CONSTRUCTION REQUEST FOR PROPOSAL

RFP# 22-83

Wheeler Center Lighting Improvements

City of Ann Arbor
Public Works Unit

Due Date: January 10, 2023 by 2:00 p.m. (local time)

Issued By:

City of Ann Arbor
Procurement Unit
301 E. Huron Street
Ann Arbor, MI 48104

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SECTION I - GENERAL INFORMATION

A. OBJECTIVE

The purpose of this Request for Proposal (RFP) is to select a firm to make lighting improvements at the City of Ann Arbor's Wheeler Center.

B. QUESTIONS AND CLARIFICATIONS / DESIGNATED CITY CONTACTS

All questions regarding this Request for Proposal (RFP) shall be submitted via e-mail. Questions will be accepted and answered in accordance with the terms and conditions of this RFP.

All questions shall be submitted on or before December 20, 2022 at 4:00 p.m. (local time), and should be addressed as follows:

Scope of Work/Proposal Content questions shall be e-mailed to **Maddie.snable@tetratech.com**

RFP Process and Compliance questions shall be e-mailed to Colin Spencer, Buyer - CSpencer@a2gov.org

Should any prospective bidder be in doubt as to the true meaning of any portion of this RFP, or should the prospective bidder find any ambiguity, inconsistency, or omission therein, the prospective bidder shall make a written request for an official interpretation or correction by the due date for questions above.

All interpretations, corrections, or additions to this RFP will be made only as an official addendum that will be posted to a2gov.org and MITN.info and it shall be the prospective bidder's responsibility to ensure they have received all addenda before submitting a proposal. Any addendum issued by the City shall become part of the RFP, and must be incorporated in the proposal where applicable.

C. PRE-PROPOSAL MEETING

A pre-proposal conference for this project will be held on December 13, 2022 at 2:00 p.m. at **Wheeler Center, 4251 Stone School Road, Ann Arbor, MI 48108**

Attendance at this conference is highly recommended. Administrative and technical questions regarding this project will be answered at this time. The pre-proposal conference is for information only. Any answers furnished will not be official until verified in writing by the Financial Service Area, Procurement Unit. Answers that change or substantially clarify the proposal will be affirmed in an addendum.

D. PROPOSAL FORMAT

To be considered, each firm must submit a response to this RFP using the format provided in Section III. No other distribution of proposals is to be made by the prospective bidder. An official authorized to bind the bidder to its provisions must sign

the proposal. Each proposal must remain valid for at least one hundred and twenty (120) days from the due date of this RFP.

Proposals should be prepared simply and economically providing a straightforward, concise description of the bidder's ability to meet the requirements of the RFP. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal.

E. SELECTION CRITERIA

Responses to this RFP will be evaluated using a point system as shown in Section III. A selection committee comprised primarily of staff from the City will complete the evaluation.

If interviews are desired by the City, the selected firms will be given the opportunity to discuss their proposal, qualifications, past experience, and their fee proposal in more detail. The City further reserves the right to interview the key personnel assigned by the selected bidder to this project.

All proposals submitted may be subject to clarifications and further negotiation. All agreements resulting from negotiations that differ from what is represented within the RFP or in the proposal response shall be documented and included as part of the final contract.

F. SEALED PROPOSAL SUBMISSION

All proposals are due and must be delivered to the City on or before January 10, 2023 by 2:00 p.m. (local time). Proposals submitted late or via oral, telephonic, telegraphic, electronic mail or facsimile **will not** be considered or accepted.

Each respondent should submit in a sealed envelope

- **one (1) original proposal**
- **one (1) additional proposal copy**
- **one (1) digital copy of the proposal preferably on a USB/flash drive as one file in PDF format**

Proposals submitted should be clearly marked: **"RFP No. 22-83 – Wheeler Center Lighting Improvements"** and list the bidder's name and address.

Proposals must be addressed and delivered to:
City of Ann Arbor
c/o Customer Service
301 East Huron Street
Ann Arbor, MI 48107

All proposals received on or before the due date will be publicly opened and recorded on the due date. No immediate decisions will be rendered.

Hand delivered proposals may be dropped off in the Purchasing drop box located in the Ann Street (north) vestibule/entrance of City Hall which is open to the public

Monday through Friday from 8am to 5pm (except holidays). The City will not be liable to any prospective bidder for any unforeseen circumstances, delivery, or postal delays. Postmarking on the due date will not substitute for receipt of the proposal.

Bidders are responsible for submission of their proposal. Additional time will not be granted to a single prospective bidder. However, additional time may be granted to all prospective bidders at the discretion of the City.

A proposal may be disqualified if the following required forms are not included with the proposal:

- **Attachment D - Prevailing Wage Declaration of Compliance**
- **Attachment E - Living Wage Declaration of Compliance**
- **Attachment G - Vendor Conflict of Interest Disclosure Form**
- **Attachment H - Non-Discrimination Declaration of Compliance**

Proposals that fail to provide these forms listed above upon proposal opening may be deemed non-responsive and may not be considered for award.

G. DISCLOSURES

Under the Freedom of Information Act (Public Act 442), the City is obligated to permit review of its files, if requested by others. All information in a proposal is subject to disclosure under this provision. This act also provides for a complete disclosure of contracts and attachments thereto.

H. TYPE OF CONTRACT

A sample of the Construction Agreement is included as Attachment A. Those who wish to submit a proposal to the City are required to review this sample agreement carefully. **The City will not entertain changes to its Construction Agreement.**

For all construction work, the respondent must further adhere to the City of Ann Arbor General Conditions. The General Conditions are included herein. Retainage will be held as necessary based on individual tasks and not on the total contract value. The Contractor shall provide the required bonds included in the Contract Documents for the duration of the Contract.

The City reserves the right to award the total proposal, to reject any or all proposals in whole or in part, and to waive any informality or technical defects if, in the City's sole judgment, the best interests of the City will be so served.

This RFP and the selected bidder's response thereto, shall constitute the basis of the scope of services in the contract by reference.

I. NONDISCRIMINATION

All bidders proposing to do business with the City shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the Section 9:158 of the Ann Arbor City Code. Breach of the obligation not to discriminate as outlined in Attachment G shall be a material breach of the contract. Contractors are required to post a copy of Ann Arbor's Non-Discrimination Ordinance attached at all work locations where its employees provide services under a contract with the City.

J. WAGE REQUIREMENTS

The Attachments provided herein outline the requirements for payment of prevailing wages or of a "living wage" to employees providing service to the City under this contract. The successful bidder must comply with all applicable requirements and provide documentary proof of compliance when requested.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. Use of Michigan Department of Transportation Prevailing Wage Forms (sample attached hereto) or a City-approved equivalent will be required along with wage rate interviews.

For laborers whose wage level are subject to federal, state and/or local prevailing wage law the appropriate Davis-Bacon wage rate classification is identified based upon the work including within this contract. **The wage determination(s) current on the date 10 days before proposals are due shall apply to this contract.** The U.S. Department of Labor (DOL) has provided explanations to assist with classification in the following resource link: www.wdol.gov.

For the purposes of this RFP the Construction Type of Building will apply.

K. CONFLICT OF INTEREST DISCLOSURE

The City of Ann Arbor Purchasing Policy requires that the consultant complete a Conflict of Interest Disclosure form. A contract may not be awarded to the selected bidder unless and until the Procurement Unit and the City Administrator have reviewed the Disclosure form and determined that no conflict exists under applicable federal, state, or local law or administrative regulation. Not every relationship or situation disclosed on the Disclosure Form may be a disqualifying conflict. Depending on applicable law and regulations, some contracts may awarded on the recommendation of the City Administrator after full disclosure, where such action is allowed by law, if demonstrated competitive pricing exists and/or it is determined the award is in the best interest of the City. A copy of the Conflict of Interest Disclosure Form is attached.

L. COST LIABILITY

The City of Ann Arbor assumes no responsibility or liability for costs incurred by the bidder prior to the execution of an Agreement. The liability of the City is limited to the terms and conditions outlined in the Agreement. By submitting a proposal, bidder

agrees to bear all costs incurred or related to the preparation, submission, and selection process for the proposal.

M. DEBARMENT

Submission of a proposal in response to this RFP is certification that the Respondent is not currently debarred, suspended, proposed for debarment, and declared ineligible or voluntarily excluded from participation in this transaction by any State or Federal departments or agency. Submission is also agreement that the City will be notified of any changes in this status.

N. PROPOSAL PROTEST

All proposal protests must be in writing and filed with the Purchasing Manager within five (5) business days of the award action. The bidder must clearly state the reasons for the protest. If any bidder contacts a City Service Area/Unit and indicates a desire to protest an award, the Service Area/Unit shall refer the bidder to the Purchasing Manager. The Purchasing Manager will provide the bidder with the appropriate instructions for filing the protest. The protest shall be reviewed by the City Administrator or designee, whose decision shall be final.

Any inquiries or requests regarding this procurement should be only submitted in writing to the Designated City Contacts provided herein. Attempts by the bidder to initiate contact with anyone other than the Designated City Contacts provided herein that the bidder believes can influence the procurement decision, e.g., Elected Officials, City Administrator, Selection Committee Members, Appointed Committee Members, etc., may lead to immediate elimination from further consideration.

O. SCHEDULE

The following is the schedule for this RFP process.

Activity/Event	**Anticipated Date**
Written Question Deadline	December 20, 2022
Addenda Published (if needed)	Week of December 26, 2022
Proposal Due Date	January 10, 2023, 2:00 p.m. (Local Time)
Selection/Negotiations	January 2023
Expected City Council Authorizations	February 2023

The above schedule is for information purposes only and is subject to change at the City's discretion.

P. IRS FORM W-9

The selected bidder will be required to provide the City of Ann Arbor an IRS form W-9.

Q. RESERVATION OF RIGHTS

1. The City reserves the right in its sole and absolute discretion to accept or reject any or all proposals, or alternative proposals, in whole or in part, with or without cause.
2. The City reserves the right to waive, or not waive, informalities or irregularities in terms or conditions of any proposal if determined by the City to be in its best interest.
3. The City reserves the right to request additional information from any or all bidders.
4. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested within RFP.
5. The City reserves the right to determine whether the scope of the project will be entirely as described in the RFP, a portion of the scope, or a revised scope be implemented.
6. The City reserves the right to select one or more contractors or service providers to perform services.
7. The City reserves the right to retain all proposals submitted and to use any ideas in a proposal regardless of whether that proposal is selected. Submission of a proposal indicates acceptance by the firm of the conditions contained in this RFP, unless clearly and specifically noted in the proposal submitted.
8. The City reserves the right to disqualify proposals that fail to respond to any requirements outlined in the RFP, or failure to enclose copies of the required documents outlined within the RFP.

R. IDLEFREE ORDINANCE

The City of Ann Arbor adopted an idling reduction Ordinance that went into effect July 1, 2017. The full text of the ordinance (including exemptions) can be found at: www.a2gov.org/idlefree.

Under the ordinance, No Operator of a Commercial Vehicle shall cause or permit the Commercial Vehicle to Idle:

(a) For any period of time while the Commercial Vehicle is unoccupied; or

(b) For more than 5 minutes in any 60-minute period while the Commercial Vehicle is occupied.

In addition, generators and other internal combustion engines are covered

(1) Excluding Motor Vehicle engines, no internal combustion engine shall be operated except when it is providing power or electrical energy to equipment or a tool that is actively in use.

S. ENVIRONMENTAL COMMITMENT

The City of Ann Arbor recognizes its responsibility to minimize negative impacts on human health and the environment while supporting a vibrant community and economy. The City further recognizes that the products and services the City buys have inherent environmental and economic impacts and that the City should make procurement decisions that embody, promote, and encourage the City's commitment to the environment.

The City encourages potential vendors to bring forward emerging and progressive products and services that are best suited to the City's environmental principles.

T. BID SECURITY

Each bid must be accompanied by a certified check, or Bid Bond by a surety licensed and authorized to do business within the State of Michigan, in the amount of 5% of the total of the bid price.

U. MAJOR SUBCONTRACTORS

The Bidder shall identify each major subcontractor it expects to engage for this Contract if the work to be subcontracted is 15% or more of the bid sum or over $50,000, whichever is less. The Bidder also shall identify the work to be subcontracted to each major subcontractor. The Bidder shall not change or replace a subcontractor without approval by the City.

V. LIQUIDATED DAMAGES

A liquidated damages clause, as given on page C-2, Article III of the Contract, provides that the Contractor shall pay the City as liquidated damages, and not as a penalty, a sum certain per day for each and every day that the Contractor may be in default of completion of the specified work, within the time(s) stated in the Contract, or written extensions.

Liquidated damages clauses, as given in the General Conditions, provide further that the City shall be entitled to impose and recover liquidated damages for breach of the obligations under Chapter 112 of the City Code.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

SECTION II - SCOPE OF WORK

Please see the plan set for more details.

A. Standard Specifications

All work performed under this Contract shall be performed in accordance with the Public Services Department Standard Specifications in effect at the date of availability of the contract documents stipulated in the Advertisement. All work under this Contract which is not included in these Standard Specifications, or which is performed using modifications to these Standard Specifications, shall be performed in accordance with the Detailed Specifications provided during the implementation of individual tasks under this Contract.

Copies of the Standard Specifications can be downloaded from the following web link.

https://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx

SECTION III - MINIMUM INFORMATION REQUIRED

PROPOSAL FORMAT

The following describes the elements that should be included in each of the proposal sections and the weighted point system that will be used for evaluation of the proposals.

Bidders should organize Proposals into the following Sections:

A. Qualifications, Experience and Accountability
B. Workplace Safety
C. Workforce Development
D. Social Equity and Sustainability
E. Schedule of Pricing/Cost
F. Authorized Negotiator
G. Attachments

Bidders are strongly encouraged to provided details for all of the information requested below within initial proposals. Backup documentation may be requested at the sole discretion of the City to validate all of the responses provided herein by bidders. False statements by bidders to any of the criteria provided herein will result in the proposal being considered non-responsive and will not be considered for award.

Pursuant to Sec 1:314(9) of the City Code which sets forth requirements for evaluating construction bids, Bidders should submit the following:

A. Qualifications, Experience and Accountability - 20 Points

1. Qualifications and experience of the bidder and of key persons, management, and supervisory personnel to be assigned by the bidder.

2. References from individuals or entities the bidder has worked for within the last five (5) years including information regarding records of performance and job site cooperation.

3. Evidence of any quality assurance program used by the bidder and the results of any such program on the bidder's previous projects.

4. A statement from the bidder as to any major subcontractors it expects to engage including the name, work, and amount.

B. Workplace Safety – 20 Points

1. Documentation of an on-going, Michigan OSHA-approved safety-training program for employees to be used on the proposed job site.

2. Evidence of the bidder's worker's compensation Experience Modification Rating ("EMR"). Preference within this criterion will be given to an EMR of 1.0 or less based on a three-year average.

3. Evidence that all craft labor that will be employed by the bidder for the project has, or will have prior to project commencement, completed at least the OSHA 10-hour training course for safety established by the U.S. Department of Labor, Occupational Safety & Health Administration.

4. The safety record of bidder and major subcontractors, including OSHA, MIOSHA, or other safety violations.

C. Workforce Development – 20 Points

1. The ratio of masters or journeypersons to apprentices proposed to be used on the construction project job site, if apprentices are to be used on the project.

2. Documentation as to bidder's pay rates, health insurance, pension or other retirement benefits, paid leave, or other fringe benefits to its employees.

3. Documentation that the bidder participates in a Registered Apprenticeship Program that is registered with the United States Department of Labor Office of Apprenticeship or by a State Apprenticeship Agency recognized by the USDOL Office of Apprenticeship.

D. Social Equity and Sustainability – 20 Points

1. A statement from the bidder as to what percentage of its workforce resides in the City of Ann Arbor and in Washtenaw County, Michigan. The City will consider in evaluating which bids best serve its interests, the extent to which responsible and qualified bidders are able to achieve this goal.

2. Evidence of Equal Employment Opportunity Programs for minorities, women, veterans, returning citizens, and small businesses.

3. Evidence that the bidder is an equal opportunity employer and does not discriminate on the basis of race, sex, pregnancy, age, religion, national origin, marital status, sexual orientation, gender identity or expression, height, weight, or disability.

4. The bidder’s proposed use of sustainable products, technologies, or practices for the project, which reduce the impact on human health and the environment, including raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and waste management.

5. The bidder’s environmental record, including findings of violations and penalties imposed by government agencies.

E. Schedule of Pricing/Cost – 20 Points

Company: _____

Notes:
1. Provide a Unit Price and Total Price for all bid items specified.
2. Quantities included in the bid table represent estimated quantities for different work. The CONTRACTOR shall be compensated for the actual number of items completed using the unit prices provided.
3. The City, at its sole discretion, may elect to delete any portion of the work delineated below, with no change to the unit prices provided. Work shall be determined based upon the availability of funds.
4. Any item not provided in the following list shall be considered incidental.
5. Change order shall be awarded based on the base bid or any combination of a base bid and alternate bid in any manner the City believes to be in its best interest.

Item No.	Item Description	Qty	Unit	Unit Price	Total Price
1.	General Conditions (Max, 10% of items 2 through 69)	1	LS	$	$
SITE LIGHTING					
2.	Lamp Replacement Transformer Conversion (HA)	19	EA	$	$
3.	Lamp Replacement Transformer Conversion (HA2)	3	EA	$	$
4.	Fixture Replacement (HE)	1	EA	$	$
5.	Lamp Replacement (SA)	3	EA	$	$
6.	Fixture Replacement (SB)	2	EA	$	$
7.	Fixture Replacement (SC)	3	EA	$	$
8.	Lamp Replacement (SE)	3	EA	$	$
9.	Fixture Replacement (SF)	4	EA	$	$
10.	Fixture Replacement (SG)	7	EA	$	$
AUTO WASH & TRUCK WASH LIGHTING					
11.	Fixture Replacement (A)	14	EA	$	$
12.	Fixture Replacement (B)	8	EA	$	$
DECANT STATION					
13.	Fixture Replacement (A)	4	EA	$	$
14.	Lamp Replacement (B)	2	EA	$	$
FUELING STATION					
15.	Fixture Replacement (A)	16	EA	$	$
16.	Lamp Replacement (B)	1	EA	$	$

COVERED STORAGE AND PARKING BLDG					
17.	Fixture Replacement (WB)	9	EA	$	$
18.	Lamp Replacement (FA)	20	EA	$	$
SALT/SAND BUNKER					
19.	Fixture Replacement (A)	8	EA	$	$
20.	Fixture Replacement (WA)	1	EA	$	$
SALT DOME BUILDING					
21.	Fixture Replacement (A)	4	EA	$	$
VEHICLE STORAGE BUILDING					
22.	Lamp Replacement (D (D1))	65	EA	$	$
23.	Lamp Replacement (A (A1))	41	EA	$	$
24.	Lamp Replacement (B (B1))	13	EA	$	$
25.	Lamp Replacement (C (C1))	3	EA	$	$
26.	Lamp Replacement (G)	1	EA	$	$
27.	Lamp Replacement (H)	8	EA	$	$
OPERATIONS BULDING					
28.	Fixture Replacement (K)	4	EA	$	$
29.	Fixture Replacement (K1)	8	EA	$	$
30.	Fixture Replacement (K2)	3	EA	$	$
31.	Fixture Replacement (L)	30	EA	$	$
32.	Fixture Replacement (M)	6	EA	$	$
33.	Fixture Replacement (N)	10	EA	$	$
34.	Fixture Replacement (N2 (N3))	21	EA	$	$
35.	Fixture Replacement (S1)	7	EA	$	$
36.	Lamp Replacement (Utility Shop/Storage-Type not indicated)	3	EA	$	$
37.	Lamp Replacement (A (A1))	59	EA	$	$
38.	Lamp Replacement (B (B1))	12	EA	$	$
39.	Lamp Replacement (C (C2))	41	EA	$	$
40.	Lamp Replacement (C1 (C3))	44	EA	$	$
41.	Lamp Replacement (D (D2))	47	EA	$	$
42.	Lamp Replacement (E (E2))	56	EA	$	$
43.	Lamp Replacement (E1 (E3))	30	EA	$	$
44.	Lamp Replacement (F (F1))	13	EA	$	$
45.	Lamp Replacement (G)	6	EA	$	$
46.	Lamp Replacement (G2)	4	EA	$	$

47.	Lamp Replacement (H)	10	EA	$	$
48.	Lamp Replacement (J)	12	EA	$	$
49.	Lamp Replacement (P)	4	EA	$	$
50.	Lamp Replacement (T)	6	EA	$	$
51.	Lamp Replacement (U)	2	EA	$	$
52.	Lamp Replacement (X1 & X2)	32	EA	$	$
53.	Lamp Replacement (X3)	15	EA	$	$
54.	Demolish (V)	2	EA	$	$
55.	Demolish (Vestibule square lights-Type not indicated)	6	EA	$	$
56.	Disable in Controller (R)	8	EA	$	$
57.	Disable in Controller (R1)	3	EA	$	$
58.	Disable in Controller (R2)	3	EA	$	$
59.	Emergency Battery Pack – Replacement	123	EA	$	$
60.	Occupancy Sensor – Replacement	21	EA	$	$
61.	Controller – Replacement	5	EA	$	$
62.	Main Relay Panel – Replacement	1	EA	$	$
63.	Relay Panel – Replacement	2	EA	$	$
64.	Relay Panel – New	2	EA	$	$
65.	Lighting Panel – New	2	EA	$	$
66.	Contact Closure - New	100	EA	$	$
67.	Final Closeout	1	EA	$	$
68.	Permit Allowance	1	EA	$5,000	$5,000
69.	Misc. Allowance	1	EA	$10,000	$10,000
70.	Certified Payroll Compliance and Reporting	1	EA	$	$
TOTAL BASE QUOTATION (ITEMS 1 THROUGH 70)					**$**

Total Base Quotation: _____ Dollars

($_____)

(Amount shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern.)

QUOTATION FORM

SECTION 2 – MATERIAL, EQUIPMENT AND ENVIRONMENTAL ALTERNATES

The Base Bid proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the request for quotation. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the Contractor wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

If an environmental alternative is bid the City strongly encourages bidders to provide recent examples of product testing and previous successful use for the City to properly evaluate the environmental alternative. Testing data from independent accredited organizations are strongly preferred.

Item Number	Description	Add/Deduct Amount

If the Contractor does not suggest any material or equipment alternate, the Contractor should complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any material or equipment alternate under the Contract.

Signature of Authorized Representative of Contractor _____ Date _____

BID FORM

SECTION 3 - TIME ALTERNATE

If the Contractor takes exception to the time stipulated in the Summary of Work-Mechanical, it is requested to stipulate below its proposed time for performance of the work. Consideration will be given to time in evaluating the quotation.

If the Contractor does not suggest any time alternate, the Contractor should complete the following statement:

For the work outlined in this request for bid, the bidder does NOT propose any time alternate under the Contract.

Signature of Authorized Representative of Contractor _____Date _____

BID FORM

SECTION 4 - MAJOR SUBCONTRACTORS

For purposes of this Contract, a Subcontractor is anyone (other than the Contractor) who performs work (other than or in addition to the furnishing of materials, plans or equipment) at or about the construction site, directly or indirectly for or on behalf of the Contractor (and whether or not in privity of Contract with the Contractor), but shall not include any individual who furnishes merely the individual's own personal labor or services.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision to Section 4 of the General Conditions covering subcontractor's employees who perform work on this contract.

For the work outlined in these documents the Bidder expects to engage the following major subcontractors to perform the work identified:

Subcontractor (Name and Address)	Work	Amount
	Electrical	
	Programming/Controls	

If the Bidder does not expect to engage any major subcontractor, the Bidder should complete the following statement:

For the work outlined in this request for bid, the bidder does NOT expect to engage any major subcontractor to perform work under the Contract.

Signature of Authorized Representative of Contractor_____ Date _____

BID FORM

SECTION 5 – CONTRACTOR REFERENCES

Include a minimum of 3 references from similar project completed within the past 10 years.

1) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

2) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone Number

3) _____ _____ _____
Project Name Cost Date Constructed

_____ _____
Contact Name Phone

F. AUTHORIZED NEGOTIATOR / NEGOTIATIBLE ELEMENTS (ALTERNATES)

Include the name, phone number, and e-mail address of persons(s) in your organization authorized to negotiate the agreement with the City.

The proposal price shall include materials and equipment selected from the designated items and manufacturers listed in the bidding documents. This is done to establish uniformity in bidding and to establish standards of quality for the items named.

If the bidder wishes to quote alternate items for consideration by the City, it may do so under this Section. A complete description of the item and the proposed price differential must be provided. Unless approved at the time of award, substitutions where items are specifically named will be considered only as a negotiated change in Contract Sum.

If the Bidder takes exception to the time stipulated in Article III of the Contract, Time of Completion, page C-2, it is requested to stipulate its proposed time for performance of the work.

Consideration for any proposed alternative items or time may be negotiated at the discretion of the City.

G. ATTACHMENTS

General Declaration, Legal Status of Bidder, Conflict of Interest Form, Living Wage Compliance Form, Prevailing Wage Compliance Form and the Non-Discrimination Form should be completed and returned with the proposal. These elements should be included as attachments to the proposal submission.

PROPOSAL EVALUATION

1. The selection committee will evaluate each proposal by the above-described criteria and point system. The City reserves the right to reject any proposal that it determines to be unresponsive and deficient in any of the information requested for evaluation. A proposal with all the requested information does not guarantee the proposing firm to be a candidate for an interview if interviews are selected to be held by the City. The committee may contact references to verify material submitted by the bidder.

2. The committee then will schedule interviews with the selected firms if necessary. The selected firms will be given the opportunity to discuss in more detail their qualifications, past experience, proposed work plan (if applicable) and pricing.

3. The interview should include the project team members expected to work on the project, but no more than six members total. The interview shall consist of a presentation of up to thirty minutes (or the length provided by the committee) by the

bidder, including the person who will be the project manager on this contract, followed by approximately thirty minutes of questions and answers. Audiovisual aids may be used during the oral interviews. The committee may record the oral interviews.

4. The firms interviewed will then be re-evaluated by the above criteria and adjustments to scoring will be made as appropriate. After evaluation of the proposals, further negotiation with the selected firm may be pursued leading to the award of a contract by City Council, if suitable proposals are received.

The City reserves the right to waive the interview process and evaluate the bidder based on their proposal and pricing schedules alone.

The City will determine whether the final scope of the project to be negotiated will be entirely as described in this RFP, a portion of the scope, or a revised scope.

Work to be done under this contract is generally described through the detailed specifications and must be completed fully in accordance with the contract documents.

Any proposal that does not conform fully to these instructions may be rejected.

PREPARATION OF PROPOSALS

Proposals should have no plastic bindings but will not be rejected as non-responsive for being bound. Staples or binder clips are acceptable. Proposals should be printed double sided on recycled paper.

Each person signing the proposal certifies that they are a person in the bidder's firm/organization responsible for the decisions regarding the fees being offered in the Proposal and has not and will not participate in any action contrary to the terms of this provision.

ADDENDA

If it becomes necessary to revise any part of the RFP, notice of the addendum will be posted to Michigan Inter-governmental Trade Network (MITN) www.mitn.info and/or the City of Ann Arbor web site www.A2gov.org for all parties to download.

Each bidder should acknowledge in its proposal all addenda it has received on the General Declarations form provided in the Attachments section herein. The failure of a bidder to receive or acknowledge receipt of any addenda shall not relieve the bidder of the responsibility for complying with the terms thereof. The City will not be bound by oral responses to inquiries or written responses other than official written addenda.

SECTION IV - ATTACHMENTS

Attachment A – Sample Standard Contract

Attachment B – General Declarations

Attachment C - Legal Status of Bidder

Attachment D – Prevailing Wage Declaration of Compliance Form

Attachment E – Living Wage Declaration of Compliance Form

Attachment F – Living Wage Ordinance Poster

Attachment G – Vendor Conflict of Interest Disclosure Form

Attachment H – Non-Discrimination Ordinance Declaration of Compliance Form

Attachment I – Non-Discrimination Ordinance Poster

Sample Certified Payroll Report Template

ATTACHMENT A
SAMPLE STANDARD CONTRACT

If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors of service to the City of Ann Arbor such as the following:

Administrative Use Only
Contract Date: _____

CONTRACT

THIS CONTRACT is between the CITY OF ANN ARBOR, a Michigan Municipal Corporation, 301 East Huron Street, Ann Arbor, Michigan 48104 ("City") and _____ _____("Contractor")

(An individual/partnership/corporation, include state of incorporation) (Address)

Based upon the mutual promises below, the Contractor and the City agree as follows:

ARTICLE I - Scope of Work

The Contractor agrees to furnish all of the materials, equipment and labor necessary; and to abide by all the duties and responsibilities applicable to it for the project titled **[Insert Title of Bid and Bid Number**] in accordance with the requirements and provisions of the following documents, including all written modifications incorporated into any of the documents, all of which are incorporated as part of this Contract:

Non-discrimination and Living Wage Declaration of Compliance Forms (if applicable)
Vendor Conflict of Interest Form
Prevailing Wage Declaration of Compliance Form (if applicable)
Bid Forms
Contract and Exhibits
Bonds
General Conditions
Standard Specifications
Detailed Specifications
Plans
Addenda

ARTICLE II - Definitions

Administering Service Area/Unit means **[Insert Name of Administering Service Unit]**

Project means **[Insert Title of Bid and Bid Number]**

Supervising Professional means the person acting under the authorization of the manager of the Administering Service Area/Unit. At the time this Contract is executed,

the Supervising Professional is: [**Insert the person's name**] whose job title is [**Insert job title**]. If there is any question concerning who the Supervising Professional is, Contractor shall confirm with the manager of the Administering Service Area/Unit.

