, ALL PANEL SECTIONS (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES, ALL PANEL SECTIONS (AMPS)
38,409	13,901	12,495	12,013	46

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	6,990 VA	1.00	6,990 VA
H = ELECTRIC HEAT	6,000 VA	1.00	6,000 VA
K = KITCHEN EQUIPMENT	0 VA	0.65	0 VA
L = LIGHTING	600 VA	1.25	750 VA
M = 25% of LARGEST MOTOR	2,702 VA	0.25	676 VA
m - ALL MOTORS	19,239 VA	1.25	24,049 VA
R = RECEPTACLE	5,580 VA	NEC DEMAND	5,580 VA

CONNECTED LOAD SUMMARY
38,409 VA
107 AMPS

NEC LOAD SUMMARY
44,044 VA
122 AMPS

B C D E

RFI-TG10.4-611

E

PANEL:	LPH-1-C-12 (SECTION 1 of 1)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	225A MCB	BUS AMPACITY: 225A	25,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	HP-1-B-4	20/1	1	914						2	~~20/3~~**20/1**	~~LOADING DOCK ROLLING DOOR~~ **SPARE**	~~M~~
M	HP-1-B-5	20/1	3		2,989					4	~~"~~	~~"~~ **SPARE**	~~M~~
M	"	20/3	5			2,989				6	~~"~~	~~"~~ **SPARE**	~~M~~
M	"	"	7	2,989						8	20/1	SPARE	
M	HP-1-B-6	"	9		914					10	20/1	SPARE	
M	EF-1-B-1	20/3	11			941				12	20/1	SPARE	
M	"	"	13	941						14	20/1	SPARE	
M	"	"	15		941					16	20/1	SPARE	
	SPARE	20/1	17							18	20/1	SPARE	
	SPARE	20/1	19							20	20/1	SPARE	
	SPARE	20/1	21							22	20/1	SPARE	
	SPARE	20/1	23							24	20/1	SPARE	
	SPARE	20/1	25							26	20/1	SPARE	
	SPARE	20/1	27							28	20/1	SPARE	
	SPARE	20/1	29							30	20/1	SPARE	
	SPARE	20/1	31							32		SPACE	
	SPARE	20/1	33							34		SPACE	
	SPARE	20/1	35							36		SPACE	
	SPACE		37							38		SPACE	
	SPACE		39							40		SPACE	
	SPACE		41							42		SPACE	
	SUBTOTAL (VA)			4,844	4,844	3,930	0	0	0			SUBTOTAL (VA)	

TOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES (AMPS)
13,618	4,844	4,844	3,930	16

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	0 VA	1.00	0 VA
H = ELECTRIC HEAT	0 VA	1.00	0 VA
K = KITCHEN EQUIPMENT	0 VA	1.00	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	3,984 VA	0.25	996 VA
m - ALL MOTORS	13,618 VA	1.00	13,618 VA
R = RECEPTACLE	0 VA	NEC DEMAND	0 VA

CONNECTED LOAD SUMMARY
13,618 VA
16 AMPS

NEC LOAD SUMMARY
14,614 VA
18 AMPS

E

E B

PANEL:	LP-1-C-1 (SECTION 1 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	400A MCB	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
H	EWH-1-B-1	20/2	1	3,000						2	20/1	SPARE	
H	"	"	3		3,000					4	20/1	SPARE	
M	EF-1-B-2	20/1	5			528				6	20/1	SPARE	
H	EWH-1-B-2	20/2	7	3,000						8	20/1	SPARE	
H	"	"	9		3,000					10	20/1	SPARE	
M	~~SPARE~~ **LOADING DOCK ROLLING DOOR**	20/1	11			**1,920**				12	20/1	SPARE	
R	GENERAL RECPT	20/1	13	540			1,656			14	20/1	RM 01483 - OVERHEAD GRILLE	M
R	EQMT RM RECPT, GENERAL RECPT	20/1	15		1,260			1,656		16	20/1	RM 01462 - OVERHEAD GRILLE	M
R	EQMT RM RECPT, GENERAL RECPT	20/1	17			1,260			864	18	20/1	RM 01425 - OVERHEAD GRILLE	M
R	GENERAL RECPT	20/1	19	1,440			864			20	20/1	RM 01425 - OVERHEAD GRILLE	M
	SPARE	20/1	21					528		22	20/1	RM 01422 - DB DOOR ACTUATOR	M
	SPARE	20/1	23						528	24	20/1	RM 01441 - DB DOOR ACTUATOR	M
R	RESTROOM RECEPT	20/1	25	360						26	20/1	~~RM 01461 - DB DOOR ACTUATOR~~ **SPARE**	~~M~~
E	01481 01426 RR HAND DRYER	20/1	27		1,020			528		28	20/1	RM 01462 - DB DOOR ACTUATOR	M
M	SF-1-B-1	20/1	29			696			528	30	20/1	RM 01483 - DB DOOR ACTUATOR	M
	SPARE	20/1	31							32	20/1	SPARE	
	SPARE	20/1	33							34	20/1	SPARE	
	SPARE	20/1	35							36	20/1	SPARE	
	SPARE	20/1	37							38	20/1	SPARE	
	SPARE	20/1	39							40	20/1	SPARE	
	SPARE	20/1	41							42	20/1	SPARE	
SUBTOTAL (VA)				8,340	8,280	4,404	2,520	2,712	1,920	SUBTOTAL (VA)			

SUBTOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	SUBTOTAL ALL PHASES (AMPS)
28,176	10,860	10,992	6,324	34

RFI-TG10.4-611

PANEL: LP-1-C-1 (SECTION 2 of 2) — 277/480V, 3 PHASE-4 WIRE — SURFACE MOUNTED

MAIN: MLO — BUS AMPACITY: 400A — 18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
	SPACE	20/1	43				720			44	20/1	SIGNAGE (3)	E
	SPACE	20/1	45					960		46	20/1	SIGNAGE (4)	E
	SPACE	20/1	47						240	48	20/1	SIGNAGE (1)	E
	SPACE	20/1	49				600			50	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	51					600		52	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	53						600	54	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	55				600			56	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	57							58	20/1	SPARE	
	SPACE	20/1	59							60	20/1	SPARE	
	SPACE	20/1	61							62	20/1	SPARE	
	SPACE	20/1	63							64	20/1	SPARE	
	SPACE	20/1	65							66	20/1	SPARE	
	SPACE		67							68		SPACE	
	SPACE		69							70		SPACE	
	SPACE		71							72		SPACE	
	SPACE		73							74		SPACE	
	SPACE		75							76		SPACE	
	SPACE		77							78		SPACE	
	SPACE		79				0			80	100/3	DML-1-C-1	L
	SPACE		81					0		82			L
	SPACE		83						0	84			L
	SUBTOTAL (VA)			0	0	0	1,920	1,560	840			SUBTOTAL (VA)	

TOTAL ALL PHASES, ALL PANEL SECTIONS (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES, ALL PANEL SECTIONS (AMPS)
32,496	12,780	12,552	7,164	39

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	2,940 VA	1.00	2,940 VA
H = ELECTRIC HEAT	12,000 VA	1.00	12,000 VA
K = KITCHEN EQUIPMENT	0 VA	0.65	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	1,656 VA	0.25	414 VA
m - ALL MOTORS	12,696 VA	1.25	15,870 VA
R = RECEPTACLE	4,860 VA	NEC DEMAND	4,860 VA

CONNECTED LOAD SUMMARY
32,496 VA
90 AMPS

NEC LOAD SUMMARY
36,084 VA
100 AMPS

B E

TG10.4 – Electrical, Communications, Security, and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-446	8/19/2014		2.13,D Access Control Card 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-544	8/26/2014	SE1-6000, 6001, 6002		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-580	9/3/2014		28 13 00, QBD Answer TG10.4-189	Are all card readers in the contract drawings to be FICAM-FIPS 201-2 licensed, and supported by FICAM approved middleware? Please indicate on the Security Schedule which readers are to employ FICAM FIPS 201-2 approved middleware.	All readers are to employ FIPS 201-2 middleware.
TG10.4-591	9/5/2014	ES-2110		Per the response to TG10.4-308, a total of 6-2" conduits and 6-6" conduits are required. Per the legend, the ductbank conduit routing through profile C call out are transfer 1(2-6",2-2") and main/bus tie 2 (2-6", 2-2"). Where does the remaining (2-6",2-2") from the south electrical room terminate?	See sheet A1-9244 detail D/A1-3010 for elevated view of all 6 x 6" & 6 x 2" conduit arrays. Be advised there are two duct profiles on ES-2110 that feed the electrical room.
TG10.4-603	9/8/2014	SE1-2014(SKS-1002)		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-611	9/10/2014	A1-2302,A1-9711, E12302,(A1-9711-Detail 2)		A1-9711(Overhead Door/Overhead Grill Door Schedule) calls for Door No-01461B to be a motorized Overhead Door but E1-2302 doesn't depict a motor for that door. Please see attached and confirm that power is to be provided for the above mentioned door.	Please see sketches SKE RFI-TG10.4-611-1 and SKE RFI-TG10.4-611-2, attached. The power source has been revised to accommodate the 120V connection. In SKE-RFI-TG10.4-611-2, the bi-fold door connection was also removed.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-616	9/19/2014		Exhibit "A" Pgs 37-39	Items #26-29 refer to general trenches; 1) are they just for generic pricing with no associated length? 2) What are the assumed trench depths?	1) The Bid Form requires linear foot pricing. 2) Assume minimum coverage for trench depths.
TG10.4-617	9/19/2014		Exhibit "A" Pgs 37-39	1) On the pages referenced Item #2 and #18-31; are they just the ES drawings? 2) If so please provide clarification between what is SFPUC and what is PG&E. Also please provide which of the utility's regulations takes precedence.	1) ES drawings are to be used in conjunction with "A", "C" and "U" drawings for coordination but the primary scope for pricing is the "ES" set of documents. 2) SFPUC is using PG&E standards for underground Electrical Service installation but both entities may be involved with inspections.
TG10.4-618	9/19/2014		Exhibit "A" Pgs 37-39, ES drawing ES-2108	On page 38 of 66 Item #18 reference ES-2108 to provide a PG&E manhole per note #1. Note #1 on this sheet does not reference PG&E, please clarify what this bid item is referencing, possibly a different drawing.	All Conduit Plans and section sheets ES-2108 thru ES-2112 are to reference sheet notes on ES-2107 for general conduit and trench notes. ES-2107 sheet notes set the standard for Type 7 EMH size. The other Conduit Plans and section sheets ES-2108 thru ES-2112 sheets notes have additional requirements for each EMH as identified under 'Number Notes'. The EMH on ES-2108 was selected for representative unit pricing because it reflects street installed EMH conditions.
TG10.4-619	9/19/2014		Exhibit "A" Pgs 37-39	On the pages referenced above for items 19-24 ask to exclude shoring removal at linear and perpendicular penetrations but does not for it to be excluded on ES-2108-2110 and 2112. Why is part of the linear shoring being excluded in one area at 2111 but not the others for the same conduit run? Can we assume excluding all shoring removal?	Trenching, shoring wall removal and trench recompaction and paving are deleted from the TG10.4 Trade Package. The TG10.4 Trade Subcontractor will only install the SFPUC duct bank with associated encasement and identification tap per PG&E standard. The TG10.4 Trade Subcontractor is to coordinate all activity with another Trade Subcontractor. Exhibit A scope of work will be revised in Addendum #8.
TG10.4-620	9/19/2014		Exhibit "A" Pgs 37-39	Item #2 on page 37 is the ES package as a whole, how does Items #18-25 become adders when it appears to be included in Item #2 of page 37 of 66?	Unit LS pricing is per SFPUC request for potential future revisions that may involve additional or deductive work.
TG10.4-621	9/19/2014		ES Drawings	How is TG10.4 to deal with the spoils from the ES drawings? How is TG10.4 to deal with the spoils from the ES drawings?	Please refer to response to TG10.4-619.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-622	9/19/2014		"Exhibit ""A"" Pgs 37-39 ES drawings"	We assume the shoring around the Transit Center will be cut and removed below grade; can they be cut and removed below grade to a point where TG10.4 will not have to cut them a second time to make provisions for the utility duct banks? This would save the owner having to pay twice for removal, once the contractor removing it now and further removal by TG10.4. Can the removal by the other trade package be to a depth of at least 6' or 7' below grade?	Please refer to response to TG10.4-619.
TG10.4-623	9/19/2014		ES drawings	Is the TG10.4 Trade Package contractor responsible for relocating the K-rail and fence for the installation of the utility duct banks?	No. Trenching and associated K-rail management will be done by others. Please see TG10.4-619 for more detail.
TG10.4-624	9/19/2014		Exhibit "A"	When performing a site survey on 9/17/14 we noted temporary power cords, spider boxes and lighting at the Train platform level; please confirm that this is to remain and may be used in reconfiguring the temporary power under TG10.4.	Assume all temporary power cords and spider boxes as currently used are nonexistent. Other trade subcontractors will remove their material when demobilizing. Only general site/safety lighting shall remain for TG10.4 Trade Subcontractor use.
TG10.4-625	9/19/2014		ES drawings	Along Minna and Natoma where the utility duct banks are to be installed there are a number of loading docks, if this work creates an issue limiting after hour access and deliveries, how is this impact to be handled?	The Electrical Service installation will be done after hours and will have minimal, if any, impact to loading dock areas.
TG10.4-627	9/19/2014		Exhibit "A" Bid Items, ES drawings	Item #20 referencing Section "A" on ES-2111; Please confirm that this Item is only for that section of duct bank breaking away from Section "H" to where it enters the building?	Correct. Section A represents the flattened transition of Section H from sheet ES-2110 as it enters the building while traversing under Section B duct bank installation with one caveat: Section A on ES-2111 requires 2 additional 2" conduits stubbed from the shoring wall per the section note.
TG10.4-628	9/19/2014		Exhibit "A" Bid Items, ES drawings	Confirm Item #21 & 23 referencing duct bank Section "B" and "D" on ES-2017 is referring to only the section of duct bank breaking away from Section "C" to where they enter the building? If not provide clarification.	Confirmed.
TG10.4-629	9/19/2014		Exhibit "A" Bid Items, ES drawings	Please clarify the scope of work for Item #22 & 24 shown on ES-2111 for adding duct bank Section "C" & "E" ; as this adder cannot be implemented without affecting duct bank Section "B".	For unit price purposes consider profiles "C" & "E" as wholly independent of Profile B. Unit pricing is to reflect only the profiles of "C" & "E" without traversing any other profile.
TG10.4-630	9/19/2014		Exhibit "A" Bid Items, ES drawings	Please clarify the scope of work for Item #25 as shown on ES-2112. Are we to assume that this item is to the point for where the duct bank splits north at Minna and south at Natoma?	Correct. Profiles change at the north/south split; therefore, unit pricing for ES-2112 profiles beyond the split are not applicable.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-631	9/19/2014		Exhibit "A" Bid Items, ES drawings	The details as related to the scope of work for Item #25 as shown on ES-2112 for details for Section "A", "B", and "C" are not accurate for this application. The details show dirt excavation and backfill but this duct bank is located in a bridge above the lower concourse; please provide details for the appropriate installation.	The details are accurate. Duct Bank installation will occur within a coordinated temporary bridge removal and permanent road installation process. The TG10.4 Trade Subcontractor will only be responsible for the actual duct bank and associated encasement. Please see TG10.4-619 for more detail.
TG10.4-633	9/19/2014		ES Drawings	The trench details and specification call for asphalt to be patched and/or replaced with hot mix, we are assuming that the roads circumnavigating the Transit Center will be completely resurfaced as part of project completion; for the TG10.4 asphalt repair will cold patch be acceptable?	The patching and repairing of roads for primary Electrical Service installation is deleted from the TG10.4 scope of work. Please see TG10.4-619 for more detail.
TG10.4-634	9/22/2014		2.1 Access Control, Paragraph 6 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-635	9/22/2014		Para: 2.2.D.1 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-636	9/24/2014		ES Drawings	Are the elevations shown on the ES drawings accurate for determining the point of entry required through the foundation wall? If not, for pricing duct bank and shoring wall demo please provide the elevations to be used.	The combination of the 'ES' and 'A' slab edge and elevation drawings provide the necessary information for bidding purposes.
TG10.4-637	9/24/2014		Exhibit A	Per addenda #7 Exhibit A - TG10.4 package, the schedule of bid and steel plating per PG&E Standards for shallow duct bank installation prices item numbers 26 through 29 states to furnish and install red concrete information regarding steel plating for shallow duct bank. Provide PG&E electric and gas service requirements manual 2014 does not have any information to accurately price these bid items.	The LS price request is only for the addition of steel plating and red concrete for any trench where profiles noted cannot achieve required minimum depths. Assume 1/2" steel plating and red concrete as that required for direct conduit encasement per the PG&E standard.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-638	9/24/2014		ES Drawings Exhibit A	It is our understanding that the shoring wall may be removed to a depth low enough that TG10.4 would be able to perform the work shown on the ES drawings without any shoring wall obstruction. This would have substantial impact on cost reduction for the utility duct bank. In order to incorporate removal of this scope of work in the TG10.4 bid package please confirm this change as soon as possible.	Please refer to response to TG10.4-619.

SKE-RFI-TG10.4-611-1

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

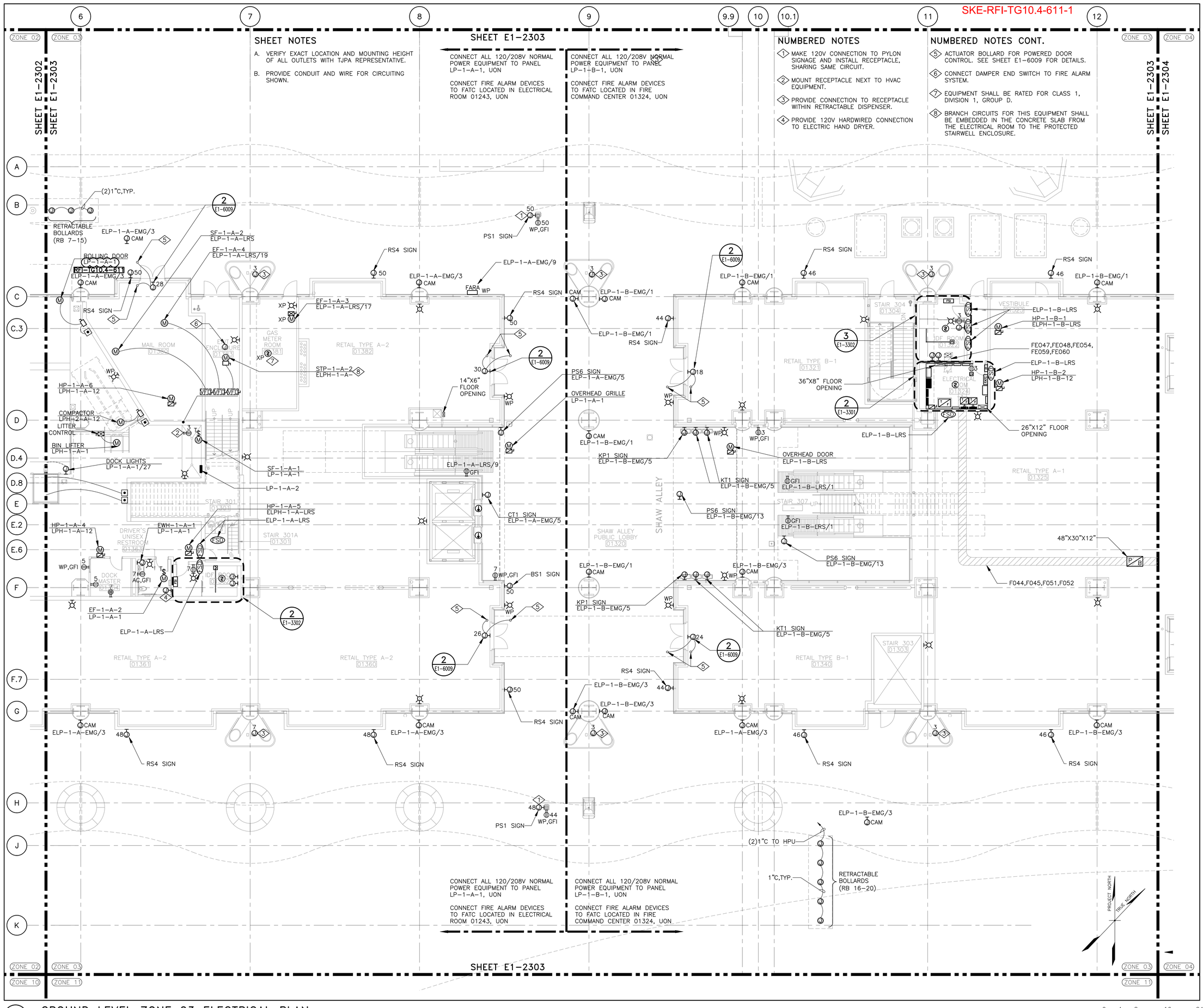
B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. MAKE 120V CONNECTION TO PYLON SIGNAGE AND INSTALL RECEPTACLE, SHARING SAME CIRCUIT.
2. MOUNT RECEPTACLE NEXT TO HVAC EQUIPMENT.
3. PROVIDE CONNECTION TO RECEPTACLE WITHIN RETRACTABLE DISPENSER.
4. PROVIDE 120V HARDWIRED CONNECTION TO ELECTRIC HAND DRYER.

NUMBERED NOTES CONT.

5. ACTUATOR BOLLARD FOR POWERED DOOR CONTROL. SEE SHEET E1-6009 FOR DETAILS.
6. CONNECT DAMPER END SWITCH TO FIRE ALARM SYSTEM.
7. EQUIPMENT SHALL BE RATED FOR CLASS 1, DIVISION 1, GROUP D.
8. BRANCH CIRCUITS FOR THIS EQUIPMENT SHALL BE EMBEDDED IN THE CONCRETE SLAB FROM THE ELECTRICAL ROOM TO THE PROTECTED STAIRWELL ENCLOSURE.



1 / E1-2001 GROUND LEVEL ZONE 03 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	04/23/14	ISSUED FOR BID - ADDENDUM #3	CFH
4	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

REVISIONS

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: GROUND LEVEL
ZONE 03 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
CAROLINE FENLON - HARDING
No. E-6560
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: J. TILLS	CHECKED BY: C. GRANT
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE: E · FACILITY NO.: 140 · REVISION: D
SHEET NUMBER: SKE-RFI-TG10.4-611-1	SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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XREFS: XAGRID-96.dwg\ XAZONES.dwg\ XAFLR01PH1.dwg\ XLFLR01PH1.dwg\ TJPA-TB 34x44E.dwg\ XAGRID.dwg\ XEFLR01PH1.dwg\ CFH-STAMP.dwg

SKE-RFI-TG10.4-611-2

SHEET E1-2304

SHEET NOTES

A. VERIFY EXACT LOCATION AND MOUNTING HEIGHT OF ALL OUTLETS WITH TJPA REPRESENTATIVE.

B. PROVIDE CONDUIT AND WIRE FOR CIRCUITING SHOWN.

NUMBERED NOTES

1. MAKE 120V CONNECTION TO PYLON SIGNAGE AND INSTALL RECEPTACLE, SHARING SAME CIRCUIT.
2. PROVIDE WALL MOUNTED PLASMA SCREENS FOR GRAPHIC DISPLAY OF FIRE ALARMS.
3. NOT USED.
4. NOT USED.

NUMBERED NOTES CON'T.

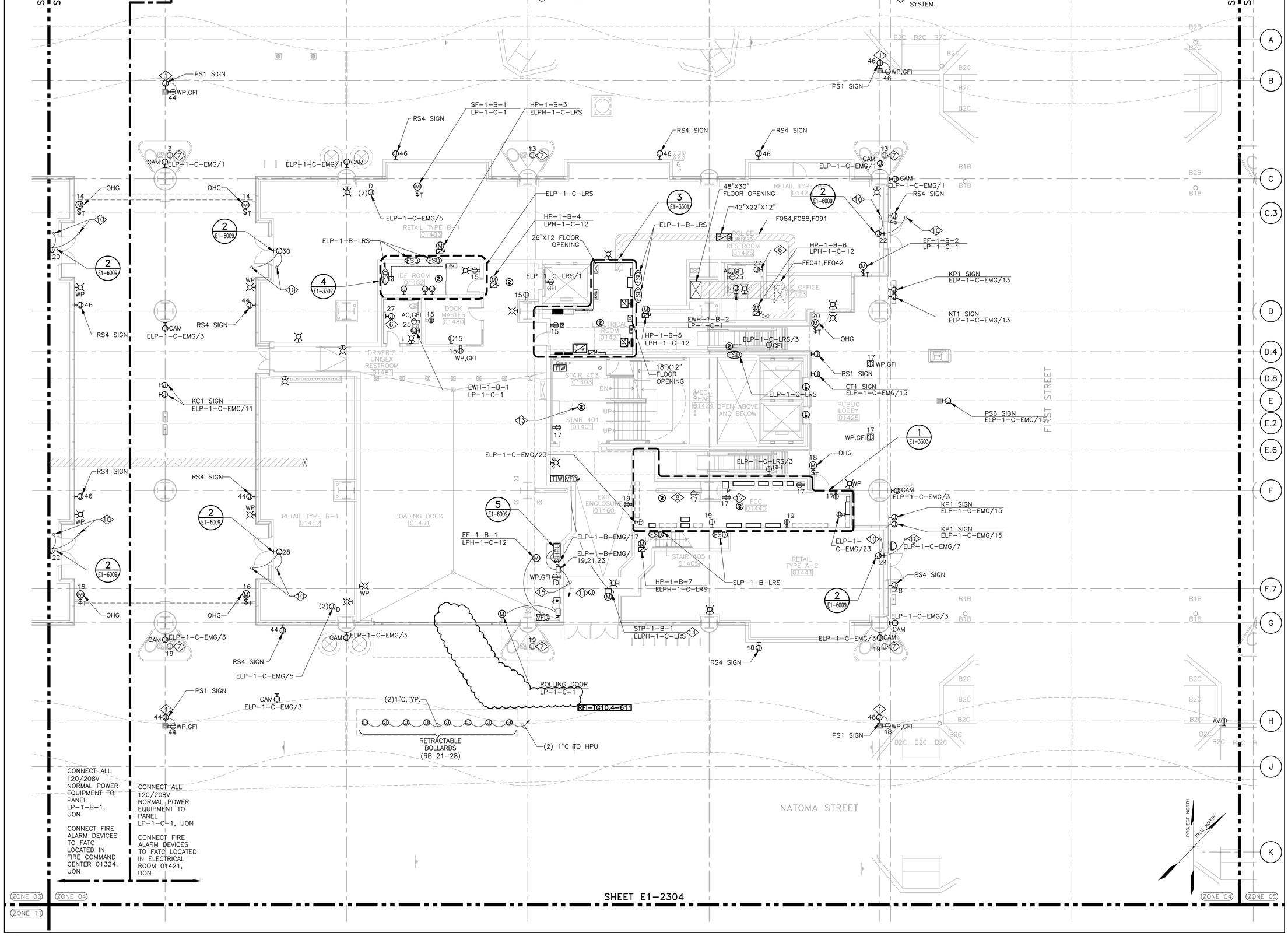
5. NOT USED.
6. PROVIDE 120V HARDWIRED CONNECTION FOR ELECTRIC HAND DRYER.
7. PROVIDE CONNECTION TO RECEPTACLE WITHIN RETRACTABLE DISPENSER.
8. NOT USED.