Contractor's Representative means _____ [**Insert name**] whose job title is [**Insert job title**].

ARTICLE III - Time of Completion

(A) The work to be completed under this Contract shall begin immediately on the date specified in the Notice to Proceed issued by the City.

(B) The entire work for this Contract shall be completed by June 30, 2023.

(C) Failure to complete all the work within the time specified above, including any extension granted in writing by the Supervising Professional, shall obligate the Contractor to pay the City, as liquidated damages and not as a penalty, an amount equal to $500 for each calendar day of delay in the completion of all the work. If any liquidated damages are unpaid by the Contractor, the City shall be entitled to deduct these unpaid liquidated damages from the monies due the Contractor.

The liquidated damages are for the non-quantifiable aspects of any of the previously identified events and do not cover actual damages that can be shown or quantified nor are they intended to preclude recovery of actual damages in addition to the recovery of liquidated damages.

ARTICLE IV - The Contract Sum

Choose one only.

(A) The City shall pay to the Contractor for the performance of the Contract, the unit prices as given in the Bid Form for the estimated bid total of:

_____Dollars ($_____)

(B) The amount paid shall be equitably adjusted to cover changes in the work ordered by the Supervising Professional but not required by the Contract Documents. Increases or decreases shall be determined only by written agreement between the City and Contractor.

ARTICLE V - Assignment

This Contract may not be assigned or subcontracted any portion of any right or obligation under this contract without the written consent of the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under this contract unless specifically released from the requirement, in writing, by the City.

ARTICLE VI - Choice of Law

This Contract shall be construed, governed, and enforced in accordance with the laws of the State of Michigan. By executing this Contract, the Contractor and the City agree to venue in a court of appropriate jurisdiction sitting within Washtenaw County for purposes of any action arising under this Contract. The parties stipulate that the venue referenced in this Contract is for convenience and waive any claim of non-convenience.

Whenever possible, each provision of the Contract will be interpreted in a manner as to be effective and valid under applicable law. The prohibition or invalidity, under applicable law, of any provision will not invalidate the remainder of the Contract.

ARTICLE VII - Relationship of the Parties

The parties of the Contract agree that it is not a Contract of employment but is a Contract to accomplish a specific result. Contractor is an independent Contractor performing services for the City. Nothing contained in this Contract shall be deemed to constitute any other relationship between the City and the Contractor.

Contractor certifies that it has no personal or financial interest in the project other than the compensation it is to receive under the Contract. Contractor certifies that it is not, and shall not become, overdue or in default to the City for any Contract, debt, or any other obligation to the City including real or personal property taxes. City shall have the right to set off any such debt against compensation awarded for services under this Contract.

ARTICLE VIII - Notice

All notices given under this Contract shall be in writing, and shall be by personal delivery or by certified mail with return receipt requested to the parties at their respective addresses as specified in the Contract Documents or other address the Contractor may specify in writing. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; or (2) three days after mailing certified U.S. mail.

ARTICLE IX - Indemnification

To the fullest extent permitted by law, Contractor shall indemnify, defend and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses including attorney's fees resulting or alleged to result, in whole or in part, from any act or omission, which is in any way connected or associated with this Contract, by the Contractor or anyone acting on the Contractor's behalf under this Contract. Contractor shall not be responsible to indemnify the City for losses or damages caused by or resulting from the City's sole negligence. The provisions of this Article shall survive the expiration or earlier termination of this contract for any reason.

ARTICLE X - Entire Agreement

This Contract represents the entire understanding between the City and the Contractor and it supersedes all prior representations, negotiations, agreements, or understandings whether written or oral. Neither party has relied on any prior representations in entering into this Contract. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Contract, regardless of the other party's failure to object to such form. This Contract shall be binding on and shall inure to the benefit of the parties to this Contract and their permitted successors and permitted assigns and nothing in this Contract,

express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Contract. This Contract may be altered, amended or modified only by written amendment signed by the City and the Contractor.

ARTICLE XI – Electronic Transactions

The City and Contractor agree that signatures on this Contract may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this Contract. This Contract may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

FOR CONTRACTOR

By_____

Its:_____

FOR THE CITY OF ANN ARBOR

By_____
Christopher Taylor, Mayor

By_____
Jacqueline Beaudry, City Clerk

Approved as to substance

By_____

City Administrator

By_____

Services Area Administrator

Approved as to form and content

_____
Atleen Kaur, City Attorney

PERFORMANCE BOND

(1) _____ of _____ (referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for $, the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the City entitled _____ _____, for RFP No. 22-83 and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq.

(3) Whenever the Principal is declared by the City to be in default under the Contract, the Surety may promptly remedy the default or shall promptly:

(a) complete the Contract in accordance with its terms and conditions; or

(b) obtain a bid or bids for submission to the City for completing the Contract in accordance with its terms and conditions, and upon determination by Surety of the lowest responsible bidder, arrange for a Contract between such bidder and the City, and make available, as work progresses, sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs and damages for which Surety may be liable hereunder, the amount set forth in paragraph 1.

(4) Surety shall have no obligation to the City if the Principal fully and promptly performs under the Contract.

(5) Surety agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder, or the specifications accompanying it shall in any way affect its obligations on this bond, and waives notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work, or to the specifications.

(6) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202_.

_____	_____
(Name of Surety Company)	(Name of Principal)
By _____	By _____
(Signature)	(Signature)
Its _____	Its _____
(Title of Office)	(Title of Office)

Approved as to form:

Stephen K. Postema, City Attorney

Name and address of agent:

LABOR AND MATERIAL BOND

(1) _____

of _____(referred to as "Principal"), and _____, a corporation duly authorized to do business in the State of Michigan, (referred to as "Surety"), are bound to the City of Ann Arbor, Michigan (referred to as "City"), for the use and benefit of claimants as defined in Act 213 of Michigan Public Acts of 1963, as amended, being MCL 129.201 et seq., in the amount of

$ _____, for the payment of which Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, by this bond.

(2) The Principal has entered a written Contract with the Cityentitled _____

_____

_____

____, for RFP No. 22-83_____; and this bond is given for that Contract in compliance with Act No. 213 of the Michigan Public Acts of 1963 as amended;

(3) If the Principal fails to promptly and fully repay claimants for labor and material reasonably required under the Contract, the Surety shall pay those claimants.

(4) Surety's obligations shall not exceed the amount stated in paragraph 1, and Surety shall have no obligation if the Principal promptly and fully pays the claimants.

(5) Principal, Surety, and the City agree that signatures on this bond may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this bond. This bond may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

SIGNED AND SEALED this _____ day of _____, 202_

_____	_____
(Name of Surety Company)	(Name of Principal)
By _____	By _____
(Signature)	(Signature)
Its_____	Its _____
(Title of Office)	(Title of Office)

Approved as to form:

Stephen K. Postema, City Attorney

Name and address of agent:

GENERAL CONDITIONS

Section 1 - Execution, Correlation and Intent of Documents

The contract documents shall be signed in 2 copies by the City and the Contractor.

The contract documents are complementary and what is called for by any one shall be binding. The intention of the documents is to include all labor and materials, equipment and transportation necessary for the proper execution of the work. Materials or work described in words which so applied have a well-known technical or trade meaning have the meaning of those recognized standards.

In case of a conflict among the contract documents listed below in any requirement(s), the requirement(s) of the document listed first shall prevail over any conflicting requirement(s) of a document listed later.

(1) Addenda in reverse chronological order; (2) Detailed Specifications; (3) Standard Specifications; (4) Plans; (5) General Conditions; (6) Contract; (7) Bid Forms; (8) Bond Forms; (9) Bid.

Section 2 - Order of Completion

The Contractor shall submit with each invoice, and at other times reasonably requested by the Supervising Professional, schedules showing the order in which the Contractor proposes to carry on the work. They shall include the dates at which the Contractor will start the several parts of the work, the estimated dates of completion of the several parts, and important milestones within the several parts.

Section 3 - Familiarity with Work

The Bidder or its representative shall make personal investigations of the site of the work and of existing structures and shall determine to its own satisfaction the conditions to be encountered, the nature of the ground, the difficulties involved, and all other factors affecting the work proposed under this Contract. The Bidder to whom this Contract is awarded will not be entitled to any additional compensation unless conditions are clearly different from those which could reasonably have been anticipated by a person making diligent and thorough investigation of the site.

The Bidder shall immediately notify the City upon discovery, and in every case prior to submitting its Bid, of every error or omission in the bidding documents that would be identified by a reasonably competent, diligent Bidder. In no case will a Bidder be allowed the benefit of extra compensation or time to complete the work under this Contract for extra expenses or time spent as a result of the error or omission.

Section 4 - Wage Requirements

Under this Contract, the Contractor shall conform to Chapter 14 of Title I of the Code of the City of Ann Arbor as amended; which in part states "...that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of

subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen, mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. At the request of the City, any contractor or subcontractor shall provide satisfactory proof of compliance with the contract provisions required by the Section.

Pursuant to Resolution R-16-469 all public improvement contractors are subject to prevailing wage and will be required to provide to the City payroll records sufficient to demonstrate compliance with the prevailing wage requirements. A sample Prevailing Wage Form is provided in the Appendix herein for reference as to what will be expected from contractors. Use of the Prevailing Wage Form provided in the Appendix section or a City-approved equivalent will be required along with wage rate interviews.

Where the Contract and the Ann Arbor City Ordinance are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used.

If the Contractor is a “covered employer” as defined in Chapter 23 of the Ann Arbor City Code, the Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. The Contractor agrees to pay those employees providing Services to the City under this Contract a “living wage,” as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Contract are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

Contractor agrees that all subcontracts entered into by the Contractor shall contain similar wage provision covering subcontractor’s employees who perform work on this contract.

Section 5 - Non-Discrimination

The Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. The Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of Title IX of the Ann Arbor City Code, and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

Section 6 - Materials, Appliances, Employees

Unless otherwise stipulated, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, transportation, and other facilities necessary or used for the execution and completion of the work. Unless otherwise specified, all materials incorporated in the permanent work shall be new, and both workmanship and materials shall be of the highest quality. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials.

The Contractor shall at all times enforce strict discipline and good order among its employees, and shall seek to avoid employing on the work any unfit person or anyone not skilled in the work assigned.

Adequate sanitary facilities shall be provided by the Contractor.

Section 7 - Qualifications for Employment

The Contractor shall employ competent laborers and mechanics for the work under this Contract. For work performed under this Contract, employment preference shall be given to qualified local residents.

Section 8 - Royalties and Patents

The Contractor shall pay all royalties and license fees. It shall defend all suits or claims for infringements of any patent rights and shall hold the City harmless from loss on account of infringement except that the City shall be responsible for all infringement loss when a particular process or the product of a particular manufacturer or manufacturers is specified, unless the City has notified the Contractor prior to the signing of the Contract that the particular process or product is patented or is believed to be patented.

Section 9 - Permits and Regulations

The Contractor must secure and pay for all permits, permit or plan review fees and licenses necessary for the prosecution of the work. These include but are not limited to City building permits, right-of-way permits, lane closure permits, right-of-way occupancy permits, and the like. The City shall secure and pay for easements shown on the plans unless otherwise specified.

The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn and specified. If the Contractor observes that the contract documents are at variance with those requirements, it shall promptly notify the Supervising Professional in writing, and any necessary changes shall be adjusted as provided in the Contract for changes in the work.

Section 10 - Protection of the Public and of Work and Property

The Contractor is responsible for the means, methods, sequences, techniques and procedures of construction and safety programs associated with the work contemplated by this contract. The Contractor, its agents or sub-contractors, shall comply with the "General Rules and Regulations for the Construction Industry" as published by the Construction Safety Commission of the State of Michigan and to all other local, State and National laws, ordinances, rules and regulations pertaining to safety of persons and property.

The Contractor shall take all necessary and reasonable precautions to protect the safety of the public. It shall continuously maintain adequate protection of all work from damage, and shall take all necessary and reasonable precautions to adequately protect all public and private property from injury or loss arising in connection with this Contract. It shall make good any damage, injury or loss to its work and to public and private property resulting from lack of reasonable protective precautions, except as may be due to errors in the contract documents, or caused by agents or

employees of the City. The Contractor shall obtain and maintain sufficient insurance to cover damage to any City property at the site by any cause.

In an emergency affecting the safety of life, or the work, or of adjoining property, the Contractor is, without special instructions or authorization from the Supervising Professional, permitted to act at its discretion to prevent the threatened loss or injury. It shall also so act, without appeal, if authorized or instructed by the Supervising Professional.

Any compensation claimed by the Contractor for emergency work shall be determined by agreement or in accordance with the terms of Claims for Extra Cost - Section 15.

Section 11 - Inspection of Work

The City shall provide sufficient competent personnel for the inspection of the work.

The Supervising Professional shall at all times have access to the work whenever it is in preparation or progress, and the Contractor shall provide proper facilities for access and for inspection.

If the specifications, the Supervising Professional's instructions, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Supervising Professional timely notice of its readiness for inspection, and if the inspection is by an authority other than the Supervising Professional, of the date fixed for the inspection. Inspections by the Supervising Professional shall be made promptly, and where practicable at the source of supply. If any work should be covered up without approval or consent of the Supervising Professional, it must, if required by the Supervising Professional, be uncovered for examination and properly restored at the Contractor's expense.

Re-examination of any work may be ordered by the Supervising Professional, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to be in accordance with the contract documents, the City shall pay the cost of re-examination and replacement. If the work is not in accordance with the contract documents, the Contractor shall pay the cost.

Section 12 - Superintendence

The Contractor shall keep on the work site, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Supervising Professional. The superintendent will be responsible to perform all on-site project management for the Contractor. The superintendent shall be experienced in the work required for this Contract. The superintendent shall represent the Contractor and all direction given to the superintendent shall be binding as if given to the Contractor. Important directions shall immediately be confirmed in writing to the Contractor. Other directions will be confirmed on written request. The Contractor shall give efficient superintendence to the work, using its best skill and attention.

Section 13 - Changes in the Work

The City may make changes to the quantities of work within the general scope of the Contract at any time by a written order and without notice to the sureties. If the changes add to or deduct from the extent of the work, the Contract Sum shall be adjusted accordingly. All the changes shall be

executed under the conditions of the original Contract except that any claim for extension of time caused by the change shall be adjusted at the time of ordering the change.

In giving instructions, the Supervising Professional shall have authority to make minor changes in the work not involving extra cost and not inconsistent with the purposes of the work, but otherwise, except in an emergency endangering life or property, no extra work or change shall be made unless in pursuance of a written order by the Supervising Professional, and no claim for an addition to the Contract Sum shall be valid unless the additional work was ordered in writing.

The Contractor shall proceed with the work as changed and the value of the work shall be determined as provided in Claims for Extra Cost - Section 15.

Section 14 - Extension of Time

Extension of time stipulated in the Contract for completion of the work will be made if and as the Supervising Professional may deem proper under any of the following circumstances:

(1) When work under an extra work order is added to the work under this Contract;

(2) When the work is suspended as provided in Section 20;

(3) When the work of the Contractor is delayed on account of conditions which could not have been foreseen, or which were beyond the control of the Contractor, and which were not the result of its fault or negligence;

(4) Delays in the progress of the work caused by any act or neglect of the City or of its employees or by other Contractors employed by the City;

(5) Delay due to an act of Government;

(6) Delay by the Supervising Professional in the furnishing of plans and necessary information;

(7) Other cause which in the opinion of the Supervising Professional entitles the Contractor to an extension of time.

The Contractor shall notify the Supervising Professional within 7 days of an occurrence or conditions which, in the Contractor's opinion, entitle it to an extension of time. The notice shall be in writing and submitted in ample time to permit full investigation and evaluation of the Contractor's claim. The Supervising Professional shall acknowledge receipt of the Contractor's notice within 7 days of its receipt. Failure to timely provide the written notice shall constitute a waiver by the Contractor of any claim.

In situations where an extension of time in contract completion is appropriate under this or any other section of the contract, the Contractor understands and agrees that the only available adjustment for events that cause any delays in contract completion shall be extension of the required time for contract completion and that there shall be no adjustments in the money due the Contractor on account of the delay.

Section 15 - Claims for Extra Cost

If the Contractor claims that any instructions by drawings or other media issued after the date of the Contract involved extra cost under this Contract, it shall give the Supervising Professional written notice within 7 days after the receipt of the instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property. The procedure shall then be as provided for Changes in the Work-Section l3. No claim shall be valid unless so made.

If the Supervising Professional orders, in writing, the performance of any work not covered by the contract documents, and for which no item of work is provided in the Contract, and for which no unit price or lump sum basis can be agreed upon, then the extra work shall be done on a Cost-Plus-Percentage basis of payment as follows:

(1) The Contractor shall be reimbursed for all reasonable costs incurred in doing the work, and shall receive an additional payment of 15% of all the reasonable costs to cover both its indirect overhead costs and profit;

(2) The term "Cost" shall cover all payroll charges for employees and supervision required under the specific order, together with all worker's compensation, Social Security, pension and retirement allowances and social insurance, or other regular payroll charges on same; the cost of all material and supplies required of either temporary or permanent character; rental of all power-driven equipment at agreed upon rates, together with cost of fuel and supply charges for the equipment; and any costs incurred by the Contractor as a direct result of executing the order, if approved by the Supervising Professional;

(3) If the extra is performed under subcontract, the subcontractor shall be allowed to compute its charges as described above. The Contractor shall be permitted to add an additional charge of 5% percent to that of the subcontractor for the Contractor's supervision and contractual responsibility;

(4) The quantities and items of work done each day shall be submitted to the Supervising Professional in a satisfactory form on the succeeding day, and shall be approved by the Supervising Professional and the Contractor or adjusted at once;

(5) Payments of all charges for work under this Section in any one month shall be made along with normal progress payments. Retainage shall be in accordance with Progress Payments-Section 16.

No additional compensation will be provided for additional equipment, materials, personnel, overtime or special charges required to perform the work within the time requirements of the Contract.

When extra work is required and no suitable price for machinery and equipment can be determined in accordance with this Section, the hourly rate paid shall be 1/40 of the basic weekly rate listed in the Rental Rate Blue Book published by Dataquest Incorporated and applicable to the time period the equipment was first used for the extra work. The hourly rate will be deemed to include all costs of operation such as bucket or blade, fuel, maintenance, "regional factors", insurance, taxes, and the like, but not the costs of the operator.

Section 16 - Progress Payments

The Contractor shall submit each month, or at longer intervals, if it so desires, an invoice covering work performed for which it believes payment, under the Contract terms, is due. The submission shall be to the City's Finance Department - Accounting Division. The Supervising Professional will, within 10 days following submission of the invoice, prepare a certificate for payment for the work in an amount to be determined by the Supervising Professional as fairly representing the acceptable work performed during the period covered by the Contractor's invoice. To insure the proper performance of this Contract, the City will retain a percentage of the estimate in accordance with Act 524, Public Acts of 1980. The City will then, following the receipt of the Supervising Professional's Certificate, make payment to the Contractor as soon as feasible, which is anticipated will be within 15 days.

An allowance may be made in progress payments if substantial quantities of permanent material have been delivered to the site but not incorporated in the completed work if the Contractor, in the opinion of the Supervising Professional, is diligently pursuing the work under this Contract. Such materials shall be properly stored and adequately protected. Allowance in the estimate shall be at the invoice price value of the items. Notwithstanding any payment of any allowance, all risk of loss due to vandalism or any damages to the stored materials remains with the Contractor.

In the case of Contracts which include only the Furnishing and Delivering of Equipment, the payments shall be; 60% of the Contract Sum upon the delivery of all equipment to be furnished, or in the case of delivery of a usable portion of the equipment in advance of the total equipment delivery, 60% of the estimated value of the portion of the equipment may be paid upon its delivery in advance of the time of the remainder of the equipment to be furnished; 30% of the Contract Sum upon completion of erection of all equipment furnished, but not later than 60 days after the date of delivery of all of the equipment to be furnished; and payment of the final 10% on final completion of erection, testing and acceptance of all the equipment to be furnished; but not later than l80 days after the date of delivery of all of the equipment to be furnished, unless testing has been completed and shows the equipment to be unacceptable.

With each invoice for periodic payment, the Contractor shall enclose a Contractor's Declaration - Section 43, and an updated project schedule per Order of Completion - Section 2.

Section 17 - Deductions for Uncorrected Work

If the Supervising Professional decides it is inexpedient to correct work that has been damaged or that was not done in accordance with the Contract, an equitable deduction from the Contract price shall be made.

Section 18 - Correction of Work Before Final Payment

The Contractor shall promptly remove from the premises all materials condemned by the Supervising Professional as failing to meet Contract requirements, whether incorporated in the work or not, and the Contractor shall promptly replace and re-execute the work in accordance with the Contract and without expense to the City and shall bear the expense of making good all work of other contractors destroyed or damaged by the removal or replacement.

If the Contractor does not remove the condemned work and materials within l0 days after written notice, the City may remove them and, if the removed material has value, may store the material

at the expense of the Contractor. If the Contractor does not pay the expense of the removal within 10 days thereafter, the City may, upon 10 days written notice, sell the removed materials at auction or private sale and shall pay to the Contractor the net proceeds, after deducting all costs and expenses that should have been borne by the Contractor. If the removed material has no value, the Contractor must pay the City the expenses for disposal within 10 days of invoice for the disposal costs.

The inspection or lack of inspection of any material or work pertaining to this Contract shall not relieve the Contractor of its obligation to fulfill this Contract and defective work shall be made good. Unsuitable materials may be rejected by the Supervising Professional notwithstanding that the work and materials have been previously overlooked by the Supervising Professional and accepted or estimated for payment or paid for. If the work or any part shall be found defective at any time before the final acceptance of the whole work, the Contractor shall forthwith make good the defect in a manner satisfactory to the Supervising Professional. The judgment and the decision of the Supervising Professional as to whether the materials supplied and the work done under this Contract comply with the requirements of the Contract shall be conclusive and final.

Section 19 - Acceptance and Final Payment

Upon receipt of written notice that the work is ready for final inspection and acceptance, the Supervising Professional will promptly make the inspection. When the Supervising Professional finds the work acceptable under the Contract and the Contract fully performed, the Supervising Professional will promptly sign and issue a final certificate stating that the work required by this Contract has been completed and is accepted by the City under the terms and conditions of the Contract. The entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor by the City within 30 days after the date of the final certificate.

Before issuance of final certificates, the Contractor shall file with the City:

(1) The consent of the surety to payment of the final estimate;
(2) The Contractor's Affidavit in the form required by Section 44.

In case the Affidavit or consent is not furnished, the City may retain out of any amount due the Contractor, sums sufficient to cover all lienable claims.

The making and acceptance of the final payment shall constitute a waiver of all claims by the City except those arising from:

(1) unsettled liens;
(2) faulty work appearing within 12 months after final payment;
(3) hidden defects in meeting the requirements of the plans and specifications;
(4) manufacturer's guarantees.

It shall also constitute a waiver of all claims by the Contractor, except those previously made and still unsettled.

Section 20 - Suspension of Work

The City may at any time suspend the work, or any part by giving 5 days notice to the Contractor in writing. The work shall be resumed by the Contractor within 10 days after the date fixed in the

written notice from the City to the Contractor to do so. The City shall reimburse the Contractor for expense incurred by the Contractor in connection with the work under this Contract as a result of the suspension.

If the work, or any part, shall be stopped by the notice in writing, and if the City does not give notice in writing to the Contractor to resume work at a date within 90 days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work suspended and will be entitled to the estimates and payments for all work done on the portions abandoned, if any, plus 10% of the value of the work abandoned, to compensate for loss of overhead, plant expense, and anticipated profit.

Section 21 - Delays and the City's Right to Terminate Contract

If the Contractor refuses or fails to prosecute the work, or any separate part of it, with the diligence required to insure completion, ready for operation, within the allowable number of consecutive calendar days specified plus extensions, or fails to complete the work within the required time, the City may, by written notice to the Contractor, terminate its right to proceed with the work or any part of the work as to which there has been delay. After providing the notice the City may take over the work and prosecute it to completion, by contract or otherwise, and the Contractor and its sureties shall be liable to the City for any excess cost to the City. If the Contractor's right to proceed is terminated, the City may take possession of and utilize in completing the work, any materials, appliances and plant as may be on the site of the work and useful for completing the work. The right of the Contractor to proceed shall not be terminated or the Contractor charged with liquidated damages where an extension of time is granted under Extension of Time - Section 14.

If the Contractor is adjudged a bankrupt, or if it makes a general assignment for the benefit of creditors, or if a receiver is appointed on account of its insolvency, or if it persistently or repeatedly refuses or fails except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if it fails to make prompt payments to subcontractors or for material or labor, or persistently disregards laws, ordinances or the instructions of the Supervising Professional, or otherwise is guilty of a substantial violation of any provision of the Contract, then the City, upon the certificate of the Supervising Professional that sufficient cause exists to justify such action, may, without prejudice to any other right or remedy and after giving the Contractor 3 days written notice, terminate this Contract. The City may then take possession of the premises and of all materials, tools and appliances thereon and without prejudice to any other remedy it may have, make good the deficiencies or finish the work by whatever method it may deem expedient, and deduct the cost from the payment due the Contractor. The Contractor shall not be entitled to receive any further payment until the work is finished. If the expense of finishing the work, including compensation for additional managerial and administrative services exceeds the unpaid balance of the Contract Sum, the Contractor and its surety are liable to the City for any excess cost incurred. The expense incurred by the City, and the damage incurred through the Contractor's default, shall be certified by the Supervising Professional.

Section 22 - Contractor's Right to Terminate Contract

If the work should be stopped under an order of any court, or other public authority, for a period of 3 months, through no act or fault of the Contractor or of anyone employed by it, then the Contractor may, upon 7 days written notice to the City, terminate this Contract and recover from the City payment for all acceptable work executed plus reasonable profit.

Section 23 - City's Right To Do Work

If the Contractor should neglect to prosecute the work properly or fail to perform any provision of this Contract, the City, 3 days after giving written notice to the Contractor and its surety may, without prejudice to any other remedy the City may have, make good the deficiencies and may deduct the cost from the payment due to the Contractor.

Section 24 - Removal of Equipment and Supplies

In case of termination of this Contract before completion, from any or no cause, the Contractor, if notified to do so by the City, shall promptly remove any part or all of its equipment and supplies from the property of the City, failing which the City shall have the right to remove the equipment and supplies at the expense of the Contractor.

The removed equipment and supplies may be stored by the City and, if all costs of removal and storage are not paid by the Contractor within 10 days of invoicing, the City upon 10 days written notice may sell the equipment and supplies at auction or private sale, and shall pay the Contractor the net proceeds after deducting all costs and expenses that should have been borne by the Contractor and after deducting all amounts claimed due by any lien holder of the equipment or supplies.

Section 25 - Responsibility for Work and Warranties

The Contractor assumes full responsibility for any and all materials and equipment used in the construction of the work and may not make claims against the City for damages to materials and equipment from any cause except negligence or willful act of the City. Until its final acceptance, the Contractor shall be responsible for damage to or destruction of the project (except for any part covered by Partial Completion and Acceptance - Section 26). The Contractor shall make good all work damaged or destroyed before acceptance. All risk of loss remains with the Contractor until final acceptance of the work (Section 19) or partial acceptance (Section 26). The Contractor is advised to investigate obtaining its own builders risk insurance.

The Contractor shall guarantee the quality of the work for a period of one year. The Contractor shall also unconditionally guarantee the quality of all equipment and materials that are furnished and installed under the contract for a period of one year. At the end of one year after the Contractor's receipt of final payment, the complete work, including equipment and materials furnished and installed under the contract, shall be inspected by the Contractor and the Supervising Professional. Any defects shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. Any defects that are identified prior to the end of one year shall also be inspected by the Contractor and the Supervising Professional and shall be corrected by the Contractor at its expense as soon as practicable but in all cases within 60 days. The Contractor shall assign all manufacturer or material supplier warranties to the City prior to final payment. The assignment shall not relieve the Contractor of its obligations under this paragraph to correct defects.

Section 26 - Partial Completion and Acceptance

If at any time prior to the issuance of the final certificate referred to in Acceptance and Final Payment - Section 19, any portion of the permanent construction has been satisfactorily completed, and if the Supervising Professional determines that portion of the permanent construction is not required for the operations of the Contractor but is needed by the City, the Supervising Professional shall issue to the Contractor a certificate of partial completion, and immediately the City may take over and use the portion of the permanent construction described in the certificate, and exclude the Contractor from that portion.

The issuance of a certificate of partial completion shall not constitute an extension of the Contractor's time to complete the portion of the permanent construction to which it relates if the Contractor has failed to complete it in accordance with the terms of this Contract. The issuance of the certificate shall not release the Contractor or its sureties from any obligations under this Contract including bonds.

If prior use increases the cost of, or delays the work, the Contractor shall be entitled to extra compensation, or extension of time, or both, as the Supervising Professional may determine.

Section 27 - Payments Withheld Prior to Final Acceptance of Work

The City may withhold or, on account of subsequently discovered evidence, nullify the whole or part of any certificate to the extent reasonably appropriate to protect the City from loss on account of:

(1) Defective work not remedied;

(2) Claims filed or reasonable evidence indicating probable filing of claims by other parties against the Contractor;

(3) Failure of the Contractor to make payments properly to subcontractors or for material or labor;

(4) Damage to another Contractor.

When the above grounds are removed or the Contractor provides a Surety Bond satisfactory to the City which will protect the City in the amount withheld, payment shall be made for amounts withheld under this section.

Section 28 - Contractor's Insurance

(1) The Contractor shall procure and maintain during the life of this Contract, including the guarantee period and during any warranty work, such insurance policies, including those set forth below, as will protect itself and the City from all claims for bodily injuries, death or property damage that may arise under this Contract; whether the act(s) or omission(s) giving rise to the claim were made by the Contractor, any subcontractor, or anyone employed by them directly or indirectly. Prior to commencement of any work under this contract, Contractor shall provide to the City documentation satisfactory to the City, through City-approved means (currently myCOI), demonstrating it has obtained the required policies and endorsements. The certificates of insurance endorsements and/or copies of

policy language shall document that the Contractor satisfies the following minimum requirements. Contractor shall add registration@mycoitracking.com to its safe sender's list so that it will receive necessary communication from myCOI. When requested, Contractor shall provide the same documentation for its subcontractor(s) (if any).

Required insurance policies include:

(a) Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

Bodily Injury by Accident - $500,000 each accident
Bodily Injury by Disease - $500,000 each employee
Bodily Injury by Disease - $500,000 each policy limit

(b) Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 04 13 or current equivalent. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements specifically for the following coverages: Products and Completed Operations, Explosion, Collapse and Underground coverage or Pollution. Further there shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. The following minimum limits of liability are required:

$1,000,000	Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined.
$2,000,000	Per Project General Aggregate
$1,000,000	Personal and Advertising Injury
$2,000,000	Products and Completed Operations Aggregate, which, notwithstanding anything to the contrary herein, shall be maintained for three years from the date the Project is completed.

(c) Motor Vehicle Liability Insurance, including Michigan No-Fault Coverages, equivalent to, as a minimum, Insurance Services Office form CA 00 01 10 13 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The City of Ann Arbor shall be named as an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. Further, the limits of liability shall be $1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.

(d) Umbrella/Excess Liability Insurance shall be provided to apply excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of $1,000,000.

(2) Insurance required under subsection (1)(b) and (1)(c) above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute

with this insurance. Further, the Contractor agrees to waive any right of recovery by its insurer against the City for any insurance listed herein.

(3) Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and un-qualified 30-day written notice of cancellation in favor of the City of Ann Arbor. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company(s); name and address of the agent(s) or authorized representative(s); name(s), email address(es), and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions which may be approved by the City, in its sole discretion; (c) that the policy conforms to the requirements specified Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. Upon request, the Contractor shall provide within 30 days a copy of the policy(ies) and all required endorsements to the City. If any of the above coverages expire by their terms during the term of this Contract, the Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.

(4) Any Insurance provider of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the City.

(5) City reserves the right to require additional coverage and/or coverage amounts as may be included from time to time in the Detailed Specifications for the Project.

(6) The provisions of General Condition 28 shall survive the expiration or earlier termination of this contract for any reason.

Section 29 - Surety Bonds

Bonds will be required from the successful bidder as follows:

(1) A Performance Bond to the City of Ann Arbor for the amount of the bid(s) accepted;
(2) A Labor and Material Bond to the City of Ann Arbor for the amount of the bid(s) accepted.

Bonds shall be executed on forms supplied by the City in a manner and by a Surety Company authorized to transact business in Michigan and satisfactory to the City Attorney.

Section 30 - Damage Claims

The Contractor shall be held responsible for all damages to property of the City or others, caused by or resulting from the negligence of the Contractor, its employees, or agents during the progress of or connected with the prosecution of the work, whether within the limits of the work or elsewhere. The Contractor must restore all property injured including sidewalks, curbing, sodding, pipes, conduit, sewers or other public or private property to not less than its original condition with new work.

Section 31 - Refusal to Obey Instructions

If the Contractor refuses to obey the instructions of the Supervising Professional, the Supervising Professional shall withdraw inspection from the work, and no payments will be made for work performed thereafter nor may work be performed thereafter until the Supervising Professional shall have again authorized the work to proceed.

Section 32 - Assignment

Neither party to the Contract shall assign the Contract without the written consent of the other. The Contractor may assign any monies due to it to a third party acceptable to the City.

Section 33 - Rights of Various Interests

Whenever work being done by the City's forces or by other contractors is contiguous to work covered by this Contract, the respective rights of the various interests involved shall be established by the Supervising Professional, to secure the completion of the various portions of the work in general harmony.

The Contractor is responsible to coordinate all aspects of the work, including coordination of, and with, utility companies and other contractors whose work impacts this project.

Section 34 - Subcontracts

The Contractor shall not award any work to any subcontractor without prior written approval of the City. The approval will not be given until the Contractor submits to the City a written statement concerning the proposed award to the subcontractor. The statement shall contain all information the City may require.

The Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as it is for the acts and omissions of persons directly employed by it.

The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the work to bind subcontractors to the Contractor by the terms of the General Conditions and all other contract documents applicable to the work of the subcontractors and to give the Contractor the same power to terminate any subcontract that the City may exercise over the Contractor under any provision of the contract documents.

Nothing contained in the contract documents shall create any contractual relation between any subcontractor and the City.

Section 35 - Supervising Professional's Status

The Supervising Professional has the right to inspect any or all work. The Supervising Professional has authority to stop the work whenever stoppage may be appropriate to insure the proper execution of the Contract. The Supervising Professional has the authority to reject all work and materials which do not conform to the Contract and to decide questions which arise in the execution of the work.

The Supervising Professional shall make all measurements and determinations of quantities. Those measurements and determinations are final and conclusive between the parties.

Section 36 - Supervising Professional's Decisions

The Supervising Professional shall, within a reasonable time after their presentation to the Supervising Professional, make decisions in writing on all claims of the City or the Contractor and on all other matters relating to the execution and progress of the work or the interpretation of the contract documents.

Section 37 - Storing Materials and Supplies

Materials and supplies may be stored at the site of the work at locations agreeable to the City unless specific exception is listed elsewhere in these documents. Ample way for foot traffic and drainage must be provided, and gutters must, at all times, be kept free from obstruction. Traffic on streets shall be interfered with as little as possible. The Contractor may not enter or occupy with agents, employees, tools, or material any private property without first obtaining written permission from its owner. A copy of the permission shall be furnished to the Supervising Professional.

Section 38 - Lands for Work

The Contractor shall provide, at its own expense and without liability to the City, any additional land and access that may be required for temporary construction facilities or for storage of materials.

Section 39 - Cleaning Up

The Contractor shall, as directed by the Supervising Professional, remove at its own expense from the City's property and from all public and private property all temporary structures, rubbish and waste materials resulting from its operations unless otherwise specifically approved, in writing, by the Supervising Professional.

Section 40 - Salvage

The Supervising Professional may designate for salvage any materials from existing structures or underground services. Materials so designated remain City property and shall be transported or stored at a location as the Supervising Professional may direct.

Section 41 - Night, Saturday or Sunday Work

No night or Sunday work (without prior written City approval) will be permitted except in the case of an emergency and then only to the extent absolutely necessary. The City may allow night work which, in the opinion of the Supervising Professional, can be satisfactorily performed at night. Night work is any work between 8:00 p.m. and 7:00 a.m. No Saturday work will be permitted unless the Contractor gives the Supervising Professional at least 48 hours but not more than 5 days notice of the Contractor's intention to work the upcoming Saturday.

Section 42 - Sales Taxes

Under State law the City is exempt from the assessment of State Sales Tax on its direct purchases. Contractors who acquire materials, equipment, supplies, etc. for incorporation in City projects are not likewise exempt. State Law shall prevail. The Bidder shall familiarize itself with the State Law and prepare its Bid accordingly. No extra payment will be allowed under this Contract for failure of the Contractor to make proper allowance in this bid for taxes it must pay.

Section 43

CONTRACTOR'S DECLARATION

I hereby declare that I have not, during the period _____, 20___, to _____, 20 , performed any work, furnished any materials, sustained any loss, damage or delay, or otherwise done anything in addition to the regular items (or executed change orders) set forth in the Contract titled _____, for which I shall ask, demand, sue for, or claim compensation or extension of time from the City, except as I hereby make claim for additional compensation or extension of time as set forth on the attached itemized statement. I further declare that I have paid all payroll obligations related to this Contract that have become due during the above period and that all invoices related to this Contract received more than 30 days prior to this declaration have been paid in full except as listed below.

There is/is not (Contractor please circle one and strike one as appropriate) an itemized statement attached regarding a request for additional compensation or extension of time.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Past due invoices, if any, are listed below.

Section 44

CONTRACTOR'S AFFIDAVIT

The undersigned Contractor,_____, represents that on _____, 20___, it was awarded a contract by the City of Ann Arbor, Michigan to_____ under the terms and conditions of a Contract titled _____. The Contractor represents that all work has now been accomplished and the Contract is complete.

The Contractor warrants and certifies that all of its indebtedness arising by reason of the Contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and others for labor and material used in accomplishing the project, as well as all other claims arising from the performance of the Contract, have been fully paid or satisfactorily settled. The Contractor agrees that, if any claim should hereafter arise, it shall assume responsibility for it immediately upon request to do so by the City of Ann Arbor.

The Contractor, for valuable consideration received, does further waive, release and relinquish any and all claims or right of lien which the Contractor now has or may acquire upon the subject premises for labor and material used in the project owned by the City of Ann Arbor.

This affidavit is freely and voluntarily given with full knowledge of the facts.

_____ _____
Contractor Date

By _____
(Signature)

Its _____
(Title of Office)

Subscribed and sworn to before me, on this _____ day of _____, 20__
_____ , _____ County, Michigan
Notary Public
_____ County, MI
My commission expires on:

STANDARD SPECIFICATIONS

All work under this contract shall be performed in accordance with the Public Services Department Standard Specifications in effect at the date of availability of the contract documents stipulated in the Bid. All work under this Contract which is not included in these Standard Specifications, or which is performed using modifications to these Standard Specifications, shall be performed in accordance with the Detailed Specifications included in these contract documents.

Standard Specifications are available online:

http://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx

DETAILED SPECIFICATIONS

DETAILED SPECIFICATIONS

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PART 1 - GENERAL

1.01 SUMMARY

A. The Work to be performed shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services (including applying for permits, paying permit fees, and scheduling and closing inspections), including but not limited to fuel, power, water, essential communications, and performing all Work or other operations required in strict accordance with the Drawings and these specifications. The Work shall be complete, and all Work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the Work in good faith shall be provided by the Contractor as though originally so indicated, at no increase in cost to the City.

B. The Project is located at the Wheeler Center, 4251 Stone School Road, Ann Arbor, MI 48108.

C. The Work consists of demolition, installation new lighting fixtures and lamps, installation of new controller and all other work needed for a complete job.

1.02 WORK SEQUENCE

A. CONTRACTOR shall arrange its Work so that at no time shall it cause unnecessary interruption to the operation of existing facilities. In order to meet the overall objective of this Project, certain elements of the Work must be completed in a particular sequence. It may also be necessary to do certain parts of the Work outside normal working hours. CONTRACTOR shall do this Work at such times and at no additional cost to Owner. CONTRACTOR shall be completely responsible for fines and other enforcement imposed upon the facility resulting from inadvertent or unplanned interruptions caused by CONTRACTOR that result in water quality violations. CONTRACTOR shall be responsible for the means and methods of construction.

B. CONTRACTOR shall submit complete details of its plan to Engineer for review

1.03 CONTRACTOR USE OF PREMISES

A. Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public. Confine operations to areas within Contract limits indicated. Portions of the Site beyond areas in which construction operations are indicated are not to be disturbed.

B. Keep driveways and entrances serving the premises clear and available to Owner, Owner's employees, and private property owners at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on Site. Areas for Contractor's trailers, equipment, and material storage, and CONTRACTOR's employee parking shall be as indicated on Drawings or agreed by Owner prior to the start of construction.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.04 OWNER OCCUPANCY

A. Full OWNER Occupancy: Owner will occupy the Site and existing building during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.

1.05 MISCELLANEOUS PROVISIONS

A. Time and Sequence of Work: In general, it is the intention and understanding that CONTRACTOR shall have control over the sequence or order of execution of the several parts of the Work to be done under the Contract and over the method of accomplishing the required results, except as some particular sequence or method may be distinctly demanded by the Drawings and Project Manual or by the expressed provisions of the Contract. Engineer may, however, make such reasonable requirements as may, in ENGINEER's judgment, be necessary for the proper and effective protection of Work partially or wholly completed, and to these requirements CONTRACTOR shall conform.

B. The Contractor shall be responsible for coordinating the general construction, electrical and controls construction schedules and for ensuring that permanent or temporary service is available for all existing, proposed, and temporary facilities that are required to be on line at any given time.

C. The Contractor has the option of providing temporary facilities that can eliminate a constraint, provided it is done without cost to the Owner and provided that all requirements of these Specifications are fulfilled. Work not specifically covered in the following paragraphs may, in general, be done at any time during the contract period, subject to the operating requirements and constraints and construction requirements outlined hereinafter. All references to days in this Section shall be consecutive calendar days.

1.06 GENERAL CONSTRAINTS

A. The Contractor shall schedule the Work so that the facility is maintained in continuous operation. All treatment processes shall be maintained in continuous operation during the construction period except during approved process interruptions. Shutdowns and diversions shall conform to the requirements hereinafter specified and shall be minimized by the Contractor as much as possible. If in the judgment of the Engineer a requested shutdown is not required for the Contractor to perform the Work, the Contractor shall utilize approved alternative methods to accomplish the Work. All shutdowns shall be coordinated with and scheduled at times suitable to the Owner. Shutdowns shall not begin until all required materials are on hand and ready for installation. Each shutdown period shall commence at a time approved by the Owner. If the Contractor completes all required Work before the specified transfer period has ended, the Owner may immediately place the existing system back into service.

B. The Contractor shall submit a proposed written plan of work, with a request to schedule shutdown work for Owner and Engineer approval. Work plan shall include sequence of events, needs for coordination with facility staff, plans for lock-out/tag-out, contingency plans for how to return equipment and tanks to service early if needed for emergencies, and details of how the duration of the shut-down will be minimized.

C. Short-term shutdowns (24 hours or less) shall require 2 days prior notice to schedule date and time with Owner, unless otherwise noted herein. Once a short-term shutdown starts, Contractor shall work continuously until the work is complete and the disrupted process or system can be returned to service. Long-term shutdowns (longer than 24 hours) shall require 7 days prior notice to schedule date and time with Owner, unless otherwise noted herein. The Contractor shall submit a plan of work showing sequence of events throughout shutdown period, and listing all items requiring coordination with Owner's staff. The Contractor shall schedule a coordination meeting with the Owner prior to the initiation of a long-term shutdown. Once a long-term shutdown starts, Contractor shall work on the shutdown area full days, every regular work day, until the work is complete and the disrupted process or system can be returned to service, unless otherwise required herein.

D. The Owner shall have the authority to order work stopped or prohibited that would, in his opinion, unreasonably result in interrupting the necessary functions of the facility operations. The Owner reserves the right to cancel a scheduled shutdown, without additional compensation due the Contractor, and will consider a contract extension if the cancellation affects the contractor's critical path.

E. Unless specifically required by this specification, the Contractor shall not request more than one shutdown occur simultaneously.

F. If the Contractor impairs performance or operation of the facility as a result of not complying with specified provisions for maintaining facility operations, then the Contractor shall immediately make all repairs or replacements and do all work necessary to restore the facility to operation to the satisfaction of the Owner and Engineer. Such work shall progress continuously to completion 24 hours per day and seven work days per week.

G. After any damage to the existing facilities by the Contractor's Work that, in the opinion of the Owner, constitutes an emergency, the Contractor shall be immediately available and provide immediate services for the repair of damage and mitigation of the emergency.

H. Shutdowns shall be scheduled between Monday and Friday, unless there are extenuating circumstances approved by the Engineer.

1.07 GENERAL REQUIREMENTS

A. Access to Facility, Roadways, and Parking Areas
   1. An unobstructed traffic route through all facility gates shall be maintained at all times for the Owner's operations personnel and maintenance equipment. Contractor shall be responsible for notices and signage needed to maintain access for facility operations.
   2. An unobstructed traffic route around the facility shall be maintained at all times (except for closures approved in the above text) for the Owner's operations personnel, maintenance equipment, and delivery vehicles.
   3. It shall be the responsibility of the General Contractor to obtain any permits required from the City of Ann Arbor Building Department or other governmental agency having jurisdiction and pay all associated fees. Contractor shall schedule and coordinate all inspections. Costs incurred by rescheduled inspections as a result of Contractor not being prepared shall be at Contractor's expenses.
   4. The Contractor will not disturb the maintenance of facility operations without a written and approved plan.

5. The Contractor will submit plans for approval for any needed outages or disturbances to operations. These plans will include the area, process or systems that will be impacted and duration of the outage. No plans can be implemented without written authorization from Owner or Engineer.

B. Personnel Access
1. Facility personnel shall have access to all areas which remain in operation throughout the construction period. The Contractor shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the Engineer to maintain personnel access to areas in operation. Access and adequate parking areas for facility personnel must be maintained throughout construction.

C. Power, Light and Communications Systems (General)
1. Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation. Individual units may be disconnected as required for replacement, but service shall be available at all times. Shutdown of electrical facilities, when allowed, shall be limited to not more than two (2) hours unless otherwise noted or approved by the Owner. The Contractor shall coordinate shutdowns required to minimize the duration of shutdowns and the total number of shutdowns required to complete construction.

1.08 SPECIFIC OPERATIONAL CONSTRAINTS

A. The Contractor shall schedule the work for the following based on the constraints given in such a manner as to maintain the facility operation. Contractor shall submit a proposed construction schedule including all planned system shutdowns and tie-ins for the Owner's and Engineer's review no later than 30 calendar days after issuance of the Notice to Proceed. At a minimum, Construction Schedule shall indicate a proposed start date and duration for each of the items listed in this section. No construction shall begin on any of the items listed in this section until the proposed schedule has been approved.

B. Contractor shall install as much of the new systems that will replace existing systems as feasible prior to shut-down of any system. New control wiring shall be installed prior to removing existing control wiring.

C. Specific operational constraints are specified in Table 1 with liquidated damages that may apply.

Table 1
Ann Arbor Wheeler Center
Summary of Shutdown Notices, Durations, Dates, Deadlines, and Liquidated Damages

Item	Notice to Owner (days)	Maximum Duration	Dates and Deadlines	Liquidated Damages
Substantial Completion	N/A	N/A	June 30, 2023	$500/day

*

D. Anticipated Contract Dates are:

Notice to Proceed	March 1, 2023
Submittals to Engineer or Owner	No Later Than March 15, 2023
Commissioning	June 2023
Substantial Completion	June 15, 2023
Final Completion	June 30, 2023

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 21 00– ALLOWANCES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for processing Allowances. Selected materials and equipment, and in some cases their installation, are shown and specified in the Contract Documents by Allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order.

1.02 DEFINITIONS

A. Lump Sum Allowance: A monetary sum that includes, as part of the Contract Price, the associated costs and requirements to complete the specified Allowance.

1.03 SUBMITTALS

A. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the Site for use in fulfillment of each Allowance.

1.04 OWNER'S INSTRUCTIONS

A. At the earliest feasible date after Contract Award, advise Engineer of the date when the final selection and purchase of each product or system described by an Allowance must be completed in order to avoid delay in performance of the Work.

B. When requested by Engineer, obtain Bids for each Allowance for use in making final selections; include recommendations that are relevant to performance of the Work.

C. Purchase products and systems as selected by Engineer from the designated supplier.

D. Use Allowances only as directed for Owner's purposes, and only by Change Orders which designate amounts to be charged to the Allowance.

E. If the actual price for the specified Allowance is more or less than the stated Allowance, the Contract Price shall be adjusted accordingly by Change Order. The adjustment in Contract Price shall be made in accordance with Section 15 of the General Conditions.

F. Change Orders authorizing use of funds from the Contingency or Provisionary Allowances will include CONTRACTOR's related costs and reasonable overhead and profit margins.

G. At Project closeout, any amounts remaining in Allowances will be credited to Owner by Change Order.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect products and services covered by an Allowance promptly upon delivery for damage or defects.

3.02 PREPARATION

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

SCHEDULE OF ALLOWANCES

1. Lump Sum Allowance for Building Permit. An Allowance of $5,000 shall be included in the Contract Price for this Work. CONTRACTOR shall make all arrangements for and shall pay for this Work under this Contract. For further information, contact:

Company	City of Ann Arbor Building Department
Address	301 E. Huron Street, Ann Arbor, MI 48104
Phone	734-794-6267

2. Lump Sum Allowance for Miscellaneous work. An allowance of $10,000 shall be included in the Contract Price for this Work. CONTRACTOR shall make all arrangements for and shall pay for this Work under this Contract as work is defined during the course of the project.

END OF SECTION

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

1.02 DEFINITIONS

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.03 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, removal and disposal of existing product, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See Measurement and Payment Section

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Measurement and Payment Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.03 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on the response to Contractor's Request for Information (RFI).

1.04 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request or 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use forms acceptable to Engineer.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Proposal Request Form: Use form acceptable to Engineer.

1.05 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 27 00 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: This Section specifies administrative and procedural requirements for measurement and payment. Payment for Work under this Contract will be made on a unit price or lump sum basis for Work actually completed. Final measurements of the Work will be taken by ENGINEER to determine the amount of Work completed. The method of applying the unit prices to measured quantities shall be as specified in this Section.

1.02 OWNER'S INSTRUCTIONS

A. Payment will only be made for items listed on Bid Form. The costs for other Work required for a complete Project will be included in the prices Bid for the other items of Work listed on Bid Form.

B. Payment for each item will be in accordance with the General Conditions, and include all applicable labor, material, equipment, and ancillary items to complete the Work specified.

C. All measurements shall be rounded to the nearest whole unit.

1.03 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by ENGINEER and paid for by OWNER.

B. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

C. The date for each progress payment will be determined at the Pre-Construction Conference. The period of construction Work covered by each Application for Payment is 1 month. Actual start/end dates will be determined at the Pre-Construction Conference.

D. Use the AIA (American Institute of Architects) Application and Certification for Payment form for Applications for Payment.
   1. Complete every entry on the form, including execution by person authorized to sign legal documents on behalf of CONTRACTOR.
   2. Incomplete applications will be returned without action.

E. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:
   1. List of subcontractors.
   2. List of principal suppliers and fabricators.
   3. CONTRACTOR's Construction Schedule (preliminary if not final).
   4. Schedule of principal products.
   5. Submittal Schedule (preliminary if not final).

F. Application for Payment at Substantial Completion: Administrative actions and submittals that shall proceed or coincide with this application include:
   1. Warranties (guarantees) and maintenance agreements.
   2. Maintenance instructions.
   3. Meter readings.
   4. Start-up performance and balancing reports.
   5. Changeover information related to OWNER's occupancy, use, operation, and maintenance.
   6. Final cleaning.
   7. Application for reduction of retainage, and consent of surety.
   8. Advice on shifting insurance coverages.
   9. Final progress photographs.
   10. List of incomplete Work, recognized as exceptions to ENGINEER's Certificate of Substantial Completion.

G. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
   1. Completion of Project closeout requirements.
   2. Completion of items specified for completion after Substantial Completion.
   3. Assurance that unsettled claims will be settled.
   4. Assurance that Work not complete and accepted will be completed without undue delay.
   5. Transmittal of required Project construction records to OWNER.
   6. Proof that taxes, fees, and similar obligations have been paid.
   7. Removal of temporary facilities and services.
   8. Removal of surplus materials, rubbish, and similar elements.
   9. CONTRACTOR's waivers of mechanics liens for Project.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

SCHEDULE OF UNIT PRICES

Description: Allowances
Payment: Lump Sum.
Measurement: Each.
Work Required: As specified in Section 01 21 00 - Allowances.

Description: General Conditions, Max 10% of Total Base Bid
Payment: Lump Sum.
Measurement: Each.
Work Required: This item of work will be paid for on a pro rata basis at the time of each progress payment. Measurement will be based on the ratio between work completed during the payment period and the total contract amount. When all of the work of this Contract has been completed, the measurement of this item shall be 1.0 Lump Sum, minus any deductions incurred for inadequate performance as described herein. This amount will not be increased for any reason, including extensions of time, extras, and/or additional work.

The unit price for this item of work shall include all labor, material, and equipment costs to perform all the work specified in the Standard Specifications and as modified by this Detailed Specification. The amount for this work shall be no more than 10% of the total base bid.

Description: Lamp Replacement (per fixture)
Payment: Each
Measurement: Each.
Work Required: Remove current fixture and replace with an equivalent LED lamp. The lamp shall bypass the ballast within the existing light. Emergency lights shall bypass the ballast while remaining connected to the battery backup. Replacement of lamps within each fixture shall be completed as specified in technical specifications. Dispose of removed lamps and equipment (ballasts, wiring, etc.).

Description: Fixture Replacement
Payment: Each
Measurement: Each.

Work Required: Remove current fixture and replace with an LED equivalent. Replacement of fixture shall be completed as specified in technical specifications including wiring work needed to complete job. Dispose of removed fixture and equipment.

Description: Other New Equipment and Equipment Replacement (Battery packs, occupancy sensors, controllers, panels, and contact enclosures)
Payment: Each
Measurement: Each
Work Required: Remove and Replace equipment as specified in technical specifications including mounting and wiring work needed to complete job. Dispose of removed equipment.

Description: Light Transformer Conversion
Payment: Each
Measurement: Each
Work Required: Type HA and HA2 lights are being converted from 480V to 277V by removing the ballast, installing a 480/277V transformer, and installing a 277V line voltage LED screw base bulb.

The existing reflector needs minor trimming to accommodate the bulb length. See site staff for transformer conversion practices.

Description:	Demolish
Payment:	Each
Measurement:	Each
Work Required:	Remove current fixture, associated wiring and conduit, and associated fixture programming within controller. Dispose of removed fixture and equipment.

Description:	Disable in Controller
Payment:	Each
Measurement:	Each
Work Required:	Remove associated fixture programming within controller.

Description:	Final Closeout
Payment:	Lump Sum.
Measurement:	Each.
Work Required:	Submission of O&M documents, submission of record drawings, work outlined in specification 01 77 00 and all other work associated with closing out contract items.

Description: Certified Payroll Compliance and Reporting
Payment: Lump Sum.
Measurement: Each.
Work Required: The unit price for this item of work shall include all supervisory, accounting, administrative, and equipment costs needed to monitor and perform all work related to maintaining compliance with the tasks specified in this Detailed Specification, the City of Ann Arbor Code of Ordinances, its Prevailing Wage Compliance policy and the applicable Federal and State laws.

Payment for this work will be made with each progress payment, on a pro-rata basis, based on the percentage of construction completed. When all of the work of this contract has been completed, the measurement of this item shall be 1.0 times the Lump Sum bid amount. This amount will not be increased for any reason, including extensions of time, extra work, and/or adjustments to existing items of work.

END OF SECTION

SECTION 01 29 00 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements governing CONTRACTOR's Applications for Payment.

B. Related Sections:
   1. CONTRACTOR's Construction Schedule and Submittal Schedule are included in Section 01330.

1.02 OWNER'S INSTRUCTIONS

A. Schedule of Values:
   1. Coordinate preparation of Schedule of Values with preparation of CONTRACTOR's Construction Schedule.
   2. Correlate line items on Schedule of Values with other required administrative schedules and forms, including:
      a. CONTRACTOR's Construction Schedule.
      b. Application for Payment form.
      c. List of subcontractors.
      d. Schedule of Allowances.
      e. Schedule of Alternates.
      f. List of products.
      g. List of principal suppliers and fabricators.
      h. Schedule of Submittals.
   3. Submit Schedule of Values to ENGINEER at the earliest feasible date, but in no case later than 7 days before the date scheduled for submittal of the initial Application for Payment.
   4. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for Schedule of Values.
   5. Identification: Include the following Project identification on Schedule of Values:
      a. Project name and location.
      b. Name of ENGINEER.
      c. Project number.
      d. CONTRACTOR's name and address.
      e. Date of submittal.
   6. Arrange Schedule of Values in a tabular form with separate rows for each Specification Section and separate columns for each major structure or area of Work.
   7. Provide a breakdown of the Contract Price in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
   8. Round off amounts to the nearest whole dollar; the total shall equal the Contract Price.
   9. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
   10. Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually on Applications for Payment. Each item on Schedule of Values

and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

11. At CONTRACTOR's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items on Schedule of Values or distributed as general overhead expense.
12. Update and resubmit Schedule of Values when Change Orders or Work Change Directives result in a change in the Contract Price.
13. A Lump Sum payment equal to 1-1/2% of the total Bid Price (to include all bonds, insurance, etc.) will be allowed for "mobilization" as a progress payment line item and as a portion of the amount bid for General Conditions. The actual cost of bonds and insurance (up to maximum payment of 1-1/2%) will be considered in the initial payment request provided that cost documentation suitable to the OWNER is furnished by the CONTRACTOR. Any outstanding balance of the mobilization line litem will be payable when the Project work is 10% complete as indicated by the approved progress payments (less costs of mobilization and stored equipment).
14. Payment Restrictions
    a. Major equipment items will be paid according to the following schedule:
        1) Upon equipment delivery – 60% of the contract amount
        2) Upon successful start-up, testing and validation (i.e. substantial completion) – 30% of the contract amount
        3) Upon completion of punch list work (i.e. final completion) – 10% of the contract amount
    b. Retainage shall apply to the above payment sequence
    c. Major equipment items are considered to consist of the following items:
        1) Electric motors
        2) Generator
        3) VFDs
        4) Motor control centers
        5) Air handling units/Roof-top units.

B. Initial Application for Payment: Administrative actions and submittals that must precede submittal of the first Application for Payment include the following:
    1. List of subcontractors.
    2. List of principal suppliers and fabricators.
    3. Schedule of Values.
    4. CONTRACTOR's Construction Schedule (preliminary if not final).
    5. Schedule of principal products.
    6. Submittal Schedule (preliminary if not final).