NUMBERED NOTES CON'T.

9. NOT USED.
10. ACTUATOR BOLLARD FOR POWERED DOOR CONTROL. SEE SHEET E1-6009 FOR DETAILS.
11. CONNECT DAMPER END SWITCH TO FIRE ALARM SYSTEM.
12. LOCATE WITHIN 5' OF FIRE ALARM PANEL.
13. FOR ACTIVATION OF STAIR PRESSURIZATION SYSTEM.

NUMBERED NOTES CON'T.

14. BRANCH CIRCUITS FOR THIS EQUIPMENT SHALL BE EMBEDDED IN THE CONCRETE SLAB FROM THE ELECTRICAL ROOM TO THE PROTECTED STAIRWELL ENCLOSURE.
15. ROUTE TWO 1"C FROM HPU TO FIRST BOLLARD IN SERIES FOR POWER AND CONTROL WIRING.



1 E1-2001 GROUND LEVEL ZONE 04 ELECTRICAL PLAN
SCALE: 1/8" = 1'-0"

0 4 8 16 24
SCALE IN FEET

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID - ADDENDUM #1	CFH
3	03/21/14	ISSUED FOR BID - ADDENDUM #2	CFH
4	06/20/14	ISSUED FOR BID - ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
GROUND LEVEL
ZONE 04 ELECTRICAL PLAN

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRONE FENLON - HARDING
No. E-9650
ELECTRICAL
STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING

DESIGNED BY: J. TILLS	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: 1/8" = 1'-0	SIZE E · FACILITY NO. 140 · REVISION D
SHEET NUMBER SKE-RFI-TG10.4-611-2	SEQUENCE NUMBER ___ of ___

ISSUED FOR CONSTRUCTION

XREFS: XAGRID.dwg\ XAGRID-96.dwg\ XAZONES.dwg\ XAFLR01PH1.dwg\ XEFLR01PH1.dwg\ XLFLR01PH1.dwg\ TJPA-TB 34x44E.dwg\ CFH-STAMP.dwg

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RFI-TG10.4-611

E

PANEL: LPH-1-A-12 (SECTION 1 of 1) — 277/480V, 3 PHASE-4 WIRE — SURFACE MOUNTED

MAIN: 225A MCB — BUS AMPACITY: 225A — 65,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	HP-1-A-3	20/3	1	2,989			581			2	20/3	LOADING DOCK LEVELER	M
M	"	"	3		2,989			581		4	"	"	M
M	"	"	5			2,989			581	6	"	"	M
M	EF-1-A-1	20/3	7	1,993			581			8	20/3	LOADING DOCK LEVELER	M
M	"	"	9		1,993			581		10	"	"	M
M	"	"	11			1,993			581	12	"	"	M
M	HP-1-A-2	20/1	13	914						14	~~20/3~~**20/1**	~~LOADING DOCK ROLLING DOOR~~ **SPARE**	~~M~~
M	HP-1-A-4	20/1	15		914					16	"	" **SPARE**	~~M~~
M	HP-1-A-6	20/1	17			2,271				18	"	" **SPARE**	~~M~~
	SPARE	20/1	19				443			20	20/3	SF-B1-A-4	M
	SPARE	20/1	21					443		22	"	"	M
	SPARE	20/1	23						443	24	"	"	M
M	EF-B1-A-5	15/3	25	941			3,880			26	25/3	LOADING DOCK COMPACTOR	M
M	"	"	27		941			3,880		28	"	"	M
M	"	"	29			941			3,880	30	"	"	M
M	EF-B1-A-6	15/3	31	581			3,880			32	25/3	LOADING DOCK COMPACTOR	M
M	"	"	33		581			3,880		34	"	"	M
M	"	"	35			581			3,880	36	"	"	M
M	HP-1-A-7	20/1	37	2,271			442			38	15/3	EF-B1-A-4	M
	SPACE		39					442		40	"	"	M
	SPACE		41						442	42	"	"	M
SUBTOTAL (VA)				9,689	7,418	8,775	9,807	9,807	9,807	SUBTOTAL (VA)			

TOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES (AMPS)
55,303	19,496	17,225	18,582	67

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	0 VA	1.00	0 VA
H = ELECTRIC HEAT	0 VA	1.00	0 VA
K = KITCHEN EQUIPMENT	0 VA	1.00	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	16,026 VA	0.25	4,007 VA
m - ALL MOTORS	55,303 VA	1.00	55,303 VA
R = RECEPTACLE	0 VA	NEC DEMAND	0 VA

CONNECTED LOAD SUMMARY
55,303 VA
67 AMPS

NEC LOAD SUMMARY
59,309 VA
71 AMPS

E

E D C B

PANEL:	LP-1-A-1 (SECTION 1 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	400A MCB	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
R	EQMT RM RECPT, GENERAL RECPT	20/1	1	1,440			3,000			2	20/2	EWH-1-A-1	H
R	EQMT RM RECPT, GENERAL RECPT	20/1	3		1,440			3,000		4	"	"	H
R	EQMT RM RECPT, GENERAL RECPT	20/1	5			1,440			**1,920**	6	20/1	~~SPARE~~ **LOADING DOCK ROLLING DOOR**	**M**
R	EQMT RM RECPT, GENERAL RECPT	20/1	7	1,260						8	20/1	SPARE	
M	EF-1-A-2	20/1	9		696					10	20/1	SPARE	
M	SF-1-A-3	20/1	11			1,176				12	20/1	SPARE	
M	SF-1-A-1	20/1	13	696						14	20/1	SPARE	
E	01363 DRIVER RR HAND DRYER	20/1	15		510					16	20/1	SPARE	
E	WEATHER STATION	20/1	17			100			901	18	20/3	RM 01320 - OVERHEAD GRILLE	M
E	WEATHER STATION	20/1	19	100			901			20	"	"	M
E	VEHICLE RESTRAINT SYSTEM	20/1	21		500			901		22	"	"	M
E	VEHICLE RESTRAINT SYSTEM	20/1	23			500			1,656	24	20/1	RM 01260 - OVERHEAD GRILLE	M
M	EF-1-A-5	20/1	25	696			1,656			26	20/1	RM 01220 - OVERHEAD GRILLE	M
L	DOCK LIGHTS	20/1	27		600			1,656		28	20/1	RM 01260 - OVERHEAD GRILLE	M
	SPARE	20/1	29						1,656	30	20/1	RM 01245 - OVERHEAD GRILLE	M
	SPARE	20/1	31							32	20/1	SPARE	
	SPARE	20/1	33							34	20/1	SPARE	
	SPARE	20/1	35							36	20/1	SPARE	
	SPARE	20/1	37							38	20/1	SPARE	
	SPARE	20/1	39							40	20/1	SPARE	
	SPARE	20/1	41							42	20/1	SPARE	
SUBTOTAL (VA)				4,192	3,746	3,216	5,557	5,557	6,133	SUBTOTAL (VA)			

SUBTOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	SUBTOTAL ALL PHASES (AMPS)
28,401	9,749	9,303	9,349	34

RFI-TG10.4-611

PANEL:	LP-1-A-1 (SECTION 2 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	MLO	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	EF-1-A-2	20/1	43	696			960			44	20/1	SIGNAGE (4)	E
M	EF-1-A-3	20/1	45		696			1,440		46	20/1	SIGNAGE (6)	E
M	SF-1-A-1	20/1	47			696			1,440	48	20/1	SIGNAGE (6)	E
M	RM 01220 - DB DOOR ACTUATOR	20/1	49	528			1,440			50	20/1	SIGNAGE (6)	E
M	RM 01221 - DB DOOR ACTUATOR	20/1	51		528					52	20/1	SPARE	
	SPARE	20/1	53							54	20/1	SPARE	
M	RM 01245 - DB DOOR ACTUATOR	20/1	55	528						56	20/1	SPARE	
M	RM 01260 - DB DOOR ACTUATOR	20/1	57		528					58	20/1	SPARE	
M	RM 01260 - DB DOOR ACTUATOR	20/1	59			528				60	20/1	SPARE	
	SPACE	20/1	61							62	20/1	SPARE	
	SPACE	20/1	63							64	20/1	SPARE	
	SPACE	20/1	65							66	20/1	SPARE	
	SPACE		67							68		SPACE	
	SPACE		69							70		SPACE	
	SPACE		71							72		SPACE	
	SPACE		73							74		SPACE	
	SPACE		75							76		SPACE	
	SPACE		77							78		SPACE	
	SPACE		79				0			80	100/3	DML-1-A-1	L
	SPACE		81					0		82			L
	SPACE		83						0	84			L
SUBTOTAL (VA)				1,752	1,752	1,224	2,400	1,440	1,440	SUBTOTAL (VA)			

TOTAL ALL PHASES, ALL PANEL SECTIONS (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES, ALL PANEL SECTIONS (AMPS)
38,409	13,901	12,495	12,013	46

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	6,990 VA	1.00	6,990 VA
H = ELECTRIC HEAT	6,000 VA	1.00	6,000 VA
K = KITCHEN EQUIPMENT	0 VA	0.65	0 VA
L = LIGHTING	600 VA	1.25	750 VA
M = 25% of LARGEST MOTOR	2,702 VA	0.25	676 VA
m - ALL MOTORS	19,239 VA	1.25	24,049 VA
R = RECEPTACLE	5,580 VA	NEC DEMAND	5,580 VA

CONNECTED LOAD SUMMARY
38,409 VA
107 AMPS

NEC LOAD SUMMARY
44,044 VA
122 AMPS

B C D E

RFI-TG10.4-611

E

PANEL:	LPH-1-C-12 (SECTION 1 of 1)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	225A MCB	BUS AMPACITY: 225A	25,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
M	HP-1-B-4	20/1	1	914						2	~~20/3~~**20/1**	~~LOADING DOCK ROLLING DOOR~~ **SPARE**	~~M~~
M	HP-1-B-5	20/1	3		2,989					4	~~"~~	~~"~~ **SPARE**	~~M~~
M	"	20/3	5			2,989				6	~~"~~	~~"~~ **SPARE**	~~M~~
M	"	"	7	2,989						8	20/1	SPARE	
M	HP-1-B-6	"	9		914					10	20/1	SPARE	
M	EF-1-B-1	20/3	11			941				12	20/1	SPARE	
M	"	"	13	941						14	20/1	SPARE	
M	"	"	15		941					16	20/1	SPARE	
	SPARE	20/1	17							18	20/1	SPARE	
	SPARE	20/1	19							20	20/1	SPARE	
	SPARE	20/1	21							22	20/1	SPARE	
	SPARE	20/1	23							24	20/1	SPARE	
	SPARE	20/1	25							26	20/1	SPARE	
	SPARE	20/1	27							28	20/1	SPARE	
	SPARE	20/1	29							30	20/1	SPARE	
	SPARE	20/1	31							32		SPACE	
	SPARE	20/1	33							34		SPACE	
	SPARE	20/1	35							36		SPACE	
	SPACE		37							38		SPACE	
	SPACE		39							40		SPACE	
	SPACE		41							42		SPACE	
	SUBTOTAL (VA)			4,844	4,844	3,930	0	0	0			SUBTOTAL (VA)	

TOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES (AMPS)
13,618	4,844	4,844	3,930	16

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	0 VA	1.00	0 VA
H = ELECTRIC HEAT	0 VA	1.00	0 VA
K = KITCHEN EQUIPMENT	0 VA	1.00	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	3,984 VA	0.25	996 VA
m - ALL MOTORS	13,618 VA	1.00	13,618 VA
R = RECEPTACLE	0 VA	NEC DEMAND	0 VA

CONNECTED LOAD SUMMARY
13,618 VA
16 AMPS

NEC LOAD SUMMARY
14,614 VA
18 AMPS

E

E B

PANEL:	LP-1-C-1 (SECTION 1 of 2)	277/480V, 3 PHASE-4 WIRE	SURFACE MOUNTED
MAIN:	400A MCB	BUS AMPACITY: 400A	18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
H	EWH-1-B-1	20/2	1	3,000						2	20/1	SPARE	
H	"	"	3		3,000					4	20/1	SPARE	
M	EF-1-B-2	20/1	5			528				6	20/1	SPARE	
H	EWH-1-B-2	20/2	7	3,000						8	20/1	SPARE	
H	"	"	9		3,000					10	20/1	SPARE	
M	~~SPARE~~ **LOADING DOCK ROLLING DOOR**	20/1	11			**1,920**				12	20/1	SPARE	
R	GENERAL RECPT	20/1	13	540			1,656			14	20/1	RM 01483 - OVERHEAD GRILLE	M
R	EQMT RM RECPT, GENERAL RECPT	20/1	15		1,260			1,656		16	20/1	RM 01462 - OVERHEAD GRILLE	M
R	EQMT RM RECPT, GENERAL RECPT	20/1	17			1,260			864	18	20/1	RM 01425 - OVERHEAD GRILLE	M
R	GENERAL RECPT	20/1	19	1,440			864			20	20/1	RM 01425 - OVERHEAD GRILLE	M
	SPARE	20/1	21					528		22	20/1	RM 01422 - DB DOOR ACTUATOR	M
	SPARE	20/1	23						528	24	20/1	RM 01441 - DB DOOR ACTUATOR	M
R	RESTROOM RECEPT	20/1	25	360						26	20/1	~~RM 01461 - DB DOOR ACTUATOR~~ **SPARE**	~~M~~
E	01481 01426 RR HAND DRYER	20/1	27		1,020			528		28	20/1	RM 01462 - DB DOOR ACTUATOR	M
M	SF-1-B-1	20/1	29			696			528	30	20/1	RM 01483 - DB DOOR ACTUATOR	M
	SPARE	20/1	31							32	20/1	SPARE	
	SPARE	20/1	33							34	20/1	SPARE	
	SPARE	20/1	35							36	20/1	SPARE	
	SPARE	20/1	37							38	20/1	SPARE	
	SPARE	20/1	39							40	20/1	SPARE	
	SPARE	20/1	41							42	20/1	SPARE	
SUBTOTAL (VA)				8,340	8,280	4,404	2,520	2,712	1,920	SUBTOTAL (VA)			

SUBTOTAL ALL PHASES (VA)	PHASE A	PHASE B	PHASE C	SUBTOTAL ALL PHASES (AMPS)
28,176	10,860	10,992	6,324	34

RFI-TG10.4-611

PANEL: LP-1-C-1 (SECTION 2 of 2) — 277/480V, 3 PHASE-4 WIRE — SURFACE MOUNTED

MAIN: MLO — BUS AMPACITY: 400A — 18,000 AIC SYMMETRICAL

TYP	DESCRIPTION	DEVICE	CKT	LOAD/PHASE (VA) A	B	C	A	B	C	CKT	DEVICE	DESCRIPTION	TYP
	SPACE	20/1	43				720			44	20/1	SIGNAGE (3)	E
	SPACE	20/1	45					960		46	20/1	SIGNAGE (4)	E
	SPACE	20/1	47						240	48	20/1	SIGNAGE (1)	E
	SPACE	20/1	49				600			50	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	51					600		52	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	53						600	54	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	55				600			56	20/1	RM 03424 - DB SLIDING DOOR	M
	SPACE	20/1	57							58	20/1	SPARE	
	SPACE	20/1	59							60	20/1	SPARE	
	SPACE	20/1	61							62	20/1	SPARE	
	SPACE	20/1	63							64	20/1	SPARE	
	SPACE	20/1	65							66	20/1	SPARE	
	SPACE		67							68		SPACE	
	SPACE		69							70		SPACE	
	SPACE		71							72		SPACE	
	SPACE		73							74		SPACE	
	SPACE		75							76		SPACE	
	SPACE		77							78		SPACE	
	SPACE		79				0			80	100/3	DML-1-C-1	L
	SPACE		81					0		82			L
	SPACE		83						0	84			L
	SUBTOTAL (VA)			0	0	0	1,920	1,560	840			SUBTOTAL (VA)	

TOTAL ALL PHASES, ALL PANEL SECTIONS (VA)	PHASE A	PHASE B	PHASE C	TOTAL ALL PHASES, ALL PANEL SECTIONS (AMPS)
32,496	12,780	12,552	7,164	39

LOAD SUMMARY BY TYPE	CONNECTED LOAD	DEMAND FACTOR	NEC LOAD
E = EQUIPMENT	2,940 VA	1.00	2,940 VA
H = ELECTRIC HEAT	12,000 VA	1.00	12,000 VA
K = KITCHEN EQUIPMENT	0 VA	0.65	0 VA
L = LIGHTING	0 VA	1.25	0 VA
M = 25% of LARGEST MOTOR	1,656 VA	0.25	414 VA
m - ALL MOTORS	12,696 VA	1.25	15,870 VA
R = RECEPTACLE	4,860 VA	NEC DEMAND	4,860 VA

CONNECTED LOAD SUMMARY
32,496 VA
90 AMPS

NEC LOAD SUMMARY
36,084 VA
100 AMPS

B E

TG10.4 – Electrical, Communications, Security and Integrated Networks

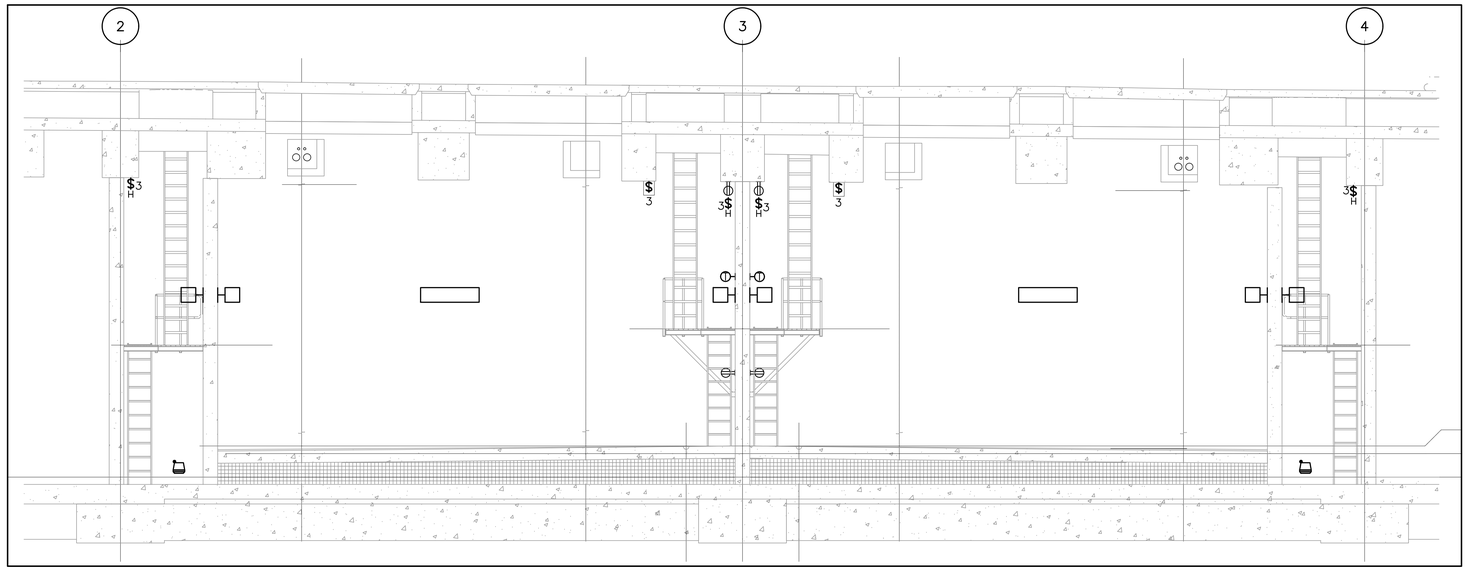
Questions are numbered in the order received. Numbers missing in the sequence either have been answered in a previous response set or will be answered in a future set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-431	8/11/2014		Division 25, 26, 27 & 28	Warranty/Commissioning of Division 25, 26, 27 & 28: How is the commissioning and testing process going to be implemented with so many areas that will not have a completely designed system with an identifiable SOW, active head end, and over all integration? Someone needs to provide some level of detail stating what the end result will look like, including a refined commissioning matrix showing responsibilities and ownership at a specific condition; then this would allow us to determine final cost estimate.	Please refer to Specification Section 01 91 00, General Commissioning Requirements, for overall project commissioning requirements. TJPA has a commissioning agent with overall commissioning responsibilities. Refer to Division 25, 26, 27, and 28 specific commissioning specification sections for specific requirements for each division and trade subcontractor responsibilities. Commissioning responsibilities will only include base contract work as bid under the TG10.4 package.
TG10.4-444	8/12/2014	A1-3002	05 00 00	REFERENCE: Sheet A1-3002 (IFC Drawings for Main Package dated 3/31/14). 1. As shown on Sheet A1-3002, steel plates have been added to the utility pads. 2. No information is provided regarding the thickness of the steel plates, attachment details, or grounding details. 3. Please provide the thickness, attachment, and grounding details for the steel plates referenced on Sheet A1-3002.	1. Steel plates shall be embedded in the concrete pads with shear studs welded to the bottom of the plates, as shown in detail 5/S1-3002. 2. Typical for each steel plate at the SFPUC transformers: The TG10.4 Trade Subcontractor will tap the grounding electrode conductor embedded in the vault slab. The TG10.4 Trade Subcontractor will extend the tap conductor in the slab and bond it to the steel plate. Additionally, the TG10.4 Trade Subcontractor will bond the metal ladders in the vaults and sumps pits; and bond to building steel. See attached sketch SKE-036 and apply required scope revision for each vault. 3. See architectural drawings for the dimensions of the steel plates. The thickness is 3/4".

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-551	8/29/2014		Section 28 05 00, Part 2 Products, 2.7 Interfaces, paragraph A, Common Work Results, issued June 20, 2014	Also reference SSI Q&A minutes, question #46, and SSI NDA form 01 35 70/ATI page 2, and Exhibit A, August 22, 2014 page 13, paragraph E. Exclusions. The SSI NDA form allows requests for access to TG18.1 Bus Ramp documents, but access does not appear to be allowed. The current Exhibit A excludes Bus Ramp work except for control and power termination, testing, start-up and commissioning of Bus Ramp systems. Section 28 05 00 Common Work Results calls out integration of Bus Ramp systems to allow monitoring from the SCC. The SSI Q&A minutes state that we should review the Bus Ramp documents. Please allow access to TG18.1 SSI documents, or remove the Bus Ramp integration requirement.	Bus Ramps plans and specifications containing SSI are available on the TJPA's secure website to TG10.4 bidders who have signed TJPA's Non-Disclosure Agreement (NDA). The NDA, along with instructions, can be downloaded from the TG10.4 contract page of TJPA's website at http://www.transbaycenter.org/rfp/electrical
TG10.4-577	8/29/2014		25 30 20, Paragraph 2.19	This section calls for a weather station to be provided for this project, the drawings do not show where the station is to be installed; please provide the location of where the weather station is to be installed.	There is a total of five (5) weather stations for the project, located as follows: 1) Ground Level, Northwest Corner, on top of Signage Pylon (see E1-2302, Note 8). 2) Ground Level, Southwest Corner, on top of Signage Pylon (see E1-2302, Note 8). 3) Ground Level, Northeast Corner, on top of GGT Supervisor Booth (see E1-2306, Note 5). 4) Ground Level, Southeast Corner, on top of GGT Supervisor Booth (see E1-2306, Note 5). 5) Roof Park Level, aligned with First Street, on top of elevator penthouse parapet (see E1-2604, Note 1).

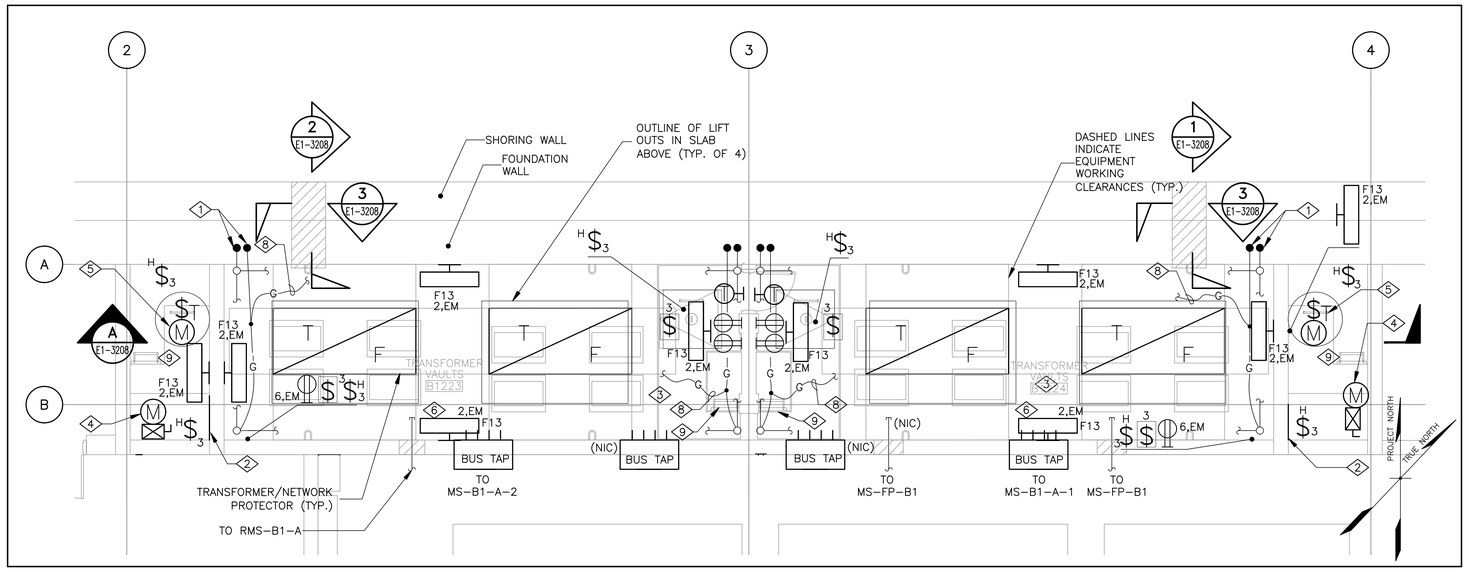
Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-632	9/19/2014		ES-2111, E1-3210, Section "C" and Detail "A" & #3	These 2 details for the same location do not match; please provide which of the 2 details should be used for the duct bank.	For spacing between conduits, refer to the architectural slab edge plans for horizontal dimensions, and ES-series drawings for vertical dimensions (invert elevations). Refer to the sketches listed below for Link Seal dimensions: SKE-RFI-T-1695-1 SKE-RFI-T-1695-2 SKE-RFI-T-1695-3 SKE-RFI-T-1695-4
TG10.4-649	9/29/2014	Exhibit A Detail(s): page 13; E.3 / page 15	28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-655	9/29/2014	SE1-2102		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-656	9/29/2014			Additive Specification Alternate #19 states to "Provide an Visual System at the Roof Park Amphitheater." Since the roof park is no longer part of the TG10.4 bid, shouldn't this item be eliminated from the Bid Form?	Additive Alternate #19 is no longer applicable. Addendum #8 will insert N/A in the pricing column.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-658	9/29/2014		SBE Requirements	Recently we have received calls from SBE contractors who are having an issue with getting a P&P Bond for their scope of work. The issue is not whether they can handle the work or not, but that their bonding capacity with this work will more than max out their capacity. With having to have a significant dollar value of work performed by SBE puts them and the sub-prime at risk. Typically Public projects have a bond assistance program to assist the SBE contractors, but for this project there is no bond assistance or 2nd Tier Subguard provided. Please provide a solution for this issue that is similar to other Public projects to assist the SBE.	Risk management for SBE participation is a TG10.4 bidder responsibility. There is no assistance for 2nd tiered SBE bonding capacity within Subguard.
TG10.4-663	9/29/2014		Exhibit A	Exhibit A under the section "Additional Coverage" requires additional coverage of $10M; our engineers have stated that the industry standard is $1M to $3M per claim with a $3M to $5M aggregate; this project's requirements are higher than the industry standard and are asking for them to be reduced to $3M per claim and $5M aggregate.	“Additional Coverage” as written shall remain.
TG10.4-665	9/29/2014		TG10.4 schedule	The TG10.4 schedule indicates that all procurement is to be finished by April 19, 2015. Commissioning of security systems does not begin until June 2, 2017. For warranty purposes, would it be more appropriate to delay procurement until late 2016?	Procurement, as currently shown, is a placeholder to reflect general, overall procurement requirements as of January 2014. Exhibit I does not fully detail the numerous specified warranty requirements, and it does not address the bid extensions as experienced by the TG10.4 trade package. Once the TG10.4 trade package is awarded, the TG10.4 Trade Subcontractor will participate in the development of a more detailed TG10.4 schedule, helping to further define necessary procurement durations that will reflect TG10.4 procurement activities extending well into 2016.