C. Applications For Payment:
    1. Each Application for Payment shall be consistent with previous applications and payments as certified by ENGINEER and paid for by OWNER.
    2. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.
    3. The date for each progress payment will be determined at the Pre-Construction Conference. The period of construction Work covered by each Application for Payment is 1 month. Actual start/end dates will be determined at the Pre-Construction Conference.
    4. Complete every entry on the form, including execution by person authorized to sign legal documents on behalf of CONTRACTOR. Incomplete applications will be returned without action.
    5. Entries shall match data on Schedule of Values and CONTRACTOR's Construction Schedule. Use updated Schedules if revisions have been made.

6. Include amounts of Change Orders and Work Change Directives issued prior to the last day of the construction period covered by the application.
7. Submit executed electronic copy of each Application for Payment to ENGINEER; including waivers of lien and similar attachments.
8. After review by engineer and revisions, transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to ENGINEER or OWNER as defined at preconstruction meeting.

D. Application for Payment at Substantial Completion:
   1. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for OWNER occupancy of designated portions of the Work.
   2. Administrative actions and submittals that shall proceed or coincide with this application include:
      a. Occupancy permits and similar approvals.
      b. Warranties (guarantees) and maintenance agreements.
      c. Test/adjust/balance records.
      d. Maintenance instructions.
      e. Meter readings.
      f. Start-up performance reports.
      g. Changeover information related to OWNER's occupancy, use, operation, and maintenance.
      h. Final cleaning.
      i. Application for reduction of retainage and consent of surety.
      j. Final progress photographs.
      k. List of incomplete Work, recognized as exceptions to ENGINEER'S Certificate of Substantial Completion.

E. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
   1. Submit documents required for progress payments.
   2. Submit documents required in the General Conditions, as may be modified by the Supplementary Conditions.
   3. Completion of Project closeout requirements.
   4. Completion of items specified for completion after Substantial Completion.
   5. Transmittal of required Project construction records to OWNER.
   6. Proof that taxes, fees, and similar obligations have been paid.
   7. Submit Consent of Surety.
   8. Removal of temporary facilities and services.
   9. Completion of all punch list items.
   10. Submission of warranties
   11. Submission of operation and maintenance materials
   12. Completion of record drawings
   13. Removal of surplus materials, rubbish, and similar elements.
   14. Releases of Waivers of Lien Rights:
      a. When submitting releases of waivers of lien rights, provide release or waiver by CONTRACTOR of each SUBCONTRACTOR and supplier that provided CONTRACTOR with labor, material, or equipment.
      b. Provide a list of Subcontractors and Suppliers for which release or waiver of lien is required.

c. Each release or waiver of lien shall be signed by an authorized representative of entity submitting release or waiver to CONTRACTOR, and shall include Subcontractor's or Supplier's corporate seal if applicable.
d. Release or waiver of lien may be conditional upon receipt of final payment..

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 31 00 - PROJECT COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Coordination of Work under this Contract.
   2. Scheduling
   3. Permits
   4. Administrative and supervisory personnel.
   5. Land survey work.
   6. Pre-Construction Conference.
   7. Progress meetings.
   8. Inspections
   9. Start-up
   10. General installation provisions.
   11. Cleaning and protection.

B. Related Sections Specified Elsewhere:
   1. Equipment installation check, and operation, maintenance, and training of OWNER's personnel are included in Section 01 60 00 and Sections for specific equipment items.
   2. Requirements for CONTRACTOR's Construction Schedule are included in Section 01 33 00.
   3. Liquidated Damages in Section 01 11 13, general conditions and agreement

1.02 SUBMITTALS

A. Within 15 days of Notice to Proceed, submit a list of CONTRACTOR's principal staff assignments, including the Superintendent and other personnel in attendance at Site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

1.03 SCHEDULING

A. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair. Make adequate provisions to accommodate items scheduled for later installation. CONTRACTOR shall coordinate the general construction including the work of subcontractors.

B. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at Site in accordance with Laws or Regulations. Contractor shall train CONTRACTOR's employees on use of these sheets and shall keep a master copy on hand at Site.

C. Coordination with Other Contractors:
   1. Contractor shall so conduct CONTRACTOR's operations as not to interfere with or injure the Work of other Contractors or workmen employed on adjoining or related Work, and CONTRACTOR shall promptly make good any injury or damage which may be done to such Work by CONTRACTOR or CONTRACTOR's employees or agents.
   2. Should a contract for adjoining Work be awarded to another contractor, and should the Work on one of these contracts interfere with that of the other, ENGINEER shall decide which contract shall cease Work for the time being and which shall continue, or whether Work on both contracts shall continue at the same time and in what manner.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Project closeout activities.

1.04 PERMITS

A. It is the responsibility of the CONTRACTOR to obtain and pay for any permits required to complete the work as well as scheduling/coordinating all inspections.

1.05 PRE-CONSTRUCTION CONFERENCE

A. ENGINEER will schedule a Pre-Construction Conference and organizational meeting at the Site or other convenient location prior to commencement of construction activities to review responsibilities and personnel assignments.

B. Attendees: OWNER, Engineer and ENGINEER's consultants, CONTRACTOR and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:
   1. Tentative Construction Schedule.
   2. Critical Work sequencing.
   3. Designation of responsible personnel.
   4. Procedures for processing field decisions and Change Orders.
   5. Procedures for processing Applications for Payment.
   6. Distribution of Contract Documents.
   7. Submittal of Shop Drawings, product data, and samples.
   8. Preparation of Record Documents.
   9. Use of the premises.
   10. Office, Work, and storage areas.
   11. Equipment deliveries and priorities.
   12. Safety procedures.
   13. First aid.

14. Security.
15. Housekeeping.
16. Working hours.

1.06 PROGRESS MEETINGS

A. Attendees: In addition to representatives of OWNER and Engineer, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.

B. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

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

D. Reporting: ENGINEER will prepare and distribute copies of minutes of the meeting to each party present and to other parties who should have been present. The minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.

E. Schedule Updating: CONTRACTOR shall revise Construction Schedule after each progress meeting where revisions to Schedule have been made or recognized. Issue revised Schedule no later than 3 days after the progress meeting date to ENGINEER for distribution concurrently with the progress meeting minutes.

1.07 INSPECTIONS

A. CONTRACTOR shall participate in inspections with OWNER and ENGINEER as needed throughout the project.

1.08 LOCK-OUT/TAG-OUT

A. CONTRACTOR shall be responsible for locking and tagging all valves and electrical equipment in accordance with OWNER policies and procedures.

1.10 SITE SUPERINTENDENT

A. CONTRACTOR shall provide a site superintendent present at all times work under the contract is being completed. The site superintendent shall have the authority to make decisions on all aspects of work in this contract.

PART 2 - PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 CLEANING AND PROTECTION

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

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period.

END OF SECTION

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Startup construction schedule.
   2. Contractor's Construction Schedule.
   3. Construction schedule updating reports.
   4. Daily construction reports.
   5. Material location reports.
   6. Site condition reports.
   7. Unusual event reports.

1.03 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

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

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

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

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

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

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

1.04 INFORMATIONAL SUBMITTALS

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

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

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

D. Daily Construction Reports: Submit at weekly intervals.

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

F. Unusual Event Reports: Submit at time of unusual event.

G. Qualification Data: For scheduling consultant.

1.05 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from entities involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.06 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

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

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work under More Than One Contract: Include a separate activity for each contract.
   3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.

4. Work Restrictions: Show the effect of the following items on the schedule:
    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use-of-premises restrictions.
    f. Seasonal variations.
    g. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    a. Submittals.
    b. Purchases.
    c. Fabrication.
    d. Deliveries.
    e. Installation.
    f. Tests and inspections.
    g. Adjusting.
    h. Startup and placement into final use and operation.
    i. Commissioning.
6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    a. Structural completion.
    b. Temporary enclosure and space conditioning.
    c. Permanent space enclosure.
    d. Completion of mechanical installation.
    e. Completion of electrical installation.
    f. Substantial Completion.

D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

E. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule three days before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

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

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

G. Distribution: Distribute copies of approved schedule to Architect/Engineer Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
   1. Post copies in Project meeting rooms and temporary field offices.
   2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.07 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.08 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Testing and inspection.
   8. Accidents.
   9. Meetings and significant decisions.
   10. Unusual events.
   11. Stoppages, delays, shortages, and losses.
   12. Meter readings and similar recordings.
   13. Emergency procedures.
   14. Orders and requests of authorities having jurisdiction.
   15. Change Orders received and implemented.
   16. Construction Change Directives received and implemented.
   17. Services connected and disconnected.
   18. Equipment or system tests and startups.
   19. Partial completions and occupancies.
   20. Substantial Completions authorized.

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

C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
   1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 33 00 - SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals, including, but not necessarily limited to, the following:
   1. CONTRACTOR's Construction Schedule.
   2. Submittal Schedule.
   3. Shop Drawings.
   4. Product data.
   5. Samples.
   6. Progress photographs.
   7. Record photographs.

B. Topics covered elsewhere include, but are not limited to:
   1. Permits.
   2. Applications for payment.
   3. Performance and payment bonds.
   4. Insurance certificates.
   5. List of subcontractors.
   6. Demonstration and Training

1.02 SCHEDULE OF VALUES

A. Within fourteen (14) days after issuance of Notice to Proceed, CONTRACTOR shall submit two (2) copies of the proposed schedule of values for the ENGINEER’s review and approval.

B. Schedule of values shall meet requirements of Section 01 29 00.

C. Schedule of values shall be revised as needed based on ENGINEER’s comments.

D. Schedule of values shall be organized according to specification divisions.

E. Schedule of values shall include sections for tracking all costs associated with each stage of the project.

1.03 SUBMITTALS

A. Bonds and Insurance Certificates shall be submitted to and approved by OWNER and ENGINEER prior to the initiation of any construction on Site.

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

1.04 SUBMITTAL PROCEDURES

A. Coordination:
   1. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   2. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   3. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
   4. ENGINEER reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Processing:
   1. Allow sufficient review time so that installation shall not be delayed as a result of the time required to process submittals, including time for resubmittals.
   2. ENGINEER will review and return submittals with reasonable promptness, or advise CONTRACTOR when a submittal being processed must be delayed for coordination or receipt of additional information by putting the submittal "On Hold" and returning a transmittal identifying the reasons for the delay.
   3. No extension of Contract Time will be authorized because of failure to transmit submittals to ENGINEER sufficiently in advance of the Work to permit processing.

C. Submittal Preparation:
   1. Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
   2. Provide a space approximately 4 inches by 5 inches on the label or beside the title block on submittals not originating from CONTRACTOR to record CONTRACTOR's review and approval markings and the action taken.
   3. Include the following information on the label for processing and recording action taken.
      a. Project name.
      b. Date.
      c. Name and address of ENGINEER.
      d. Name and address of CONTRACTOR.
      e. Name and address of subcontractor.
      f. Name and address of supplier.
      g. Name of manufacturer.
      h. Number and title of appropriate Specification Section.
      i. Drawing number and detail references, as appropriate.
   4. Any markings done by CONTRACTOR shall be done in a color other than red. Red is reserved for ENGINEER's marking.
   5. The number of copies to be submitted will be determined at the pre-construction conference. Reproducibles may be submitted and will be marked and returned to CONTRACTOR. Blue or black line prints shall be submitted in sufficient quantity for distribution to ENGINEER and OWNER recipients.

D. Submittal Transmittal:
   1. Package each submittal appropriately for shipping and handling. This shall include an index either on the transmittal or within the submittal itself. Transmit each submittal from CONTRACTOR to ENGINEER using a transmittal form. Submittals received from sources other than CONTRACTOR will be returned without action. Use separate transmittals for items

from different specification sections. Number each submittal consecutively. Number submittals with specification section numbering. Resubmittals should have the same number as the original, plus a suffix letter designation for each resubmittal (i.e., 01 31 00-A, 01 31 00-B, etc.).

2. Indicate on the transmittal relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include CONTRACTOR's certification that information complies with Contract Document requirements. On resubmittal, all changes shall be clearly identified for ease of review. Resubmittals shall be reviewed for the clearly identified changes only. Any changes not clearly identified will not be reviewed and original submittal shall govern.

1.05 CONSTRUCTION SCHEDULE

A. Within fourteen (14) days after issuance of the Notice to Proceed, the CONTRACTOR shall prepare three (3) copies of the proposed schedule and submit two (2) copies to the ENGINEER for review and approval. Hard copies of project schedule shall be in color with critical path shown. CONTRACTOR shall also submit electronic copy of schedule.

1. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on Schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
2. Coordinate Construction Schedule with Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.
3. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on Schedule to allow time for ENGINEER's procedures necessary for certification of Substantial Completion.

B. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 2 weeks following the meeting or activity.

1.06 SUBMITTAL SCHEDULE

A. After development and acceptance of Construction Schedule, prepare a complete Schedule of Submittals. Submit Schedule within 10 days of the date required for establishment of Construction Schedule.

B. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products, as well as Construction Schedule.

C. Prepare Schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

1. Scheduled date for the first submittal.
2. Related Section number.
3. Submittal category.
4. Name of subcontractor.
5. Description of the part of the Work covered.
6. Scheduled date for resubmittal.
7. Scheduled date ENGINEER's final release or approval.

D. Following response to initial submittal, print and distribute copies to ENGINEER, OWNER, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.

E. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

F. Schedule Updating: Revise Schedule after each meeting or activity where revisions have been recognized or made within 48 hours following the meeting or activity.

1.07 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
   1. Dimensions.
   2. Identification of products and materials included.
   3. Compliance with specified standards.
   4. Notation of coordination requirements.
   5. Notation of dimensions established by field measurement.

C. Nameplate data for equipment including electric motors shall be included on Shop Drawings. Electric motor data shall state the manufacturer, horsepower, service factor, voltage, enclosure type, oversize wiring box, etc.

D. Shop Drawings shall indicate shop painting requirements to include type of paint and manufacturer.

E. Standard manufactured items in the form of catalog work sheets showing illustrated cuts of the items to be furnished, scale details, sizes, dimensions, quantity, and all other pertinent information should be submitted and approved in a similar manner.

F. Measurements given on Shop Drawings or standard catalog sheets, as established from Contract Drawings and as approved by ENGINEER, shall be followed. When it is necessary to verify field measurements, they shall be checked and established by CONTRACTOR. The field measurements so established shall be followed by CONTRACTOR and by all affected trades.

G. Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 inches by 11 inches but no larger than 36 inches by 48 inches.

H. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.08 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.

B. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
   1. Manufacturer's printed recommendations.
   2. Compliance with recognized trade association standards.
   3. Compliance with recognized testing agency standards.
   4. Application of testing agency labels and seals.
   5. Notation of dimensions verified by field measurement.
   6. Notation of coordination requirements.

C. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.09 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

B. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match Engineer's Sample. Include the following:
   1. Generic description of the Sample.
   2. Sample source.
   3. Product name or name of manufacturer.
   4. Compliance with recognized standards.
   5. Availability and delivery time.

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

D. Where variation in color, pattern, texture, or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3) that show approximate limits of the variations.

E. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

F. Preliminary Submittals: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
   1. Preliminary submittals will be reviewed and returned with ENGINEER's mark indicating selection and other action.

G. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; 1 will be returned marked with the action taken.

H. Maintain sets of Samples, as returned, at the Site, for quality comparisons throughout the course of construction.

I. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

J. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.10 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, ENGINEER will review each submittal, mark to indicate action taken, and return promptly.
   1. Compliance with specified characteristics is CONTRACTOR's responsibility.

B. Action Stamp: ENGINEER will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:
   1. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
   2. Final-But-Restricted Release: When submittals are marked "Furnish as Corrected," that part of the Work covered by the submittal may proceed, provided it complies with notation or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
   3. Returned for Resubmittal: When submittal is marked "Rejected" or "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
      a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at Site, or elsewhere where Work is in progress.
   4. Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Acknowledge Receipt."
   5. The approval of ENGINEER shall not relieve CONTRACTOR of responsibility for errors on Drawings or submittals as ENGINEER's checking is intended to cover compliance with Drawings and Specifications and not enter into every detail of the shop work.

1.11 RECORD PHOTOGRAPHS

A. CONTRACTOR shall take a minimum of 48 pre-construction photographs to document the condition of the site prior to beginning work. These photos should document the conditions of the roof, ceiling and walls before and after installation.

B. After final acceptance of the Work, 48 photographs shall be taken of each structure and major feature of the Project as directed by ENGINEER. These photographs shall be taken from points and at times directed by ENGINEER.

C. Photographs shall include condition of parking lots and access roads before and after installation.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 35 16 - ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes special procedures for alteration work.

1.02 DEFINITIONS

A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.

B. Consolidate: To strengthen loose or deteriorated materials in place.

C. Design Reference Sample: A sample that represents the Architect's pre-bid selection of work to be matched; it may be existing work or work specially produced for the Project.

D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

K. Retain: To keep existing items that are not to be removed or dismantled.

L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.03 PROJECT MEETINGS FOR ALTERATION WORK

A. Preliminary Conference for Alteration Work: Before starting alteration work, conduct conference at Project site.

1. Attendees: In addition to representatives of Owner, Architect, and Contractor, testing service representative, and chemical-cleaner manufacturer(s) shall be represented at the meeting.
2. Agenda: Discuss items of significance that could affect progress of alteration work, including review of the following:
    a. Fire-prevention plan.
    b. Governing regulations.
    c. Areas where existing construction is to remain and the required protection.
    d. Hauling routes.
    e. Sequence of alteration work operations.
    f. Storage, protection, and accounting for salvaged and specially fabricated items.
    g. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

B. Coordination Meetings: Conduct coordination meetings specifically for alteration work at monthly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
1. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of alteration work. Include topics for discussion as appropriate to status of Project.
2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.04 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1.05 INFORMATIONAL SUBMITTALS

A. Alteration Work Program: Submit 30 days before work begins.

B. Fire-Prevention Plan: Submit 30 days before work begins.

1.06 QUALITY ASSURANCE

A. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.

B. Alteration Work Program: Prepare a written plan for alteration work for whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole-Project alteration work program with specific requirements of programs required in other alteration work Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

C. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

D. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.07 STORAGE AND HANDLING OF SALVAGED MATERIALS

A. Salvaged Materials:
1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

B. Salvaged Materials for Reinstallation:
1. Repair and clean items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.

D. Storage: Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
1. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.

PART 2 - PRODUCTS –

NOT USED

PART 3 - EXECUTION

3.01 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration work.
   1. Use only proven protection methods, appropriate to each area and surface being protected.
   2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration work is being performed.
   3. Erect temporary barriers to form and maintain fire-egress routes.
   4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration work.
   5. Contain dust and debris generated by alteration work, and prevent it from reaching the public or adjacent surfaces.
   6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
   7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
   8. Provide supplemental sound-control treatment to isolate demolition work from other areas of the building.

B. Temporary Protection of Materials to Remain:
   1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
   2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration work program.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:
   1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration work before commencing operations.
   2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration work.
   3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

3.02 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:
   1. Comply with NFPA 241 requirements unless otherwise indicated.
   2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

a. If combustible material cannot be removed, provide fire blankets to cover such materials.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
   1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
   2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
   3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
   4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
   5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
   6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
      a. Train each fire watch in the proper operation of fire-control equipment and alarms.
      b. Prohibit fire-watch personnel from other work that would be a distraction from fire-watch duties.
      c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
      d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
      e. Maintain fire-watch personnel at Project site until two hours after conclusion of daily work.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.
   1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.03 GENERAL ALTERATION WORK

A. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs or video recordings.

B. Perform surveys of Project site as the Work progresses to detect hazards resulting from alterations.

C. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
   1. Do not proceed with the work in question until directed by Architect.

END OF SECTION

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

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

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
   2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

1.02 DEFINITIONS

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

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

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
   1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" has the same meaning as the term "testing agency."

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

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.03 DELEGATED DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated Design Services Statement: Submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.04 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.

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

1.05 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
   1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
   2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

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

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

1.06 REPORTS AND DOCUMENTS

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

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Statement on condition of substrates and their acceptability for installation of product.
   2. Statement that products at Project site comply with requirements.
   3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   5. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Statement that equipment complies with requirements.
   2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   3. Other required items indicated in individual Specification Sections.

1.07 QUALITY ASSURANCE

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

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

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

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

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

F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
   1. Requirements of authorities having jurisdiction supersede requirements for specialists.

G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

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

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

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.

b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. When testing is complete, remove test specimens and test assemblies; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.08 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Engage a qualified testing agency to perform quality-control services.
a. Contractor will not employ same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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

D. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."

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

G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching.

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

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

END OF SECTION

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. ENGINEER and ARCHITECT are used interchangeably throughout specifications.

C. "Approved": When used to convey ENGINEER action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

D. "Directed": A command or instruction by ENGINEER. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

E. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

F. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

G. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

H. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.

I. "Provide": Furnish and install, complete and ready for the intended use.

J. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.03 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
   1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.04 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
   1. AABC - Associated Air Balance Council; www.aabc.com.
   2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
   3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
   4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
   5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
   6. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
   7. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
   8. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
   9. AF&PA - American Forest & Paper Association; www.afandpa.org.
   10. AGA - American Gas Association; www.aga.org.
   11. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
   12. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
   13. AI - Asphalt Institute; www.asphaltinstitute.org.
   14. AIA - American Institute of Architects (The); www.aia.org.
   15. AISC - American Institute of Steel Construction; www.aisc.org.
   16. AISI - American Iron and Steel Institute; www.steel.org.
   17. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
   18. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
   19. ANSI - American National Standards Institute; www.ansi.org.
   20. APA - APA - The Engineered Wood Association; www.apawood.org.
   21. APA - Architectural Precast Association; www.archprecast.org.
   22. API - American Petroleum Institute; www.api.org.
   23. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
   24. ARI - American Refrigeration Institute; (See AHRI).
   25. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
   26. ASCE - American Society of Civil Engineers; www.asce.org.
   27. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
   28. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.

29. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
30. ASSE - American Society of Safety Engineers (The); www.asse.org.
31. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
32. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
33. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
34. AWEA - American Wind Energy Association; www.awea.org.
35. AWI - Architectural Woodwork Institute; www.awinet.org.
36. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
37. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
38. AWS - American Welding Society; www.aws.org.
39. AWWA - American Water Works Association; www.awwa.org.
40. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
41. BIA - Brick Industry Association (The); www.gobrick.com.
42. BICSI - BICSI, Inc.; www.bicsi.org.
43. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
44. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
45. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
46. CDA - Copper Development Association; www.copper.org.
47. CEA - Canadian Electricity Association; www.electricity.ca.
48. CEA - Consumer Electronics Association; www.ce.org.
49. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
50. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
51. CGA - Compressed Gas Association; www.cganet.com.
52. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
53. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
54. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
55. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
56. CPA - Composite Panel Association; www.pbmdf.com.
57. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
58. CRRC - Cool Roof Rating Council; www.coolroofs.org.
59. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
60. CSA - Canadian Standards Association; www.csa.ca.
61. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
62. CSI - Construction Specifications Institute (The); www.csinet.org.
63. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
64. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
65. CWC - Composite Wood Council; (See CPA).
66. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
67. DHI - Door and Hardware Institute; www.dhi.org.
68. ECA - Electronic Components Association; www.ec-central.org.
69. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
70. EIA - Electronic Industries Alliance; (See TIA).
71. EIMA - EIFS Industry Members Association; www.eima.com.
72. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.

73. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
74. ESTA - Entertainment Services and Technology Association; (See PLASA).
75. EVO - Efficiency Valuation Organization; www.evo-world.org.
76. FM Approvals - FM Approvals LLC; www.fmglobal.com.
77. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
78. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridaroof.com.
79. FSA - Fluid Sealing Association; www.fluidsealing.com.
80. FSC - Forest Stewardship Council U.S.; www.fscus.org.
81. GA - Gypsum Association; www.gypsum.org.
82. GANA - Glass Association of North America; www.glasswebsite.com.
83. GS - Green Seal; www.greenseal.org.
84. HI - Hydraulic Institute; www.pumps.org.
85. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
86. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
87. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
88. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
89. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
90. IAS - International Approval Services; (See CSA).
91. ICBO - International Conference of Building Officials; (See ICC).
92. ICC - International Code Council; www.iccsafe.org.
93. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
94. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
95. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
96. IEC - International Electrotechnical Commission; www.iec.ch.
97. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
98. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
99. IESNA - Illuminating Engineering Society of North America; (See IES).
100. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
101. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
102. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
103. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
104. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
105. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
106. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
107. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
108. ISO - International Organization for Standardization; www.iso.org.
109. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
110. ITU - International Telecommunication Union; www.itu.int/home.
111. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
112. LMA - Laminating Materials Association; (See CPA).
113. LPI - Lightning Protection Institute; www.lightning.org.
114. MBMA - Metal Building Manufacturers Association; www.mbma.com.
115. MCA - Metal Construction Association; www.metalconstruction.org.
116. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
117. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.

118. MHIA - Material Handling Industry of America; www.mhia.org.
119. MIA - Marble Institute of America; www.marble-institute.com.
120. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
121. MPI - Master Painters Institute; www.paintinfo.com.
122. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
123. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
124. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
125. NADCA - National Air Duct Cleaners Association; www.nadca.com.
126. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
127. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
128.
129. NCMA - National Concrete Masonry Association; www.ncma.org.
130. NEBB - National Environmental Balancing Bureau; www.nebb.org.
131. NECA - National Electrical Contractors Association; www.necanet.org.
132. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
133. NEMA - National Electrical Manufacturers Association; www.nema.org.
134. NETA - InterNational Electrical Testing Association; www.netaworld.org.
135. NFHS - National Federation of State High School Associations; www.nfhs.org.
136. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
137. NFPA - NFPA International; (See NFPA).
138. NFRC - National Fenestration Rating Council; www.nfrc.org.
139. NHLA - National Hardwood Lumber Association; www.nhla.com.
140. NLGA - National Lumber Grades Authority; www.nlga.org.
141. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
142. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
143. NRCA - National Roofing Contractors Association; www.nrca.net.
144. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
145. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
146. NSPE - National Society of Professional Engineers; www.nspe.org.
147. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
148. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
149. NWFA - National Wood Flooring Association; www.nwfa.org.
150. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
151. PDI - Plumbing & Drainage Institute; www.pdionline.org.
152. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
153. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
154. RFCI - Resilient Floor Covering Institute; www.rfci.com.
155. RIS - Redwood Inspection Service; www.redwoodinspection.com.
156. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
157. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
158. SDI - Steel Deck Institute; www.sdi.org.
159. SDI - Steel Door Institute; www.steeldoor.org.
160. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
161. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
162. SIA - Security Industry Association; www.siaonline.org.

163. SJI - Steel Joist Institute; www.steeljoist.org.
164. SMA - Screen Manufacturers Association; www.smainfo.org.
165. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
166. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
167. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
168. SPIB - Southern Pine Inspection Bureau; www.spib.org.
169. SPRI - Single Ply Roofing Industry; www.spri.org.
170. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
171. SSINA - Specialty Steel Industry of North America; www.ssina.com.
172. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
173. STI - Steel Tank Institute; www.steeltank.com.
174. SWI - Steel Window Institute; www.steelwindows.com.
175. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
176. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
177. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
178. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
179. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
180. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
181. TMS - The Masonry Society; www.masonrysociety.org.
182. TPI - Truss Plate Institute; www.tpinst.org.
183. TPI - Turfgrass Producers International; www.turfgrasssod.org.
184. TRI - Tile Roofing Institute; www.tileroofing.org.
185. UBC - Uniform Building Code; (See ICC).
186. UL - Underwriters Laboratories Inc.; www.ul.com.
187. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
188. USGBC - U.S. Green Building Council; www.usgbc.org.
189. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
190. WASTEC - Waste Equipment Technology Association; www.wastec.org.
191. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
192. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
193. WDMA - Window & Door Manufacturers Association; www.wdma.com.
194. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
195. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
196. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
197. WPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
   1. DIN - Deutsches Institut fur Normung e.V.; www.din.de.
   2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
   3. ICC - International Code Council; www.iccsafe.org.
   4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.
   1. COE - Army Corps of Engineers; www.usace.army.mil.
   2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
   3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
   4. DOD - Department of Defense; http://dodssp.daps.dla.mil.
   5. DOE - Department of Energy; www.energy.gov.
   6. EPA - Environmental Protection Agency; www.epa.gov.
   7. FAA - Federal Aviation Administration; www.faa.gov.
   8. FG - Federal Government Publications; www.gpo.gov.
   9. GSA - General Services Administration; www.gsa.gov.
   10. HUD - Department of Housing and Urban Development; www.hud.gov.
   11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
   12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
   13. SD - Department of State; www.state.gov.
   14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
   15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
   16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
   17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
   18. USP - U.S. Pharmacopeia; www.usp.org.
   19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
   1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
   2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
   3. DSCC - Defense Supply Center Columbus; (See FS).
   4. FED-STD - Federal Standard; (See FS).
   5. FS - Federal Specification; Available from Department of Defense Single Stock Point; http://dodssp.daps.dla.mil.
      a. Available from Defense Standardization Program; www.dsp.dla.mil.
      b. Available from General Services Administration; www.gsa.gov.
      c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
   6. MILSPEC - Military Specification and Standards; (See DOD).
   7. USAB - United States Access Board; www.access-board.gov.
   8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
   1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
   2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
   3. CDHS - California Department of Health Services; (See CDPH).
   4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
   5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
   6. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
   7. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 45 00 – QUALITY CONTROL

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Quality control and control of installation.

B. References.

C. Manufacturers' field services

1.02 QUALITY CONTROL AND CONTROL OF INSTALLAITON

D. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to product Work of specified quality.

E. Comply with manufacturer's instructions, including each step in sequence.

F. Should manufacturers' instructions conflict with Contract Documents, request clarification from ENGINEER before proceeding.

G. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

H. Perform Work by persons qualified to produce required and specified quality.

I. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.

J. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

K. All materials and equipment shall be new, unless otherwise noted.

1.03 REFERENCES

A. Conform to reference standard by date of issue current on date of Contract Documents.

B. Should specified reference standards conflict with Contract Documents, request clarification from the ENGINEER before proceeding.

C. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the ENGINEER shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: This Section specifies procedural and administrative requirements for temporary services and facilities.

B. Temporary Utilities include, but are not limited to:
   1. Water service and distribution.
   2. Temporary electric power.
   3. Temporary lighting.

C. Temporary Construction and Support Facilities include, but are not limited to:
   1. Temporary heating facilities.
   2. CONTRACTOR's field offices and storage sheds.
   3. Sanitary facilities.

D. Construction Buildings and Facilities include, but are not limited to.
   1. Temporary enclosures.
   2. Temporary Project identification signs.
   3. Temporary Site identification signs.
   4. Temporary Project bulletin boards.
   5. Stairs.
   6. Hoists.
   7. Ongoing construction cleanup.
   8. Storage of equipment and material.

1.02 REFERENCES

A. Codes and Standards:
   1. Comply with NFPA Code 241, "Building Construction and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library, "Temporary Electrical Facilities."
   2. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services," prepared jointly by AGC and ASC, for industry recommendations.
   3. Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

1.03 SUBMITTALS

A. Shop Drawings: Submit in accordance with Section 01 33 00, Submittals covering the items included under this Section. Shop Drawing submittals shall include:
   1. Temporary Utilities: Submit a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to OWNER, change over from use of temporary service to use of the permanent service.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction including, but not limited to:
   1. Building Code requirements.
   2. Health and Safety regulations.
   3. Utility Company regulations.
   4. Police, Fire Department, and Rescue Squad rules.
   5. Environmental Protection regulations.
   6. State and Local Soil Erosion and Sedimentation Control regulations.
   7. National Fire Protection Association (NFPA):NFPA No.70-93
   8. National Electrical Code (NEC) and local amendments thereto.
   9. Comply with federal, state, and local codes and regulations, and utility company requirements.
   10. American Water Works Association and National Sanitation Foundation.
   11. UL

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

1.05 PROJECT CONDITIONS

A. Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do no overload facilities or permit them to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Site.

1.06 SEQUENCING AND SCHEDULING

A. CONTRACTOR shall inform the local Fire Department in advance of CONTRACTOR's program of street obstruction and detours, so that the Fire Department can set up plans for servicing the area in case of an emergency.
   1. CONTRACTOR shall also notify the public agency having jurisdiction over the roads at least 1 week prior to obstructing any street.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide new materials; if acceptable to ENGINEER, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

2.02 EQUIPMENT

A. Provide new equipment; if acceptable to ENGINEER, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110 to 120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

D. First Aid Supplies: Comply with governing regulations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they shall serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required or as directed by ENGINEER/OWNER.

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

3.02 TEMPORARY UTILITY INSTALLATION

A. Engage the appropriate local utility company to install temporary service or to connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.
   1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

B. Public and Private Utilities: Where any utilities, water, sewer, gas, telephone, or any other either public or private, are encountered, CONTRACTOR must provide adequate protection for them, and CONTRACTOR shall be held responsible for any damages to such utilities arising from CONTRACTOR's operations.

C. Water for Construction
   1. Owner will provide water for cleaning or other purposes.

D. Sanitary Sewers: Owner will provide access to one shared restroom for Contractor.

3.03 CONSTRUCTION BUILDINGS AND FACILITIES INSTALLATION

A. Temporary Project Bulletin Board: As a minimum, the following items must be posted:
   1. Wage Rates (when applicable).
   2. Safety Poster (OSHA or State OSHA).
   3. Nondiscrimination Poster.
   4. Equal Employment Opportunity Statement signed by a Company official.
   5. All permits

B. Hoists: CONTRACTOR shall provide temporary hoists to lift building materials and equipment to the intended areas. Hoists shall be capable of carrying the intended load without exceeding the load limitation of the hoisting device.

C. Ongoing Construction Cleanup: Project cleanup shall be an ongoing operation. CONTRACTOR shall maintain an order of neatness and good housekeeping comparable to that maintained by OWNER. Project cleanup applies to the Site and all areas affected by construction operations. CONTRACTOR shall:
   1. Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 degrees F (27 degrees C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.
   2. Maintain dirt and debris resulting from CONTRACTOR's operations in designated spoil piles as approved by ENGINEER or remove from the Site daily. Dirt and debris shall not collect or interfere with OWNER's facility operations. Excess dirt and debris shall be removed from the Site as needed to confine spoil piles in designated areas.
   3. Perform general cleanup inside of OWNER's buildings at least once every two weeks. Cleanup shall include consolidation of stored materials, removal of waste material and debris, and sweeping of flooring surfaces.
   4. Maintain clear access to all properties affected by construction activities. Maintain unobstructed access to existing buildings, equipment, safety equipment, and other items requiring OWNER access for facility operation.
   5. Keep tools, equipment, and materials in a neat and orderly arrangement.
   6. Maintain culverts, sewers, and drainage structures by removing sediment and debris from construction operations.
   7. Repair all holes and ruts resulting from construction operations that affect OWNER's use of property with approved material; compact, level, and restore.

D. Storage of Equipment and Material: Pumps and other machinery units shall be stored in weathertight structures provided by CONTRACTOR.
   1. Motors, electrical switchgear, gauges, and other equipment of a delicate nature, as determined by ENGINEER, shall be stored in weathertight warehouses which are maintained at a temperature of at least 60 degrees F.
   2. Structural steel, miscellaneous and cast iron items may be placed in open yard storage, but any such items having attached motors or other machinery units shall have such units well wrapped with waterproof paper or cloth for protection from the weather.
   3. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of ENGINEER.

4. Materials and equipment distributed, stored, and placed upon or near the Site of the Work shall at all times be so disposed as not to interfere with work prosecuted by OWNER or other Contractors in the employment of OWNER or with drainage. Materials and equipment shall not be stored on public streets.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by ENGINEER.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10, "Standard for Portable Fire Extinguishers," and NFPA 241, "Standard for Safeguarding Construction, Alterations and Demolition Operations."
   1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than 1 extinguisher on each floor at or near each usable stairwell.
   2. Store combustible materials in containers in fire-safe locations.
   3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
   4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs, and Lights: Comply with Standards and Code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.

D. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
   1. Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

E. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the Site.

F. Control of Noise: CONTRACTOR shall eliminate noise to as great an extent as possible at all times. Air compressors shall be equipped with silencers, and the exhaust of all gasoline motors and other power equipment shall be provided with mufflers.
   1. CONTRACTOR shall require strict observances of all pertinent ordinances and regulations. Any blasting permitted in such locations shall be done with reduced charges.

3.05 OPERATION, TERMINATION, AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour-day basis where required to achieve indicated results and to avoid possibility of damage.

C. Termination and Removal: Unless ENGINEER requires that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of CONTRACTOR. OWNER reserves the right to take possession of Project identification signs.
   2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period including, but not limited to:
      a. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
      b. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION

SECTION 01 53 40 - PROTECTION of ENVIRONMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Contractor in executing work shall maintain work areas, on-and-off site, free from environmental pollution that would be in violation of federal, state, or local regulations.

1.02 PROTECTION of SEWERS

B. Take adequate measures to prevent impairment of operation of existing sewer system. Prevent construction material, pavement, concrete, earth, or other debris from entering sewer or sewer structure.

1.03 DISPOSAL of EXCESS EXCAVATED and OTHER WASTE MATERIALS

A. Dispose waste material in accordance with federal and state codes, and local zoning ordinances.

B. Unacceptable disposal sites include, but are not limited to, sites within wetland or critical habitat, and sites where disposal will have detrimental effect on surface water or groundwater quality.

C. Make arrangements for disposal subject to submission of proof to engineer that owner(s) of proposed site(s) has valid fill permit issued by appropriate government agency and submission of haul route plan, including map of proposed route(s).

D. Provide watertight conveyance for liquid, semi-liquid, or saturated solids that tend to bleed during transport. Liquid loss from transported materials not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.

1.04 PROTECTION of AIR QUALITY

A. Contain paint aerosols and V.O.C.’s by acceptable work practices.

B. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment used by contractor, and encouraging shutdown of motorized equipment not actually in use.

C. If temporary heating devices are necessary for protection of work, they shall not cause air pollution.

1.05 PROTECTION from FUEL and SOLVENTS

A. All required material must be submitted prior to the precon meeting. No equipment may be delivered to the site without approval of submittals.

B. The owner reserves the right to restrict equipment location.

C. Disposal of waste fluids shall be in conformance with federal, state, and local laws and regulations.

1.06 USE of CHEMICALS

A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of U.S. EPA, U.S. Department of Agriculture, state, or other applicable regulatory agency.

B. Use of such chemicals and disposal of residues shall be in conformance with manufacturer's written instructions and applicable regulatory requirements.

1.07 NOISE CONTROL

A. Conduct operations to cause least annoyance to residents in vicinity of work, and comply with applicable local ordinances.

B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.

C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

D. Route vehicles carrying materials over such streets as will cause least annoyance to public and do not operate on public streets between hours of 6:00 P.M. and 7:00 A.M., or on Saturdays, Sundays, or legal holidays unless approved by owner.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 HAZARDOUS MATERIALS PROJECT PROCEDURES

A. Applicable Regulations:
   1. RCRA, 1976 – Resource Conservation and Recovery Act: This federal statute regulates generation, transportation, treatment, storage and disposal of hazardous wastes nationally.
   2. Act 64, 1979 – Michigan's Hazardous Waste Management Act: This statute regulates generation, transportation, treatment, storage, and disposal of hazardous wastes.
   3. Act 641 as amended 1990 – Michigan's Solid Waste Act: This statute regulates generation, transportation, treatment, storage and disposal of solid wastes.

B. Use the Uniform Hazardous Waste Manifest (shipping paper) to use an off-site hazardous waste disposal facility.

C. Federal, State and local laws and regulations may apply to the storage, handling and disposal of hazardous materials and wastes. The list below includes the regulations which are most frequently encountered:

Topic	Agency and Telephone Number
Small quantity hazardous waste management, including hazardous waste stored in tanks	Hazardous Waste Division, DEQ (517) 373-2730 in Lansing, or District Office Certified County Health Department
Disposal of heavy metals into municipal sanitary sewers	Contact the superintendent of your wastewater treatment plant for permission
Hazard Communication Standards (for chemical in the workplace)	Occupational Health Division, Michigan Department of Consumer and Industrial Services (517) 373-1410
Burning of waste oil and other discharges to the air	Air Quality Division, DEQ (517) 322-1333 in Lansing, or District Office
Local fire prevention regulations and codes (including chemical storage requirements)	Local fire chief or fire marshal

D. Department of Environmental Quality
Hazardous Waste Division
Compliance Section District Offices

Jackson District Office
301 E. Louis Glick Hwy.
Jackson, MI 49201
(517) 780-7690
(517) 780-7855 (fax)

END OF SECTION

SECTION 01 60 00 - GENERAL EQUIPMENT STIPULATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. These General Equipment Stipulations apply, in general, to all equipment provided under other Specification Sections. They shall supplement the detailed equipment specifications, but in cases of conflict the equipment specifications shall govern.

1.02 OPERATION AND MAINTENANCE

A. Refer to Section 01 78 10

1.03 QUALITY ASSURANCE

A. Compliance with OSHA: All equipment provided under this Contract shall meet all the requirements of the Federal and/or State Occupational Safety and Health Acts. Each equipment supplier shall submit to ENGINEER certification that the equipment furnished is in compliance with OSHA.

B. Electrical Codes, Ordinances, and Industrial Standards: The design, testing, assembly, and methods of installation of the wiring materials, electrical equipment and accessories proposed under this Contract shall conform to the National Electrical Code and to applicable State and local requirements. UL listing and labeling shall be adhered to under this Contract. Any equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that the equipment furnished has been manufactured in accordance with the National Electrical Code and OSHA requirements. Any additional cost resulting from any deviation from codes or local requirements shall be borne by CONTRACTOR.

1.04 SHIPPING AND HANDLING EQUIPMENT

A. All equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment and handling.

1.05 SPARE MATERIALS

A. All V-belt driven equipment shall be furnished with a complete set of spare belts per each piece of equipment. When two or more similar pieces of equipment are furnished, replacement belt assemblies shall be furnished for every other drive assembly.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Anchor Bolts: Anchor bolts, nuts, and washers shall be hot-dipped galvanized in conformity with ASTM A 385 and be supplied with sleeves.

B. Shop Painting:
   1. Non-submerged Applications: Tnemec Series 37H, Chem-Prime.
   2. Submerged, Non-potable Applications: Tnemec Series 66, Hi-Build Epoxoline.
   3. Submerged, Potable Applications: Tnemec Series 139, Pota-Pox II.
   4. Rust preventive compound shall be:
      a. Dearborn Chemical, No-Ox-ID2W.
      b. Houghton, Rust Veto 344.
      c. Rust-Oleum R-9.

2.02 MANUFACTURED UNITS

A. Wall and Slab Sleeves and Castings: Where water- or gas-tightness is essential and at other locations where indicated, wall castings and sleeves shall be provided with an intermediate flange located approximately at the center of the wall or slab.
   1. All sleeves and casting shall be flush with walls and underside of slabs but shall extend 2 inches above finished floors.

2.03 COMPONENTS

A. Lubrication: Equipment shall be adequately lubricated by systems which require attention no more often than weekly during continuous operation. Lubrication system shall not require attention during start-up or shutdown and shall not waste lubricants.
   1. Lubrication point shall be easily accessible with all points of application provided with standard fittings for greasing or placing oil.
   2. Lubricants of the type recommended by the equipment manufacturer shall be provided in sufficient quantity for all consumption prior to completion of required testing and acceptance of equipment by OWNER.

B. Safety Guards: All belt or chain drives, fan blades, couplings, vertical or horizontal drive shafts, and other moving or rotating parts shall be covered on all sides by a safety guard. Safety guards shall be fabricated from 16 gauge or heavier galvanized or aluminum-clad sheet steel or 1/2-inch mesh galvanized expanded metal. Each guard shall be designed for easy installation and removal and painted safety yellow.
   1. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be hot-dipped galvanized.
   2. All safety guards in outdoor locations shall be designed to prevent the entrance of rain and dripping water.

C. Anchor Bolts: All necessary anchor bolts shall be provided as per the manufacturer's recommendations for size, strength, and location and shall meet the requirements of Standard Details on Drawings. Substantial templates and working drawings for installation shall be provided. Two nuts shall be furnished.

1. Unless otherwise shown or specified, anchor bolts for items of equipment mounted on baseplates shall be long enough to permit 1-1/2 inches of grout beneath the baseplate and to provide adequate anchorage into structural concrete.

D. Seals: Mercury seals will not be acceptable.

E. Bearings: All antifriction bearings shall be designed per the Anti-Friction Bearing Manufacturers Association (AFBMA) recommendations with a rating life of B-10, 30,000 hours.

F. Equipment Bases: A cast iron or welded steel baseplate shall be provided for all equipment and motor assemblies. Each baseplate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have a threaded drain connection. Bases shall be fully braced to withstand shock loads and resist buckling. Necessary safety guard mounting shall be provided as part of the equipment base.

G. Motor Starters and Control Panels: Motor starters 480 volt or less shall be size one or larger and have 120 volt AC contactor coils. All control circuits and indicating lights associated with the starter shall be 120 volt. The control transformer shall be sized to have 100 VA minimum spare capacity for future use. A terminal strip shall be provided for all control wires entering the starter with spare terminals for future use. The terminal strip and wires shall be identified. One spare normally open auxiliary starter contact, wired to the terminal strip, shall be provided for future use. Indicating lights shall be 120 volt, oiltight, push-to-test type. Explosion-proof units shall meet NEC Class I, Division I, Group D requirements.
   1. Provide equipment enclosures appropriate for areas in which they are installed. Each area will be designated on Drawings with a type of construction, such as NEMA 4, 4X, 7, or 9 if it is other than NEMA 12. An area designated by a name and elevation includes space bounded by floor, ceiling, and enclosing walls.

2.04 FABRICATION

A. Shop Painting: All iron and steel surfaces shall be protected by suitable paint or coatings applied in the shop or at point of fabrication. Surfaces which will be inaccessible after assembly shall be protected for the life of the equipment.
   1. All iron and steel surfaces which will be totally or partially submerged or located in a continuously or intermittently moist atmosphere during normal operation shall be shop blast cleaned to a near-white finish, removing all dirt, rust-scale, and foreign matter by any of the recommended methods outlined in the Steel Structures Painting Council Specification SP-10.
   2. The cleaned surfaces shall be shop primed before any rust bloom forms. All other exposed surface shall be properly filed, scraped, sanded, etched, brushed, sandblasted, and/or cleaned to provide surfaces free from dirt, loose crystals, rust, scale, oil, and grease and shop primed.
   3. Shop primed surfaces shall be painted with one or more coats of a primer which meets the requirements of this Section and is compatible with the finish painting system specified in Section 09 90 00. Minimum shop coat thickness shall be 1.5 dry mills.

B. Electric motors, speed reducers, starters, pumps, motor control centers, control panels, and other self-contained or enclosed components shall be shop finished with 2 coats of an enamel paint as per manufacturer's recommendations.

C. Where specified, steel and iron surfaces shall be hot-dipped galvanized in conformity with ASTM A 153 and A 385.

D. Machined, polished, and nonferrous surfaces which are not to be painted or galvanized shall be coated with rust preventive compound.

PART 3 - EXECUTION

3.01 EQUIPMENT BASES

A. The baseplate shall be installed on a concrete base. Baseplates shall be anchored to the concrete base with suitable anchor bolts and grouted in place.

3.02 WALL AND SLAB SLEEVES AND CASTINGS

A. Unless otherwise shown on Drawings or specified, at all points where pipes or conduit pass through walls, slabs or roofs, suitable sleeves or castings shall be furnished and installed. Sleeves and castings shall not be painted in areas to be embedded in the concrete. All loose rust, scale, grease, or oil shall be removed prior to pouring the concrete.

B. Unless otherwise shown or approved by ENGINEER, the space between the pipe and the sleeve shall be caulked. All ground buried and water or gas retaining wall or slab sleeves or castings shall be mechanical joint.

3.03 EQUIPMENT INSTALLATION CHECK

A. Refer to Section 01 81 00.

B. Manufacturer's representative shall provide all necessary tools and testing equipment required including noise level and vibration sensing equipment.

3.04 OPERATION AND MAINTENANCE TRAINING

A. Refer to Section 01 82 00.

END OF SECTION

SECTION 01 63 00 - SUBSTITUTION REQUEST APPLICATION

CONTRACTOR: _____ Request Number: _____

_____ Date: _____

_____ Project: _____

_____ _____

To: ENGINEER - Tetra Tech, Inc. Contract: _____

Proposed Substitution: _____

Specification Title: _____ Description: _____

Section: _____ Page: _____ Article/Paragraph: _____

Reason for not providing specified item: _____

_____

SUBSTITUTION IMPACT

Will proposed Substitution affect other portions of the Work: ☐ No ☐ Yes

If yes, provide brief explanation: _____

_____

Will proposed Substitution affect Contract Price: ☐ No ☐ Yes

If yes, provide

Deduct Price: $_____

Add Price: $_____

Will proposed Substitution affect Contract Times: ☐ No ☐ Yes

If yes, provide number of calendar days: _____

CONTACT INFORMATION

Manufacturer: _____

Address: _____

Contact Person: _____ Phone: _____ Fax: _____

Supplier: _____

Address: _____

Contact Person: _____ Phone: _____ Fax: _____

Installer/Subcontractor: _____

Address: _____

Contact Person: _____ Phone: _____ Fax: _____

Similar Installations; attach additional information, if required:

Project: _____ Owner: _____

City: _____ State: _____

Contact Person: _____ Phone: _____ Fax: _____

Date Installed: _____ ENGINEER: _____

Contact Person: _____ Phone: _____ Fax: _____

Address Installed: _____

Project: _____ Owner: _____

City: _____ State: _____

Contact Person: _____ Phone: _____ Fax: _____

Date Installed: _____ ENGINEER: _____

Contact Person: _____ Phone: _____ Fax: _____

Address Installed: _____

Project: _____ Owner: _____

City: _____ State: _____

Contact Person: _____ Phone: _____ Fax: _____

Date Installed: _____ ENGINEER: _____

Contact Person: _____ Phone: _____ Fax: _____

Address Installed: _____

PRODUCT INFORMATION

Brief description of differences between proposed substitution and specified product: _____

_____

_____

Copy of project specification with exceptions noted attached: ☐ Yes ☐ No

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

Warranty same as specified product: ☐ Yes ☐ No

If no, provide proposed warranty period: _____

Closest maintenance service and replacement parts location: _____

_____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Other _____

CONTRACTOR CERTIFICATIONS

The Undersigned Certifies:

1. Proposed substitution has been fully investigated and determined by CONTRACTOR to be equal or superior in all respects to specified product.
2. Cost data provided in this request includes all manufacturer's, supplier's, subcontractor's and CONTRACTOR's costs. CONTRACTOR shall not make further claims for additional Contract Times or Contract Price related to this request if OWNER accepts this substitution.
3. Proposed substitution does not affect dimensions and functional clearances.
4. Changes necessary to building design including, but not limited to, ENGINEER's design, detailing, and construction costs caused by the substitution will be borne by CONTRACTOR.
5. Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

CONTRACTOR: _____

Submitted by: _____ Date _____

Signed by: _____

Title: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: _____ Facsimile: _____

ENGINEER's REVIEW AND RECOMMENDATIONS

☐ Substitution reviewed and recommended for OWNER acceptance.

☐ Substitution reviewed with comments and recommended for OWNER acceptance. See review comments below.

☐ In ENGINEER's opinion, substitution appears not to adequately function and achieve the results of the originally specified product.

☐ ENGINEER recommends CONTRACTOR provide a special performance guarantee as a condition of OWNER acceptance. See review comments below.

☐ Substitution request too late. Use specified products.

☐ CONTRACTOR to make submittals in accordance with Specification Section 01330.

ENGINEER's review comments: _____

_____

_____

Additional review comments attached: ☐ Yes ☐ No

ENGINEER: _____

Recommended by: _____

Title: _____

Date _____

OWNER's REVIEW AND ACTION

☐ Substitution reviewed and accepted by OWNER. CONTRACTOR to make submittals in accordance with Specification Section 01330.

☐ Substitution reviewed with comments and accepted by OWNER. See review comments below. CONTRACTOR to make submittals in accordance with Specification Section 01330.

☐ In accordance with ENGINEER's recommendations, substitution rejected by OWNER.

☐ Substitution rejected by OWNER.

☐ ENGINEER to prepare a Contract Change Order for execution by CONTRACTOR and OWNER to incorporate changes to the Contract Documents.

OWNER's review comments: _____

_____

_____

_____

Additional review comments attached: ☐ Yes ☐ No

OWNER: _____

Accepted by: _____

Title: _____

Date _____

Copy: ☐ OWNER ☐ CONTRACTOR ☐ RPR ☐ CPM ☐ Shop Dwg. File

END OF SECTION

SECTION 01 77 00 - CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements for Contract closeout including, but not limited to:
   1. Warranties and Bonds.
   2. Requirements for Substantial Completion.
   3. Project record document submittal.
   4. Final cleaning.

B. Certifications and other commitments and agreements for continuing services to OWNER are specified elsewhere in the Contract Documents.

1.02 WARRANTY REQUIREMENTS

A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve CONTRACTOR of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with CONTRACTOR.

B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. CONTRACTOR is responsible for the cost of replacing or rebuilding defective Work regardless of whether OWNER has benefited from use of the Work through a portion of its anticipated useful service life.

E. OWNER's Recourse: Written warranties made to OWNER are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which OWNER can enforce such other duties, obligations, rights, or remedies.

F. Rejection of Warranties: OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

G. OWNER reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.03 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections.

B. All wearable items should be supplied to provide at least two years of operation and maintenance.

1.04 SUBSTANTIAL COMPLETION

A. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documents for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Price.
   2. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
   3. Advise OWNER of pending insurance changeover requirements.
   4. Submit specific warranties, workmanship bonds, maintenance agreements, O&M Manuals, final certifications, and similar documents.
   5. Obtain and submit releases enabling OWNER unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates, and similar releases.
   6. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, ENGINEER will either proceed with inspection or advise CONTRACTOR of unfilled requirements.
   1. ENGINEER will prepare the Certificate of Substantial Completion following inspection, or advice CONTRACTOR of construction that must be completed or corrected before the certificate will be issued.
   2. ENGINEER will repeat inspection when requested and assured that the Work has been substantially completed.
   3. Results of the completed inspection will form the basis of requirements for final acceptance.

C. The warranty period for specific portions of the Work will begin on the date established on Component Acceptance Form or at such other date as agreed by OWNER, ENGINEER, and CONTRACTOR.

1.05 FINAL ACCEPTANCE

A. Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   2. Submit an updated final statement, accounting for final additional changes to the Contract Price.
   3. Submit a copy of ENGINEER's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by ENGINEER.
   4. Submit consent of surety to final payment.
   5. Submit a final liquidated damages settlement statement.

6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
7. Submit record drawings, maintenance manuals, final Project photographs, damage or settlement survey, property survey, and similar final record information.
8. Deliver tools, spare parts, extra stock, and similar items.
9. Make final changeover of permanent locks and transmit keys to OWNER. Advise OWNER's personnel of changeover in security provisions.
10. Complete start-up testing of systems, and instruction of OWNER's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
11. Meet all other conditions of the contract.

B. Reinspection Procedure: ENGINEER will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to ENGINEER.
   1. Upon completion of reinspection, ENGINEER will prepare a certificate of final acceptance as shown in the end of this Section, or advise CONTRACTOR of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
   2. If necessary, reinspection will be repeated.

1.06 SUBMITTALS

A. Submit written warranties to ENGINEER prior to the date certified for Substantial Completion. If ENGINEER's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of ENGINEER.

B. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties.

1.07 RECORD DOCUMENT SUBMITTALS

A. Record Drawings:
   1. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown.
   2. Mark whichever Drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   3. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
   4. Mark new information that is important to OWNER, but was not shown on Contract Drawings or Shop Drawings.
   5. Note related Change Order numbers where applicable.
   6. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.

B. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work.

1. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to ENGINEER for OWNER's records.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. General cleaning during construction is required by the General Conditions and included in Section 01 31 00 and 01 50 00.

B. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a municipal facility.

C. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion as shown at the end of this Section.
   1. Remove labels that are not permanent labels.
   2. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances.
   3. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition.
   4. Clean Site, including landscape development areas, of rubbish, litter, accumulated debris, surplus materials of any kind which result from its operation, including construction equipment, tools, sheds, sanitary enclosures, etc., and foreign substances.
   5. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth even-textured surface.
   6. The site of the work shall be rehabilitated or developed in accordance with other sections of the Specifications. In the absence of any portion of these requirements, the CONTRACTOR shall completely rehabilitate the site to a condition and appearance equal or superior to that which existed just prior to construction, except for those items whose permanent removal or relocation was required in the Contract Documents or ordered by the OWNER.

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

E. Comply with regulations of authorities having jurisdiction and safety standards for cleaning.
   1. Do not burn waste materials. Do not bury debris or excess materials on OWNER's property.
   2. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
   3. Remove waste materials from Site and dispose of in a lawful manner.

F. Where extra materials of value remaining after completion of associated Work have become OWNER's property, arrange for disposition of these materials as directed.

END OF SECTION

CERTIFICATE OF SUBSTANTIAL COMPLETION

Contract _____

Contract No. _____

Date Issued: _____

OWNER _____

CONTRACTOR _____

This Certificate of Substantial Completion applies to all Work under the Contract.

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on

_____ _____
DATE OF SUBSTANTIAL COMPLETION

A tentative punch list of items to be completed or corrected is attached hereto as Attachment No. A. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR by _____, _____.

The responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees pending final payment shall be as follows:

OWNER: Shall perform and/or maintain insurances, if any, in accordance with Article 5 of the General Conditions, and allow CONTRACTOR reasonable access to complete or correct items on the tentative list. Additional responsibilities are:

_____

_____

CONTRACTOR: Shall perform and/or maintain Site security, temporary facilities, Bonds and insurances in accordance with Article 5 of the General Conditions, and protect the Work. Additional responsibilities are:

_____

_____

The following documents are attached to and made a part of this Certificate:

Attachment A: Tentative Punch List of Items to be completed prior to Final Payment (Pages 1 to 2, inclusive).

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on _____
Date

_____
_____
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Substantial Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

CERTIFICATE OF FINAL COMPLETION

Contract _____

Contract No. _____

Date Issued: _____

OWNER _____

CONTRACTOR _____

This Certificate of Final Completion applies to all Work under the Contract Documents or to the following specified parts thereof:

The Work to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR and ENGINEER, in accordance with Paragraph 14.06 of the General Conditions, and that Work is hereby declared to be finally complete in accordance with the Contract Documents on

_____
DATE OF FINAL COMPLETION

CONTRACTOR's general warranty and guarantee period commences on ___ __ and terminates on __ ____.

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of CONTRACTOR's obligation to correct defective Work in accordance with the General Conditions of the Contract Documents.

Executed by ENGINEER on _____
Date

_____
ENGINEER

By: _____
(Authorized Signature)

CONTRACTOR accepts this Certificate of Final Completion on _____
Date

_____
CONTRACTOR

By: _____
(Authorized Signature)

END OF SECTION

SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Spare parts and maintenance products.

C. Preventative maintenance instructions

D. Warranties and bonds

1.02 PROJECT RECORD DOCUMENTS

A. Maintain on site one clean, undamaged set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed Shop Drawings, Product Data, and Samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by OWNER.