A / E1-3208 TRANSFORMER VAULT PARTIAL PLAN @ LOWER CONCOURSE LEVEL
SCALE: 1/4" = 1'-0"

0 2 4 8 12
SCALE IN FEET



1 / E1-3208 LOWER CONCOURSE – ENLARGED ELECTRICAL ROOM – SECTOR A (WEST VAULT) PLAN VIEW
SCALE: 1/4" = 1'-0"

0 2 4 8 12
SCALE IN FEET

SHEET NOTES

A. REFER TO SHEET A1-3012 FOR ADDITIONAL REQUIREMENTS FOR THE VAULT CONSTRUCTION.

B. THE UTILITY SERVICE PROVIDER MUST REVIEW AND APPROVE THIS NOT-FOR-CONSTRUCTION VAULT DRAWING PRIOR TO THE CONSTRUCTION OF THE VAULT. ONCE APPROVED, THE UTILITY SERVICE PROVIDER FORWARDS A STAMPED DRAWING TO THE SENDER FOR HIS/HER USE AND DISTRIBUTION TO THE GENERAL CONTRACTOR. THE UTILITY SERVICE PROVIDER REQUIRES NOTIFICATION OF MAJOR DESIGN OR CONSTRUCTION CHANGES. THE UTILITY SERVICE PROVIDER MUST REVIEW AND APPROVE THESE CHANGES BEFORE PROCEEDING WITH THE DESIGN OR CONSTRUCTION.

C. THE UTILITY SERVICE PROVIDER INSPECTS THE VAULT DURING ITS CONSTRUCTION TO ASSURE THE INSTALLATION AND PLACEMENT OF VARIOUS ITEMS REQUIRED. NO ELECTRICAL EQUIPMENT IS INSTALLED BY THE UTILITY SERVICE PROVIDER UNTIL THE VAULT IS COMPLETED AND CLEAR OF ANY DEBRIS FOR A SAFE WORKING ENVIRONMENT. THE INSPECTOR MUST ACCEPT AND SIGN OFF ON THE VAULT BEFORE ENERGIZING THE NEW SERVICE. CALL THEM TO SCHEDULE INSPECTIONS.

D. NO FOREIGN EQUIPMENT SHALL PASS THROUGH OR TERMINATE IN THE VAULT. DO NOT INSTALL SPRINKLER SYSTEMS IN THE VAULT SINCE OUR TRANSFORMER(S) CONTAIN OIL. USE SURFACE MOUNTED ELECTRICAL CONDUITS AND BOXES PROVIDING THEY ARE WEATHER PROOF PVC AND APPROVED BY THE CITY OF SAN FRANCISCO.

E. LIGHT FIXTURES SHALL BE OF TYPE "F13". REFER TO LIGHTING FIXTURE SCHEDULE. MOUNTING HEIGHT SHALL BE 10'-0" AFF TO BOTTOM OF FIXTURE, UON. PROVIDE CONVENIENCE GFI DUPLEX RECEPTACLES. MAINTAIN 60 INCHES ABOVE THE FINISHED FLOOR FOR ALL RECEPTACLES, EXCLUDING THE RECEPTACLE AT THE ENTRANCE. PROVIDE POWER FOR ALL EQUIPMENT FROM THE CUSTOMER'S EMERGENCY POWER SUPPLY. REFER TO PG&E DRAWING 054438, SHEET 2 THROUGH 5 FOR INSTALLATION DETAILS.

F. PROVIDE LINK SEAL SLEEVES FOR PRIMARY SERVICE CONDUITS. CONFIRM QUANTITY AND SIZE WITH THE UTILITY SERVICE PROVIDER. PROVIDE SLEEVES AT THE REQUIRED DEPTHS FOR THE UTILITY SERVICE PROVIDER PRIMARY CONDUITS. COORDINATE THE SLEEVES LOCATIONS AS REQUIRED. MAINTAINING A MINIMUM OF 36 INCHES OF COVER BETWEEN THE FINISHED STREET GRADE AND THE TOP OF THE WINDOW.

G. PROVIDE HEAVY DUTY SUMP PUMPS SIMILAR TO THE BARNES SED-50. PROVIDE A PROPER DISCHARGE TO THE BUILDING'S SEWAGE SYSTEM VIA A 2 INCH PIPE. PROVIDE A MINIMUM SUMP PUMP DEPTH OF 18 INCHES BELOW THE FINISH FLOOR. REFER TO PG&E DRAWING 054438, SHEET 2 THROUGH 5 FOR INSTALLATION DETAILS.

H. FOR BUS PENETRATIONS INTO THE VAULT, MAINTAIN A MINIMUM OF 36 INCHES FROM THE SIDE WALLS, 24 INCHES FROM THE CEILING AND 102 INCHES ABOVE THE FINISHED FLOOR. REFER TO PG&E DRAWING 041352 FOR INSTALLATION DETAILS.

I. PROVIDE A FORCED-AIR VENTILATION DIRECT DRIVE EXPLOSION PROOF FAN SYSTEM. PROVIDE A 24" X 24" OPENING BETWEEN THE MAIN VAULT AND THE VENT SHAFT DIRECTLY ABOVE A 30" X 30" NATURAL AIR (EMERGENCY) OPENING. MAINTAIN CROSS VENTILATION. INSTALL 1/2" INCH MESH SCREENS ON BOTH SIDES OF THE FAN ASSEMBLY. REFER TO PG&E DRAWING 054438, SHEETS 2 THROUGH 5 FOR INSTALLATION DETAILS.

J. CONNECT ALL EMERGENCY 120V EQUIPMENT POWER TO ELP-B2-A-EMG-1, UON.

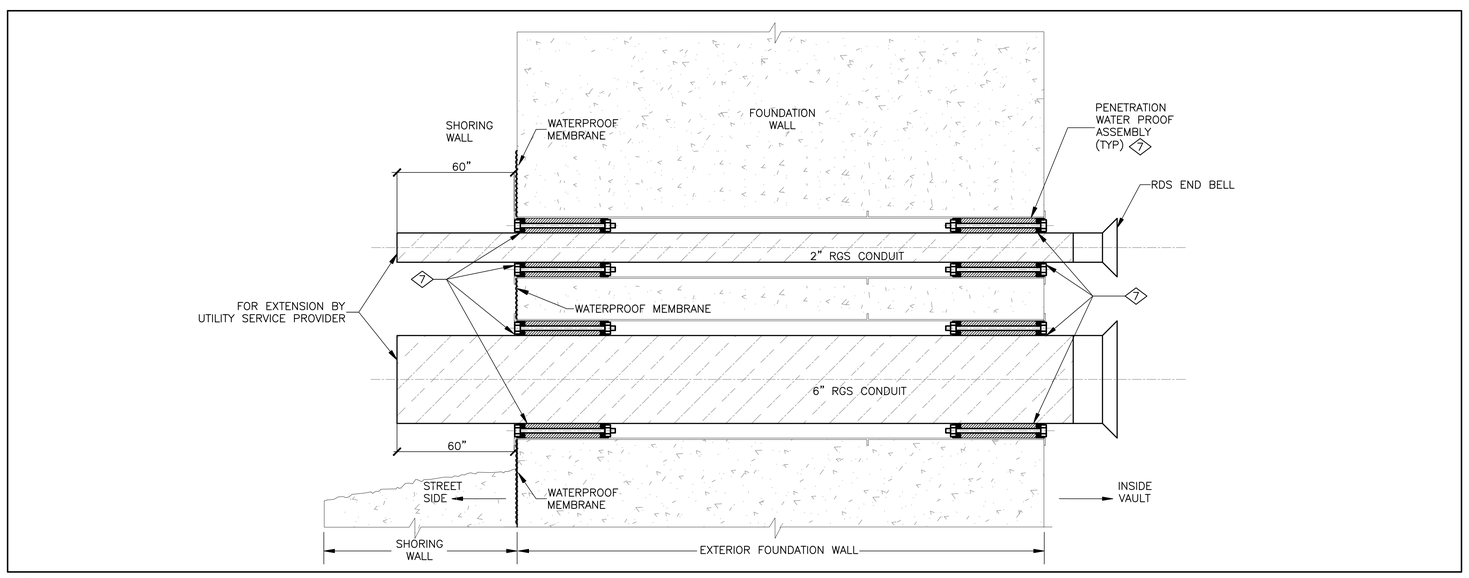
K. COORDINATE LOCATIONS OF ALL DEVICES WITH UTILITY PROVIDER.

NUMBERED NOTES

1. GROUNDING ELECTRODE CONDUCTORS, #3/0 BARE COPPER, ROUTED TO DEDICATED GROUND RODS INSTALLED BELOW THE BUILDING MAT SLAB INSTALLED IN PREVIOUS BID PACKAGE. REFER TO DRAWING E1-3201 FOR ADDITIONAL INFORMATION. GROUND RODS ARE 5/8" INCH x 10 FEET, STAINLESS STEEL. PROVIDE TEN FEET OF CONDUCTOR INSIDE VAULT AT EACH LOCATION FOR USE BY THE UTILITY SERVICE PROVIDER. CAD WELD ALL GROUND CONNECTIONS (TYP).
2. MOUNTING PLATE, 1/4" GALVANIZED STEEL, SEE DETAIL 4, SHEET M1-7.02. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, 1 3/4" O.D WASHER, AND FLUSH FASTENERS TO INSTALL MOUNTING PLATE IN PLACE. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, NUTS AND WASHER TO INSTALL FAN ON MOUNTING PLATE. 1/2" WIRE MESH SCREEN.
3. FLOOR IS SLOPED TO DRAIN.
4. TDI-3-20-0328, 5460 CFM @ 0.25 S.P. 1725 RPM, 1HP, 480V/3PH.
5. SEE PLUMBING DRAWINGS FOR EXTENSION OF 2" SUMP DRAIN LINES.
6. 8'-0" AFF TO TOP OF LIGHT FIXTURE.
7. LINK SEAL OR APPROVED EQUAL.
8. EXTEND 2/0 CU CONDUCTOR TO STEEL PLATE UNDER TRANSFORMER AND CADWELD, TYPICAL FOR EACH STEEL PLATE.
9. BOND METAL LADDER TO BUILDING STEEL WITH A #2 CU CONDUCTOR.

3$H	MANHOLE LIGHT SWITCH, 60" AFF THREE WAY, ILLUMINATED HANDLE
	VAULT LIGHT FIXTURE
	DUPLEX RECEPTACLE, GFI, 60" AFF, UON
•	GROUNDING ELECTRODE CONDUCTOR EMBEDDED IN CONCRETE FOUNDATION WALL OR SLAB
	FAN CONTROL THERMOSTAT SET 85°F
	SUMP PUMP – SP
3$	THREE-WAY, FAN CUTOFF SWITCH, 60" AFF WITH PILOT LIGHT

LEGEND



2 / E1-3208 SECTION – SFPUC CONDUITS
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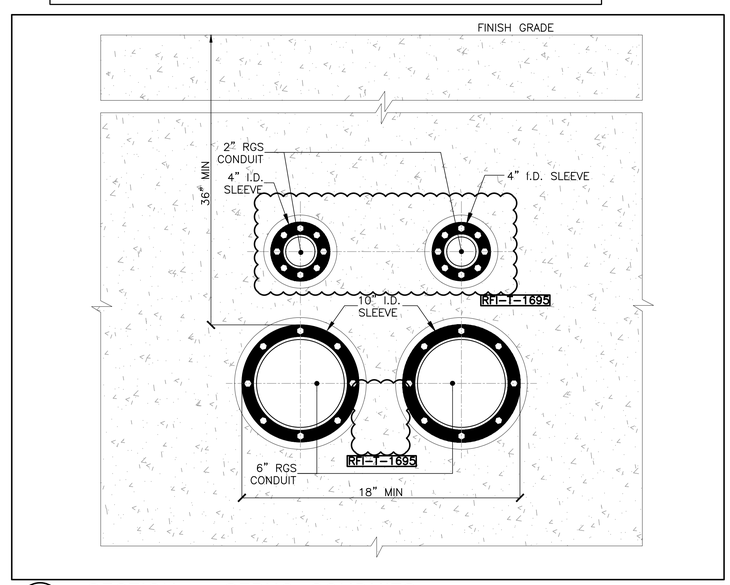
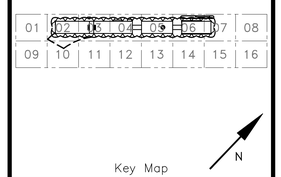


3 / E1-3208 SECTION – SFPUC CONDUITS
SCALE: NONE

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com



Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
3	04/23/14	ISSUED FOR BID – ADDENDUM #3	CFH
4	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ENLARGED PLANS

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHRISTINE FENLON - HARDING
No. E-9660
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: C. FENLON-HARDING	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: NTS	SIZE: E / FACILITY NO.: 140 / REVISION: D
SHEET NUMBER: SKE-RFI-T-1695-1	SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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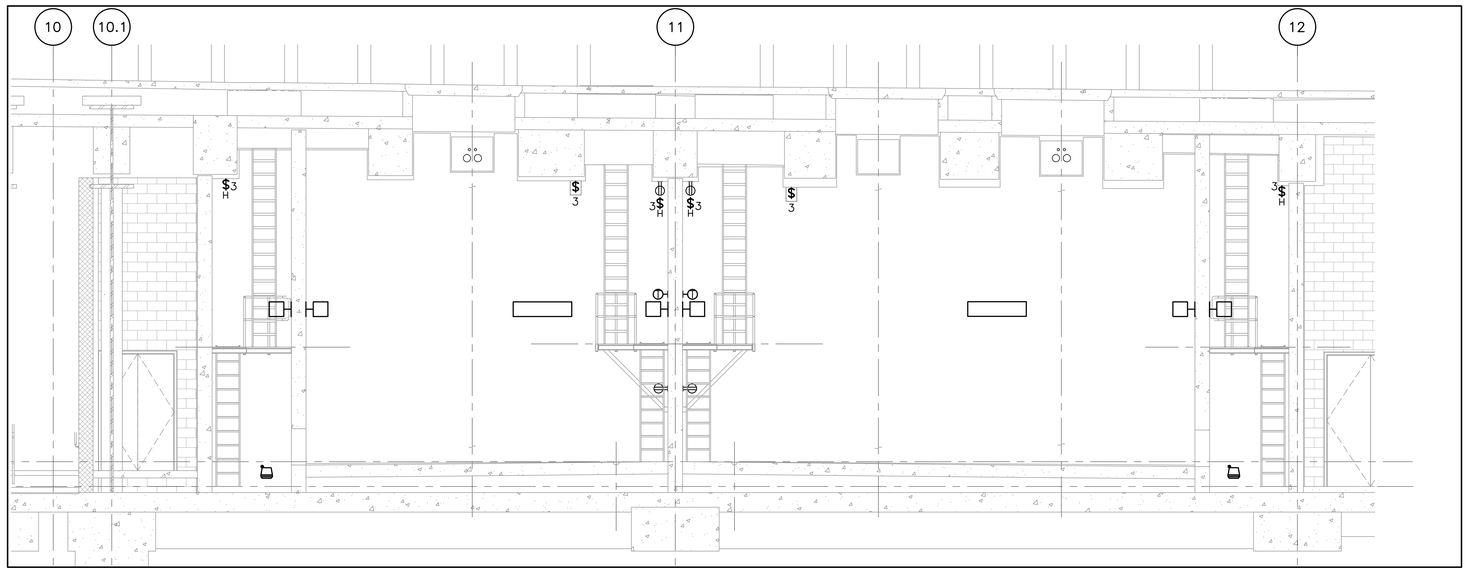

A / E1-3209 TRANSFORMER VAULT PARTIAL PLAN @ LOWER CONCOURSE LEVEL
SCALE: 1/4" = 1'-0"

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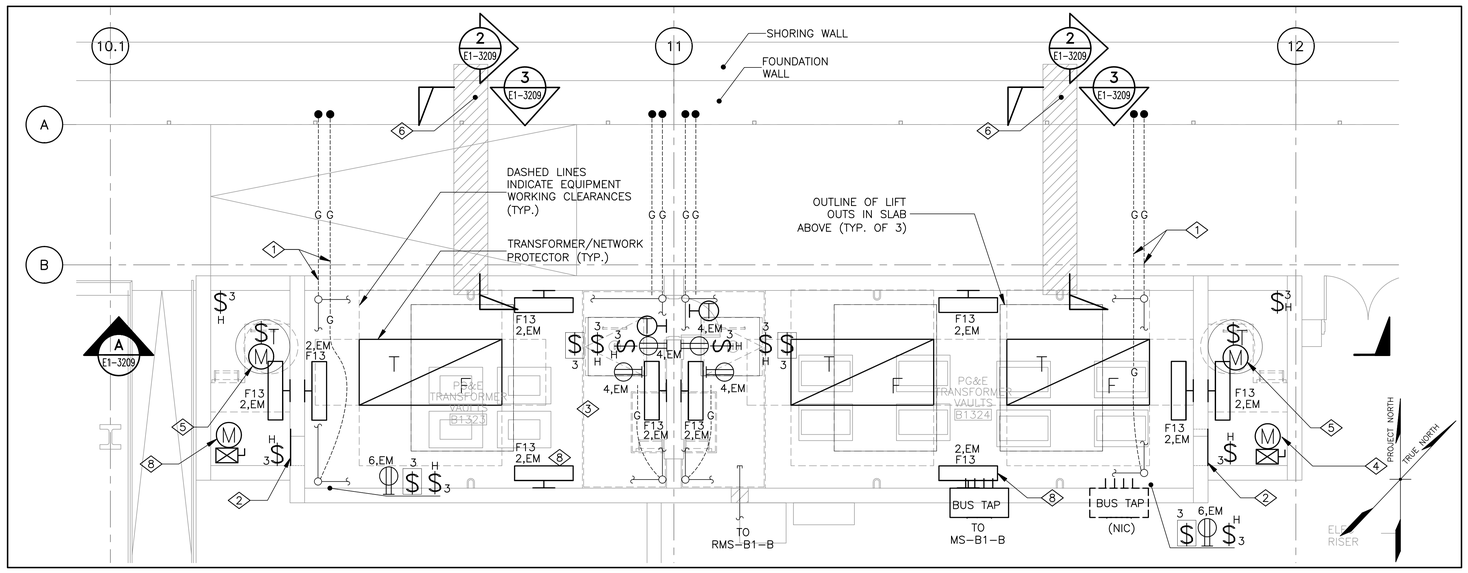
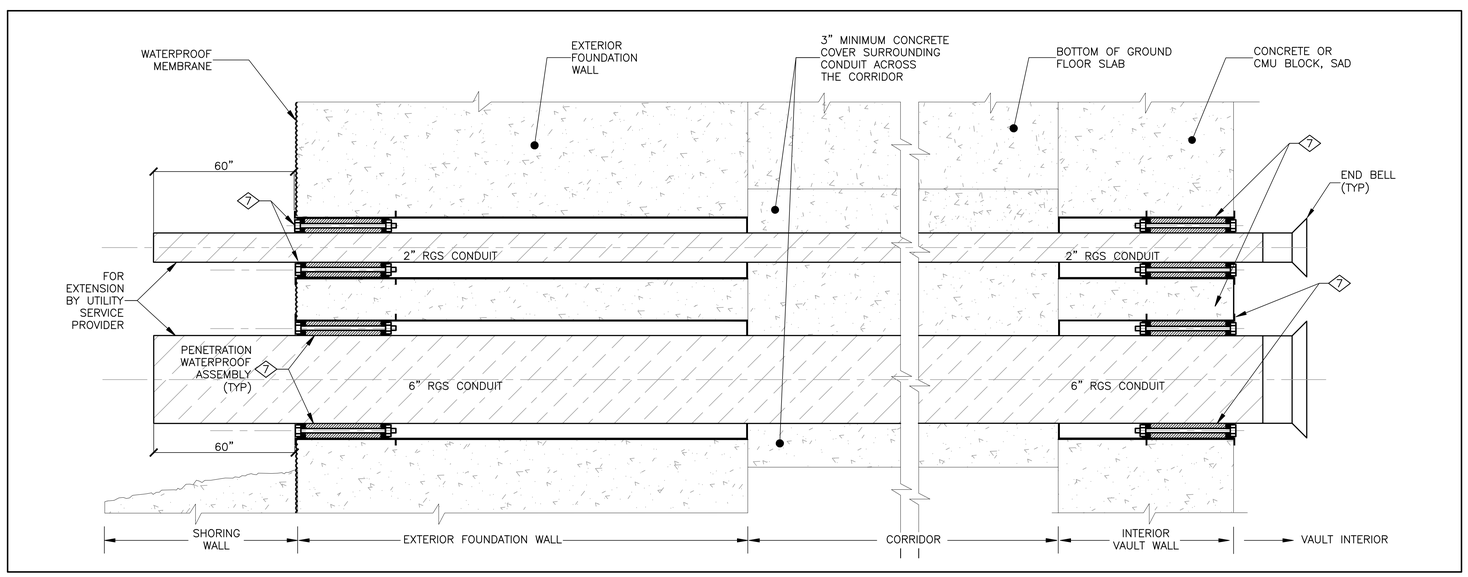
SCALE IN FEET

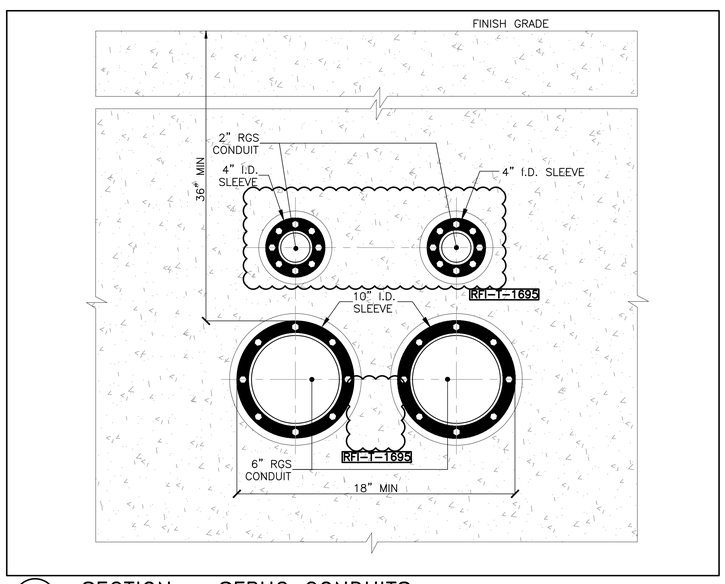


1 / E1-2203 LOWER CONCOURSE – ENLARGED ELECTRICAL ROOM – SECTOR B (WEST CENTER) PLAN VIEW
SCALE: 1/4" = 1'-0"

0 2 4 8 12
SCALE IN FEET



2 / E1-3209 SECTION – SFPUC CONDUITS
SCALE: NONE



3 / E1-3209 SECTION – SFPUC CONDUITS
SCALE: NONE

SHEET NOTES

A. REFER TO SHEET A1-3012 FOR ADDITIONAL REQUIREMENTS FOR THE VAULT CONSTRUCTION.

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F. PROVIDE LINK SEAL SLEEVES FOR PRIMARY SERVICE CONDUITS. CONFIRM QUANTITY AND SIZE WITH THE UTILITY SERVICE PROVIDER. PROVIDE SLEEVES AT THE REQUIRED DEPTHS FOR THE UTILITY SERVICE PROVIDER PRIMARY CONDUITS. COORDINATE THE SLEEVES LOCATIONS AS REQUIRED. MAINTAINING A MINIMUM OF 36 INCHES OF COVER BETWEEN THE FINISHED STREET GRADE AND THE TOP OF THE WINDOW.

G. PROVIDE HEAVY DUTY SUMP PUMPS SIMILAR TO THE BARNES SED-50. PROVIDE A PROPER DISCHARGE TO THE BUILDING'S SEWAGE SYSTEM VIA A 2 INCH PIPE. PROVIDE A MINIMUM SUMP PUMP DEPTH OF 18 INCHES BELOW THE FINISH FLOOR. REFER TO PG&E DRAWING 054438, SHEET 2 THROUGH 5 FOR INSTALLATION DETAILS.

H. FOR BUS PENETRATIONS INTO THE VAULT, MAINTAIN A MINIMUM OF 36 INCHES FROM THE SIDE WALLS, 24 INCHES FROM THE CEILING AND 102 INCHES ABOVE THE FINISHED FLOOR. REFER TO PG&E DRAWING 041352 FOR INSTALLATION DETAILS.

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J. CONNECT ALL EMERGENCY 120V EQUIPMENT POWER TO ELP-B1-B-EMG, UON.