C. Store record documents separate from documents used for construction.

D. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish floor datum.
   2. Measured horizontal and vertical locations of all underground and exposed utilities and appurtenances, including thrust blocks, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   4. Measured horizontal and vertical locations of all concealed and exposed electrical conduits. Conduits shall be shown in plain view on the record drawings with their size and contents indicated.
   5. Field changes of dimension and detail.
   6. Details not on original Contract drawings.

F. Indicate the date of revisions to the plans in the appropriate box on the plans.

G. Submit documents to ENGINEER prior to Final Application for Payment.

1.03 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections. This may include, but is not limited to the topics in Table 01 78 00-A. When 10% does not yield a whole number, round up to nearest who number of lamps.

B. All wearable items should be supplied to provide at least two years of operation and maintenance.

01 78 00-A, Spare Parts Table

Equipment	**Specification Section**	**Parts**
LED Interior Lighting	26 51 19	10% of total quantity of each type of bulb
LED Exterior Lighting	26 56 19	10% of total quantity of each type of bulb

C. Deliver to project site and place in location as directed; obtain signed receipt from the City prior to final payment.

D. Cover and protect parts from moisture.

E. Crate in containers designed for prolonged storage suitable for handling with hoisting equipment containers: wooded, cardboard, or palletized.

F. Stencil on containers:
   1. Manufacturer/supplier name.
   2. Unit name.
   3. Spare part name.
   4. Manufacturer catalogue number.
   5. Other identifying information.
   6. Precautionary information.

1.04 PREVENTATIVE MAINTENANCE SCHEDULE

A. Submit, in addition to the operation and maintenance data, an equipment maintenance schedule for each piece of equipment. Include the following:
   1. Identity of Equipment.
   2. Routine manufacturer recommended preventative maintenance
      a. Daily
      b. Weekly
      c. Monthly
      d. Quarterly
      e. Semi-Annually
      f. Annually

B. Equipment maintenance schedule shall be in a clear, tabular format and the same format for all equipment. Four (4) copies of each shall be provided.

1.05 WARRANTIES AND BONDS

A. Warranties and bond requirements are covered in the General Conditions except where modified in the technical specifications.

B. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers. All warranties shall begin at the Date of Final Payment, or at the date of acceptance by the OWNER, whichever is later. Table 01 78 00-B is a guide for warranties in this contract but is not intended to replace any warranty requirements listed in individual sections of this project manual.

01 78 00-B, Warranty Table

Equipment	**Specification Section**	**Warranty Length**
LED Interior Lighting	26 51 19	10 years
LED Exterior Lighting	26 56 19	10 years

C. Execute and assemble all transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers into one binder.

D. Verify that documents are in proper form, contain full information, and are notarized. Manufacturer's warranties shall be in the name of the Owner.

E. Provide Table of Contents and assemble in three-ring binders with durable plastic cover.

F. Submit prior to Final Application for Payment.

G. Time of submittals:
   1. Make warranty submittal within ten days after Date of Substantial Completion, prior to Final Application for Payment.
   2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.

H. Rejection of Warranties: OWNER reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 78 10 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Operation and maintenance data/manuals.

1.02 SUBMITTALS

A. Submit operations and maintenance data for all equipment. Submittals shall be in separate binders. One binder will cover all O&M procedures and a second binder will cover preventative maintenance procedures.

B. Quantity Required and Timing of Submittals:
   1. Preliminary Submittal:
      a. Printed Copies: 4 copies, exclusive of copies required by CONTRACTOR.
      b. Electronic Copies: 1 copy.
      c. Submit to ENGINEER by the earlier of: ninety days following approval of Shop Drawings and product data submittals, or thirty days prior to starting training of operations and maintenance personnel, or ten days prior to field quality control testing at the Site.
      d. Furnish preliminary operation and maintenance data submittal in acceptable form and content, as determined by ENGINEER, before associated materials and equipment will be eligible for payment.
   2. Final Submittal: Provide final submittal prior to Substantial Completion, unless submittal is specified as required prior to an interim Milestone.
      a. Printed Copies: 4 copies.
      b. Electronic Copies (Searchable PDF): 2 copies

1.03 OPERATION AND MAINTENANCE DATA/MANUALS

A. Binding and Cover:
   1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy as required. Binders shall be minimum one-inch wide and maximum of three-inch wide. Binders for each copy of each volume shall be identical.
   2. Binders shall be locking three-ring/”D”-ring type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front of each volume.
   3. Do not overfill binders.
   4. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
   5. Provide the following information on cover of each volume:
      a. Title: “OPERATING AND MAINTENANCE INSTRUCTIONS”.
      b. Name or type of material or equipment covered in the manual.
      c. Volume number, if more than one volume is required, listed as “Volume __ of

__", with appropriate volume-designating numbers filled in.

d. Name of Project and, if applicable, Contract name and number.

e. Name of building or structure, as applicable.

f. Names and contact information of Engineer, General Contractor and Major Subcontractors.

6. Provide the following information on spine of each volume:
   a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS".
   b. Name or type of material or equipment covered in the manual.
   c. Volume number, if more than one volume is required, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.
   d. Project name and building or structure name.
7. The manuals' cover sheets and spines shall all be matching. The CONTRACTOR shall prepare a template for use by the various subcontractors.

B. Pages:
1. Print pages in manual on 30-pound (minimum) paper, 8.5 inches by 11 inches in size.
2. Provide each page with binding margin at least one inch wide. Punch each page with holes suitable for the associated binding.

C. Drawings:
1. Bind into the manual drawings, diagrams, and illustrations up to and including 11 inches by 17 inches in size, with reinforcing specified for pages.
2. Documents larger than 11 inches by 17 inches shall be folded and inserted into clear plastic pockets bound into the manual. Mark pockets with printed text indicating content and drawing numbers. Include no more than three drawing sheets per pocket.

D. Copy Quality and Document Clarity:
1. Contents shall be original-quality copies. Documents in the manual shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals that contain copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable. Faxed copies are unacceptable.
2. Clearly mark in ink to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished or cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:
1. Table of Contents:
   a. Provide table of contents in each volume of each operations and maintenance manual.
   b. In table of contents and at least once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identification is unacceptable.

2. Use dividers and labeled index tabs between equipment items and between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.
3. Each equipment item shall have an individual cover sheet with the following information:
    a. Name or type of material or equipment.
    b. Manufacturer's name, address, telephone number, fax number, and Internet website address.
    c. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.
    d. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
    e. City Equipment Number if applicable.

1.04 ELECTRONIC REQUIREMENTS

A. Electronic Copies of Operation and Maintenance Manuals:
    1. Each electronic copy shall include all information included in printed copy.
    2. Submit each electronic copy on a separate compact disc (CD), unless another electronic data transfer method or format is acceptable to ENGINEER.
    3. File Format:
        a. The O&M Manuals will be placed into the OWNER's Content Management System. All electronic files shall be compatible with this system.
        b. Files shall be in "portable document format (PDF)". Files shall be entirely electronically searchable and created from the original document. Scanned/Image PDF's will not be accepted.
        c. Submit separate file for each separate document in the printed copy.
        d. Within each file, provide bookmarks for the following:
            1) Each chapter and subsection listed in the printed copy document's table of contents.
            2) Each figure.
            3) Each table.
            4) Each appendix.
    4. Also provide drawings and figures in one of the following formats: ".bmp", ".tif", ".jpg", or ".gif". Submit files in a separate directory on the CD.
    5. Technical drawings will be provided in both AutoDesk DWG format and PDF format.

1.05 CONTENT

A. Submit complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; operating instructions for start-up, normal and emergency conditions; regulation and control; operational troubleshooting; and shutdown. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.

B. Submit written explanations of all safety considerations relating to operation and maintenance procedures.

C. Submit complete, detailed, written preventive maintenance instructions including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
   1. Written explanations with illustrations for each preventive maintenance task such as inspection, adjustment, lubrication, calibration, and cleaning. Include pre-startup checklists for each equipment item and maintenance requirements for long-term shutdowns.
   2. Recommended schedule for each preventive maintenance task.
   3. Lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
   4. Table of alternative lubricants.
   5. Troubleshooting instructions.
   6. List of required maintenance tools and equipment.

D. Complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
   1. Manufacturer's name, address, telephone number, fax number, and Internet website address.
   2. Manufacturer's local service representative's or local parts supplier's name, address, telephone number, fax number, Internet website address, and e-mail addresses, when applicable.
   3. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
   4. For each part or piece include the following information:
      a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
      b. Part name or description.
      c. Manufacturer's part number.
      d. Quantity of each part used in each assembly.
      e. Current unit price of the part at the time the operations and maintenance manual is submitted. Price list shall be dated.

E. Compete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.

F. Manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.

G. Submit manufacturer's installation and operation bulletins, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where materials pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.

H. Submit original-quality copies of each approved and accepted Shop Drawing, product data, and other submittal, updated to indicate as-installed condition. Reduced drawings are acceptable only if reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.

I. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.

J. Copy of warranty bond and service contract as applicable.

K. When copyrighted material is used in operations and maintenance manuals, obtain copyright holder's written permission to use such material in the operation and maintenance manual.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: General administrative and procedural requirements for instrumentation installations. Administrative and procedural requirements are included in this Section to expand on requirements specified in Division 1.

1.02 SUBMITTALS

A. Shop Drawings: Submit in accordance with Sections 01 33 00, Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product data for each product specified.
   2. Wiring diagrams, both elementary and schematic, differentiating between manufacturer installed and field-installed wiring.
   3. Digital Systems: Provide the following:
      a. Digital equipment layouts of input and output racks showing complete module model number and addressing assignment. Layouts of port pin assignment, connection schematic indicating cable types and port addresses.

B. Record Drawings: At Project closeout, submit record drawings of installed products, in accordance with requirements of Section 01 77 00.
   1. Where Drawings are drafted by computer equipment, CONTRACTOR shall furnish files on a disk. These Drawings shall include changes made by Field Orders, Change Orders, Addenda, and errors discovered during start-up and acceptance.
   2. Drawings shall include terminal numbers at each wiring termination and piping termination. A complete system diagram shall be included.

C. Operation and Maintenance Manuals: Submit in accordance with requirements of Section 01 78 10, operation and maintenance manuals for items included under this Section.
   1. Instructions shall be short, easy-to-understand directions specifically written for this Project describing various possible methods of operating equipment. Instructions shall include procedures for tests required, adjustments to be made, and safety precautions to be taken with equipment. These documents are to be submitted to ENGINEER's office.
   2. Provide 1 complete set of manufacturer's documentation covering programmable equipment supplied. Include hardware manuals and prints as manufacturer normally ships with programmable equipment.
      a. Include complete software manuals for operating system, as well as manuals for any other software. Written instructions for the operations and maintenance of software shall be provided. The instructions shall be short, easy-to-understand directions specifically written for this Project describing various possible methods of operating software.
      b. Include program listings, point/address lists, cross-reference listings, images of screens, data entry forms, and sample reports.
      c. Manuals shall include instructions for program users and instructions for maintenance programmers.

D. Warranty: Submit in accordance with requirements of Section 01 78 00, warranties covering the items included under this Section.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of equipment, of types and sizes required, and whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:
   1. National Electric Code.
   2. Applicable State and local requirements.
   3. UL listing and labeling shall be adhered to.

C. Items covered by this Section are designated as undelivered specifically manufactured equipment for which associated progress payments will be made in accordance with this Specification.

D. Equipment that does not have a UL, FM, CSA, or other listed testing laboratory label shall be furnished with a notarized letter signed by the supplier stating that equipment furnished has been manufactured in accordance with National Electric Code and OSHA requirements.

E. CONTRACTOR shall provide permits and licenses, observe and abide by applicable laws, regulations, ordinances, and rules of State, territory or political subdivision thereof, wherein the Work is done. CONTRACTOR shall pay fees for permits, inspections, licenses, and certifications when such fees are required.

F. To ensure timely performance and conformance with Specifications, Project meetings shall be held at OWNER's facility once every 3 months during course of Project. Cost of such meetings shall be included.

G. Calibration Equipment and Testing Apparatus: Equipment supplier shall have available test and calibration equipment for factory panel tests, installation, start-up, service contract, and maintenance or troubleshooting purposes.
   1. The equipment required for these tests is as follows:
      a. One - Digital Multimeter with an accuracy of plus or minus 0.1 percent.
      b. One - Signal calibrator for analog signals.
      c. One - Set of portable radios capable of operating within buildings at one location and 5 miles outside of buildings in hilly terrain.
      d. One - Programming terminal with software to configure programmable equipment.

H. Component Requirements: For the purposes of uniformity and conformance to industry standards, signal transmission modes shall be either electronic 4-20 mA DC or pneumatic 3-15 psi only. No other signal characteristics are acceptable, except for remote temperature detector (RTD) and thermocouple (TC) sensing circuits; 4-20 mA DC signals shall be such that devices may be wired in parallel for 1-5 volt DC as required. 1-5 volt DC mode shall be employed only within control panel enclosures.

I. Responsibility and Coordination: Drawings and Specifications are intended to include details of a complete equipment installation for purposes specified. CONTRACTOR shall be responsible for details which may be necessary to properly install, adjust, and place in operation complete installation. Any error on Drawings or in Specifications which prevents proper operation of supplied system shall be shown correct at time of Shop Drawing submittal for approval or brought to attention of ENGINEER with or prior to submittal.

J. CONTRACTOR shall be responsible for costs incurred to correct aforementioned errors brought to ENGINEER's attention. CONTRACTOR shall assume full responsibility for additional costs which may result from unauthorized deviations from Specifications.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Manufactured material shall be adequately packed to prevent damage during shipping, handling, storage, and erection. Material shipped to Site shall be packed in a container properly marked for identification. Blocks and padding shall be used to prevent movement.

B. CONTRACTOR shall inspect the material prior to removing it from carrier. If damage is observed, CONTRACTOR shall immediately notify carrier so that a claim can be made. If no such notice is given, material shall be assumed to be in undamaged condition; any subsequent damage that occurs to the equipment shall be the responsibility of CONTRACTOR. Repair and replacement of damaged parts will be done at no expense to OWNER.

C. CONTRACTOR shall be responsible for any damage charges resulting from handling of materials.

PART 2 - PRODUCTS

2.01 EQUIPMENT SUPPLIERS

A. Subject to compliance with specified requirements, equipment suppliers are specified in Sections 26 09 23 Lighting Control Devices, 26 51 19 LED Interior Lighting, and 26 56 19 LED Exterior Lighting.

B. References made in these Specifications to specific manufacturer’s products are intended to serve as a guide to type, construction, and materials. Listing of a manufacturer does not imply acceptance by ENGINEER of a manufacturer's particular product, product line, or latest product revision if it does not meet Specifications.

C. Equipment Supplier: Equipment specified under Sections 26 09 23 through 26 56 19 and shown in the Appendix shall be designed as a system, fabricated or purchased, shipped to Site, and started up by one of the qualified and approved equipment suppliers listed under this Section. Intent is for unit responsibility.
   1. Equipment supplier shall not assign any of its rights or delegate any of its obligations under these Sections without prior written acceptance by ENGINEER.
   2. Direct purchase of any items in these Sections by CONTRACTOR is not in compliance with this Specification and will not be permitted.
   3. When a Service Contract is included, it shall be performed by factory-trained personnel employed by equipment supplier. Equipment supplier shall assign a qualified Engineer employed by the supplier as Project Engineer/Project Manager.
      a. Project Engineer/Project Manager's name shall be forwarded to CONTRACTOR and ENGINEER within 30 days after receipt of a purchase order by equipment supplier.
      b. Project Engineer/Project Manager shall be focal point for design, fabrication, Contract communications, and shall be responsible for start-up and acceptance. Project Engineer/Project Manager shall be at factory test at Site for start-up and at the Site during entire acceptance procedure. Only qualified and approved equipment suppliers shall be accepted as meeting this Specification.

2.02 EQUIPMENT

A. Transmitted electronic signals to equipment of other vendors and between control panels shall be a separate isolated-floating output for each item of equipment and shall conform to ISA Standard S50.1.

B. Enclosures shall be NEMA 1, 4, 4X, or 7 as indicated on Drawings. Intrinsically safe systems, as approved by Factory Mutual, shall be furnished when called for.

C. No external power connections shall be allowed unless specifically called for in Specification. Where an external power source is called for, unit shall accept 120 VAC, plus or minus 10 percent power.

D. Current-to-current converters shall be used as power boosters to provide sufficient signal power as required. It is equipment supplier's responsibility to determine under what circumstances and locations power boosters are required, provide them, and integrate them into the instrumentation system to make system function properly.

E. Separate power supplies shall be totally enclosed with solderless terminals for connections. They shall be short circuit current limiting type that will automatically resume regulation after removal of short circuit. They shall operate from 120 volt AC, plus or minus 10 percent power. Regulated voltage shall be fixed. Units with internal trim potentiometers will be accepted.
   1. Pneumatic instruments shall have an input and output range of 3-15 psig. Units shall require a 20 psi supply. Provide an air set for each pneumatic unit or for each 20 psi manifold. Bubbler air sets, regulators, valves, etc., must be factory assembled on a subplate as specified and detailed.
   2. Instruments shall be panel-mounted or enclosed for wall mounting as shown on Drawings.

F. Size and style of instruments are defined in Specifications. Pneumatic panel-mounted units shall match in appearance similar electronic components.

G. Charts and scales are shown on Drawings. Standard scales shall not be accepted without ENGINEER's approval if it differs from those shown. Ratio station scales and other scales shall be graduated such that major graduations fall on whole numbers (i.e., 1, 2, 3, or 5, 10, 15, etc.) and minor graduations fall on 0.1 or 0.2 intervals (i.e., 1.1, 1.2 or 11, 12, etc.). If two scales are called for on ratio stations, each scale shall be indexed to meet Specification. Drawing of each scale for ratio stations shall be submitted with Shop Drawings for approval.

H. Solid-state output switches, where used, shall be overvoltage transient protected and not be damaged by dI/dT or dv/dt for their design application under this Contract.

I. Instruments shall be equipped with permanently attached identification tag. Tag shall be included on field- and panel-mounted devices. Tags shall include ENGINEER's tag identification and manufacturer's tag identification if different from ENGINEER's.
   1. Tags shall be either stamped metal or laminated phenolic with white letters engraved on a black background. Field-mounted devices shall have tags fastened with screws. Devices mounted in panels will be tagged inside panel on subplates or on device itself where it can be easily read.

J. Finish on instruments and accessories shall provide protection against corrosion by elements in environment in which they are to be installed. Both the interior and exterior of enclosures shall be

finished. Extra paint of each color used on material shall be provided by manufacturer for touch-up purposes.

K. Provide equipment identification nameplates. Nameplates shall contain ENGINEER's item designation and, for indicators and transmitters, design range and units of device shown.

2.03 SOURCE QUALITY CONTROL

A. Control and monitoring system control panels and computer equipment, if any, shall be tested at the factory and witnessed by ENGINEER prior to shipment to Site. ENGINEER shall be given 4 weeks notice before factory test date. Factory test shall include checking for conformity to Specifications, fabrication, and nomenclature. Control and monitoring system logic and terminals shall be checked line by line and function by function in total for conformity of Drawings.

B. Conduct preliminary testing prior to factory checkout by executing programs supplied for this Project. Exercise inputs to test logic for correct function and proper response of outputs. Verify correct interface with programs. Verify correct communications.

C. Factory testing shall be used to validate fieldbus and plant LAN/WAN interconnections. Proper communication between devices and software components shall be demonstrated. Data Collection and Data Management Reporting shall be demonstrated.

D. Equipment supplier shall have test equipment available at the factory. A full set of annotated logic programs and wiring diagrams with the latest revisions shall be made available to ENGINEER at factory for checking purposes. Drawings shall include wire numbers and terminal numbers.

E. Control panels and programmable equipment shall not be shipped to Site until logic conforms to Contract requirements, physical changes required by testing are made, and tags conform to factory test corrections. Equipment delivered to Site without factory test or corrections will be returned to factory at CONTRACTOR’s expense.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment provided under this Section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with detail drawings, specifications, engineering data, instructions, and recommendations of equipment manufacturer as approved by ENGINEER.

B. Install equipment as indicated, in accordance with manufacturer's written instruction, and in compliance with recognized industry practices to ensure that products fulfill requirements.

3.02 FIELD QUALITY CONTROL

A. Installation and Start-up: Equipment supplier shall have an established service facility from which qualified technical service personnel and parts may be dispatched upon call. Such a service facility shall be no more than 6 hours travel time from Site.
   1. Equipment supplier shall provide an experienced, factory-trained, competent, and authorized service representative for a minimum of 3 times at Site, including once during installation and

start-up and once during acceptance to inspect, check, and calibrate any part of system. Supplier's service representative shall revisit Site for 8 hours per day as often as necessary after installation until trouble is corrected and equipment has passed acceptance test and is operating satisfactorily to ENGINEER.

2. Third trip is after equipment has been accepted and shall be used to instruct OWNER's personnel in aspects of operation and maintenance, such as fuse locations, use of controls, instruction manuals, etc. Third trip shall be for duration of two, 8-hour days at OWNER's facility.

B. Equipment supplier shall provide two, 8-hour days of training for OWNER's personnel in aspects of operation and maintenance such as use of controls, fuse locations, instruction manuals, etc.
   1. Training and instructions at the plant shall be given by the Project Engineer assigned to the Project by the equipment supplier or other personnel as approved by ENGINEER.

3.03 DEMONSTRATION

A. Upon completion of installation and calibration, demonstrate functioning of equipment in accordance with requirements. Where possible, correct malfunctioning units at Site, then retest to demonstrate compliance; otherwise, remove and replace with new or repaired units, and retest to demonstrate compliance.

END OF SECTION

SECTION 26 05 26 - GROUNDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes: Electrical grounding and bonding Work as follows:
   1. Solidly grounded.

B. Applications of electrical grounding and bonding Work in this Section:
   1. Underground metal piping.
   2. Underground metal water piping.
   3. Underground metal structures.
   4. Metal building frames.
   5. Electrical power systems.
   6. Grounding electrodes.
   7. Separately derived systems.
   8. Raceways.
   9. Service equipment.
   10. Enclosures.
   11. Equipment.
   12. Lighting standards.
   13. Landscape lighting.
   14. Signs.

1.03 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings covering the items included under this Section. Shop Drawing submittals shall include:
   1. Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.

1.04 QUALITY ASSURANCE

A. Codes and Standards:
   1. UL Compliance: Comply with applicable requirements of UL Standards No. 467, "Electrical Grounding and Bonding Equipment," and No. 869, "Electrical Service Equipment," pertaining to grounding and bonding of systems, circuits, and equipment. In addition, comply with UL Standard 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products which are UL listed and labeled for their intended usage.

2. IEEE Compliance: Comply with applicable requirements and recommended installation practices of IEEE Standards 80, 81, 141, and 142 pertaining to grounding and bonding of systems, circuits, and equipment.

PART 2 - PRODUCTS

2.01 GROUNDING AND BONDING

A. Materials and Components:
   1. Except as otherwise indicated, provide electrical grounding and bonding systems indicated; with assembly of materials including, but not limited to, cables/wires, connectors, solderless lug terminals, grounding electrodes and plate electrodes, bonding jumper braid, surge arresters, and additional accessories needed for complete installation. Where more than one type component product meets indicated requirements, selection is Installer's option. Where materials or components are not indicated, provide products which comply with NEC, UL, and IEEE requirements and with established industry standards for those applications indicated.
   2. Conductors: Electrical copper grounding conductors for grounding system connections that match power supply wiring materials and are sized according to NEC.
   3. Ground Bus: 0.25 inch by 1 inch minimum copper ground bus where indicated.
   4. Service Arrester: 2-pole, 1 phase, 120/240 volts, No. 14 AWG 3-wire including ground, 18-inch leads, with watertight enclosure.
   5. Service Arrester: Electrical service arrester, pellet type, 120/240 volt, 1 phase, 3-wire, for exterior mounting.
   6. Service Arrester: Electrical service arrester, 480 volts, 3-phase, 4-wire, for exterior mounting.
   7. Grounding Electrodes: Steel with copper welded exterior, 3/4-inch diameter by 10 feet.
   8. Electrical Grounding Connection Accessories: Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, bonding straps, as recommended by accessories manufacturers for type services indicated.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS

A. Connect grounding conductors to underground grounding electrodes using exothermic weld process or mechanical compression type connectors.

B. Ground electrical service system neutral at service entrance equipment to grounding electrodes.

C. Ground each separately derived system neutral to effectively grounded metallic water pipe, effectively grounded structural steel member, and separate grounding electrode.

D. Connect together system neutral, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

E. Terminate feeder and branch circuit insulated equipment grounding conductors with grounding lug, bus, or bushing.

F. Connect grounding electrode conductors to 1-inch diameter or greater, metallic cold water pipe using a suitably sized ground clamp. Provide connections to flanged piping at street side of flange.

G. Connect building reinforcing steel, building steel beam, building steel roof and walls and duct bank and vault reinforcing steel to ground mat using No. 4/0 AWG bare copper grounding cable.

H. Bond bare No. 4/0 AWG grounding cable in duct banks to grounding cable in vaults and to power equipment ground bus at ends of each duct bank.

I. Bond strut and other metal inside of electrical manholes and vaults to bare No. 4/0 AWG grounding cable carried in duct bank.

J. Bond grounding cables to both ends of metal conduit or sleeves through which such cables pass.

K. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque-tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with tightening torque values specified in UL 486A to assure permanent and effective grounding.

L. Install braided type bonding jumpers with code-sized ground clamps on water meter piping to electrically bypass water meters.

M. Route grounding connections and conductors to ground and protective devices in shortest and straightest paths as possible while following building lines to minimize transient voltage rises. Protect exposed cables and straps where subject to mechanical damage.

N. Apply corrosion-resistant finish to field connections, buried metallic grounding and bonding products, and places where factory applied protective coatings have been destroyed and are subjected to corrosive action.

END OF SECTION

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Indoor occupancy and vacancy sensors.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Show installation details for the following:
      a. Occupancy sensors.
      b. Vacancy sensors.
   2. Interconnection diagrams showing field-installed wiring.
   3. Include diagrams for power, signal, and control wiring.

1.04 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and elevations, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
   1. Suspended ceiling components.
   2. Structural members to which equipment will be attached.
   3. Items penetrating finished ceiling, including the following:
      a. Luminaires.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
      f. Control modules.

B. Field quality-control reports.

C. Sample Warranty: For manufacturer's warranties.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in operation and maintenance manuals.

B. Software and Firmware Operational Documentation:
   1. Software operating and upgrade manuals.
   2. Program Software Backup: On manufacturer's website. Provide names, versions, and website addresses for locations of installed software.
   3. Device address list.
   4. Printout of software application and graphic screens.

1.06 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace lighting control devices that fail(s) in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Faulty operation of lighting control software.
      b. Faulty operation of lighting control devices.
   2. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 INDOOR OCCUPANCY AND VACANCY SENSORS

A. See Appendix E for rooms that require occupancy sensor replacements as well as quantity needed.

B. See Appendix A for occupancy sensor type and location required in each room. For occupancy sensor detection coverage, see 2.1 E or F dependent on type of sensor.

C. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Acuity Brands Lighting, Inc.

D. General Requirements for Sensors:
   1. Ceiling-mounted, solid-state indoor occupancy sensors.
   2. Ultrasonic and Multi-Technology.
   3. Integrated power pack.
   4. Wireless connection to switch**;** and BAS and lighting control system.
   5. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   6. Operation:
      a. Occupancy Sensor: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off. Timer operations shall match existing. See Appendix A for existing drawings.
   7. Sensor Output: Sensor is powered from the power pack.
   8. Power: Line voltage.
   9. Power Pack: Dry contacts rated for 20-A LED load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.

10. Mounting:
    a. Sensor: Suitable for mounting in position indicated in Appendix A on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
11. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
12. Bypass Switch: Override the "on" function in case of sensor failure.
13. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

E. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. (56 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. (186 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.
5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet (27.4 m) when mounted on a 10-foot- (3-m-) high ceiling in a corridor not wider than 14 feet (4.3 m).

F. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.
1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine lighting control devices before installation. Reject lighting control devices that are wet, moisture damaged, or mold damaged.

B. Examine walls and ceilings for suitable conditions where lighting control devices will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF SENSORS

A. Comply with NECA 1.

B. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

C. Install and aim sensors in locations as indicated in Appendix A. Do not exceed coverage limits specified in manufacturer's written instructions.

3.03 IDENTIFICATION

A. Identify controlled circuits in lighting contactors.

B. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each sensor.

C. Label time switches and contactors with a unique designation.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Lighting control devices will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.05 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting lighting control devices to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
   1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
   2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.
   3. Align high-bay occupancy sensors using manufacturer's laser aiming tool.

3.06 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 260943.16 "Addressable-Luminaire Lighting Controls" and Section 260943.23 "Relay-Based Lighting Controls."

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION

SECTION 26 09 43.23 - RELAY-BASED LIGHTING CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Networked lighting control panels.
   2. Field-mounted signal sources.
   3. Conductors and cables.

1.03 DEFINITIONS

A. BAS: Building automation system.

B. DDC: Direct digital control.

C. IP: Internet protocol.

D. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, relays, manual switches and plates, and conductors and cables.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
   3. Sound data including results of operational tests of central dimming controls.
   4. Operational documentation for software and firmware.

B. Shop Drawings: For each relay panel and related equipment.
   1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
   2. Detail enclosure types and details for types other than NEMA 250, Type 1.
   3. Detail wiring partition configuration, current, and voltage ratings.
   4. Short-circuit current rating of relays.
   5. Address Drawing: Reflected ceiling plan and floor plans, showing connected luminaires, address for each luminaire, and luminaire groups. Base plans on construction plans, using the same legend, symbols, and schedules.

6. Point List and Data Bus Load: Summary list of all control devices, sensors, ballasts, and other loads. Include percentage of rated connected load and device addresses.
7. Wire Termination Diagrams and Schedules: Coordinate nomenclature and presentation with Drawings and block diagram. Differentiate between manufacturer-installed and field-installed wiring.
8. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices.
1. Show interconnecting signal and control wiring, and interface devices that prove compatibility of inputs and outputs.
2. For networked controls, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the network protocol.

B. Qualification Data: For testing agency.

C. Field quality-control reports.

D. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.

E. Sample Warranty: For manufacturer's special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.

B. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: Username and password for manufacturer's support website.
3. Device address list.
4. Printout of software application and graphic screens.
5. Testing and adjusting of panic and emergency power features.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lighting Control Relays: Equal to 10 percent of amount installed, but no fewer than 10.

1.08 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.
   1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle and prepare panels for installation according to NECA 407.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of standalone multipreset modular dimming controls that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Damage from transient voltage surges.
   2. Warranty Period: Cost to repair or replace any parts for two years from date of Substantial Completion.
   3. Extended Warranty Period: Cost of replacement parts (materials only, f.o.b. the nearest shipping point to Project site), for eight years, that failed in service due to transient voltage surges.

PART 2 - PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Sequence of Operations: Input signal from field-mounted manual switches, or digital signal sources, shall open or close one or more lighting control relays in the lighting control panels. Any combination of inputs shall be programmable to any number of control relays.

B. Surge Protective Device: Factory installed as an integral part of control components or field-mounted surge suppressors complying with UL 1449, SPD Type 2.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.

E. Comply with UL 916.

2.02 NETWORKED LIGHTING CONTROL PANELS

A. See Appendix D for existing lighting controller information, further action for the controlling equipment within each room, and bill of materials. See Appendix A for existing drawings.

B. Existing controlling equipment shall be demolished. Do not demolish existing wire, conduit, and raceway.

C. New controlling equipment shall be installed in the same location of existing equipment.

D. Controller shall be reprogrammed to match existing controls.

E. Description: Lighting control panels using mechanically latched relays to control lighting and appliances. The panels shall be capable of being interconnected with digital communications to appear to the operator as a single lighting control system.

F. Lighting Control Panels:
   1. A single enclosure with incoming lighting branch circuits, control circuits, switching relays, and on-board timing and control unit.
   2. A vertical barrier separating branch circuits from control wiring.

G. Main Control Unit: Installed in the main lighting control panel only; powered from the branch circuit of the standard control unit.
   1. Ethernet Communications: Comply with TCP/IP protocol. The main control unit shall provide for programming of all control functions of the main and all networked slave lighting control panels including timing, sequencing, and overriding.
   2. BACnet Communications: Comply with BACnet protocol. The main control unit shall provide for communications and schedule integration with the Owner's Building Management System (BMS) via BACnet.
   3. Web Server: Display information listed below over a standard Web-enabled server for displaying information over a standard browser.
      a. A secure, password-protected login screen for modifying operational parameters, accessible to authorized users via Web page interface.
      b. Panel summary showing the master and slave panels connected to the controller.
      c. Controller diagnostic information.
      d. Show front panel mimic screens for setting up controller parameters, input types, zones, and operating schedules. These mimic screens shall also allow direct breaker control and zone overrides.
   4. Timing Unit:
      a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
      b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
      c. Four independent schedules, each having 24 time periods.
      d. Schedule periods settable to the minute.
      e. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.
      f. 16 special date periods.
   5. Time Synchronization: The timing unit shall be updated not less than every hour(s) with the network time server.
   6. Sequencing Control with Override:
      a. Automatic sequenced on and off switching of selected relays at times set at the timing unit, allowing timed overrides from external switches.
      b. Sequencing control shall operate relays one at a time, completing the operation of all connected relays in not more than 10 seconds.
      c. Override control shall allow any relay connected to it to be switched on or off by a field-deployed manual switch or by an automatic switch, such as an occupancy sensor.
      d. Override control "blinking warning" shall warn occupants approximately five minutes before actuating the off sequence.
      e. Activity log, storing previous relay operation, including the time and cause of the change of status.
      f. Download firmware to the latest version offered by manufacturer.

H. Standard Control Unit, Installed in All Lighting Control Panels: Contain electronic controls for programming the operation of the relays in the control panel, contain the status of relays, and contain communications link to enable the digital functions of the main control unit. Comply with UL 916.
   1. Electronic control for operating and monitoring individual relays, and display relay on-time.
   2. Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation.
   3. Integral keypad and digital-display front panel for local setup, including the following:
      a. Blink notice, time adjustable from software.
      b. Ability to log and display relay on-time.
      c. Capability for accepting downloadable firmware so that the latest production features may be added in the future without replacing the module.

I. Relays:
   1. Electrically operated, mechanically held single-pole switch, rated at 20 A at 277 V. Short-circuit current rating shall be not less than 5 kA. Control shall match existing.

J. Power Supply: NFPA 70, Class 2, UL listed, sized for connected equipment, plus not less than 20 percent spare capacity. Powered from a dedicated branch circuit of the panelboard that supplies power to the line side of the relays, sized to provide control power for the local panel-mounted relays, bus system, low-voltage inputs, field-installed occupancy sensors, and low-voltage photo sensors.

K. Operator Interface: At the main control unit, provide interface for a tethered connection of a portable PC running MS Windows for configuring all networked lighting control panels using setup software designed for the specified operating system. Include one portable device for initial programming of the system and training of Owner's personnel. That device shall remain the property of Owner.

L. Software:
   1. Menu-driven data entry.
   2. Online and offline programming and editing.
   3. Provide for entry of the room or space designation for the load side of each relay.
   4. Monitor and control all relays, showing actual relay state and the name of the automatic actuating control, if any.
   5. Size the software appropriate to the system.

2.03 FIELD-MOUNTED SIGNAL SOURCES

A. Indoor Occupancy Sensors: Comply with Section 26 09 23 "Lighting Control Devices." Control power may be taken from the lighting control panel, and signal shall be compatible with the relays.

2.04 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG.

B. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 AWG.

C. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 AWG.

D. Twisted-Pair Data Cable: Category 5e.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Receive, inspect, handle, and store panels according to NECA 407.

B. Examine panels before installation. Reject panels that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panels for compliance with installation tolerances and other conditions affecting performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF WIRING

A. Comply with NECA 1.

B. Wiring Methods:
1. Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters.
2. Install cables in raceways and cable trays except within consoles, cabinets, desks, counters, accessible ceiling spaces, and gypsum board partitions where unenclosed wiring method may be used.
3. Install conductors and cables concealed in accessible ceilings, walls, and floors where possible.
4. Conceal raceway and cables except in unfinished spaces.
5. Provide plenum-rated cable, where installed exposed or in open cable tray, within environmental airspaces, including plenum ceilings.
6. Comply with requirements for cable trays specified in Section 26 05 36 "Cable Trays for Electrical Systems."
7. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.03 INSTALLATION OF PANELS

A. Comply with NECA 1.

B. Install panels and accessories according to NECA 407.

C. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

D. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

E. Mount panel cabinet plumb and rigid without distortion of box.

F. Install filler plates in unused spaces.

3.04 IDENTIFICATION

A. Create a directory to indicate loads served by each relay; incorporate Owner's final room designations. Obtain approval before installing. Use a PC or typewriter to create directory; handwritten directories are unacceptable.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspection Responsibility:
   1. Owner will engage a qualified testing agency to perform tests and inspections.
   2. Engage a qualified testing agency to perform tests and inspections.
   3. Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
   4. Perform tests and inspections.

B. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers described below. Certify compliance with manufacturer's test parameters.
      a. Circuit-Breaker Tests:
         1) Compare nameplate with Drawings and Specifications.
         2) Inspect physical and mechanical conditions.
         3) Inspect anchorage and alignment.
         4) Verify that the units are clean.
         5) Operate the circuit breaker to ensure smooth operation.
         6) Inspect bolted electrical connections for high resistance using one or more of the following methods:
            a) A low-resistance ohmmeter.
            b) Verify tightness of bolted electrical connections by calibrated torque wrench.
            c) Thermographic survey.
         7) Inspect operating mechanism, contacts, and arc chutes in unsealed units.
         8) Perform insulation resistance tests for one minute on each pole, phase-to-phase, and phase-to-ground with the circuit breaker closed and across each pole using manufacturer's published data.
         9) Perform a contact/pole-resistance test.
         10) Perform insulation-resistance tests on control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be for one minute. Follow manufacturer's written instructions for solid-state units.
         11) Determine long-time pickup and delay by primary current injection.
         12) Determine short-time pickup and delay by primary current injection.
         13) Determine ground-fault pickup and time delay by primary current injection.

14) Determine instantaneous pickup by primary current injection.
15) Test functions of the trip unit by means of secondary injection.
16) Perform minimum pickup voltage tests on shunt trip and close coils according to manufacturer's published data.
17) Verify correct operation of auxiliary features such as trip and pickup indicators, zone interlocking, electrical close and trip operation, trip-free, anti-pump function, and trip unit battery condition. Reset trip logs and indicators.
18) Verify operation of charging mechanism.

b. Surge Arrestor Tests:
1) Compare nameplate with the Contract Documents.
2) Inspect physical and mechanical conditions.
3) Inspect anchorage, alignment, grounding, and clearances.
4) Verify that the units are clean.
5) Inspect bolted electrical connections for high resistance using one or more of the following methods:
a) Low-resistance ohmmeter.
b) Verify tightness of bolted electrical connections by calibrated torque wrench.
6) Verify that the ground lead on each device is individually attached to a ground bus or ground electrode.
7) Perform an insulation-resistance test on each arrestor, phase terminal-to-ground using voltage according to manufacturer written instructions.
8) Comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems" for grounding tests.

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Lighting control panel will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies lighting control panels and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.06 STARTUP SERVICE

A. Perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Confirm correct communications wiring, initiate communications between panels, and program the lighting control system according to approved configuration schedules, time-of-day schedules, and input override assignments.

3.07 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.08 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
   1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.09 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain the control unit and operator interface.

END OF SECTION

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Lighting and appliance branch-circuit panelboards.

1.03 DEFINITIONS

A. ATS: Acceptance testing specification.

B. GFCI: Ground-fault circuit interrupter.

C. GFEP: Ground-fault equipment protection.

D. HID: High-intensity discharge.

E. MCCB: Molded-case circuit breaker.

F. SPD: Surge protective device.

G. VPR: Voltage protection rating.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.
   1. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
   2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.
   1. Include dimensioned plans, elevations, sections, and details.
   2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
   3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
   4. Detail bus configuration, current, and voltage ratings.
   5. Short-circuit current rating of panelboards and overcurrent protective devices.
   6. Include evidence of NRTL listing for series rating of installed devices.
   7. Include evidence of NRTL listing for SPD as installed in panelboard.

8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Key interlock scheme drawing and sequence of operations.
11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NECA 407.

1.10 FIELD CONDITIONS

A. Environmental Limitations:
   1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
   2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
      a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
      b. Altitude: Not exceeding 6600 feet (2000 m).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:
   1. Ambient temperatures within limits specified.
   2. Altitude not exceeding 6600 feet (2000 m).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
   1. Notify Owner no fewer than two days in advance of proposed interruption of electric service.
   2. Do not proceed with interruption of electric service without Owner's written permission.
   3. Comply with NFPA 70E.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
   1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.
   1. SPD Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Flush-mounted, dead-front cabinets.
   1. Rated for environmental conditions at installed location.
      a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
      b. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
      c. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
   2. Height: 84 inches (2.13 m) maximum.
   3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
   4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
   5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
   6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
   7. Finishes:
      a. Panels and Trim: galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
      b. Back Boxes: Galvanized steel.
      c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.

G. Incoming Mains:
   1. Location: Top.
   2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:
   1. Material: Hard-drawn copper, 98 percent conductivity.
      a. Plating shall run entire length of bus.
      b. Bus shall be fully rated the entire length.
   2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
   3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
   4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
   5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.
   6. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled by an NRTL acceptable to authority having jurisdiction, as suitable for nonlinear loads in electronic-grade panelboards and others designated on Drawings. Connectors shall be sized for double-sized or parallel conductors as indicated on Drawings. Do not mount neutral bus in gutter.

7. Split Bus: Vertical buses divided into individual vertical sections.

I. Conductor Connectors: Suitable for use with conductor material and sizes.
   1. Material: Hard-drawn copper, 98 percent conductivity.
   2. Terminations shall allow use of 75 deg C rated conductors without derating.
   3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
   4. Main and Neutral Lugs: Compression type, with a lug on the neutral bar for each pole in the panelboard.
   5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
   6. Feed-Through Lugs: Compression type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
   7. Subfeed (Double) Lugs: Compression type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
   8. Gutter-Tap Lugs: Compression type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.
   9. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
   1. Percentage of Future Space Capacity: 20 percent.

L. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.
   1. Panelboards rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.
   2. Panelboards rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 14,000 A rms symmetrical.

M. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.
   1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 22,000 A rms symmetrical.
   2. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V shall have short-circuit ratings as shown on Drawings, but not less than 22,000 A rms symmetrical.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Provide lighting panels to replace controllable breaker panels in Vehicle Storage Building. Lighting panels shall power all equipment and lighting currently powered by the controllable breaker panels.

B. Lighting panels shall be mounted next to relay panel in existing controllable breaker panel location.

C. See Appendix A for existing drawings and Appendix D for bill of materials.

D. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Eaton.
   2. Siemens Industry, Inc., Energy Management Division.
   3. Square D

E. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

F. Mains: Circuit breaker sized to match existing ratings.

G. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.

H. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.
   1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
   2. External Control-Power Source: 24-V control circuit.

I. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

J. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

K. Column-Type Panelboards: Single row of overcurrent devices.
   1. Doors: Concealed hinges secured with multipoint latch with tumbler lock; keyed alike.

2.04 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.
   1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

D. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
   1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.05 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

B. Receive, inspect, handle, and store panelboards according to NECA 407.

C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces.

Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Comply with NECA 1.

C. Install panelboards and accessories according to NECA 407.

D. Equipment Mounting:
   1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 03 30 00 "Cast-in-Place Concrete."
   2. Attach panelboard to the vertical finished or structural surface behind the panelboard.
   3. Comply with requirements for seismic control devices specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Comply with mounting and anchoring requirements specified in Section 26 05 48.16 "Seismic Controls for Electrical Systems."

G. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

H. Mount panelboard cabinet plumb and rigid without distortion of box.

I. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

J. Mount surface-mounted panelboards to steel slotted supports 5/8 inch (16 mm) in depth. Orient steel slotted supports vertically.

K. Install overcurrent protective devices and controllers not already factory installed.
   1. Set field-adjustable, circuit-breaker trip ranges.
   2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

L. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

M. Install filler plates in unused spaces.

N. Stub four 1-inch (25 mm) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (25 mm) empty conduits into raised floor space or below slab not on grade.

O. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

P. Mount spare fuse cabinet in accessible location.

3.03 IDENTIFICATION

A. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

B. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:
   1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

D. Tests and Inspections:
   1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Do not perform optional tests. Certify compliance with test parameters.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Perform the following infrared scan tests and inspections and prepare reports:
      a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
      b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
      c. Instruments and Equipment:
         1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.
   1. Measure loads during period of normal facility operations.
   2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
   3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
   4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.06 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION

SECTION 26 51 19 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Lighting fixture replacement.
   2. Ballast bypass lamp replacement.
   3. Emergency battery pack replacement.
   4. Materials.
   5. Luminaire support.

B. Related Requirements:
   1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.03 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaires.
   4. Include emergency lighting units, including batteries and chargers.
   5. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
   6. Photometric data and adjustment factors based on laboratory tests complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The

adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.

a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For nonstandard or custom luminaires.
1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires and lamps.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
2. Partitions and millwork that penetrate the ceiling or extend to within 12 inches (300 mm) of the plane of the luminaires.
3. Structural members to which luminaires will be attached.
4. Initial access modules for acoustical tile, including size and locations.
5. Items penetrating finished ceiling, including the following:
a. Other luminaires.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Ceiling-mounted projectors.
6. Moldings.

B. Product Certificates: For each type of luminaire.

C. Product Test Reports: For each type of luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Sample warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
   2. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
   3. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.08 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:
   1. Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
   2. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
   1. Obtain Architect's approval of luminaires in mockups before starting installations.
   2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.10 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Ten year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Ambient Temperature: 41 to 104 deg F (5 to 40 deg C).
   1. Relative Humidity: Zero to 95 percent.

B. Altitude: Sea level to 1000 feet (300 m).

2.02 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   1. Label shall include the following lamp characteristics:
      a. "USE ONLY" and include specific lamp type.
      b. Lamp diameter, shape, size, wattage, and coating.
      c. CCT and CRI.

C. Recessed luminaires shall comply with NEMA LE 4.

D. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

E. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

F. California Title 24 compliant.

2.03 LIGHTING FIXTURE REPLACEMENT

A. Provide an LED equivalent to the existing lights specified for fixture replacement in Appendix B. See Appendix A for existing drawings, Appendix C for number of light fixtures in each room, and Appendix G for the existing lighting fixture schedules for each building.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Acuity Brands Lighting, Inc.
   2. Cooper Lighting Solutions; Signify North America Corp.
   3. Juno Lighting Group by Schneider Electric.

C. Standards:
   1. ENERGY STAR certified.
   2. RoHS compliant.

3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.04 BALLAST BYPASS LAMP REPLACEMENT

A. Provide an LED equivalent lamp to the existing lights specified for lamp replacement in Appendix B. See Appendix A for existing drawings, Appendix C for number of light fixtures in each room, and Appendix G for the existing lighting fixture schedules for each building.

B. The lamp shall bypass the ballast within the existing light. Emergency lights shall bypass the ballast while remaining connected to the battery backup.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. MaxLite
2. Philips Lighting
3. GE Lighting
4. PLT Solutions

D. Standards:
1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.05 EMERGENCY BATTERY PACK REPLACEMENT

A. Replace all emergency battery packs within the facility. See Appendix F for quantity of battery packs to replace per light fixture. See Appendix C for number of light fixtures in each room. Replacement battery packs shall be compatible with new fixture and lamp replacements.

2.06 MATERIALS

A. Metal Parts:
1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Steel:
1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for sheet steel.

C. Stainless Steel:
1. Manufacturer's standard grade.
2. Manufacturer's standard type, ASTM A240/240M.

D. Galvanized Steel: ASTM A653/A653M.

E. Aluminum: ASTM B209.

2.07 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.08 LUMINAIRE SUPPORT

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

C. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.03 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:
   1. Sized and rated for luminaire weight.
   2. Able to maintain luminaire position after cleaning and relamping.
   3. Provide support for luminaire without causing deflection of ceiling or wall.

4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaires:
1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaires:
1. Attached to structural members in walls
2. Do not attach luminaires directly to gypsum board.

3. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
4. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
5. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
6. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

3.04 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.05 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.
1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION

SECTION 26 56 19 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Lighting fixture replacement.
   2. Materials.
   3. Finishes.
   4. Luminaire support components.

B. Related Requirements:
   1. Section 26 09 23 "Lighting Control Devices" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.03 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.
   1. Arrange in order of luminaire designation.
   2. Include data on features, accessories, and finishes.
   3. Include physical description and dimensions of luminaire.
   4. Lamps, include life, output (lumens, CCT, and CRI), and energy-efficiency data.
   5. Photometric data and adjustment factors based on laboratory tests, complying with IES Lighting Measurements Testing and Calculation Guides, of each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project.

a. Manufacturer's Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

6. Wiring diagrams for power, control, and signal wiring.
7. Means of attaching luminaires to supports and indication that the attachment is suitable for components involved.
8. Include plans, elevations, sections, and mounting and attachment details.
9. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
10. Include diagrams for power, signal, and control wiring.

B. Product Schedule: For luminaires and lamps.

C. Delegated-Design Submittal: For luminaire supports.

1.05 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Luminaires.
2. Structural members to which luminaires will be attached.
3. Underground utilities and structures.
4. Existing underground utilities and structures.
5. Above-grade utilities and structures.
6. Existing above-grade utilities and structures.
7. Building features.
8. Vertical and horizontal information.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Product Certificates: For each type of the following:
1. Luminaire.

D. Product Test Reports: For each luminaire, for tests performed by manufacturer and witnessed by a qualified testing agency.

E. Source quality-control reports.

F. Sample warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires to include in operation and maintenance manuals.
1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
   2. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
   3. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
   4. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

1.08 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications:
   1. Luminaire manufacturers' laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
   2. Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products and complying with applicable IES testing standards.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

D. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

E. Mockups: For exterior luminaires, complete with power and control connections.
   1. Obtain Architect's approval of luminaires in mockups before starting installations.
   2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
   3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering prior to shipping.

1.10 FIELD CONDITIONS

A. Verify existing and proposed utility structures prior to the start of work associated with luminaire installation.

B. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.11 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including luminaire support components.
      b. Faulty operation of luminaires and accessories.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   2. Warranty Period: Ten year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp base complying with ANSI C81.61 or IEC 60061-1.

F. Bulb shape complying with ANSI C79.1.

G. CRI matching the existing light.

H. L70 lamp life of 50,000 hours.

I. Lamps dimmable from 100 percent to 0 percent of maximum light output.

J. Internal driver.

K. Nominal Operating Voltage: Matching the existing light.

L. In-line Fusing: On the primary for each luminaire.

M. Lamp Rating: Lamp marked for outdoor use.

N. Source Limitations:
   1. Obtain luminaires from single source from a single manufacturer.

2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.02 LIGHTING FIXTURE REPLACEMENT

A. Provide an LED equivalent to the existing lights specified for fixture replacement in Appendix B. See Appendix A for existing drawings, Appendix C for number of lights fixture in each room, and Appendix G for the existing lighting fixture schedules for each building.

B. Pole mounted lights shall reuse the existing poles.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Acuity Brands Lighting, Inc.
2. Cooper Lighting Solutions; Signify North America Corp.
3. Juno Lighting Group by Schneider Electric.

2.03 BALLAST BYPASS LAMP REPLACEMENT

A. Provide an LED equivalent lamp to the existing lights specified for lamp replacement in Appendix B. See Appendix A for existing drawings, Appendix C for number of light fixtures in each room, and Appendix G for the existing lighting fixture schedules for each building.

B. The lamp shall bypass the ballast within the existing light.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. MaxLite
2. Philips Lighting
3. GE Lighting
4. PLT Solutions

D. Standards:
1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

2.04 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Stainless steel. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:
   1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
   2. Glass: Annealed crystal glass unless otherwise indicated.
   3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
   1. White Surfaces: 85 percent.
   2. Specular Surfaces: 83 percent.
   3. Diffusing Specular Surfaces: 75 percent.

G. Housings:
   1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
   2. Provide filter/breather for enclosed luminaires.

H. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
   1. Label shall include the following lamp characteristics:
      a. "USE ONLY" and include specific lamp type.
      b. Lamp diameter, shape, size, wattage and coating.
      c. CCT and CRI for all luminaires.

2.05 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
   2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
   3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
   4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I,

integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.
a. Color: Chosen to match existing light.

D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
a. Color:
1) As selected from manufacturer's standard catalog of colors.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for luminaire electrical conduit to verify actual locations of conduit connections before luminaire installation.

C. Examine walls, roofs, canopy ceilings and overhang ceilings for suitable conditions where luminaires will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is substantially complete, clean luminaires used for temporary lighting and install new lamps.

3.03 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:
1. Sized and rated for luminaire weight.

2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wall-Mounted Luminaire Support:
1. Attached to structural members in walls.

G. Wiring Method: Install cables in raceways. Conceal raceways and cables.

H. Install luminaires level, plumb, and square with finished grade unless otherwise indicated.

I. Coordinate layout and installation of luminaires with other construction.

J. Adjust luminaires that require field adjustment or aiming.

3.04 INSTALLATION OF BOLLARD LUMINAIRES

A. Align units for optimum directional alignment of light distribution.
1. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 03 30 00 "Cast-in-Place Concrete."

3.05 INSTALLATION OF INDIVIDUAL GROUND-MOUNTED LUMINAIRES

A. Aim as indicated on Drawings.

B. Install on concrete base with top 4 inches (100 mm) above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Section 03 30 00 "Cast-in-Place Concrete."

3.06 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.07 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:
1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

C. Illumination Tests:
   1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
      a. IES LM-5.
      b. IES LM-50.
      c. IES LM-52.
      d. IES LM-64.
      e. IES LM-72.
   2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.

D. Luminaire will be considered defective if it does not pass tests and inspections.

E. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.08 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

3.09 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

   1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
   2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
   3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION

APPENDIX

Appendix A	Existing Lighting Drawings (for reference)
Appendix B	Light Fixture and Lamp Replacement Schedule
Appendix C	Light Fixture and Lamp Replacement Schedule by Room
Appendix D	Lighting Controller Schedule
Appendix E	Occupancy Sensor Replacements
Appendix F	Emergency Battery Replacement Schedule
Appendix G	Existing Lighting Fixture Schedules

Appendix A - Existing Drawings

Vehicle Building Lighting Sequence of Operations

BMS shall communicate to Vehicle Building lighting panels via BACnet TC/IP protocol. BMS shall turn on/off interior and exterior lighting according to a time a day schedule.

REVISION HISTORY			
1	11/28/2007	KJ	AS-BUILT DRAWING

SIEMENS

Siemens Building Technologies
BAU

45470 Commerce Ctr. Dr.
Plymouth Twp., MI. 48170
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PHONE: 734-456-3800
FAX: 866-815-0749