K. COORDINATE LOCATIONS OF ALL DEVICES WITH UTILITY PROVIDER.

NUMBERED NOTES

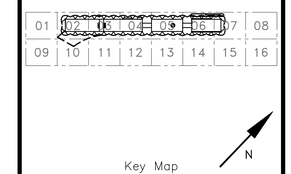
1. GROUNDING ELECTRODE CONDUCTORS, #3/0 BARE COPPER, ROUTED TO DEDICATED GROUND RODS INSTALLED BELOW THE BUILDING MAT SLAB INSTALLED IN PREVIOUS BID PACKAGE. REFER TO DRAWING E1-3201 FOR ADDITIONAL INFORMATION. GROUND RODS ARE 5/8" INCH x 10 FEET, STAINLESS STEEL. PROVIDE TEN FEET OF CONDUCTOR INSIDE VAULT AT EACH LOCATION FOR USE BY THE UTILITY SERVICE PROVIDER. CAD WELD ALL GROUND CONNECTIONS (TYP).
2. MOUNTING PLATE, 1/4" GALVANIZED STEEL, SEE DETAIL 4, SHEET M1-7.02. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, 1 3/4" O.D WASHER, AND FLUSH FASTENERS TO INSTALL MOUNTING PLATE IN PLACE. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, NUTS AND WASHER TO INSTALL FAN ON MOUNTING PLATE. 1/2" WIRE MESH SCREEN.
3. FLOOR IS SLOPED TO DRAIN.
4. TDI-3-20-0328, 5300 CFM @ 0.25 S.P. 1725 RPM, 1HP, 480V/3PH.
5. SEE PLUMBING DRAWINGS FOR EXTENSION OF 2" SUMP DRAIN LINES.
6. CONCRETE ENCASE LINK SEAL CONDUIT SLEEVES FOR THE UTILITY SERVICE PROVIDER SERVICE CONDUITS WITH 3" MINIMUM CONCRETE COVER.
7. LINK SEAL PRODUCT OR APPROVED EQUAL.
8. 8'-0" AFF TO TOP OF LIGHT FIXTURE.

3$H	MANHOLE LIGHT SWITCH, 60" AFF THREE WAY, ILLUMINATED HANDLE
	VAULT LIGHT FIXTURE.
	DUPLEX RECEPTACLE, GFI, 60" AFF
•	GROUNDING ELECTRODE CONDUCTOR EMBEDDED IN CONCRETE FOUNDATION WALL OR SLAB
	FAN CONTROL THERMOSTAT SET 85°F
	SUMP PUMP – SP
3$	THREE-WAY, FAN CUTOFF SWITCH, 60" AFF WITH PILOT LIGHT
RGS	RIGID GALVANIZED STEEL

LEGEND

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

CONSULTANT:
WSP · FLACK+KURTZ
405 Howard St.,Suite 500
San Francisco, CA 94105
Tel. (415) 398-3833
www.wspfk.com



Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
3	04/23/14	ISSUED FOR BID – ADDENDUM #3	CFH
4	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ENLARGED PLANS

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
CHALONE FENLON - HARDING
No. E15650
ELECTRICAL
STATE OF CALIFORNIA

APPROVED: PRINCIPAL ENGINEER	C. FENLON-HARDING
APPROVED: PROJECT MANAGER	W. GAW
APPROVED: PROJECT MANAGER	C. FENLON-HARDING
DESIGNED BY: C. FENLON-HARDING	CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014
SCALE: NTS	SIZE: E · FACILITY NO.: 140 · REVISION: D
SHEET NUMBER: SKE-RFI-T-1695-2	SEQUENCE NUMBER: ___ of ___

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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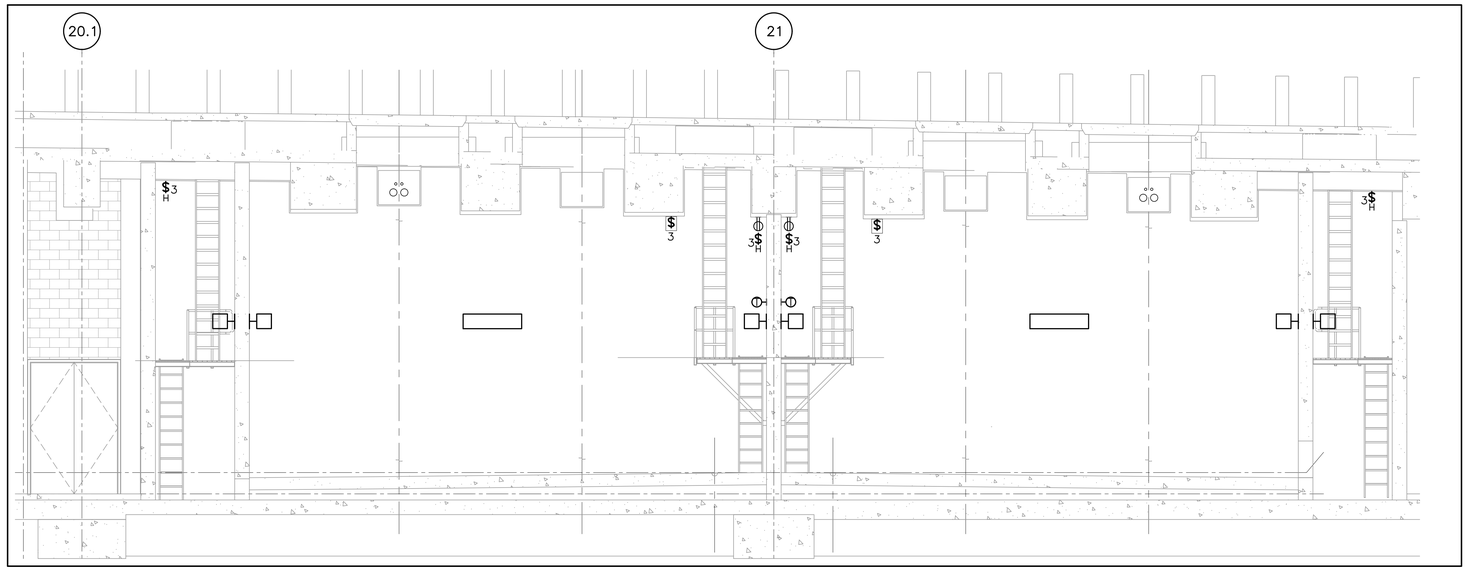
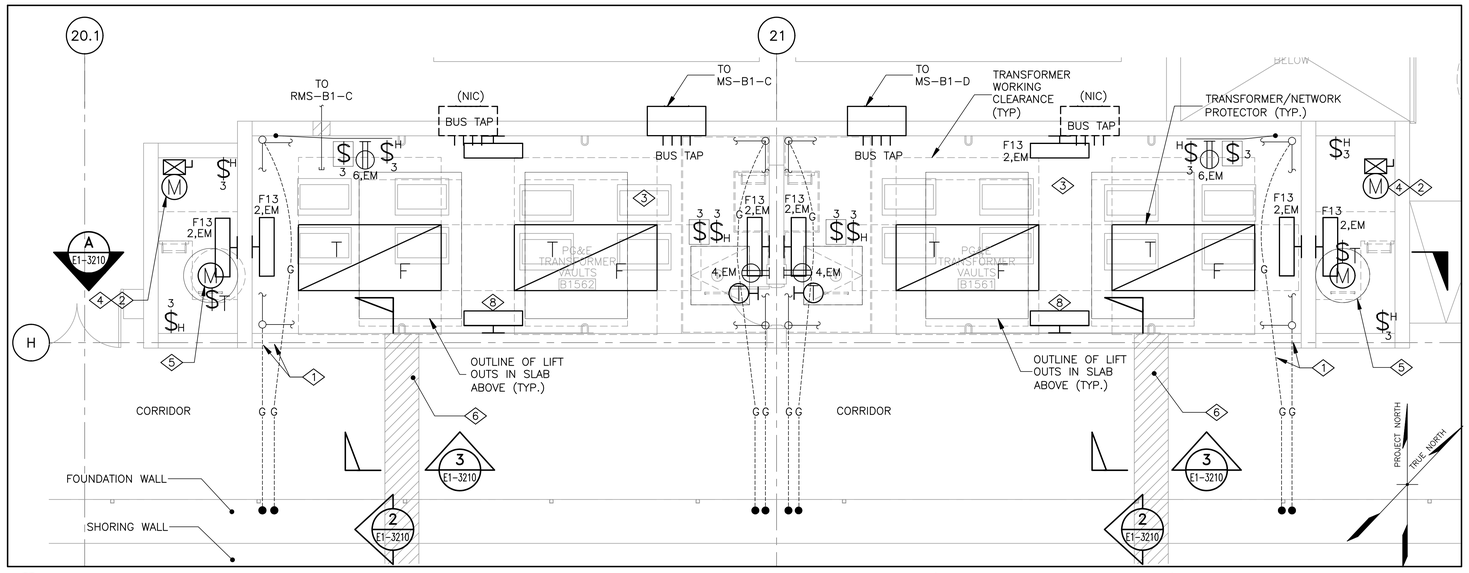


A E1-3210 TRANSFORMER VAULT PARTIAL PLAN @ LOWER CONCOURSE LEVEL
SCALE: 1/4" = 1'-0"

0 2 4 8 12
SCALE IN FEET



1 E1-2205 LOWER CONCOURSE – ENLARGED ELECTRICAL ROOM – SECTOR C AND D (EAST CENTER VAULT)
SCALE: 1/4" = 1'-0"

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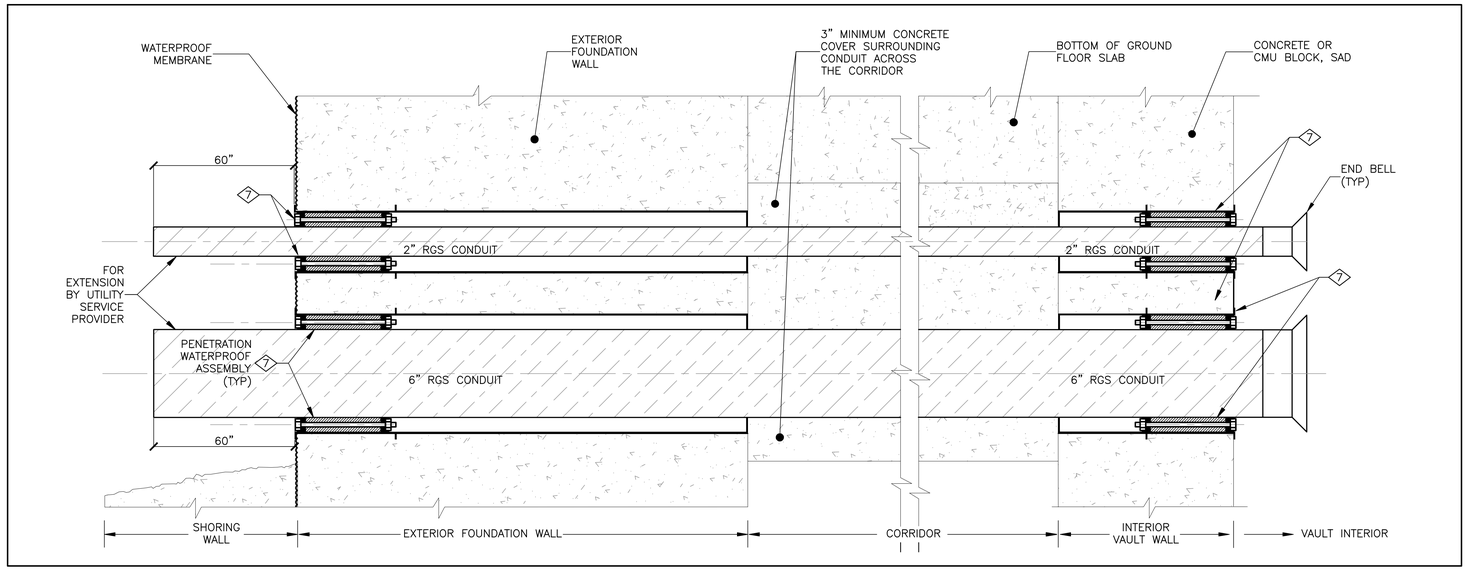
SCALE IN FEET



2 E1-3210 SECTION – SFPUC CONDUITS
SCALE: NONE

SHEET NOTES

A. REFER TO SHEET A1-3012 FOR ADDITIONAL REQUIREMENTS FOR THE VAULT CONSTRUCTION.

B. THE UTILITY SERVICE PROVIDER MUST REVIEW AND APPROVE THIS NOT-FOR-CONSTRUCTION VAULT DRAWING PRIOR TO THE CONSTRUCTION OF THE VAULT. ONCE APPROVED, THE UTILITY SERVICE PROVIDER FORWARDS A STAMPED DRAWING TO THE SENDER FOR HIS/HER USE AND DISTRIBUTION TO THE GENERAL CONTRACTOR. THE UTILITY SERVICE PROVIDER REQUIRES NOTIFICATION OF MAJOR DESIGN OR CONSTRUCTION CHANGES. THE UTILITY SERVICE PROVIDER MUST REVIEW AND APPROVE THESE CHANGES BEFORE PROCEEDING WITH THE DESIGN OR CONSTRUCTION.

C. THE UTILITY SERVICE PROVIDER INSPECTS THE VAULT DURING ITS CONSTRUCTION TO ASSURE THE INSTALLATION AND PLACEMENT OF VARIOUS ITEMS REQUIRED. NO ELECTRICAL EQUIPMENT IS INSTALLED BY THE UTILITY SERVICE PROVIDER UNTIL THE VAULT IS COMPLETED AND CLEAR OF ANY DEBRIS FOR A SAFE WORKING ENVIRONMENT. THE INSPECTOR MUST ACCEPT AND SIGN OFF ON THE VAULT BEFORE ENERGIZING THE NEW SERVICE. CALL THEM TO SCHEDULE INSPECTIONS.

D. NO FOREIGN EQUIPMENT SHALL PASS THROUGH OR TERMINATE IN THE VAULT. DO NOT INSTALL SPRINKLER SYSTEMS IN THE VAULT SINCE OUR TRANSFORMER(S) CONTAIN OIL. USE SURFACE MOUNTED ELECTRICAL CONDUITS AND BOXES PROVIDING THEY ARE WEATHER PROOF PVC AND APPROVED BY THE CITY OF SAN FRANCISCO.

E. LIGHT FIXTURES SHALL BE OF TYPE "F13". REFER TO LIGHTING FIXTURE SCHEDULE. MOUNTING HEIGHT SHALL BE 10'-0" AFF BOTTOM OF FIXTURE, UON. PROVIDE CONVENIENCE GFI DUPLEX RECEPTACLES. MAINTAIN 60 INCHES ABOVE THE FINISHED FLOOR FOR ALL RECEPTACLES, EXCLUDING THE RECEPTACLE AT THE ENTRANCE. PROVIDE POWER FOR ALL EQUIPMENT FROM THE CUSTOMER'S EMERGENCY POWER SUPPLY. REFER TO PG&E DRAWING 054438, SHEET 2 THROUGH 5 FOR INSTALLATION DETAILS.

F. PROVIDE LINK SEAL SLEEVES FOR PRIMARY SERVICE CONDUITS. CONFIRM QUANTITY AND SIZE WITH THE UTILITY SERVICE PROVIDER. PROVIDE SLEEVES AT THE REQUIRED DEPTHS FOR THE UTILITY SERVICE PROVIDER PRIMARY CONDUITS. COORDINATE THE SLEEVES LOCATIONS AS REQUIRED. MAINTAINING A MINIMUM OF 36 INCHES OF COVER BETWEEN THE FINISHED STREET GRADE AND THE TOP OF THE WINDOW.

G. PROVIDE HEAVY DUTY SUMP PUMPS SIMILAR TO THE BARNES SED-50. PROVIDE A PROPER DISCHARGE TO THE BUILDING'S SEWAGE SYSTEM VIA A 2 INCH PIPE. PROVIDE A MINIMUM SUMP PUMP DEPTH OF 18 INCHES BELOW THE FINISH FLOOR. REFER TO PG&E DRAWING 054438, SHEET 2 THROUGH 5 FOR INSTALLATION DETAILS.

H. FOR BUS PENETRATIONS INTO THE VAULT, MAINTAIN A MINIMUM OF 36 INCHES FROM THE SIDE WALLS, 24 INCHES FROM THE CEILING AND 102 INCHES ABOVE THE FINISHED FLOOR. REFER TO PG&E DRAWING 041352 FOR INSTALLATION DETAILS.

I. PROVIDE A FORCED-AIR VENTILATION DIRECT DRIVE EXPLOSION PROOF FAN SYSTEM. PROVIDE A 24" X 24" OPENING BETWEEN THE MAIN VAULT AND THE VENT SHAFT DIRECTLY ABOVE A 30" X 30" NATURAL AIR (EMERGENCY) OPENING. MAINTAIN CROSS VENTILATION. INSTALL 1/2" INCH MESH SCREENS ON BOTH SIDES OF THE FAN ASSEMBLY. REFER TO PG&E DRAWING 054438, SHEETS 2 THROUGH 5 FOR INSTALLATION DETAILS.

J. CONNECT ALL EMERGENCY 120V EQUIPMENT POWER TO ELP-B1-C-EMG, UON.

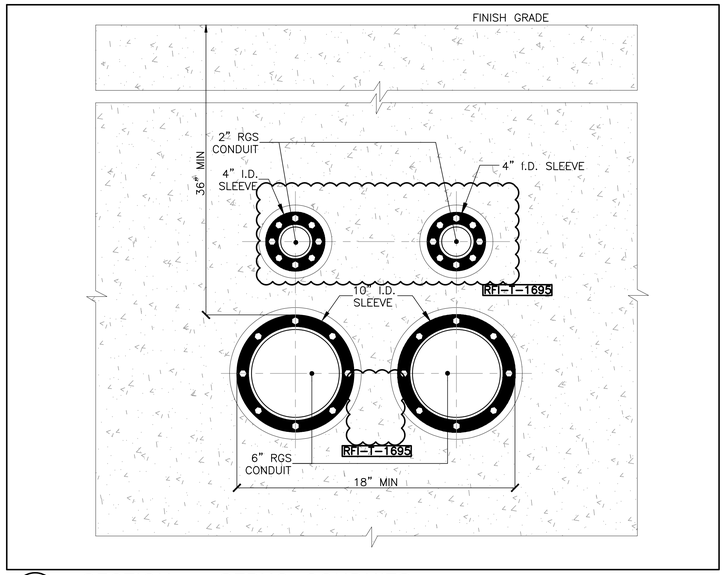
K. COORDINATE LOCATIONS OF ALL DEVICES WITH UTILITY PROVIDER.

NUMBERED NOTES

1. GROUNDING ELECTRODE CONDUCTORS, #3/0 BARE COPPER, ROUTED TO DEDICATED GROUND RODS INSTALLED BELOW THE BUILDING MAT SLAB INSTALLED IN PREVIOUS BID PACKAGE. REFER TO DRAWING E1-3202 FOR ADDITIONAL INFORMATION. GROUND RODS ARE 5/8" INCH x 10 FEET, STAINLESS STEEL. PROVIDE TEN FEET OF CONDUCTOR INSIDE VAULT AT EACH LOCATION FOR USE BY THE UTILITY SERVICE PROVIDER. CAD WELD ALL GROUND CONNECTIONS (TYP).
2. MOUNTING PLATE, 1/4" GALVANIZED STEEL, SEE DETAIL 4, SHEET M1-7.02. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, 1 3/4" O.D WASHER, AND FLUSH FASTENERS TO INSTALL MOUNTING PLATE IN PLACE. USE 8 5/8" x 1 1/2" GALVANIZED STEEL MACHINE BOLTS, NUTS AND WASHER TO INSTALL FAN ON MOUNTING PLATE. 1/2" WIRE MESH SCREEN.
3. FLOOR IS SLOPED TO DRAIN.
4. TDI-3-20-0328, 5300 CFM @ 0.25 S.P. 1725 RPM, 1HP, 480V/3PH.
5. SEE PLUMBING DRAWINGS FOR EXTENSION OF 2" SUMP DRAIN LINES.
6. CONCRETE ENCASE LINK SEAL CONDUIT SLEEVES FOR THE UTILITY SERVICE PROVIDER SERVICE CONDUITS WITH 3" MINIMUM CONCRETE COVER.
7. LINK SEAL PRODUCT OR APPROVED EQUAL.
8. 8'-0" AFF TO TOP OF LIGHT FIXTURE.

3$H	MANHOLE LIGHT SWITCH, 60" AFF THREE WAY, ILLUMINATED HANDLE
	VAULT LIGHT FIXTURE
	DUPLEX RECEPTACLE, GFI, 60" AFF
•	GROUNDING ELECTRODE CONDUCTOR EMBEDDED IN CONCRETE FOUNDATION WALL OR SLAB
	FAN CONTROL THERMOSTAT SET 85°F
	SUMP PUMP – SP
3$	THREE-WAY, FAN CUTOFF SWITCH, 60" AFF WITH PILOT LIGHT
RGS	RIGID GALVANIZED STEEL

LEGEND



3 E1-3210 SECTION – SFPUC CONDUITS
SCALE: NONE

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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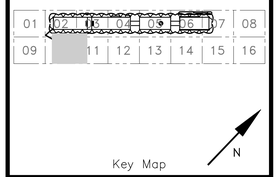

Key Map

REVISIONS

NO.	DATE	DESCRIPTION	BY
1	01/23/14	ISSUED FOR BID	CFH
2	02/21/14	ISSUED FOR BID – ADDENDUM #1	CFH
3	04/23/14	ISSUED FOR BID – ADDENDUM #3	CFH
4	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO. 08-04-CMGC-000

PROJECT TITLE: TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE: LOWER CONCOURSE LEVEL ENLARGED PLANS

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER · CHRLENE FENLON-HARDING · No. E-19520 · ELECTRICAL · STATE OF CALIFORNIA

APPROVED:
PRINCIPAL ENGINEER C. FENLON-HARDING
APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON-HARDING

DESIGNED BY:	CHECKED BY:
C. FENLON-HARDING	G. CRAIG
DRAWN BY: A. CELIS	DATE: 06/20/2014

SCALE:	SIZE	FACILITY NO.	REVISION
NTS	E	140	D

SHEET NUMBER: SKE-RFI-T-1695-3
SEQUENCE NUMBER: __ of __

ISSUED FOR CONSTRUCTION

Note: If this sheet is not 44" x 34", it has been revised from its original size. Scales noted on drawings/details are no longer applicable.

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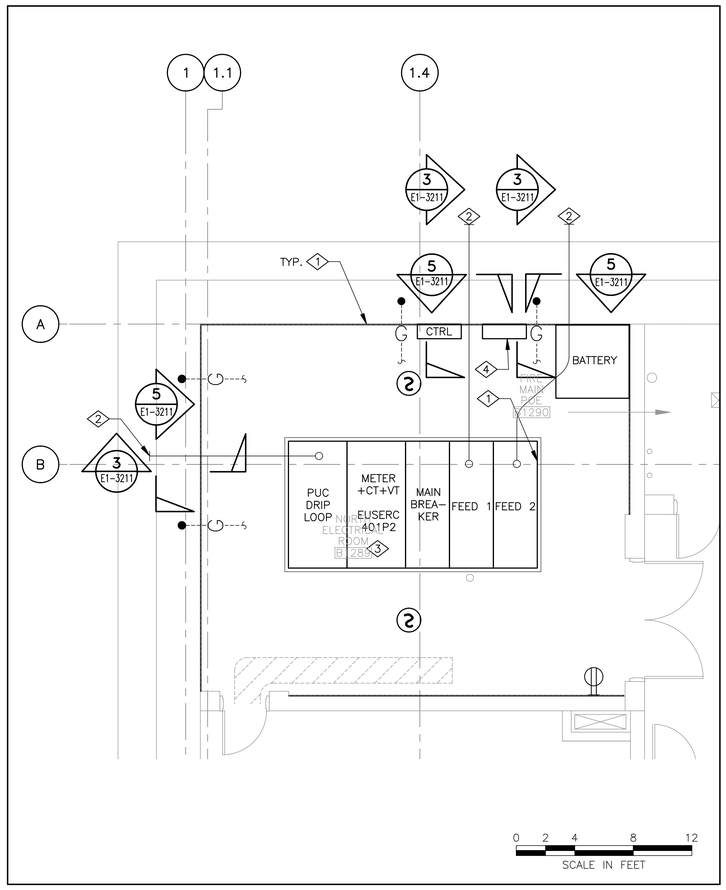
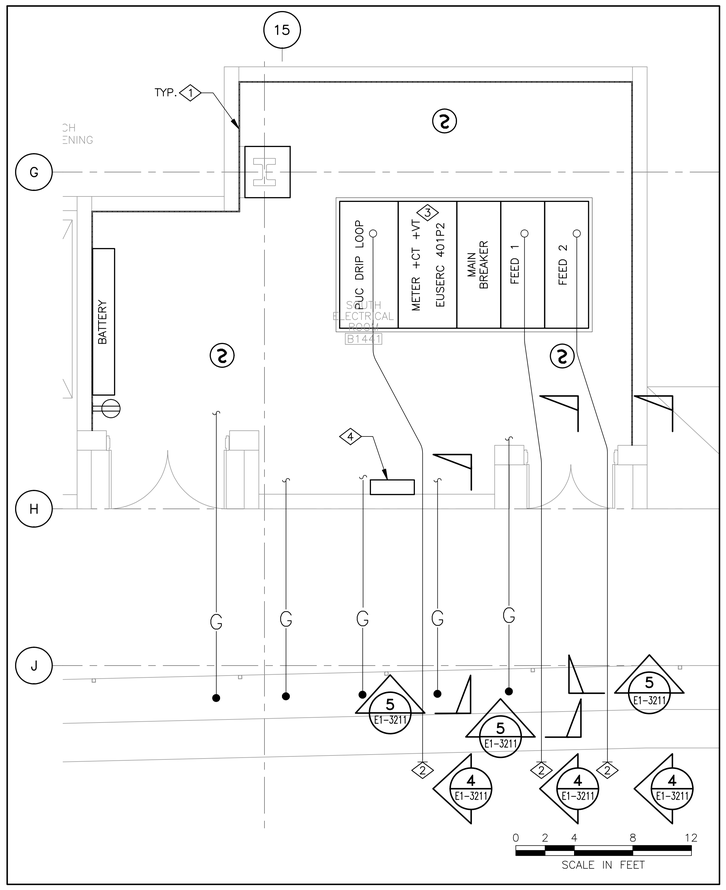
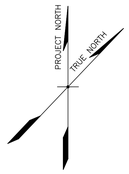


1 E1-2202 LOWER CONCOURSE – NORTH ELECTRICAL RM B1289
SCALE: 1/4" = 1'-0"



2 E1-2204 LOWER CONCOURSE – SOUTH ELECTRICAL RM B1441
SCALE: 1/4" = 1'-0"



SHEET NOTES

A. COORDINATE EXACT LOCATIONS OF CONDUIT PENETRATIONS WITH UTILITY SERVICE PROVIDER PRIOR TO INSTALLATION.

B. CONTRACTOR SHALL MEET SFPUC AND PG&E REQUIREMENTS FOR SWITCHGEAR CONFIGURATION, CABLE INSTALLATION AND INSPECTIONS. ALL FEATURES SHALL BE INSPECTED BY SFPUC AND PG&E BEFORE TERMINATING.

C. CONTRACTOR SHALL PROVIDE ROUTE FOR 12KV MAIN SERVICE TO SWITCHGEAR FROM CONDUIT AT WALL. PG&E SHALL PROVIDE SERVICE CONDUCTORS INTO CABLE TRAY AND SHALL PROVIDE DRIP LOOP.

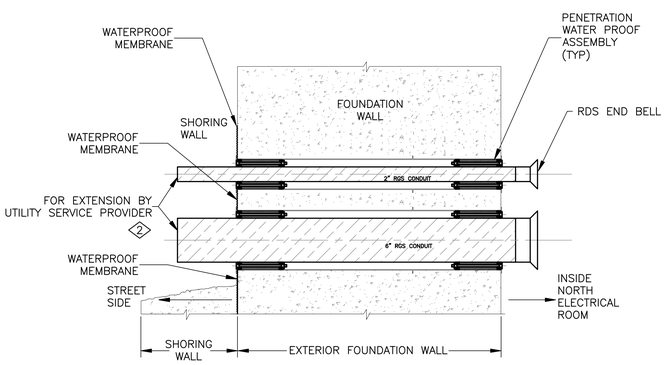
D. CONTRACTOR SHALL SUPPORT CONDUIT AND CABLE TRAY FROM CONCRETE ROOF AND WALLS. ALL EQUIPMENT AND CONSTRUCTION SHALL BE RATED AND INSTALLED FOR SEISMIC CONDITIONS.

E. CONTRACTOR SHALL COORDINATE ELECTRICAL WORK WITH OTHER TRADES AND CONTRACTORS FOR INSTALLATION OF ROOM AUXILIARY SYSTEMS (LIGHTING, RECEPTACLES AND PAINTING).

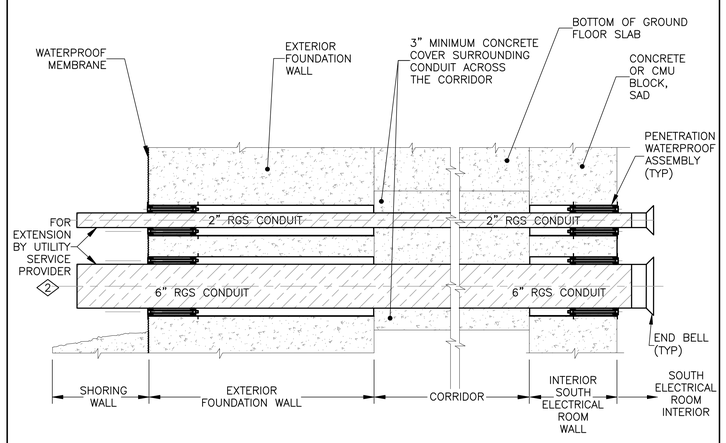
F. CONTRACTOR SHALL COORDINATE TIE–IN OF MAIN SERVICE CONDUCTORS WITH SFPUC AND PG&E. SCHEDULE WITH SFPUC ALL EQUIPMENT OUTAGES AND POWER CUTOVERS.

NUMBERED NOTES

1. 3/4" FIRE TREATED PLYWOOD.
2. PROVIDE CONDUITS IN WATERPROOF SLEEVE ASSEMBLIES STUBBED FIVE FEET OUTSIDE EXTERIOR FOUNDATION WALL AND CAPPED FOR EXTENSION BY SFPUC. WATERPROOF SEALS SHALL BE INSERTED AT INTERIOR AND EXTERIOR WALLS SIMILAR TO VAULT PENETRATION DETAILS.
3. PROVIDE A 2" EC FROM UTILITY SWITCHGEAR METER SECTION TO A 6"X6"X6" WEATHERPROOF JUNCTION BOX ON BUILDING FACADE FOR PG&E SMARTMETERS. ASSUME 200 FEET OF CONDUIT RUN AND SIX PULLBOXES ALONG THE ROUTE.
4. FIBER OPTIC PATCH PANEL. CONNECT TO SWITCHGEAR CONTROLS, ROUTED TO EACH VFI CONTROL PANEL. CONNECT SEPARATE FIBER OPTIC CABLE DIRECTLY TO OTHER SWITCHGEAR FIBER OPTIC PATCH PANEL.



3 E1-3211 SECTION – SFPUC CONDUITS
SCALE: NONE



4 E1-3211 SECTION – SFPUC CONDUITS
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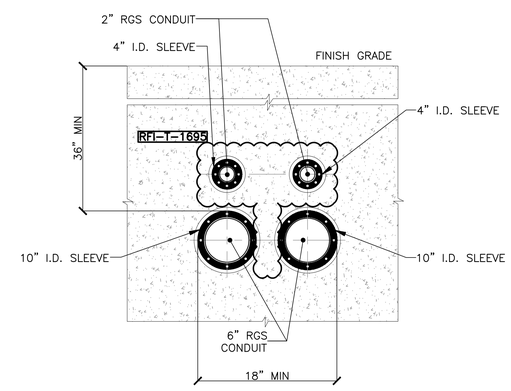

5 E1-3211 SECTION – SFPUC CONDUITS
SCALE: NONE

Transbay Transit Center
TRANSBAY JOINT POWERS AUTHORITY

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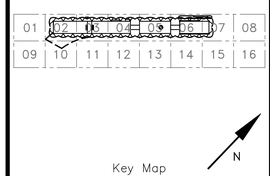

Key Map

REVISIONS

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1	01/23/14	ISSUED FOR BID	CFH
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4	06/20/14	ISSUED FOR BID – ADDENDUM #4	CFH

CONTRACT NO.
08-04-CMGC-000

PROJECT TITLE
TRANSBAY TRANSIT CENTER PROGRAM
TRANSBAY TRANSIT CENTER
SAN FRANCISCO, CA

SHEET TITLE
LOWER CONCOURSE LEVEL
ENLARGED PLANS

ARCHITECT/ENGINEER SEAL
REGISTERED PROFESSIONAL ENGINEER
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No. E-19820
ELECTRICAL
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APPROVED:
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APPROVED:
PROJECT MANAGER W. GAW
APPROVED:
PROJECT MANAGER C. FENLON–HARDING
DESIGNED BY: J. TILLS
CHECKED BY: G. CRAIG
DRAWN BY: A. CELIS
DATE: 06/20/2014
SCALE: 1/4"=1'-0"
SIZE: E
FACILITY NO.: 140
REVISION: C
SHEET NUMBER
SKE-RFI-T-1695-4
SEQUENCE NUMBER
___ of ___

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TG10.4 – Electrical, Communications, Security, and Integrated Networks

Questions are numbered in the order received. Numbers missing in the sequence have been answered in a previous response set.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-483	8/20/2014		Para: Part 3 - Execution 3.1 Factory Testing A 26 33 53	On 3.1, Factory Testing, there is a long list of items to test. However, there are no requirements for field testing, which seems like an oversight. Consider the following: a. It makes more sense to perform standard factory tests, move the UPS into place, and perform steps 3.1.D (1-10) in the field using the actual site power. In other words, we cannot simulate site conditions at the factory. b. Additionally, the batteries are always shipped separately. The actual batteries cannot be assembled at the factory, tested with the UPS, re-assembled, etc. Eaton uses a test band and the factory is not set up to test with actual batteries. c. Finally, we discussed how the logistics would likely require UPS installation first, with batteries following later. This is another reason that the testing should occur in the field. Is UPS field testing required? Can we offer field testing in lieu of the factory testing described above?	Field testing for the UPS systems is specified in Section 26 07 00, Power Distribution System (field) acceptance testing, paragraph 3.13. a) For the factory testing scope, in addition to the standard test procedures, include the scope for customized testing as noted. Test scripts shall be submitted in advance to review the vendor's standard test procedures and additional test requirements. b) Factory tests are acceptable using the factory-supplied batteries. c) Field testing is required per Specification Section 26 07 00, but shall not serve as a substitute for factory testing.
TG10.4-581	9/3/2014	Drawing Sheet: A1-7803B	Exhibit A/Sect 01 10 30APD, Paragraph(s): D.1.13 Additive Spec Alt #21	1. Can you direct us to the written specification that describes the video walls shown on drawing A1-7308B? 2. Can you detail the intended function of these video walls?	See response to TG10.4-582.
TG10.4-582	9/3/2014	A1-7848A	Exhibit A/Sect 01 10 30APD Paragraph(s): D.1.10 Additive Spec Alt #18	1. Can you direct us to the written specification that describes the video walls shown on drawing A1-7848A? 2. Can you detail the intended function of these video walls?	1. Refer to Specification Section 10 14 63 – Electronic Panel Signage, for video wall description. 2. The purpose of these video walls is to display information related to scheduling, announcements and advertising. The content of the display will be developed by TJPA during the operation of the facility.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-590	9/5/2014		28 23 00 Video Surveillance, Para:2.1.D.2.0	Paragraph(s) 2.1.D.2.0 – Integral Video Analytics; 2.2 – VAS; 2.4.A – Option Camera Resident Video Analytics. The current state of the design documents around VAS systems provides challenges to properly price and bid these sections. Within the specifications, there are references to three different types of video analytics systems/technologies. Each of these VAS technologies might be deployed either whole or in part with the other VAS technologies. It has been stated that ALL cameras would receive VAS and that all three technologies should be bid, although there has been no definition of which three technologies would be deployed, nor does it state in what cameras or at which locations. VAS systems require the proper VAS system, camera location, positioning, and lighting in order to provide very specific results. The VAS systems also place a high dollar premium per each camera. 1. Contractor proposes that the design and pricing for the 3 VAS technologies being referenced in the specification be re-assigned to the 1.5 technology package that is due out next May 2015, and that the current references to VAS be deemed for reference only.	Camera resident analytics are a Design Guidance Criteria (DGC) requirement. However, the level of analytics required to meet some of the chemical, biological, radiological, and nuclear DGC requirements lends itself to a more robust, server-based system. Include the "option" (rather than "alternate") for camera resident analytics to ensure the DGC requirements are met. Prices need to be supplied for both camera-resident and server-based analytics.
TG10.4-612	9/10/2014	A1-2302,A1-9711, E12302,(A1-9711, Detail 2,3)		A1-9711(Overhead Door/Overhead Grill Door Schedule) calls for Door No-B1256A, B1361C, 01320H to have a CBR Alarm, assuming CBR stands for chemical, doesn't depict a motor at the same biological, radiological. TE 2202 & TE 2303 don't reflect a CBR alarm for these doors. Please confirm CBR stands for Chemical, Biological, Radiological, and are required at these locations.	1. Correct, CBR stands for Chemical, Biological, and Radiological. 2. These doors are required to be controlled by the CBR alarm. CBR alarm sensors are remote, and are not located in the vicinity of these doors.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-626	9/19/2014		ES drawings	Please provide utility profiles for existing utilities on Minna, Natoma, and First Street so accurate elevations can be determined for pricing the utility duct bank scope. Note: UT drawings do not contain adequate information at duct bank locations.	The available drawings are as referenced in Exhibit A. However, trenching for the SFPUC electrical service will be deleted from the TG10.4 package when the next addendum is issued, Addendum#8, so impacts for trenching operations due to unforeseen underground utilities are not a TG10.4 scope. The TG10.4 scope of work is now limited to installation of conduit and related encasement. If any obstruction requires SFPUC service rerouting and/or redesign, it will be managed as a change condition.
TG10.4-639	9/29/2014	SE1-4000	QBD Answer TG10.4-448 1,2,3,4,6	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-641	9/29/2014		28 13 00 Para 2.10,H, QBD Response TG10.4-189 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-642	9/29/2014			See the attached Pre Bid Request for Substitution Form.	The substitution is rejected. Product information submitted is incomplete; it does not show specific pattern control from the proposed speaker.
TG10.4-644	9/29/2014			This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-645	9/29/2014			See the attached Pre Bid Request for Substitution.	Rejected. The QSC Qsys system did not indicate having electronic fault monitoring (reporting to fire panel) and a life safety interface via contact closures, which is a requirement.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-646	9/29/2014	SE 3001 Details 1 and 2	28 23 00 Paragraph(s): 2.2.B.1.c - Video Analytics System (VAS) 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-647	9/29/2014		TG-18.1 Bus Ramps and TG-10.4 28 23 00 VSS Paragraph(s): 2.2 - Video Analytics System (VAS) 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-648	9/29/2014	SE1-2102 Sheet Note 1	28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-650	9/29/2014		28 23 00 2.1.D.2.o, 2.2, Question # TG10.4-523 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-651	9/29/2014		28 23 00 Item 2.3.A.1 & 5 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-652	9/29/2014	SE1-4002 Detail(s): Detail 2	28 23 00 Page 44 item 3 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-653	9/29/2014		28 23 00 Page 7/8 item 23.c 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-654	9/29/2014	SE1-2602 / 2702 Detail(s): Cameras numbers C-RP-109 and C-RP-023	28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-657	9/29/2014			Additive Specification Alternate #20 states to "Provide an Audio Visual System at the Grand Hall; please provide a specification of what needs to be provided, quantities, head-end equipment, and operating system to drive the video wall.	This scope of work has been deleted.
TG10.4-659	9/29/2014		28 23 00 2.2 A. 2. 28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-660	9/29/2014		28 23 00 2.3 28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-661	9/29/2014		28 23 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-662	9/29/2014	E1-5004, E1-5005, E1-5006	Related to QBD TG10.4-484 26 33 54	The above specification indicates that the lighting inverters must be UL 924. However, the above-referenced QBD indicates that the battery run time is 5 minutes. All UL924 lighting inverters must have a battery run time of 90 minutes. The response to this specification cannot be "UL924" and 5-minute battery, as these two requirements contradict each other. Is there some regulation to suggest otherwise? Also indicated in the specification is a reference to UL924A. There is a common misconception that UL924A provides an alternate standard allowing a reduced run time of 5 minutes. Is that the assumption that is driving this specification? Please clarify what is required per specification and UL requirement.	Lighting inverter shall meet all UL 924 requirements except for a 90-minute run time. The lighting inverter with specified 5-minute run time is connected to the emergency generator, and is provided to maintain emergency lighting through the 10-second generator start time.
TG10.4-664	9/29/2014		1.2 Scope of work, B., 1., M. - C,4,A, 27 51 16	IED who is listed in the specification section 27 51 16 Part 2 - Products as manufacturer along with Biamp and Bosch, asks the following question. The PSIM section uses the word "integration" and goals? in the title, but then immediately below that starts talking about the required notifications (3-12 months) from us IF/WHEN we change our software – but nowhere does it state what that "integration" with PSIM is supposed to do. So our question is, can you detail the PSIM integration; in particular: How are the systems integrated, what the integration is to achieve and what information is to be passed between the systems?	The exact nature of the integration and associated functionality will be determined in a future design phase.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-666	9/29/2014	SE1 floor plan drawing		This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-667	9/29/2014	Intrusion Detection Pg. 6	28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-668	9/29/2014		28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-669	9/29/2014		Intrusion Detection Page 8 28 16 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.
TG10.4-670	9/29/2014		Page 45 28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

Question No.	Submission Date	Drawing No.	Document/ Spec. No.	Question	Response
TG10.4-671	9/29/2014		28 13 00	This question contains Sensitive Security Information and is available only to bidders who have been granted access to the document that is the basis for the question. Authorized bidders may access such questions and their responses by logging into the TJPA's secure website and opening the relevant folder.	The response to this question is available only to bidders who have been granted access to the TJPA's secure website.

00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

During the bidding period, a proposed change by a bidder of a product, equipment, or service required by the Contract Documents is considered a pre-bid request for substitution. A pre-bid request for substitution will be considered as part of the questions on bid documents (QBD) process. Refer to the CM/GC's Bid Manual for QBD instructions and forms.

During the bidding period and prior to the deadline for the submission of QBDs, Bidders may submit a request for a substitution of an "or equal" product, equipment, or service specified in the Contract Documents by completing and submitting this form as an attachment to a QBD, in accordance with the QBD process. The TJPA will respond in writing to a pre-bid request for substitution in accordance with the QBD process and deadlines specified in the bidding documents.

Pre-bid requests for substitution requested during the bidding period and accepted by Addendum prior to opening of bids are included in the Contract Documents.

Spec Section: **27 51 16-1** Date: **09/20/14**

Drawing sheet: Paragraph(s): **2.17 regarding JBL Control 47C/T**

Details:

Proposed Substitution: **We propose substitution of the JBL Control 47C/T In Ceiling Speakers for Atlas Sound FAP62T In Ceiling Speaker**

Manufacturer/address/phone#: **Atlas Sound, 4545 Baseline Rd, Phoenix AZ, 85042. PH: 800-876-8055**

Trade name/model number: **Atlas Sound FAP62T**

Product history: New 2-5 Years Old 5-10 Years Old **More Than 10 Years Old**

Differences between proposed substitution and specified product (attach required point-by-point comparative data):
Products are nearly identical in performance and appearance.

Reason for not providing specified item:
Compared to specified model, Atlas FAP62T is more than 20% less cost for the same level of performance and aesthetics. This speaker has been used as an industry goto product for projects like TTC since its introduction. Atlas Sound has also offered to give the project and additional (1) Year Warranty free of charge, extending their product warranty to a total of (6) years.

Similar installation where proposed substitution has been used (project/address/architect/owner/date installed):
The FAP62Ts have been used extensively in Airports, Train Stations, Stadiums, Resorts, and Theme Parks around the world, including the Monte Carlo in Las Vegas NV which is using over 800 FAP62T Speakers in its construction project 5 years ago.

Proposed substitution affects other parts of the work?: **No** Yes____ Explain:

Changes or modifications needed to coordinate other parts of the work that will be necessary to accommodate the proposed substitution: **No other modifications needed.**

Supporting data attached: Product Data **_X___** Drawings____ Test Reports____ Samples___
Manufacturer's Standard Form of Warranty____
Other:

The bidder certifies that:

The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.

The proposed substitution conforms in all respects to the requirements of the contract documents and all applicable regulatory requirements and is appropriate for the application intended.

The same warranty or guarantee for the specified product will be furnished for the proposed substitution.

The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the work as necessary for accepted substitution will be complete in all respects.

Attachments:

1. Product Data Sheet

FAP62T

Strategy Series® II In-Ceiling 6" Coaxial Speaker System

FAP62T

Specifications

Power Rating	50 Watts
Transformer Taps	2, 4, 8, 16, & 32 Watts & 8Ω Bypass
Frequency Response	63Hz – 20kHz (±7dB)
Sensitivity (1W / 1M)	88dB
Woofer	6" Poly Cone Butyl Rubber Surround
Woofer Magnet Weight	14 oz (398g)
HF Driver	19mm Coaxially Mounted PEI Dome Tweeter
Diameter	12½" (318mm)
Overall Height	8.48" (215mm)
Enclosure Volume	475 in^3
Cut-out Dimensions	11" (279mm)

Features

- Extended Low Frequency Response from the 475 in^3 Optimally Tuned and Ported Deep Drawn Galvanized Steel Enclosure
- Easy Installation in Drop Tile or Sheetrock Ceilings Via C-Ring/V-Rail Tile Bridge and "Dog Leg" Mounting System (Included)
- Front Mounted Tap Selector Switch for Easy System Tuning Adjustments Include Transformer Bypass Setting for 8Ω Direct Coupled Operation
- Unique "Trap Door" Input Section Allows for Through Conduit Runs with Rigid or Flex Conduit
- 4 Pole Detachable "Phoenix" Style Connector Allows Easy Pre-Wiring and Is Convenient for Daisy Chaining Additional Strategy Series Full Range Speakers or Subwoofers
- "Press Fit" Grilles Blend Better into Contemporary Architecture
- Enhanced Quality 70.7V / 100V Internal Transformers Minimize Insertion Loss and Maintain Low Frequency Response While Providing Increased Output for Higher SPL Applications
- UL Listed 1480

Applications

Atlas Sound's FAP62T combines superior coaxial loudspeaker performance with even dispersion and easy installation. A low profile enclosure and wide coverage make the FAP62T a perfect choice for low ceilings. The FAP62T will satisfy the needs of owners, architects, contractors, and consultants by delivering true, high fidelity sound reproduction in an attractive and easy-to-install system. The FAP62T is ideal for high-intelligibility voice, music, and signal reproduction in commercial, industrial, and institutional applications.

General Description

The FAP62T's 110° dispersion angle can reduce the number of loudspeakers necessary to achieve coverage in distributed systems with low ceilings.

The loudspeaker component matches the performance of the legendary Atlas Sound FA136 driver. High quality construction 6" coaxial cone type driver includes a 1" voice coil and polypropylene cone with a butyl rubber surround. The 19mm coaxially mounted tweeter is constructed of PEI. A high sensitivity of 88dB average (92dB peak) means less power may be required to achieve the desired SPL. This loudspeaker is factory assembled in an optimally tuned and ported deep drawn enclosure and includes a specially designed 32 watt low saturation 70.7V / 100V transformer. A convenient front mounted selector switch allows tap selection without the need to remove the speaker from the ceiling. This switch also includes a transformer bypass setting for 8Ω direct coupled operation.

Atlas Sound
1601 JACK MCKAY BLVD. ENNIS, TEXAS 75119 U.S.A.
TELEPHONE: (800) 876-3333
FAX (800) 765-3435

Mounting Accessories

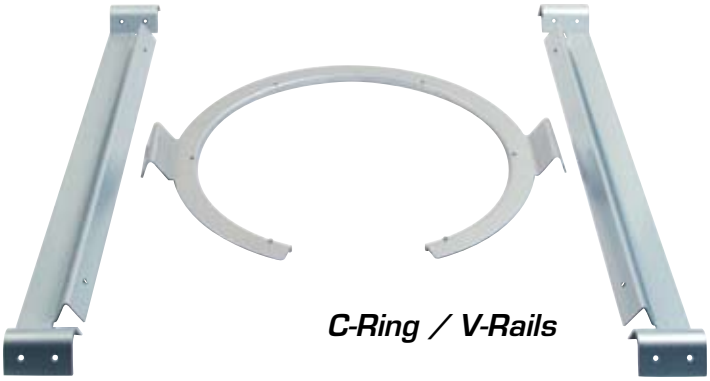
Mounting is simplified with Strategy Series® style "Dog Leg" tabs that allow easy installation into drop tile or drywall ceilings with provided tile bridge assembly. The tile bridge consists of two "V" shaped formed mounting rails and a C-Ring assembly. The C-Ring can be attached to the rails with the screws provided to extend support to the T-bar grid in suspended ceiling applications. Multiple hole locations are provided to allow the C-Ring to be positioned to the outer edge of the tile if necessary.

For existing dry-wall applications the tile bridge C-Ring and support rails can be inserted into the hole cut for the FAP62T. For easy positioning the "V" shaped support rails match the shape of the C-Ring tabs for easy maneuvering and location when working "blindly" above the deck. A uniquely designed "easy access" input panel on the side of the enclosure allows for "thru" conduit runs using flexible or rigid conduit. Below this cover resides a detachable Phoenix / Euro style locking four-pole connector, which provides for easy daisy chain wiring to other full range 70.7V loudspeakers or Atlas Sound FAPSUB subwoofers. The package includes an attractive press-fit grille, which nicely matches contemporary architecture.

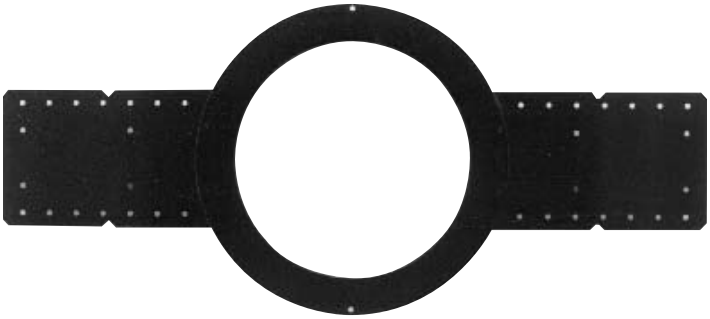
For new construction drywall ceiling applications, the optional FAP62-TR trim ring is available. This unit provides a marked location for drywall installers to cut around essentially reserving the desired location in the ceiling until final installation of FAP62T. Mounting holes are provided to accommodate 16" or 24" OC stud / joist mounting.

A support ring is also provided on the top of the FAP62T enclosure to facilitate an auxiliary support cable.

NOTE: IT IS MANDATORY THAT THIS SECONDARY SUPPORT BE UTILIZED IN DROP CEILINGS FOR SAFETY AND SEISMIC CONSIDERATIONS.



C-Ring / V-Rails



FAP62-TR

Architect & Engineer Specifications

The loudspeaker system shall be Atlas Sound FAP62T. System shall include a high performance 6" coaxial loudspeaker, ported bass reflex enclosure and press-fit grille for conventional ceiling installation.

Frequency response for the system shall be 63Hz – 20kHz (±7dB). Sensitivity shall be 88dB average.

Loudspeaker shall be comprised of a 6" coaxial cone type driver. Cone shall be constructed of polypropylene with a butyl rubber surround. The 19 mm tweeter shall be constructed of PEI. Magnet shall be a minimum of 10 oz (264 g) and the voice coil diameter shall be 1" (25 mm).

Transformer shall be a 70.7V / 100V type with 2, 4, 8, 16, and 32 watt primary taps (@70.7V) with a front mounted tap selector switch to include transformer bypass setting for 8Ω direct coupled operation.

Enclosure shall be a deep drawn steel enclosure design. Internal volume shall be 475 in^3. To facilitate connection in conduit systems, enclosure shall be equipped with an access panel covering a recessed terminal cup. This cover shall provide a combination ¾" (19mm inside diameter) / 1" (25mm inside diameter) knock-out on the side access and a top access compression fitting / strain relief to facilitate flexible conduit up to 22mm outside diameter or 1" (25mm inside diameter) conduit when the compression fitting is removed.

External wiring shall be accomplished via a removable lockable wiring connector with screw-down terminals to provide both secure wire termination and pre-wiring capability before loudspeaker installation. The 4 pole locking connector shall facilitate in/out connections and shall be located in the recessed area behind the conduit access panel.

Seismic support eye shall be provided on top of enclosure for additional suspension point when used in drop tile ceilings. Construction of enclosure shall be a minimum of 18-gauge deep drawn galvanized metal.

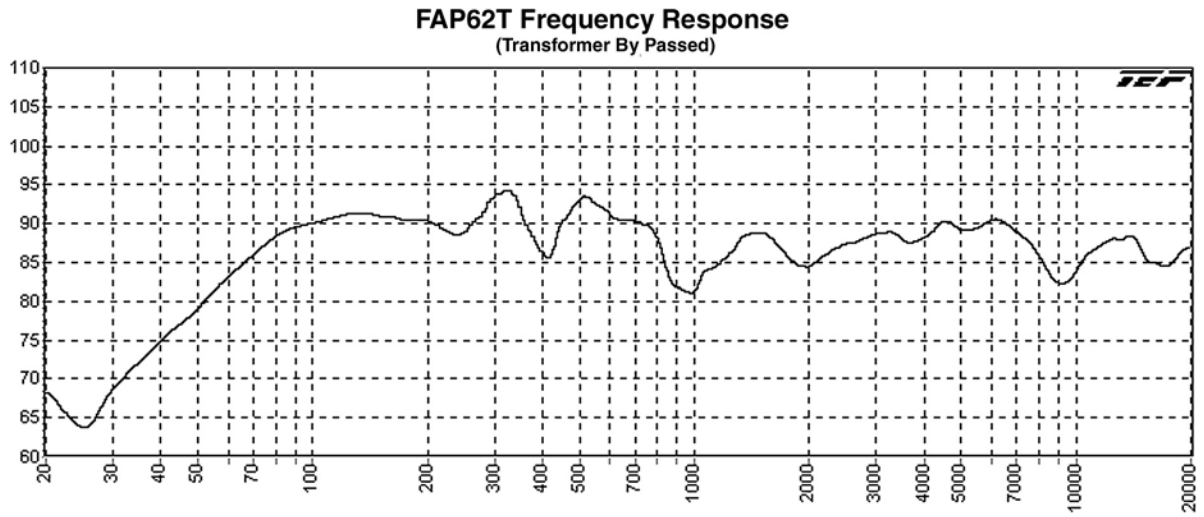
The system shall include a support backing plate to reinforce the ceiling material and tile support rails for use on either 2' x 4' (609mm x 1219mm) or 2' x 2' (609mm x 609mm) suspended ceiling tiles. This assembly can all be installed from beneath the ceiling tile.

Overall front face diameter shall not exceed 12½" (318mm); overall depth from the bottom of the ceiling shall not exceed 8.48" (215mm).

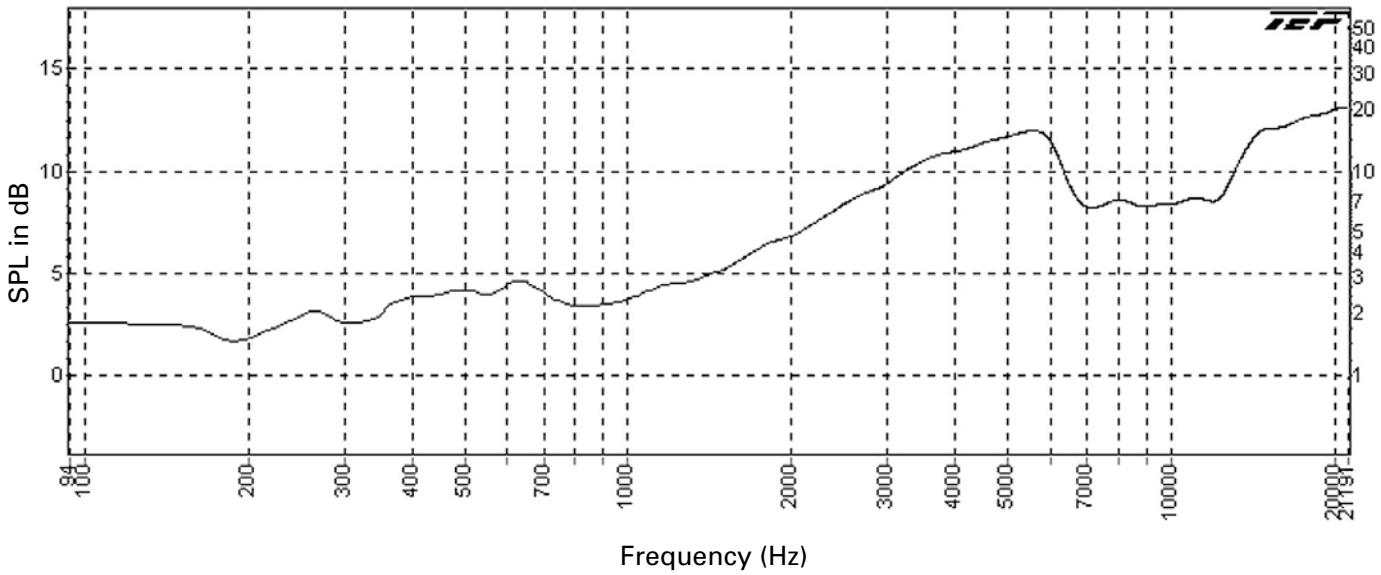
Grilles shall be press-fit, manufactured from 24-gauge perforated steel mesh and finished in white epoxy. Round grill shall be 10.48" (266mm) diameter.

The loudspeaker shall be the Atlas Sound FAP62T.

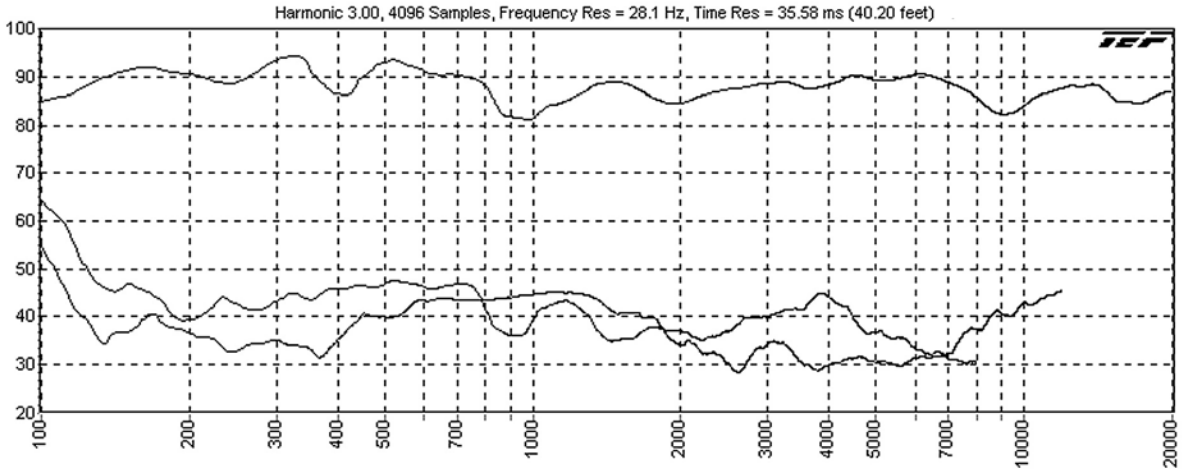
Atlas Sound
1601 JACK MCKAY BLVD. ENNIS, TEXAS 75119 U.S.A.
TELEPHONE: (800) 876-3333
FAX (800) 765-3435

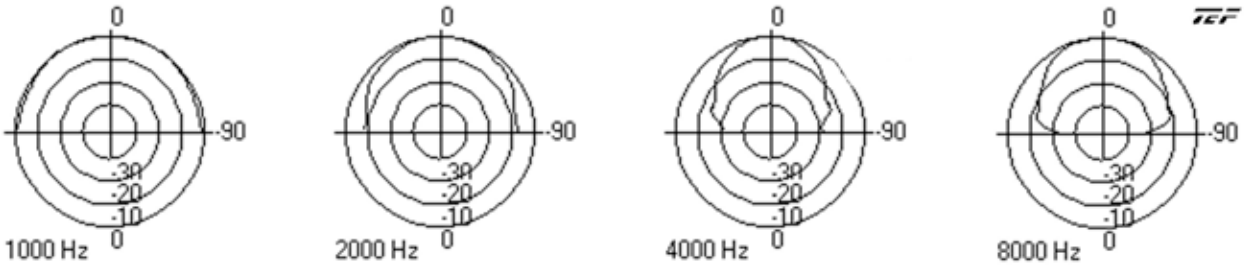


FAP62T Directivity vs Frequency



FAP62T Harmonic Distortion





00 04 41 – PRE-BID REQUEST FOR SUBSTITUTION

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Spec Section: **27 51 16- 5** Date: **09/20/14**

Drawing sheet: Paragraph(s): **2.1, 2.2, 2.4, 2.5, 2.6, 2.7,2.8, 2.9, 2.10, 2.11, 2.12, 2.13**

Details:

Proposed Substitution: **We propose substitution of the BiAmp Paging System and its components for the QSC QSYS paging system and components**

Manufacturer/address/phone#: **QSC, 1675 MacArthur Blvd, Costa Mesa, CA, 92626. PH: 800-854-4079**

Trade name/model number: **QSC QSYS**

Product history: New 2-5 Years Old **5-10 Years Old** More Than 10 Years Old

Differences between proposed substitution and specified product (attach required point-by-point comparative data):
QSC QSYS system is easier to program, easier to operate, easier and more cost effective to expand upon.

Reason for not providing specified item:
Compared to the specified model, the QSC QSYS system and its components meet and/or exceed the performance required by the specification but will cost the project about 25% less. It is also cheaper and easier to expand the system in the future.

Similar installation where proposed substitution has been used (project/address/architect/owner/date installed):
For the past 6 years, the QSC QSYS system and its components have been used extensively in Airports, Train Stations, Stadiums, Resorts, and Theme Parks around the world.

Proposed substitution affects other parts of the work?: **No** Yes____ Explain:

Changes or modifications needed to coordinate other parts of the work that will be necessary to accommodate the proposed substitution: **No other modifications needed.**

Supporting data attached: Product Data **_X___** Drawings____ Test Reports____ Samples___
Manufacturer's Standard Form of Warranty____
Other:

The bidder certifies that:

The proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.

The proposed substitution conforms in all respects to the requirements of the contract documents and all applicable regulatory requirements and is appropriate for the application intended.

The same warranty or guarantee for the specified product will be furnished for the proposed substitution.

The proposed substitution does not affect dimensions or functional clearances.

Coordination, installation, and changes in the work as necessary for accepted substitution will be complete in all respects.

Attachments:

1. Product Data Sheets

Application Note

Date: 01/18/2011
Revision: A
Author: Scott Kalarchik

Q-Sys™ Networking Overview

The intention of this document is to provide network administrators an overview of the requirements needed to implement a Q-Sys Audio System on a converged network. In order to simplify this group of networking requirements for ease of communication between parties, QSC has named these requirements the "Q-LAN Protocol Suite".

Overview of Q-Sys

Q-Sys is a system that performs complex routing, processing and management of audio in a facility. The elements of a Q-Sys system:

- The Core is based on an Intel™ server processor. It runs the system and handles the signal processing functions.
- I/O Frames are connected to the Core via the network and provide a means for audio signals to be brought into the Core from analog and digital sources as well as sending the processed audio to power amplifiers, powered loudspeakers or other audio devices. The I/O Frames are fitted with cards appropriate to the types of inputs and outputs they will receive or send.
- Peripheral devices including Page Stations and Touch Screen Controllers may also be used in a system.
- Q-Sys Designer software is used by the system designer to create signal flows, processing and control screens for a system.

Layer-3 Networking

All Q-Sys network protocols are Internet Protocol (IP) based and support advanced networks beyond the simple Layer-2 LAN. Because Q-Sys is a live system, real-time performance is required on either the LAN or the Layer-3 environments. On a Layer-3 network, routers replace some, or all, of the network switches. Therefore, routers need to have the same performance and feature requirements as the switches they replace.

Q-LAN Protocol Suite

Sampling Clock

- IEEE 1588 Precision Time Protocol (PTP) used for synchronisation
- UDP on Ports 319 and 320
- ≤100 packets per second
- ≤100 bytes per packet
- 224.0.1.129 ~ 224.0.1.132 – registered to IEEE
- Address used depends on clock configuration selected in the Designer software

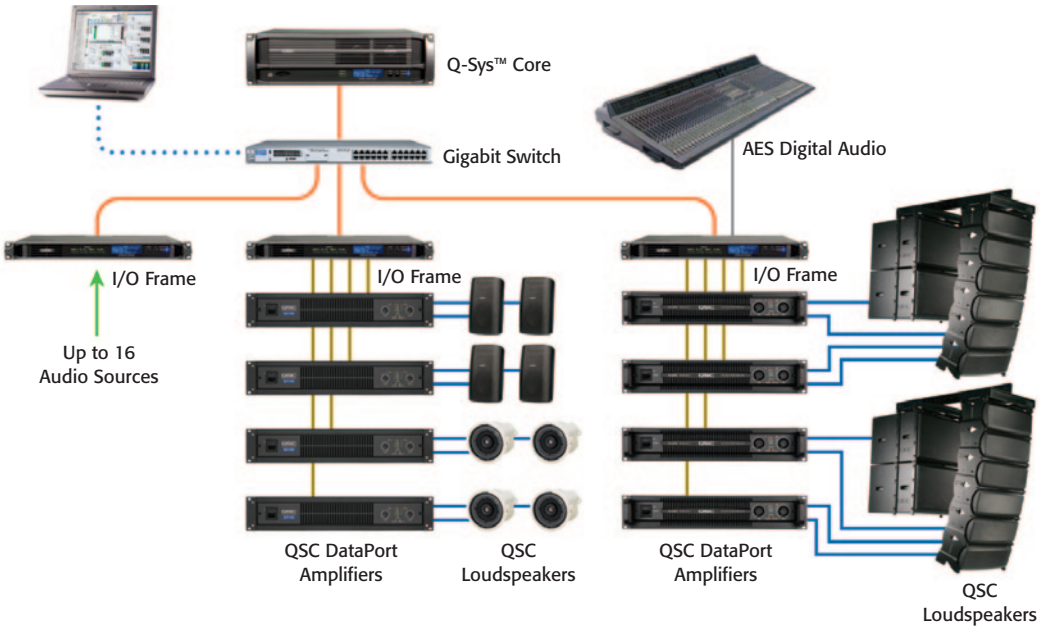


Figure A1

Audio Streams

- UDP on Ports 6511 through 6766 as needed
- Each packet contains 16 samples of up to 16 channels
- 3000 packets per second per stream
- 100 to 1100 bytes per packet or 1.65 ~ 3.31 Mbps per stream – packet size depends on channel count
- Audio sampling is 32 bit floating point format
- Up to 128 streams in and out of each Q-Sys Core
- 1 Stream in and/or out for each I/O Frame or Page Station
- 100 acknowledgements are sent every second and contain receiver-side stats

Control

- TCP and HTTP for Control Data and Core redundancy
- 1 Mbps or less – dependant on connections to User Control Interfaces (UCI's) or AMX and Crestron

QoS

- Ensures timely delivery of packets
- Employs DiffServ or Differentiated Services Code Point (DSCP)
- DSCP 63 normally reserved for Network Admin
  - DSPC 46 EF (Expedited Forwarding) for PTP
  - DSPC 34 AF (Assured Forwarding) for Audio data
  - DSPC 0 for control data
- Minimum of 4 egress queues per switch port with Strict Priority Queuing – other selection schemes (e.g. round robin, shaped round robin, fair queuing, guaranteed minimum bandwidth) are not recommended
- Each Q-Sys switch port must have 40kB of egress queue memory available
- Note: Don't enable bandwidth throttling on ports connected to the Cores

QDP and Multicast Routing

- For Q-Sys to work across a Layer-3 network, you will need to configure the network to route the multicast addresses used by the PTP Clock and Discovery protocols. Q-Sys devices implement the Internet Group Management Protocol (IGMP). IGMP allows Q-Sys devices to register to receive specific multicast addresses.
- QDP – Device Discovery – 224.0.23.175 – registered to QSC
- – Used to find Q-Sys products on the network by name regardless of IP address
- IEEE 1588 – 224.0.1.129 ~ 224.0.1.132 – Registered to IEEE

Latency

- Time on Wire @ 1 GB ≤ 12 micro seconds
- Time on Switch @ 1 GB ≤ 10 micro seconds
- Allowed Time on Network = 243 micro seconds
- Option to increased buffer size for larger networks via Designer software

Switch Requirements

- Must be a managed, non-blocking Gigabit switch with bandwidth meeting or exceeding "wire speed" bridging
- Must support DiffServ QoS
- Packet forwarding delay of less than 10 micro seconds
- No Jumbo frames on any Q-LAN paths

Bandwidth Usage

- Bandwidth equation: Mb = (1.77 x total stream count) + (1.54 x total channel count)
- Dual network redundant configurations will produce the same bandwidth on both ports

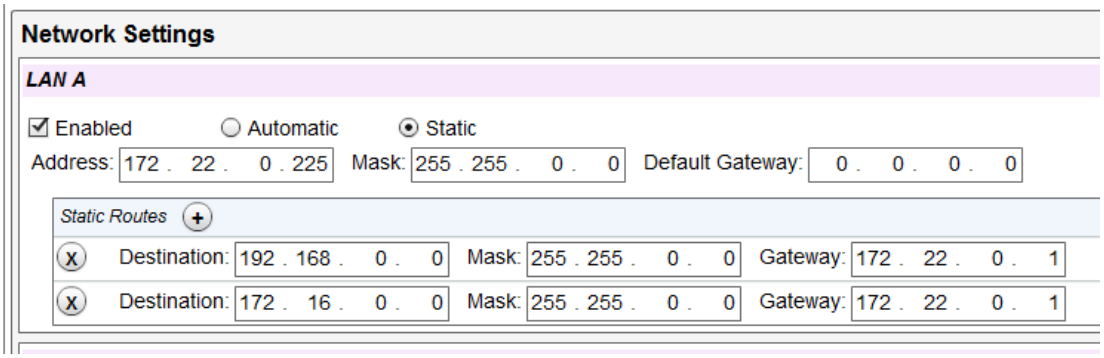
- Core bandwidth calculations are available on the "Check Design..." screen in the Designer software
- Core to Core redundant housekeeping data can be up to 6 Mbps when a Q-Sys System is being polled by AMX or Crestron

IP Address

- Three methods are use to assign IP's: Manual, DHCP, or IPv4LL (Auto-IP) – QSC recommends using Manual IP's

End Point Device Routing

This allows a device on one subnet to communicate with a device on separate subnet. There are two methods used to accomplish this task – a static route or the default gateway. A static route defines a specific destination/mask pair. The default gateway is a "catchall" for everything which doesn't match a static route. Here's an example of a static routing configuration using the "Q-Sys Configurator..." screen in the Designer software:



To see if Discovery and routing are working on the Core, enter the following URL into any web browser: http://<core-ip-address>/discovery/discovered and confirm there are files called "device.ioframe.<ioframe-name>" for each I/O Frame

If you have any questions or need additional assistance, please contact your local QSC representative, QSC's sales department or myself.

Scott Kalarchik, CCNA & CCDA
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1665 MacArthur Blvd
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Phone 800-854-4079
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Web www.qscaudio.com

Passionate About Sound

Written by: Kevin Gross
Date: October 7, 2009

WHITE PAPER

Q-LAN

The Architecture and Network Redundancy

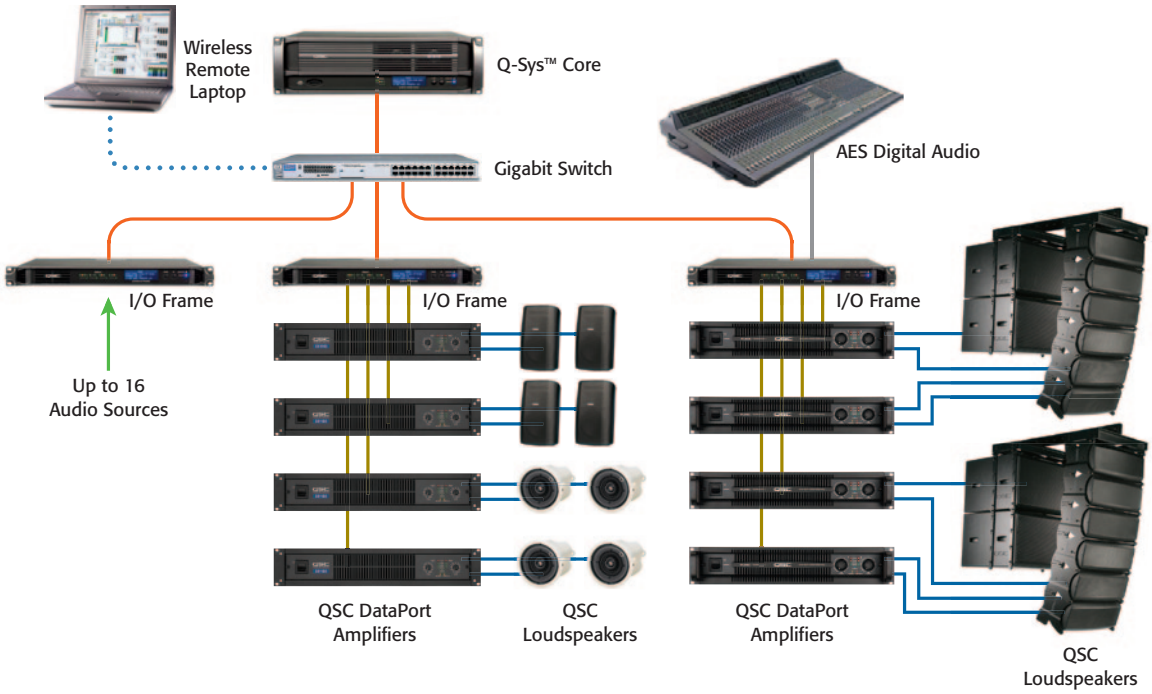
Q-LAN is a third-generation networked media distribution technology providing higher quality, lower latency and greater scalability when compared to its third generation peers and previous-generation audio networks. Q-LAN operates over gigabit and higher rate Ethernet variants. Q-LAN is a central component of QSC's comprehensive Q-Sys integrated system platform. Interactive integration with Q-Sys means that Q-LAN can be configured and monitored using the graphical and scripting tools available on the Q-Sys platform.

Q-Sys™

Since Q-LAN is an integral part of the Q-Sys platform, some background on Q-Sys is required to fully appreciate Q-LAN. Q-Sys is comprised of three principal component types: I/O Frames (and other I/O devices), Cores and User control interfaces. The components are interconnected via an Ethernet and/or IP network.

I/O devices are the entry and exit points for audio in the Q-Sys system. Audio signals presented to the I/O devices are packetized and sent over the network to the Core where the audio data is processed, re-packetized and sent back to the same or different I/O devices for output to power amplifiers or other audio destinations. Each I/O device has two Ethernet connections for use in fault-tolerant networking. The Core connects to an I/O device via Q-LAN. The number of I/O devices in a system is limited only by the size of your Core. The I/O frame supports up to a total of 16 channels in and 16 channels out through up to four modular audio I/O cards installed in the Frame. Future I/O devices may have different I/O capacity.

The Core is Q-Sys' central processing unit and is where audio signals for the system are processed and combined. Different Core models (e.g. Core 1000, Core 3000, Core 4000) are available with different network I/O and processing capacity. At least one Core is required in a system. Addition of a second Core for fault tolerance is a design option.



Q-Sys™ architecture

The Core's connection to the rest of the system is primarily through the Q-LAN network. Each Core has four gigabit Ethernet connections: two for fault-tolerant Q-LAN and another two for running control communication though connections physically separate from Q-LAN if desired. Q-LAN audio and control data can peacefully coexist (see Quality of Service) so this second set of connections is not used in typical installations.

Q-LAN allows the network to be shared between audio distribution, system control and monitoring and traditional network applications. A Windows™ PC running Q-Sys Designer software is an optional component of a Q-Sys system. The PC exists on the same network with the other components. Multiple instances of Q-Sys designer can monitor the same Q-Sys system from multiple PCs. Multiple instances of Q-Sys designer running on a single PC can control and monitor multiple systems.

Other control components such as touch screens and third-party control systems (e.g. AMX™, Crestron™) may be connected to the same network and to the same system(s).

Standard commodity gigabit Ethernet switches serve as the interconnect points for Q-LAN networking. To ensure reliable, low-latency audio delivery, these switches must meet Q-LAN performance and feature requirements (see Q-LAN Network Requirements). User interface and control components of the system may also be connected to these switches or may be connected to lower-performance segments of the network (e.g. fast Ethernet, WiFi, WAN).

Q-LAN Capacity and Quality

Q-LAN can safely use up to 90% of gigabit Ethernet link capacity. This is enough bandwidth to carry up to 512 low-latency, high-resolution audio channels. The largest Q-Sys™ Core utilizes this maximum capacity at 512 channels in and 512 channels out through one network connection. There is no limit to the total number of channels carried by a network. It is possible to build systems of systems and this way, "system" capacity is virtually unlimited.

Latency is the delay of a signal through a system or component. In audio, latency is most critical in live sound applications. Where latency is critical, generally speaking, lower latency equates to better performance.

Q-LAN latency is 1 ms. Time alignment of audio signals is assured by a high-performance hardware-assisted precision time protocol implementation (see Clock Distribution). The path through Q-Sys comprises analog-to-digital conversion, a first pass through the network to the Core, processing in the Core, a second pass through the network to the destination and finally, digital-to-analog conversion. Total system latency is 2-1/2 ms.

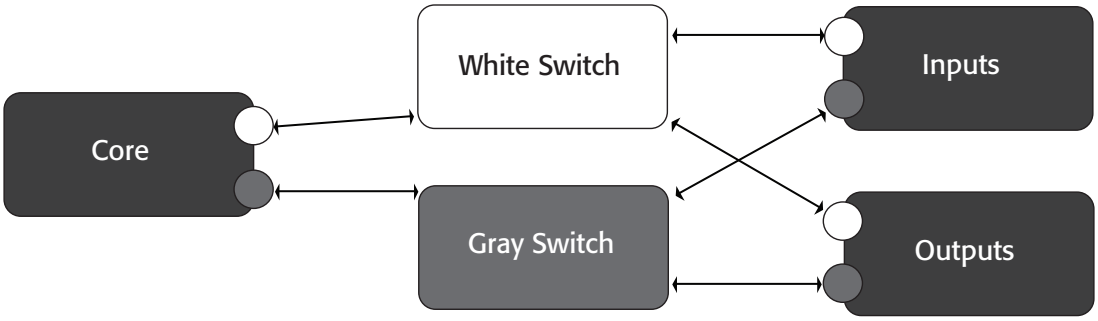
All audio processing and transport is carried out in floating-point format. Processing is handled at up to 64-bit resolution. Network transport uses 32-bit resolution. Resolution in excess of the performance of the 24-bit input and output interfaces, DACs and ADCs assures that Q-Sys processing and networking is sonically transparent. The floating-point format preserves dynamic range throughout the signal path making gain structure and intermediate overload considerations inconsequential[1]. The inputs and outputs of the system are the only places where attention to gain structure is required.

[1] Gain structure refers to the normalization of gain elements though the signal path from input to output so as to assure a constant amount of headroom. Configuring the gain structure in this way has the benefit of optimizing signal-to-noise ratio for the system. Because of the self-scaling attributes of the exponential representation used for floating-point audio data in Q-Sys, signal-to-noise ratio is inherently optimized at any gain setting or signal level.

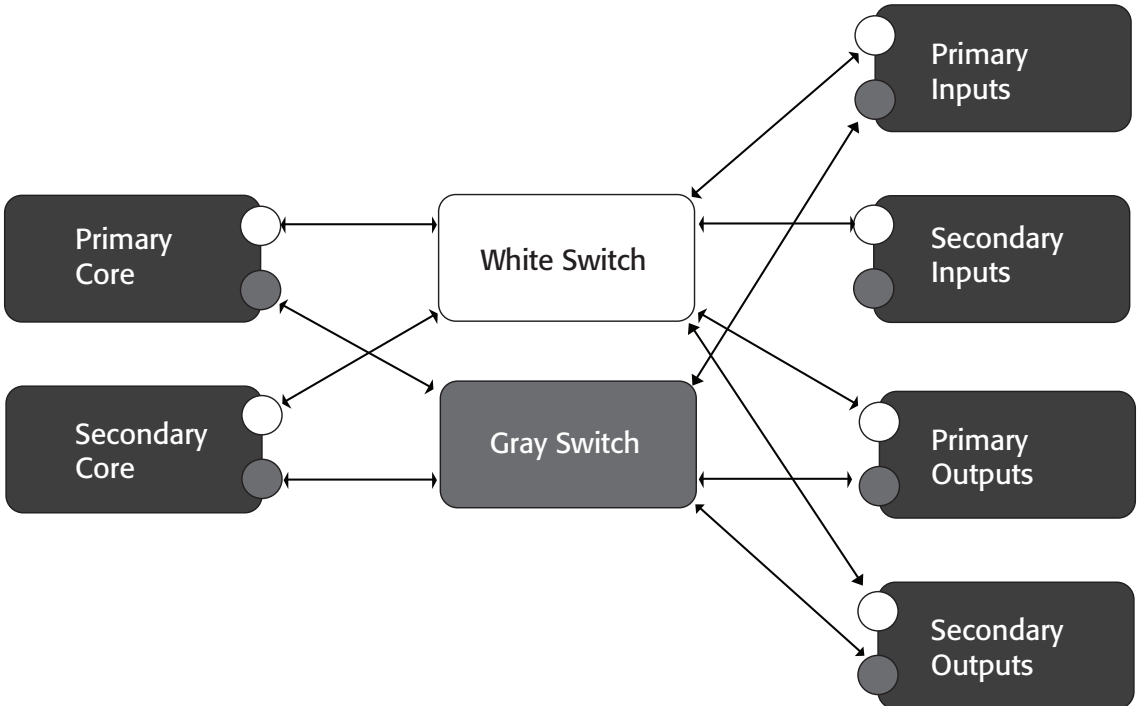
Fault Tolerance

Q-LAN supports all standard Ethernet and layer-3 fault tolerance strategies: Spanning tree protocol (including rapid spanning tree), link aggregation, IP routing, vendor-specific meshing and fail-over schemes, self-monitoring systems and redundant power supplies. Q-Sys™ accommodates a fully redundant networking configuration. When this capability is utilized, two distinct and parallel networks are built. The dual network configuration can withstand any single network component or link failure by automatically switching to the secondary network. The switch over is accomplished quickly and without interrupting audio.

Q-Sys also supports fault tolerance through dual connections to the same network. This configuration is, in some regards, more "IT friendly"[2]. This alternative configuration potentially improves fault tolerance in the presence of multiple failures but does require additional backbone bandwidth and is susceptible to adverse interaction in some fault scenarios[3].



Fully redundant network configuration



Fully redundant network with redundant Cores and redundant I/O Frames

[2] Mainstream IT professionals and departments tend to think in terms of "The" network. The idea of multiple independent networks is not always readily accepted.

[3] In some failure modes, it is possible for one piece of malfunctioning equipment to adversely affect everything connected to the same network.

In addition to support for fault tolerance in the network, fault tolerance for Q-Sys components is supported. A system can be populated with two Cores. Cores are designated primary and backup by the designer. The primary Core initially comes up in the online state and establishes audio streams to and from the I/O devices on the network. The backup Core initially comes up in the offline state and does not transmit or request to receive any audio streams.

The two Cores are designated to perform identical signal processing. Redundancy awareness in Q-Sys control communications keep operating parameters synchronized.

I/O devices may be doubled up either throughout the system or only where deemed critically necessary. Analog and digital audio sources to and from I/O Frames are wired in parallel to primary and backup input devices. Analog and digital outputs are bridged together and wired to downstream equipment. Internal relays open on the backup device to prevent contention. Microphone inputs configured to supply phantom power may be safely wired in parallel. The Core uses the following logic to select between primary and backup I/O devices operating as a redundant pair:

1. On startup select the primary.
2. Core continuously polls both primary and backup during operation.
3. If selected I/O device reports a fault or fails to respond and cannot be discovered and other device has recently reported good health, switch to the other device.

The above rules ensure that when a failure is detected in a primary device, the system switches to the backup. To avoid unnecessary interruption of audio and respond appropriately to intermittent failure scenarios, the system does not automatically switch back to the primary when the primary recovers from its failure. User interface controls allow manual switch over between primary and backup devices.

AV Networks Comparison

The OSI reference model is a useful tool for understanding how networks are organized. The model is arranged from network hardware specific at layer-1 to abstract connectivity at the higher layers. Networked audio distribution technologies can be categorized based on where they insert themselves in the OSI network reference model.

Layer-1 communications technologies operate at a basic hardware level. Protocols are unsophisticated and cannot be readily translated to other network hardware. Layer-1 technology is often focused on point-to-point communications. The network only comes into existence through the addition of purpose-built switching and routing equipment. **EtherSound™, AES50™, A-Net™** and **Rocknet™** are examples of layer-1 audio distribution technologies.

Layer-2 systems cooperate with their respective native network technology. Ethernet is, by far, the most widely-used layer-2 network. Although layer-2 systems are bound to their chosen network hardware and do not scale beyond it, insertion at this higher layer allows the use of standard network switches and often allows for the coexistence of multiple services on the same physical infrastructure: audio mixed with more traditional network applications.

AVB™ is a layer-2 network solution. AVB not only requires an uninterrupted layer-2 connection between devices but it requires that connection be made through special AVB-capable switches and network equipment.

CobraNet™ was first introduced as a first-generation network requiring a separate physical infrastructure. CobraNet evolved to become a full-featured layer-2 technology. CobraNet has not evolved to compete with greater capacity and performance of the third-generation gigabit technologies.

Layer-3 networking, also commonly known as IP or TCP/IP networking, is the basis for the Internet. The layer-3 systems operate at an abstract level above dependencies on the particular network hardware on which they run.

On a private network such as used in audio installations, a layer-3 protocol such as Q-LAN offers increased interoperability and scalability and access to advanced capabilities in modern network equipment and tools.

A layer-3 protocol operates without impediment on a layer-2 network. The reverse is not true – a layer-3 network will refuse to carry layer-2 traffic. Even if the scope of your current projects fit within layer-2 networking, there is little overhead associated with inclusion of the layer-3 capability.

Q-LAN and **DANTE™** are both layer-3 real-time audio distribution technologies. Telephony through VoIP and Audio over IP used in broadcast applications are examples of lower performance layer-3 technologies.

Audio Delivery

Q-LAN audio is transmitted in streams. A stream is an ongoing series of packets transmitted at a rate of 3000 per second. Each packet contains 16 audio samples for each of up to 16 audio channels. An arbitrary mixture of streams with different channel counts is permitted on a Q-LAN network. Samples are conveyed in 32-bit floating point format. The maximum payload size for an audio stream packet is 1024 bytes. The minimum payload is 64 bytes. Total packet size including all headers is in the range 1078 to 118 bytes. Bandwidth consumed per stream is 3.3 to 26.4 Mb per stream for streams with 1 to 16 audio channels respectively.

The organization of multiple audio channels into streams improves bandwidth efficiency (a single 16-channel stream uses half the bandwidth of 16 single-channel streams). Streams also remove the need to route related channels independently. Streams do not affect routing flexibility. All audio passes through the core and is processed there on a channel-by-channel basis. The Core supports a generous number of streams (up to 128 streams received and 128 transmitted).

Audio streams are transported via UDP/IP. As part of stream setup, a UDP port number is negotiated between transmitter and receiver. Transmitters and receivers find each other through a separate handshake sequence which occurs when a stream is first established. A receiver will open a UDP port in the range 6511 to 6766. The receiver has learned the IP address of its respective transmitter through the separate discovery mechanism (see Discovery). The receiver sends a UDP subscribe request packet to the transmitter from that port. The transmitter responds with a subscription acknowledgement packet and then begins sending audio data packets.

Streams are unidirectional from transmitter to receiver with regular, though less frequent (1 acknowledgment per 100 stream packets) acknowledgments from receiver to transmitter. The periodic acknowledgments ensure that the transmitter promptly discontinues transmission in the event of receiver or receiver connection failure.

All stream transmissions are done with unicast IP addressing. Separate streams are used to route the same audio to multiple destinations. The I/O Frames feature the ability to replicate the same audio channel multiple times on multiple outputs of an I/O Frame. In this scenario, the number of channels on the network is reduced with respect to the total number of output channels available from the system.

Discovery

Discovery is the process of enumerating and identifying devices and resources on a network. Without discovery, the only way to make connections is by using cumbersome network addresses.

Instead of exposing these addresses to users, Q-Sys devices are identified by name. Q-Sys implements its own discovery protocol called QDP which uses multicast IP messaging on a dedicated registered address of 224.0.23.175. Discovery can be accomplished anywhere on the network where this multicast address is routed. QDP used IGMP to constrain delivery of discovery messages only to where they are needed.

QDP streamlines the process of setting up a Q-Sys system. Simply attach the Cores and I/O devices to the network and the components promptly appear in Q-Sys Configurator (a component of Q-Sys Designer). Click on each item to configure and name it.

Discovery combined with system integration supported by Q-Sys designer means that audio connections across the network are specified graphically. Unlike other distribution systems, with Q-LAN, there is no requirement to assign and remember names or numbers for signals. Simply drag wires from source to destination and the connection is made for you.

Clock Distribution

Any digital audio and/or video distribution system must deliver both the media data and its corresponding clock. Q-LAN accomplishes clock distribution using the IEEE 1588 Precision time protocol (PTP). A variation of PTP is used in AVB. PTP is under consideration for use in next-generation video distribution systems standards under development by SMPTE.

Under PTP, one device on the network is elected Grandmaster. The Grandmaster transmits periodic time updates to all other PTP participants on the network. Participants also periodically do timed interrogation of the Grandmaster. These measurements are used to compensate the time base at each participant for any fixed latency introduced by the network. Q-LANs 48-kHz sample clock runs synchronously with respect to the PTP-distributed clock. All audio streams operate synchronously with respect to this master clock.

This common sample clock approach maximizes routing and processing flexibility – with all audio represented according to the same clock, it can be readily routed and combined without synchronization or alignment issues. The master clock scheme does however require that any digital audio sources to the network be pre-synchronized to the network's clock or that sample-rate conversion be employed to accommodate digital signals to the network's clock. The AES3 digital interfaces in the I/O Frames feature integrated high-quality sample-rate conversion.

Network Management

Q-Sys™ is a comprehensive and integrated system platform. The capabilities of the platform include audio distribution, audio processing and system control and monitoring. The control and monitoring capabilities of Q-Sys include control and monitoring of Q-Sys hardware as well as external components. With these comprehensive capabilities built into Q-Sys, the system is self monitoring. A separate network monitoring system is unnecessary in most Q-LAN installations.

The Q-Sys system and thus Q-LAN also features the ability to be controlled and monitored over the network by external entities or systems. If desirable, Q-Sys and Q-LAN can be integrated into larger network management platforms.

Q-LAN Network Requirements

Q-LAN is a high-performance real-time audio distribution system and as such requires real-time performance from the network which hosts it. The performance is achieved through the following means:

Use of gigabit Ethernet throughout – Gigabit Ethernet provides 10 times the bandwidth compared to previous generation 100 Mb fast Ethernet. Significantly, it does so at one tenth the latency. Even if the channel count of your application does not justify using gigabit Ethernet, the reduced latency will. Q-LAN requires use of gigabit Ethernet end-to-end for all paths carrying audio through the network

Use of Quality of service (QoS) capabilities in network equipment – QoS allows network equipment to expedite delivery of time-sensitive traffic such as Q-LAN audio and timing signals over non-real-time traffic such as file transfers. Without QoS, network performance is indeterminate.

Limiting the physical extent of the network – Network design guidelines limiting the physical extent of the network assure that data is not unduly delayed in long cable or fiber runs or by accumulated latency of a multitude of network switches.

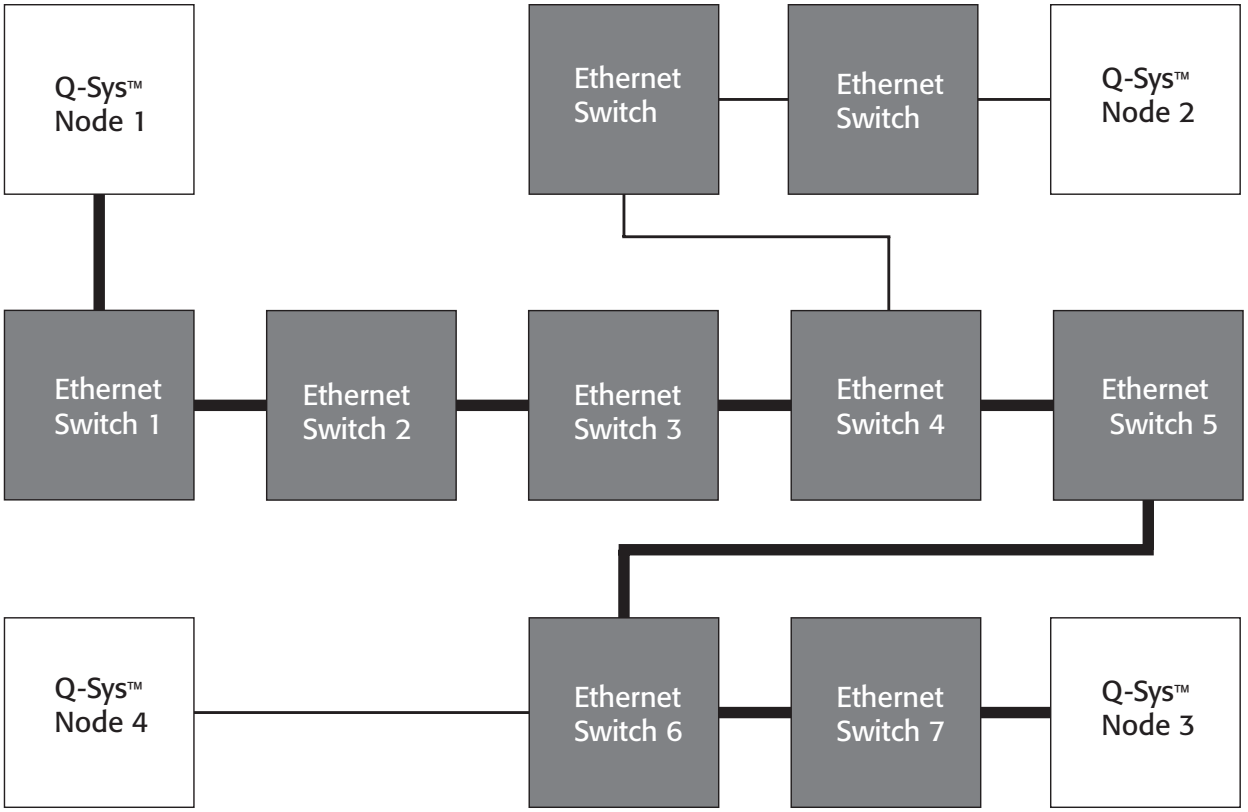
Quality of Service

Quality of service enables the network to distinguish different traffic types and for these different types of traffic to receive different treatment depending on their priorities. QoS capability is required by Q-LAN. QoS is the mechanism which allows Q-LAN to comingle with other network applications, (including other network audio distribution technologies such as CobraNet), on the same infrastructure. Q-LAN does not require a separate infrastructure. It does not require audio traffic be segregated through Virtual Local Area Network (VLAN) configurations. The QoS mechanisms do this globally for the network and with minimal configuration requirements.

Q-LAN uses layer-3 DiffServ QoS support. Q-LAN operates three distinct traffic classes.

- 101110 (46) Expedited forwarding (EF) for clock transport.
- 100010 (34) Assured forwarding (AF41) for audio transport.
- 000000 (0) Default classification for control communications.

In support of this scheme, the QoS mechanism on a switch used in a Q-LAN network must feature a minimum 4 egress queues per port. Once traffic has been separated into different classes and placed into respective queues, the switch must determine an appropriate transmission ordering. Switches typically offer several choices as to transmission strategy such as round robin, weighted round robin, weighted fair queuing or strict priority. Q-LAN requires strict priority selection. Under strict priority, the switch transmits all high priority traffic before any lower-priority traffic is transmitted.



7-hop network

Network Size

Limiting the size of the network helps ensure that performance required by Q-LAN is achieved. Network performance is limited by delays occurring in network equipment and, to a lesser extent, delays in wiring and fiber-optic cables due to the finite speed of light.

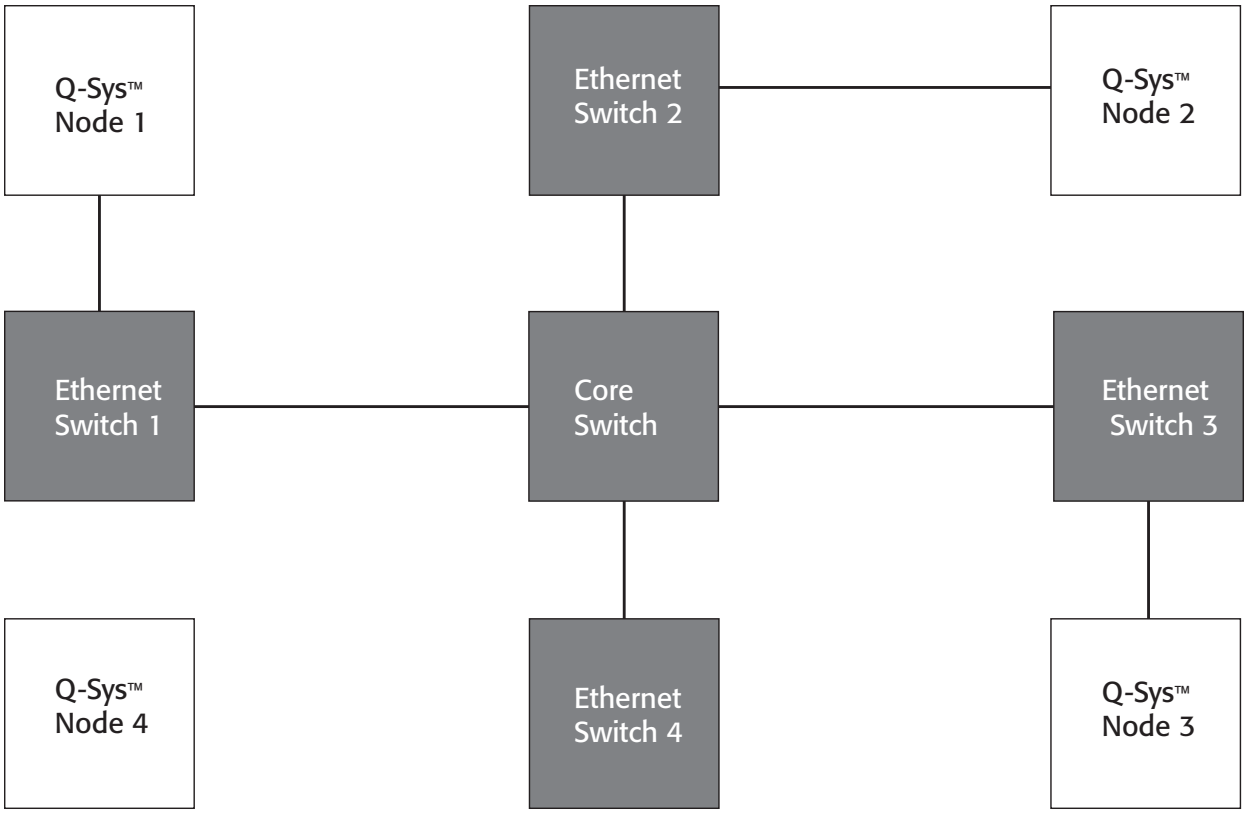
Total latency through Q-LAN is 1 ms. About one quarter of that time is budgeted to network delays (the other half is budgeted to buffering and packetizing). 1 km of twisted pair or optical cable imparts almost 5 µs delay. The minimum delay through a standard gigabit Ethernet switch is 12 µs; Maximum delay can be several times higher[4].

Q-LAN network design guidelines describe allowable network size in terms of hop count and network diameter. Hop count is the maximum number of switches any audio data must pass through between its source and destination. Diameter is the accumulated cable distance between the furthest two endpoints on the network. **Table 1** shows allowed network diameter as a function of hop count.

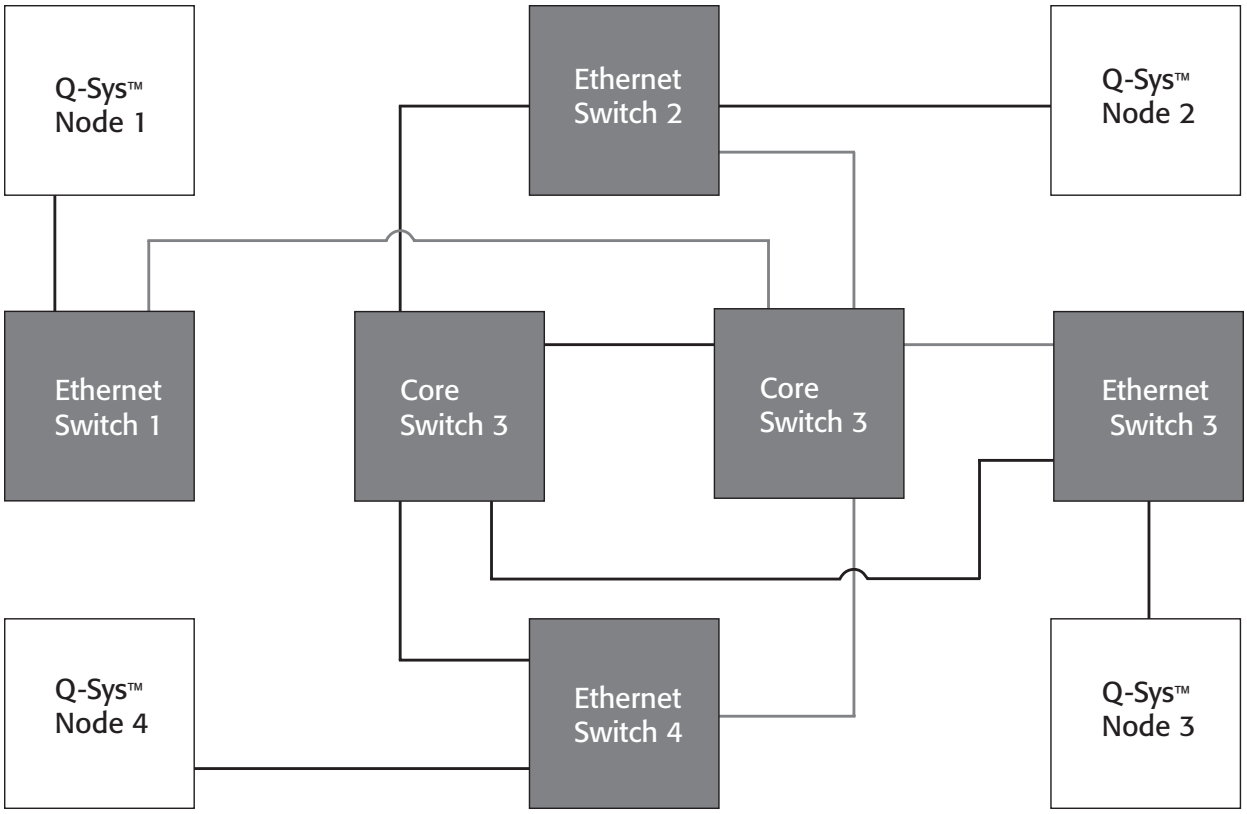
Hops	Diameter
2	35 km
3	29 km
4	22 km
5	15 km
6	9 km
7	2 km

Allowed network diameter as a function of hop count
Table 1

[4] Standard gigabit switches use store-forward switching. Exotic switches use cut-through switching and can have lower latencies. This discussion assumes QoS is deployed. Without QoS, delay can be unbounded.



3-hop core-switched network



4-hop redundant core switched network

Switch Performance

The high performance required by Q-LAN implies performance requirements for the Ethernet switches in the network that hosts it.

Internal bandwidth – Q-LAN expects non-blocking wire-speed gigabit Ethernet bridging: No dropped packets due to internal bandwidth constraints; no flow control invoked or required.

Buffer capacity – At least 80 Kbyte total egress buffering available for audio class of service with minimum of 40 Kbyte available per port for this class.

Forwarding decision time – The time from receipt of the last bit of the packet at the ingress port to the transmission of the first bit of the forwarded packet at the egress port must be 10 µs or less.

Layer-3 Networking

Q-LAN operates well with conventional layer-2 Ethernet networking. Many high-performance networking components now include layer-3 capabilities such as IGMP, WAN multicast management protocols, wire speed IP routing and support for internet routing protocols. Unlike most other networked audio distribution systems, Q-LAN can take advantage of these capabilities should you choose to activate them. These provisions make for a more scalable, robust and manageable network.

Jumbo Packets

Data on Ethernet is transmitted in packets. Ethernet packet size is limited by the IEEE 802.3 standards to 1522 bytes. A larger packet size has the potential to reduce overhead in some communications protocols. Although the IEEE has refused to condone an increase in the Ethernet packet size, many vendors, bowing to customer demand, have implemented support for jumbo packets. Jumbo packets are generally defined as having a total length between 1523 and 9216 bytes.

Network performance criteria for Q-LAN require no jumbo packet through all audio paths on the network. The presence of jumbo packets on Q-LAN-shared network links, even if on a separate VLAN, will introduce additional network latencies making a single switch hop produce the same delay as 6 switch hops with standard framing.

Jumbo packets will only be present on a network if network equipment is configured to pass them and end stations are configured to generate them. Fortunately, managed switches typically ship with jumbo-packet support disabled by default. End stations such as routers and servers also generally ship with jumbo packets disabled. A concerted and systematic configuration effort is required to enable jumbo packets on a network.

Flow Control

Low-level flow-control protocols (principally 802.3x) are used to prevent ingress buffer overflows. Modern switches have adequate internal bandwidth such that input buffer overflow is not a concern and 802.3x flow control is considered by many vendors to be a relic. Switches with internal bandwidth meeting or exceeding wire speed are not expected to initiate flow control.

Being a latency-critical application, Q-LAN cannot tolerate the delivery delays created when flow control is invoked. Flow control must therefore be disabled or not given a chance to be invoked through the network paths used by Q-LAN.

Managed vs. Unmanaged Switches

A managed switch contains an intelligent entity which can be communicated with for the purposes of configuration and monitoring. Many of the advanced features found in current-generation network equipment require configuration. Examples of these features include: STP, Link aggregation, DiffServ, Broadcast storm suppression, IGMP, SNMP, HTTP, Telnet, VLANs, IP routing. Since Q-LAN uses DiffServ, managed switches are required. Most network managers will find multiple features on the above list which they are unwilling to forgo.

With 100 Mb fast Ethernet networks, unmanaged switches were often an attractive and cost-effective option. With the new generation of gigabit Ethernet switches, unmanged switches are less common and there is little price difference between the managed and unmanaged ones.

Switch Testing

QSC has tested a number of switches whose specifications meet these Q-LAN requirements. Without exception equipment meeting specification have operated without issue.

One could use network equipment for Q-LAN with confidence based solely on published specifications were it not for the fact that not all relevant specifications are published by all manufacturers. Specifically, details on buffer

sizes and QoS selection strategy are often missing from published specifications.

QSC therefore publishes a list of network equipment which has been tested to Q-LAN specifications. An updated list can be found in the Q-Sys™ Designer help system.

Conclusion

Integrated within QSC's Q-Sys integrated system platform, a new networked digital audio distribution system has arrived. Compared with previous-generation systems and competing current-generation offerings of both the shipping and gestating variety, Q-LAN offers lower latency, higher fidelity, higher capacity and more comprehensive fault tolerance capabilities. Q-LAN operates on a cost-effective commodity gigabit Ethernet local area network. Since it uses some of the same protocols used on the Internet, Q-LAN has the ability to extend beyond the confines of the local area network. Q-LAN's integration within Q-Sys makes for a point-and-click networked audio distribution experience.

Glossary

ADC

Analog to Digital Converter. ADCs are found at the inputs of digital signal processors.

AES3

Audio Engineering Society digital audio interconnect standard (3rd AES standard). Also known as AES/EBU and technically similar to SPDIF consumer digital audio interconnect standard.

AMX

Systems technology provider and control and automation platform.

ASCII

American Standard Code for Information Interchange specifies mapping of text characters to numerical values for use in communication and human-computer interface.

AVB

Audio Video Bridging is an initiative under development by the IEEE's layer-2 net-working authority, the 802.1 working group. AVB promises interoperable audio and video interconnect (similar to FireWire's offerings) on layer-2 Ethernet networks.

Core (network architecture)

A core switch is the central routing point in certain network designs. The core switch is a high-capacity hardware configurable (typically with slide-in interface cards) usually the size of a small refrigerator. Core switches are commonly set up in redundant pairs to eliminate a single point of failure for the network.

Core (Q-Sys™)

The Core is Q-Sys' central processing unit. The Core is where audio signals for the system are processed and combined. Cores may be set up in redundant pairs to eliminate a single point of failure for the system.

Crestron

Systems technology provider and control and automation platform.

DAC

Digital to Analog Converter. DACs are found at the outputs of digital signal processors.

DHCP

Dynamic Host Configuration Protocol is used by IP network devices when first connecting to a network to receive an IP address assignment and other network configuration information.

DiffServ

Differentiated Services is an IETF standard for classifying network traffic by using the DSCP field in the IP header.

DNS

The Domain Name System is the service and protocol suite that converts domain names (e.g. www.qscaudio.com) used by humans to the IP addresses (e.g. 206.135.232.7) used by computers on an IP network.

DSCP

Differentiated Services Code Point is the field in the header of IP packets used in classifying network traffic under the DiffServ standard.

Ethernet

One of several variants of wired and wireless physical network interconnects. All Ethernet variants share a common packet format.

Fast Ethernet

A 100 Mbit/second Ethernet variant. Sub variants are available for twisted pair cabling (100BASE-TX) or fiber-optic cable (100BASE-FL).

Gigabit Ethernet

A 1000 Mbit/second Ethernet variant. Sub variants are available for twisted pair cabling (1000BASE-T) or fiber-optic cable (1000BASE-SX/LX).

Grandmaster

Source of master clock in an IEEE 1588 clock distribution system.

HTTP

Hypertext Transport Protocol is used by web browsers to retrieve content from web servers. An appliance supporting HTTP can be assumed to feature an integrated web server.

I/O Device

The I/O devices are the entry and exit points for audio in the Q-Sys™ system.

I/O Frame

The I/O frame is an I/O device that supports up to a total of 16 channels in and 16 channels out through up to four modular audio I/O cards installed in the Frame.

IEEE

Institute of Electrical and Electronics Engineers is a professional organization that, among other things, operates a standards body which is responsible for networking technologies such as Ethernet.

IEEE 1588

A time-transfer protocol that allows precise synchronization of clocks across an Ethernet network.

IEEE 802.1

IEEE standards working group responsible for networking standards related to layer-2 Ethernet networking.

IEEE 802.3

IEEE standards working group responsible for maintenance and extension of wired Ethernet standards.

IETF

The Internet Engineering Task Force is responsible for development of IP networking protocols and standards.

IGMP

Internet Group Management Protocol is a protocol used in the management of multi-cast transmissions.

IP Addressing

An IP address is a 32-bit number that uniquely identifies an endpoint on an IP network.

IP Networking

A communication system that utilizes TCP/IP or UDP/IP encapsulation of data.

IP Routing

The process of forwarding data towards its destination based on information contained in the header of an IP packet.

LAN

A Local Area Network is a network scaled for the home or small office. LANs are typically layer-2 networks. LANs may be connected through a gateway to a WAN or to the Internet.

Link Aggregation

The use of multiple links in parallel to create a single higher-bandwidth and resilient connection. Various proprietary and standardized means of designating and operating the links are available.

mDNS

Multicast Domain Name System is a scaled down variant of DNS which uses multicast messaging rather than a network of servers to distribute resource information.

Multicast

A one-to-many addressing mode. A packet with multicast addressing will be simultaneously routed to all interested listeners. Multicast is available in IP networking and on Ethernet.

OSI Reference Model

The Open Systems Interconnection Reference Model is a useful tool for understanding how networks are organized. The OSI reference model is comprised of seven layers from network hardware specific at layer-1 to abstract network connectivity at the higher layers.

PTP

Precision Time Protocol is an alternate name for IEEE 1588.

QoS

Quality of Service is a data communications discipline that includes classification and prioritization of data flowing through a network.

Q-Sys

Q-Sys is a complete integrated system platform that encompasses everything from the audio input to the loudspeakers. Q-LAN is the networked distribution component of Q-Sys.

Q-Sys Designer

Q-Sys Designer is the user interface used to configure, control and monitor Q-Sys audio signal processing and network routing. Q-Sys Designer is a Windows application that runs on a computer connected to the Q-LAN network.

SMPTE

Society of Motion Picture and Television Engineers is a professional organization that, among other things, operates a standards body which is responsible for broadcast media and interconnect standards.

SNMP

Simple Network Management Protocol is used to control and monitor network equipment and end stations.

STP

Spanning Tree Protocol ensures a loop-free topology for Ethernet networks. STP is also used to create fault tolerant networks. Advanced variants of STP are available: Rapid STP (RSTP) recovers from failure more quickly than the original. Per-VLAN STP (PVST) takes VLAN configuration into account in its operation.

Stream

Q-LAN audio is transmitted in streams. A stream is an ongoing series of packets containing one or more channels of real-time audio data.

TCP/IP

Transmission Control Protocol over Internet Protocol is the workhorse protocol suite of the Internet. The protocol suite creates reliable connections between application over a network. The TCP protocol handles error correction and connection management.

UDP, UDP/IP

User Datagram Protocol is a stripped-down protocol suite typically used for non-critical applications or real-time data. UDP is known as a "connectionless" and "unreliable" protocol meaning that it does not include the connection management and error recovery functionality found in TCP – applications are expected to provide these pieces if required.

Unicast

A one-to-one addressing mode. A packet with unicast addressing will be routed to a single destination as indicated by the IP address in the header of the packet.

VLAN

A Virtual Local Area Network is a logically segmented interconnected set of network ports or end stations. VLANs allow different services or user groups to be isolated from one another without requiring dedicated network hardware for each.

VoIP

Voice over Internet Protocol is a telecommunications protocol suite which allows conventional telephone calls to be carried over data networks such as Ethernet or the Internet.

WAN

A Wide Area Network is a network with scope larger than a LAN and smaller than the Internet. A WAN is typically a layer-3 network.

WiFi

Trade name associated with wireless Ethernet networking based on the IEEE 802.11 family of networking standards.

Zeroconf

Zero Configuration networking is a set of techniques and protocols that automatically creates a usable IP network without manual intervention or special configuration servers.

CXD-Q Series

CXD4.2Q | CXD4.3Q | CXD4.5Q

Multi-Channel Network
Processing Amplifiers

Features

- Seamless Q-Sys integration with audio transport and control via standard Gigabit Ethernet protocols and hardware.
- Capable of providing up to 5,000W continuous and 8,000W peak with 70V / 100V direct drive on the CXD4.3Q and CXD4.5Q.
- Flexible Amplifier Summing Technology™ (FAST) permits total amplifier power to be distributed across one, two, three or all four channels.
- PowerLight universal switchmode power supply with PFC for highest efficiency, improved audio performance, and low weight.
- Mic/Line input Euroblock connectors and touch-proof Euroblock loudspeaker connections.
- Eight bi-directional GPIO connections that can be used for analog or digital inputs or outputs to/from Q-Sys.
- Built-in energy saving modes ensure that the amplifier will draw the minimum amount of AC power while still providing outstanding audio quality.
- Q-Sys technical support is available 24/7 - worldwide

The QSC CXD-Q Series represents a revolutionary advancement in amplifier technology and innovation, coupled with outstanding integration capability as part of a Q-Sys system. Designed specifically for the needs of integrators, CXD-Q provides efficient, robust and extraordinarily high fidelity power to drive multiple channels and configurations of loudspeakers – all with optimal energy and rack space efficiency. The CXD-Q Series consists of three powerful, four-channel amplifiers, each a Q-Sys peripheral enabling audio routing, processing, and control. Provided in the amps is the capability to configure and combine channels in various ways to drive a wide range of loudspeaker systems including 70V and 100V without the use of transformers. These amplifiers not only provide the power and processing make your system perform better, they offer outstanding efficiency ensuring that energy costs will be kept to a minimum over the life of the installation.

Flexible Amplifier Summing

CXD-Q amplifiers feature Flexible Amplifier Summing Technology™ (FAST) that actively, two, three or all four outputs. On the CXD4.3Q and CXD4.5Q, this power can also be used to drive 70V or 100V speaker lines directly from any one or all of the four outputs.

This flexibility allows CXD-Q Series amplifiers to drive (for example) two full-range surface mounted speakers along with a subwoofer and one 100V distributed speaker line; or a high-power subwoofer and a bi-amplified full-range loudspeaker; three 70V distributed speaker lines and a low impedance surface mount speaker line; or a single high-power channel driving monster subwoofers.

Q-Sys Connectivity

The CXD-Q amplifiers benefit from the strength of the Q-Sys platform. They are true Q-Sys peripherals meaning that they can connect on a Q-LAN Ethernet network and source and recieve audio signals. The four Mic/Line inputs (with phantom power) are on-ramps into the system and can be routed to anywhere in the design. Likewise, that amplifier outputs can be routed from any input or processing source in the system. In addition the CXD-Q amplifiers offer eight bi-directional Q-Sys GPIO ports for further interfacing with other equipment. The fact that the amps are part of the Q-Sys design and system also means that they are managed and monitored by the Core. If for any reason an amplifier goes off-line or has a fault, the Core can alert the operator and ensure that system retains its integrity.

Power & Space Efficiency

CXD-Q Series amplifiers use QSC's next generation class-D power amp design in combination with a custom power stage utilizing a new output device. These purpose built MOSFET devices provide high voltage operation without needing a full bridge output and offer better audio quality and thermal performance due to co-location of the semiconductors.

CXD-Q amplifiers benefit from the proven PowerLight power supply, made even better with Power Factor Correction (PFC) that aligns the current waveform with the AC mains voltage waveform. PFC enables CXD-Q Series amps to draw current from the wall in a more efficient and controlled manner resulting in incredible power from a single standard AC breaker.

The CXD-Q amplifiers also incorporate several energy conservation and efficiency strategies. One such tool is the unique multi-stage sleep mode that saves energy when possible without sacrificing performance.

With four channels of Mic/Line input and four channels of amplification in just 2RU, the CXD-Q amplifiers replaces equipment taking up as much as three times the rack-space.

Integration Simplicity

Q-Sys is a complete integrated system that encompasses everything from the audio input to the output of the loudspeakers. As part of a Q-Sys system, the CXD-Q amplifiers are just some of the many peripherals that can be intuitively placed in a design and wired into the system. The centralized design maintains operational simplicity because not only does it allow for a "whole system" design philosophy, but the Q-Sys Core configures and manages all peripherals to ensure that all elements of the system are functioning correctly.

With the complete integration facilities provided by Q-Sys, and the power efficiency provided by the custom MOSFET and FAST, the CXD-Q amplifiers are perfect for nearly every installation application.

CXD-Q Series Specifications

Preliminary

	CXD4.2Q		CXD4.3Q		CXD4.5Q	
4 Ch.	Burst	Continuous	Burst	Continuous	Burst	Continuous
100 Vrms	N/A	N/A	N/A	500	N/A	1000
70 Vrms	N/A	N/A	N/A	625	N/A	1250
8Ω	500 Watts	400 Watts	900 Watts	625 Watts	1200 Watts	1150 Watts
4Ω	700 Watts	400 Watts	1400 Watts	625 Watts	2000 Watts	1250 Watts
2Ω	600 Watts	350 Watts	1200 Watts	625 Watts	1600 Watts	625 Watts
2 Ch.	Burst	Continuous	Burst	Continuous	Burst	Continuous
8Ω	1200 Watts	800 Watts	2400 Watts	1250 Watts	4000 Watts	2250 Watts
4Ω	1500 Watts	800 Watts	2000 Watts	1250 Watts	2400 Watts	2250 Watts
2Ω	1500 Watts	650 Watts	2500 Watts	1250 Watts	4000 Watts	2100 Watts
1 Ch.	Burst	Continuous	Burst	Continuous	Burst	Continuous
8Ω	1600 Watts	1500 Watts	3500 Watts	2500 Watts	4500 Watts	4200 Watts
4Ω	2500 Watts	1600 Watts	5000 Watts	2500 Watts	7500 Watts	4200 Watts
2Ω	1700 Watts	1600 Watts	3500 Watts	2500 Watts	4500 Watts	4250 Watts
1Ω	2500 Watts	1600 Watts	5000 Watts	2500 Watts	7500 Watts	3700 Watts
Typical Distortion						
8Ω	0.01 - 0.03%		0.01 - 0.03%		0.01 - 0.03%	
4Ω	0.03 - 0.06%		0.03 - 0.06%		0.03 - 0.06%	
Maximum Distortion						
4Ω - 8Ω	1.0%		1.0%		1.0%	
Frequency response (8Ω)	20 Hz - 15 kHz +/- 0.2 dB 20 Hz - 20 kHz +0.2 dB / -0.7 dB		20 Hz - 15 kHz +/- 0.2 dB 20 Hz - 20 kHz +0.2 dB / -0.7 dB		20 Hz - 15 kHz +/- 0.2 dB 20 Hz - 20 kHz +0.2 dB / -0.7 dB	
Noise						
Unweighted Output Unmuted	-101 dB		-101 dB		-101 dB	
Weighted Output Muted	-109 dB		-109 dB		-109 dB	
Gain (1.2V setting)	34.0 dB		38.4 dB		38.4 dB	
Damping factor	>150		>150		>150	
Input impedance	>10k, balanced or unbalanced		>10k, balanced or unbalanced		>10k, balanced or unbalanced	
Maximum input level						
(3.9V setting)	12.28V (+24 dBu)		12.28V (+24 dBu)		12.28V (+24 dBu)	
(1.2V setting)	3.88V (+14 dBu)		3.88V (+14 dBu)		3.88V (+14 dBu)	
Controls and indicators (front)	Power • Channel MUTE Buttons • Channel SELECT Buttons • Channel Input Signal and CLIP LED Indicators • Channel Output and LIMIT LED Meters • NEXT, PREV, ID Buttons • Control Knob					
Controls and indicators (rear)	AC Power Disconnect					
Input connectors	3-pin Phoenix					
Output connectors	8-pin Phoenix Speaker					
Amplifier and load protection	Short circuit, open circuit, thermal, RF protection. On/Off muting, DC fault shutdown, active inrush limiting					
AC Power Input	Universal Power Supply 100 - 240 VAC, 50 - 60 Hz					
Dimensions (HWD)	3.5" x 19" x 12" (89mm x 482mm x 305mm)		3.5" x 19" x 16" (89mm x 482mm x 406mm)		3.5" x 19" x 16" (89mm x 482mm x 406mm)	
Weight, Net / Shipping	18.5 lb (8.4 kg) / 22 lb (10.0 kg)		21.0 lb (9.5 kg) / 25 lb (11.3 kg)		22.0 lb (10.0 kg) / 26 lb (11.8 kg)	
Agency approvals	UL, CE, RoHS/WEEE compliant, FCC Class A (conducted and radiated emissions)					
Carton contents	IEC Cable, Quick Start Guide, Phoenix Connectors					

Burst Power - 20 ms 1 kHz sine burst, all channels driven
Continuous Power - EIA 1 kHz 1% THD, all channels driven

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Q-SYS™

Enterprise System Platform

Core 1100

Features

- Centralized processing architecture simplifies signal routing
- Cores are available in various sizes based on channel capacity
- Intel® Xeon® Platform provides unparalleled DSP capacity for the largest and most demanding installations
- Cores offer TCP/IP, GPIO, and RS-232 control for interfacing with external devices
- Intuitive and easy to use design GUI
- Operates using standard Gigabit Ethernet hardware for audio transport and control
- System seamlessly integrates with QSC amplifiers and loudspeakers
- Multiple levels of system redundancy are supported ranging from network-only to complete hardware redundancy including amplifiers

Q-Sys™ is a complete integrated system that encompasses everything from the audio input to the output of the loudspeakers; it provides all the routing, processing, control and monitoring, while maintaining the audio quality and reliability QSC has come to be known for.

The Core is the brain of the system, it receives and sends audio to/from the I/O Frame and Page Station that are local to the audio inputs and outputs. The Core performs all audio processing and handles all control functions. It manages QSC control devices such as the TSC Series as well as other control interfaces, recalls snapshots, provides logic functions and executes scripted commands.

The Core 1100 represents the second generation of Q-Sys Enterprise Cores, and truly leverages the faster development cycle of the Intel platform, with more than double the processing power of the model it supersedes at virtually no extra cost. The new Core 1100 provides up to 256 x 256 low latency, network audio network channels and 96x AEC processing channels, using a pair of the latest generation XEON 4-core processors coupled to server-grade cooling towers. Additional features include super-sized, low-speed fans for maximum front-to-rear airflow with minimal fan noise, and a premium field-serviceable power-supply.

Standard gigabit Ethernet switches serve as the interconnect points for Q-LAN networking. To ensure reliable, low-latency audio delivery, these switches must meet Q-LAN performance and feature requirements. User interface and control components of the system may also be connected to these switches.

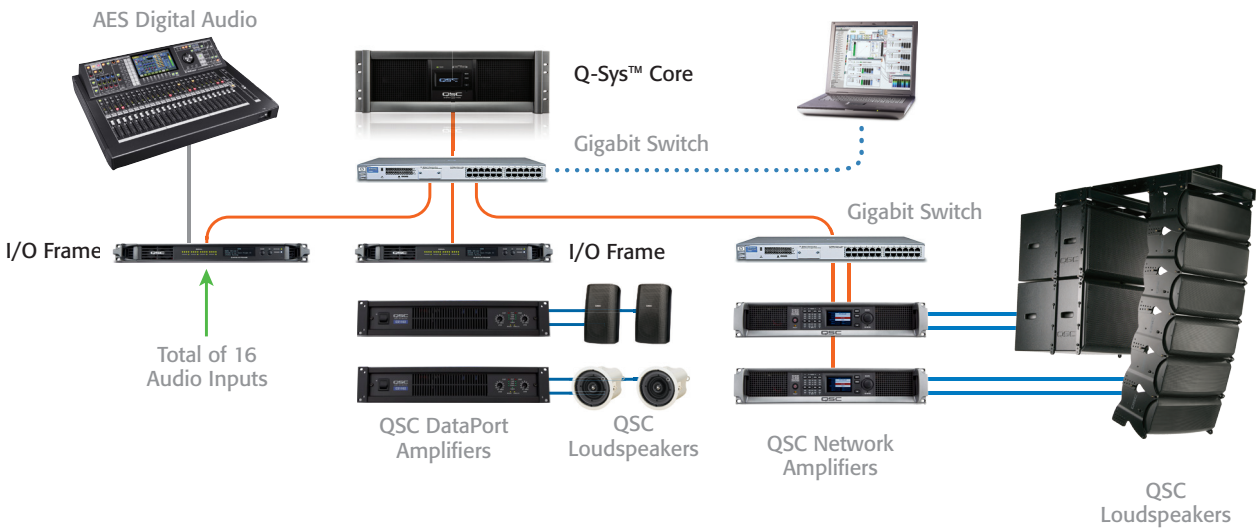
Q-Sys provides extensive levels of system control which can be as simple or sophisticated as the application requires. Advanced control functions are easily created by simply connecting Control Functions in the Q-Sys Designer environment. Controls include an extensive selection of Functions and Scripts that may be used to define automated or user-initiated actions. These actions may be set to control internal Q-Sys parameters as well as external devices via GPIO, RS-232, or TCP/IP. Snapshots of any or all controls can be created and recalled, or when a specific user interface is needed, custom control panels are easily created and published by the Core to any network device.

One of the primary development goals was to create a platform that had ample processing resources to meet the needs of even the most complex system designs. The processing tools are extensive and simple to apply using a design interface created specifically to be intuitive and easy to use. Q-Sys also offers a useful suite of trouble shooting and measurement tools for system set-up and maintenance.

The strength of the centralized architecture used by Q-Sys is that it facilitates the implementation of total or partial system redundancy. A system can be created with Core, Network, I/O Frame and even amplifier redundancy. In a redundant Q-Sys system, a problem with any of the primary devices will result in the back-up device taking over. If, for example the Core experiences a failure, the backup core automatically takes over ensuring continued flawless operation.

Q-Sys is a powerful and reliable unified system that features rock-solid performance backed by the unrivaled service and support QSC has built its reputation on. For more information please visit www.qsc.com/products/q-sys_integrated_system/

Core 1100 | Specifications



System Hardware	Core 1100
Description	System processor and control engine
Front Panel Controls	LCD page forward momentary switch Unit ID button momentary switch Clear settings momentary switch
Front Panel Indicators	Power On: Blue LED Device Status: Tri-color LED 400 x 240 pixels, True Color LCD graphics display
Rear Panel Connectors	RS-232: DE-9 (male 9-pin D shell connector) Video Out: HD-15 (female 15-pin D shell connector) Aux ports AUX A set: USB host x2, RJ45 10/100/1000 MBps Aux ports AUX B set: USB host x2, RJ45 10/100/1000 MBps GPIO A: DA-15 (female 15-pin D shell connector) GPIO B: DA-15 (female 15-pin D shell connector) Q-Sys Network LAN A: RJ45 1000 MBps only Q-Sys Network LAN B: RJ45 1000 MBps only
Capacity	
Local Audio Channels	64x64
Network Audio Streams	256x256 Single channel streams
Network Audio Channels In	256
Network Audio Channels Out	256
Acoustic Echo Canceling Channels	96
Local I/O Card Capacity	1 Slot
Line Voltage Requirements	100 VAC – 240 VAC, 50 – 60 Hz
Current Draw	Max 8.5 @ 100VAC Typical 3.8 @ 100VAC
Thermal	1100 BTU/h (typical)
Dimensions (HWD)	7" x 19" x 17.875" (177.8mm x 482.6mm x 454mm) 41 lbs. / 4RU
Accessories Included	6 ft UL/CSA/IEC line cord • User manual • Optional audio I/O ship kit

As part of QSC's ongoing commitment to product development, specifications are subject to change without notice.

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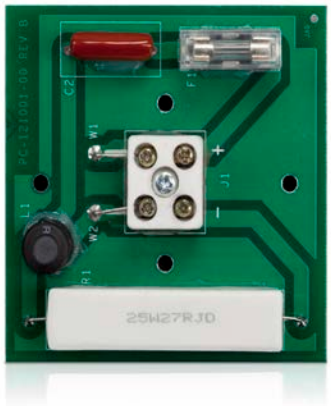
Core 1100 Spec Sheet 6/10/14

Q-Sys

Accessory

PTL-1

Pilot Tone Load



Features

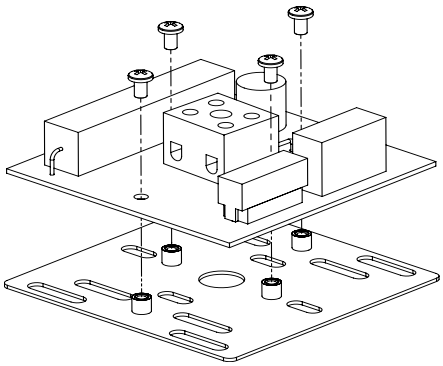
- Pilot tone detection on 70/100V loudspeaker circuits using QSC DataPort and CXD platform amplifiers
- Ceramic screw-down connector block
- Fuse protects circuit against excessive current
- Versatile install adapter plate included
- Fits most plenum rated electrical boxes

The PTL-1 is a Q-Sys accessory that provides an end-of-line 22 kHz impedance soak for 70/100V loudspeaker circuits. Used in combination with a QSC DataPort-equipped amplifier or CXD platform amplifier, the PTL-1 becomes a vital component for monitoring of a distributed loudspeaker line.

Q-Sys monitors the integrity of a loudspeaker line by transmitting a 22 kHz pilot tone (outside the audible range of human hearing and undetectable amidst the program material) and continually sensing the impedance of the PTL-1 installed at the far end of the line.

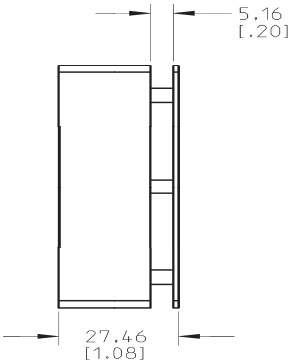
A significant drop in impedance will indicate a short circuit in the line, while an impedance rise will indicate a break or other open-circuit fault. With each detected failure, Q-Sys can generate a time-stamped entry in its Event Log and can be programmed to trigger an alert message.

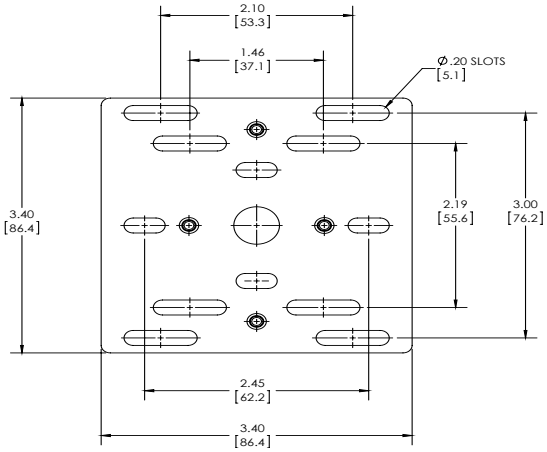
The operator can also choose when the pilot tone and monitoring is run; for example, on command during maintenance checks, or continuously for real-time diagnostics.



Specifications:

Inputs	1
Voltage	70/100V loudspeaker line
Center Frequency	22 kHz
Connector	Ceramic screw-down
Dimensions	3.3″ x 3.3″ x 1″ (84 x 84 x 25 mm)
Weight	Approx. 0.06 lb (0.03 kg)





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