ANN ARBOR MAINTENANCE FACILITY
ANN ARBOR, MI

ENGINEER	DRAFTER	CHECKED BY	INITIAL RELEASE	LAST EDIT DATE
SFM	SFM	WJH	10/27/06	11/28/07

LIGHTING SYSTEM INTERFACE

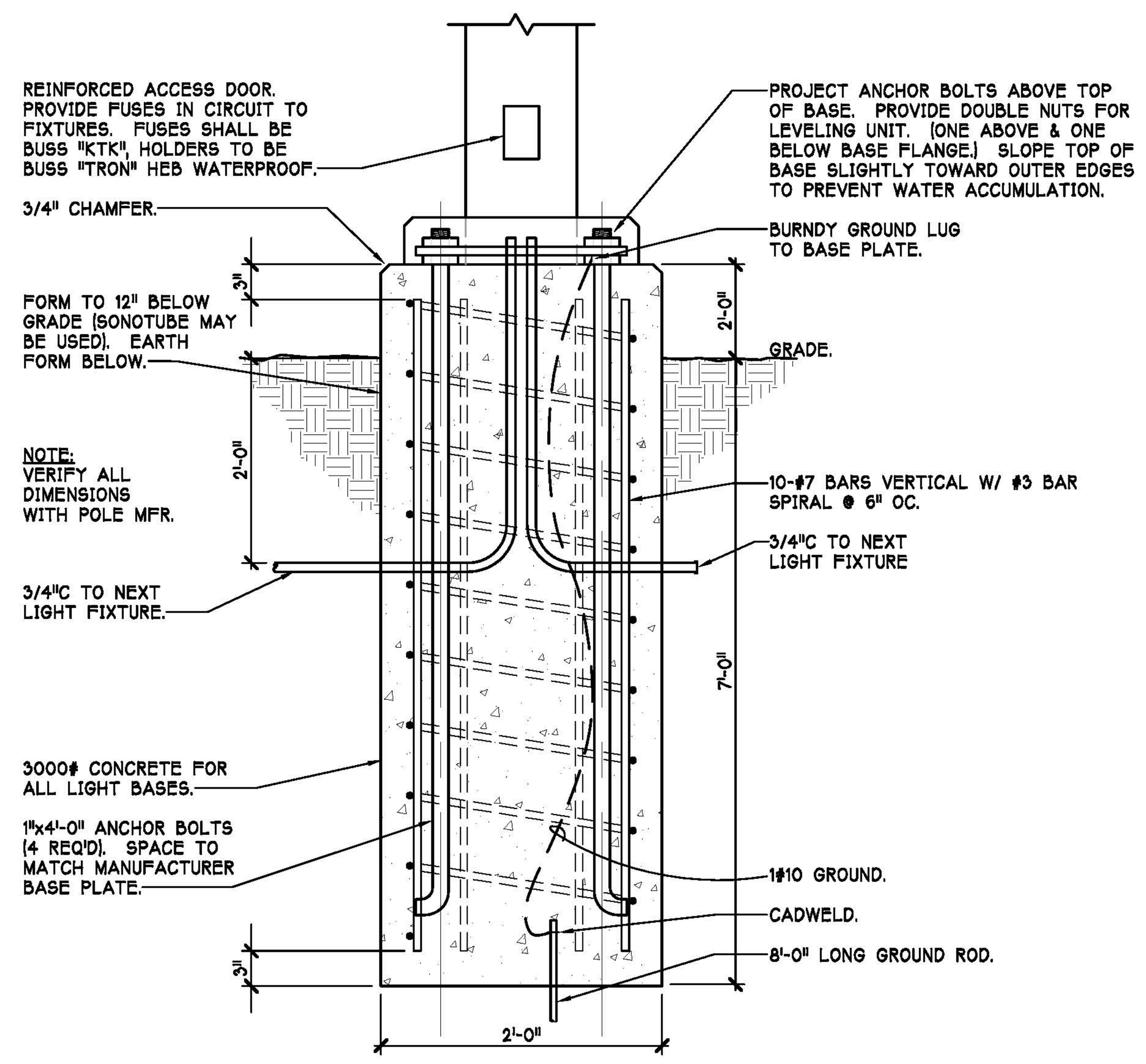
440P-702374
100
1-28A

_stitlb.dwg

SITE LIGHT FIXTURE SCHEDULE

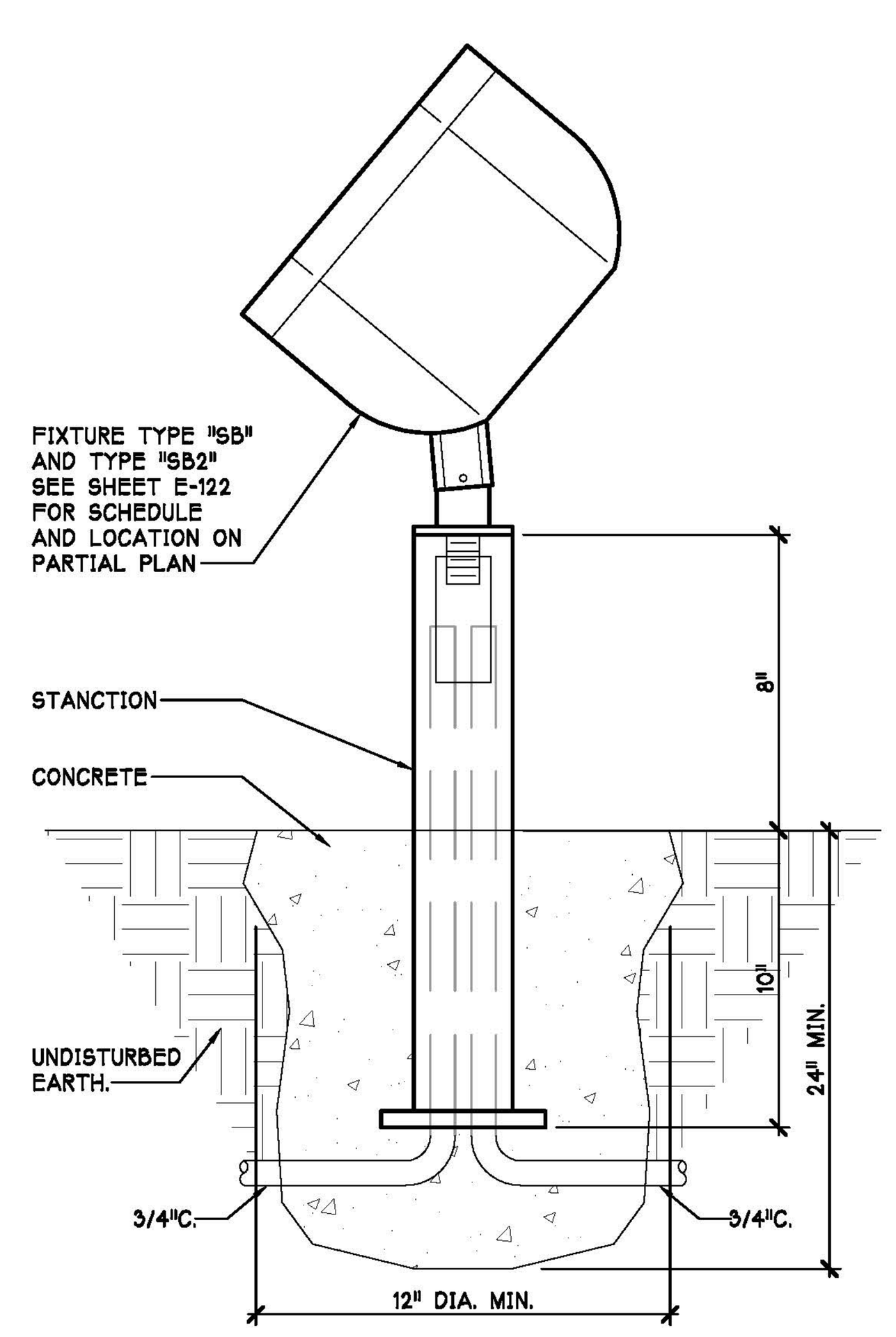
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	VOLTAGE	REMARKS
HA	AREA LIGHT WITH MULTI FACETED SPECULAR/HAMMERTONE REFLECTOR, TYPE III DISTRIBUTION, CLEAR FLAT LENS, SQUARE POLE MOUNTED, SINGLE FIXTURE HEAD	HYDREL OR PRE APPROVED EQUAL	G2XW-150M-480-SR3-SPA	150W ED17 MH	1	HPF	185	480V	14' MOUNTING HEIGHT: 12' POLE ON A 2' BASE
HA2	AREA LIGHT WITH MULTI FACETED SPECULAR/HAMMERTONE REFLECTOR, TYPE III DISTRIBUTION, CLEAR FLAT LENS, SQUARE POLE MOUNTED, TWIN FIXTURE HEAD	HYDREL OR PRE APPROVED EQUAL	G2XW-150M-480-SR3-SPA (TWIN)	150W ED17 MH	2	HPF	370	480V	14' MOUNTING HEIGHT: 12' POLE ON A 2' BASE
HD	AREA LIGHT WITH TYPE 4 DISTRIBUTION, CUTOFF REFLECTOR, HOUSE SIDE SHIELD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R4 SC	400W ED28 MH	1	HPF	462	480V	30' MOUNTING HEIGHT
HD1	AREA LIGHT WITH TYPE 4 DISTRIBUTION, CUTOFF REFLECTOR, HOUSE SIDE SHIELD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R4 SC	400W ED28 MH	1	HPF	462	230V	30' MOUNTING HEIGHT; FURNISH WITH INTEGRAL PHOTOCELL
HE	AREA LIGHT WITH TYPE 3 DISTRIBUTION, SHORT CUTOFF REFLECTOR, HOUSE SIDE SHIELD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R3 HS	400W ED28 MH	1	HPF	462	480V	30' MOUNTING HEIGHT
HG	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S	400W ED28 MH	1	HPF	462	480V	30' MOUNTING HEIGHT
HG2	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, TWO FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (TWIN)	400W ED28 MH	2	HPF	924	480V	30' MOUNTING HEIGHT
HG3	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, THREE FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (TRIPLE)	400W ED28 MH	3	HPF	1386	480V	30' MOUNTING HEIGHT
HG4	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, FOUR FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (QUAD)	400W ED28 MH	4	HPF	1848	480V	30' MOUNTING HEIGHT

NOTE: VERIFY ALL FIXTURE AND POLE COLOR SELECTIONS WITH ARCHITECT.



POLE BASE DETAIL

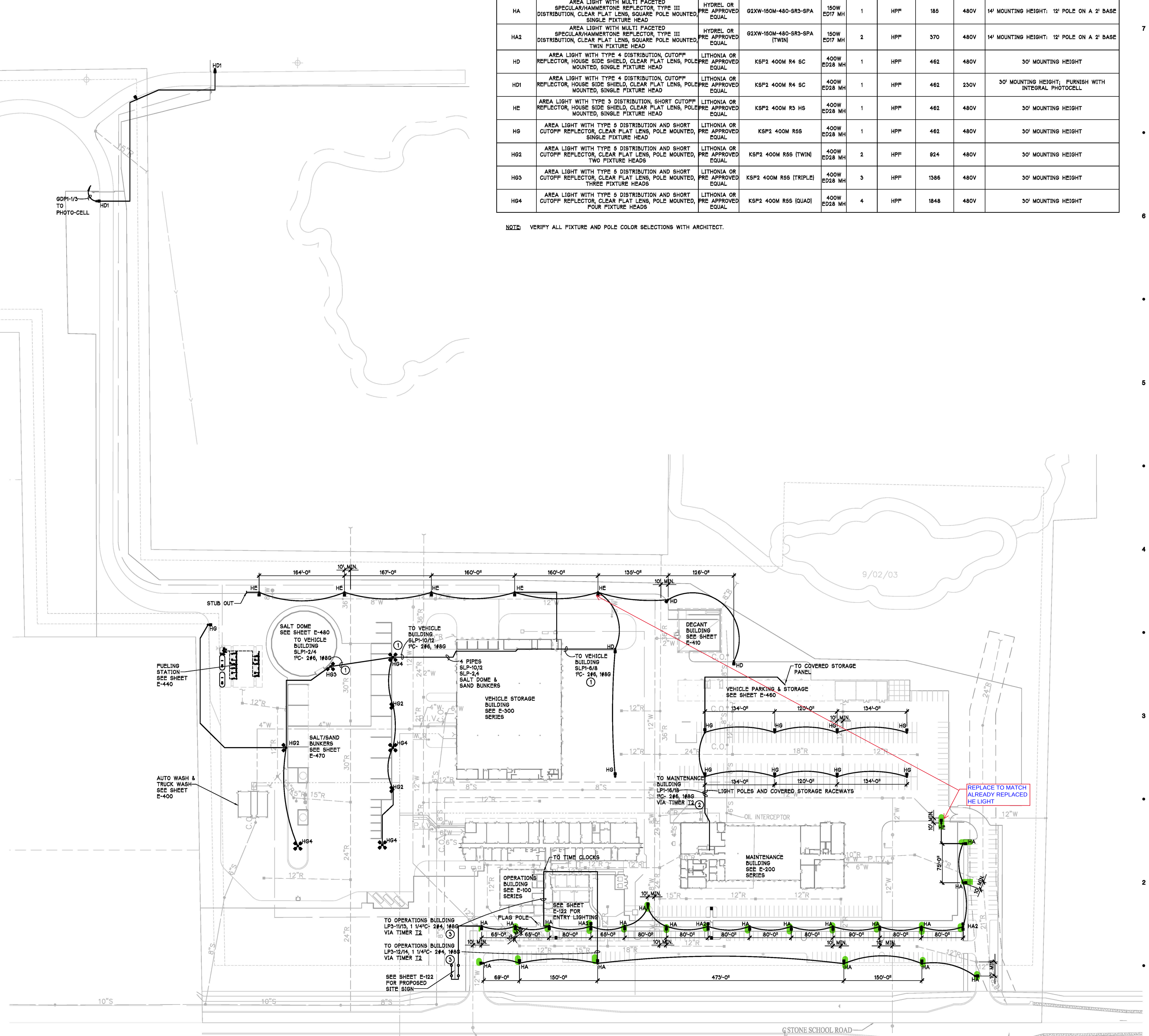
NOT TO SCALE



SITE SIGN, BUILDING AND FLAG POLE LIGHT DETAIL

NOT TO SCALE

TYPICAL OF 2 @ FLAG POLE, 4 @ SIGN & 7 @ BUILDING



NORTH

ELECTRICAL SITE PLAN - LIGHTING

SCALE - 1" = 80'-0"

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

AS BUILTS	9-10-2008
PROPOSAL REQUEST 12	2-6-2007
PROPOSAL REQUEST 3	6-2-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

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CITY OF ANN ARBOR
OPERATIONS AND
MAINTENANCE FACILITY
STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

ELECTRICAL SITE PLAN LIGHTING

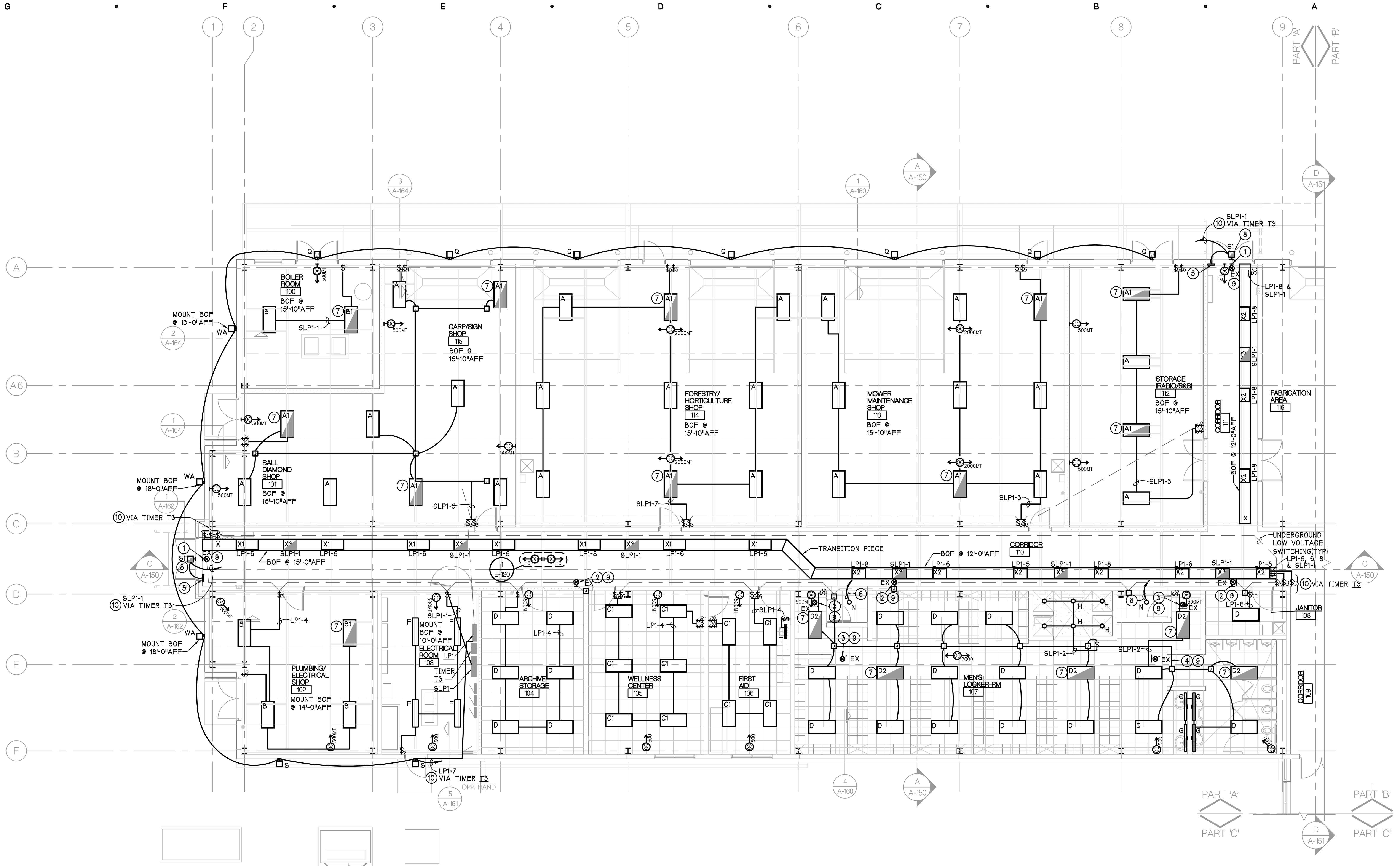
SHEET TITLE

05-309

PROJECT NUMBER

E-010

SHEET NUMBER



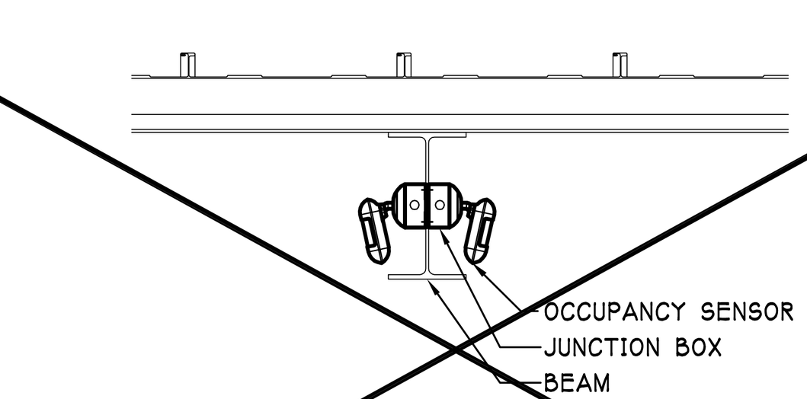
NORTH

OPERATIONS BUILDING LIGHTING FLOOR PLAN - PART 'A'

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

OPERATIONS PART C TIMER 1/2								(ELECTRICAL ROOM 134)
CONTACT	LV SW	BMS CONT.	TIME CONT.	OCC. CONT.	PHOTO-CELL	LTG PNL	CKT	DESCRIPTION
T1-1	$L	BMS 1	X		X	LP3	7	OFFICE 135 TYPE "R1"
T1-2	$H	BMS 1	X			LP3	7	OFFICE 135 TYPE "K1"
T1-3	$G	BMS 1	X	X		LP3	8	OFFICE 135 TYPE "J"
T1-4	$K	BMS 1	X	X		LP3	5	OFFICE 135 TYPE "E" & "E2"
T1-5	$J	BMS 1	X	X		LP3	2	OFFICE 135 TYPE "E" & "E2"
T1-6	$N	BMS 1	X		X	LP3	7	OFFICE 135 TYPE "R"
T1-7	$M	BMS 1	X		X	LP3	7	OFFICE 135 TYPE "R"
T1-8	$P	BMS 1	X		X	LP3	7	OFFICES 151, 159, 152 TYPE "R2"
T1-9								
T1-10								
T1-11								
T1-12								
T1-13								
T1-14								
T1-15								
T1-16								
T2-1		BMS 2	X		X	LP3	15	GROUND SIGN LIGHTS
T2-2							17	TYPE "SF"
T2-3		BMS 2	X		X	LP3	9	FLAG LIGHTS TYPE "SB"
T2-4		BMS 2	X		X	LP3	9	FRONT SITE LIGHTS TYPE "SD"
T2-5		BMS 2	X		X	DP	7	FRONT SITE LIGHTS TYPE "SC"
T2-6		BMS 2	X		X	LP3	9	FRONT SITE LIGHTS TYPE "SE"
T2-7		BMS 2	X		X	LP3	15	FRONT FLOODS LIGHTS
T2-8							17	TYPE "SG"
T2-9		BMS 2	X		X	LP3	9	FRONT ENTRANCE LIGHTS TYPE "U"
T2-10								
T2-11								
T2-12		BMS 2	X		X	LP3	2	EXTERIOR EGRESS FIXTURES TYPE "S1"
T2-13		BMS 2	X		X	LP3	11	OPERATIONS BUILDING
T2-14							13	FRONT WALK "HA" SITE POLES
T2-15		BMS 2	X		X	LP3	12	WEST SIDE OPERATIONS BUILDING
T2-16							14	PARKING "HA" SITE POLES

BMS 1. INPUT : SWEEP INTERIOR LIGHTS ON / OFF
BMS 2. INPUT : SWEEP EXTERIOR LIGHTS ON / OFF



1 / E-120 OCCUPANCY SENSOR MOUNTING DETAIL

SCALE - NONE

EL16LD01

OPERATIONS PART A TIMER 3								(ELECTRICAL ROOM 103)
CONTACT	LV SW	BMS CONT.	TIME CONT.	OCC. CONT.	PHOTO-CELL	LTG PNL	CKT	DESCRIPTION
1		BMS 2	X		X	SLP1	1	EXTERIOR EGRESS FIXTURES TYPE "S1"
2		BMS 2	X		X	LP1	1	PART A BLDG LTG "Q", "S" & "WA"
3				X		SLP1	1	CORRIDOR TYPE "X3" FIXTURES
4	$A	BMS 1	X			LP1	5	CORRIDOR TYPE "X1" & "X2" FIXTURES
5	$B	BMS 1	X			LP1	6	CORRIDOR TYPE "X1" & "X2" FIXTURES
6	$C	BMS 1	X			LP1	8	CORRIDOR TYPE "X1" & "X2" FIXTURES
7								
8								

BMS 1. INPUT : SWEEP INTERIOR LIGHTS ON / OFF
BMS 2. INPUT : SWEEP EXTERIOR LIGHTS ON / OFF

PLAN NOTES:

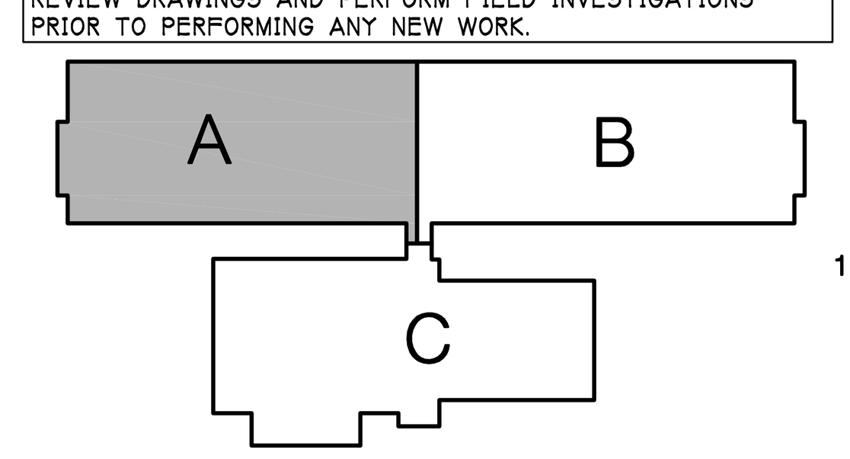
1. SINGLE FACE WALL MOUNT EXIT LIGHT @ 94"AFF (100" AT END OF MAIN CORRIDOR IN SHOP AREA) TO CENTER OF FIXTURE, MOUNT ON WALL AOVE DOOR.
2. DOUBLE FACE WALL END MOUNT EXIT LIGHT @ 120"AFF TO BOTTOM OF JUNCTION BOX.
3. SINGLE FACE CEILING MOUNT EXIT LIGHT.
4. DOUBLE FACE CEILING MOUNT EXIT LIGHT.
5. MOUNT EMERGENCY BALLAST ABOVE DOOR . VERIFY LOCATION WITH ARCHITECT. CABLE LENGTH BETWEEN BALLAST AND LIGHT FIXTURE NOT TO EXCEED MANUFACTURERS RECOMMENDATIONS.
6. CONNECT TO LIGHT CIRCUIT LP1-5 VIA CORRIDOR 110 LIGHT SWITCH.
7. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
8. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-031.
9. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXTURES IN THE SAME SPACE.
10. REFER TO TIMER T3 SCHEDULE THIS SHEET.

OCCUPANCY SENSOR LEGEND

$OC	PASSIVE INFRARED WALL SWITCH WITH ADAPTABILITY
OC HB	WALL MOUNTED HIGH BAY PASSIVE INFRARED
OC LR	WALL MOUNTED LONG RANGE PASSIVE INFRARED
OC 450	CEILING MOUNTED ULTRASONIC, 450 SQ. FT.
OC 450PIR	CEILING MOUNTED PASSIVE INFRARED, 450 SQ. FT.
OC 450MT	CEILING MOUNTED MULTI-TECHNOLOGY, 450 SQ. FT.
OC 500MT	WALL MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 500	CEILING MOUNTED ULTRASONIC, 500 SQ. FT.
OC 500MT	CEILING MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 1000	CEILING MOUNTED ULTRASONIC, 1000 SQ. FT.
OC 1000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 1000 SQ. FT.
OC 2000	CEILING MOUNTED ULTRASONIC, 2000 SQ. FT.
OC 2000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 2000 SQ. FT.
OC 1200MT	WALL MOUNTED MULTI-TECHNOLOGY, 1200 SQ. FT.

NOTES:
1. ALL POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED WITH ALL OCCUPANCY SENSORS.
2. ALL OCCUPANCY SENSORS SHALL BE MOUNTED 3'-5' AWAY FROM DIRECT AIR FLOW. VERIFY FINAL LOCATIONS IN FIELD.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

EL00KP10

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
12 PROPOSAL REQUEST 12	2-6-2007
G SUPP. INSTR. 7	9-21-2006
3 PROPOSAL REQUEST 3	6-2-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

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OPERATIONS AND
MAINTENANCE FACILITY
STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS LIGHTING FLOOR PLAN - PART 'A'

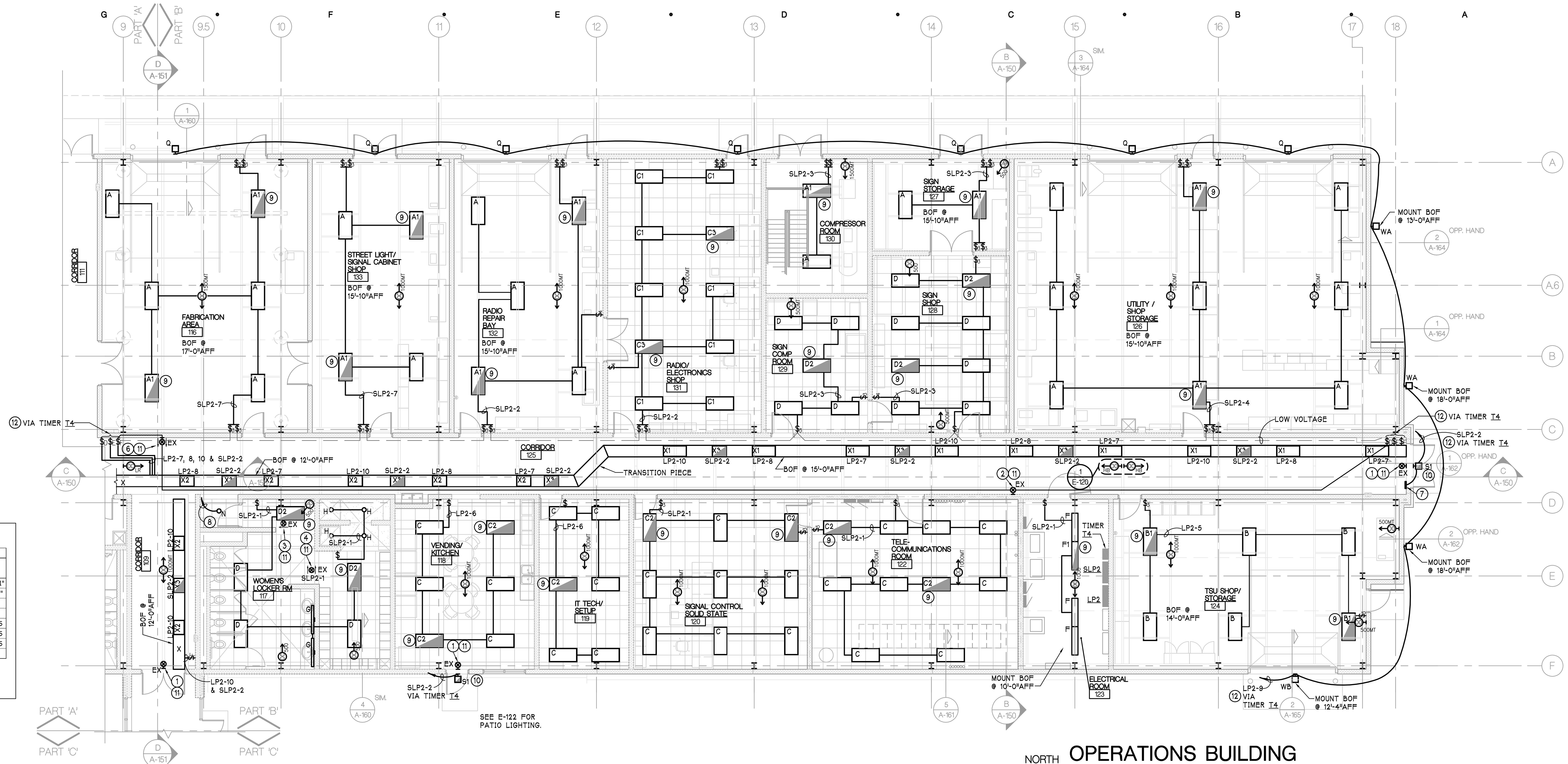
SHEET TITLE

05-309

PROJECT NUMBER

E-120

SHEET NUMBER



OPERATIONS PART B TIMER 4								(ELECTRICAL ROOM 124)
CONTACT	LV SW	BMS CONT.	TIME CONT.	OCC. CONT.	PHOTO-CELL	LTG PNL	CKT	DESCRIPTION
1		BMS 2	X		X	SLP2	2	EXTERIOR EGRESS FIXTURES TYPE "S1"
2		BMS 2	X		X	LP2	9	PART B BLDG LTG "Q", "S" "WA" & "WB"
3		BMS 2	X		X	LP2-12	10	PATIO POLE LIGHTS TYPE "SA"
4	$D			X		SLP2	2	CORRIDOR TYPE "X3" FIXTURES
5	$E	BMS 1	X			LP2	7	CORRIDOR TYPE "X1" & "X2" FIXTURES
6	$F	BMS 1	X			LP2	8	CORRIDOR TYPE "X1" & "X2" FIXTURES
7		BMS 1	X			LP2	10	CORRIDOR TYPE "X1" & "X2" FIXTURES
8								

BMS 1. INPUT : SWEEP INTERIOR LIGHTS ON / OFF
BMS 2. INPUT : SWEEP EXTERIOR LIGHTS ON / OFF

NORTH

OPERATIONS BUILDING LIGHTING FLOOR PLAN - PART 'B'

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

OPERATIONS BUILDING LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A (A1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, UPLIGHT SLOTS, SPREAD BEAM DISTRIBUTION, HIGH POWER FACTOR ELECTRONIC BALLAST	HOLOPHANE, LITHONIA OR PRE APPROVED EQUAL	HBS24-XSWGNU-K46MK32	54W T5HO	6	2	363	3500K	277V	WIRE FOR DUEL LEVEL SWITCHING; MOUNT BOF AS INDICATED ON PLANS USING GRAPPLE HANGERS FROM STRUCTURE; PROVIDE WITH WIRE GUARD; FIXTURE TYPE "A1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
B (B1)	16"x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, UPLIGHT SLOTS, SPREAD BEAM DISTRIBUTION, HIGH POWER FACTOR ELECTRONIC BALLAST	HOLOPHANE, LITHONIA OR PRE APPROVED EQUAL	HBS24-XSWGNU-K44MK22	54W T5HO	4	1	249	3500K	277V	MOUNT BOF AS INDICATED ON PLANS USING GRAPPLE HANGERS FROM STRUCTURE; PROVIDE WITH WIRE GUARD; FIXTURE TYPE "B1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
C (C2)	2'x4' RECESSED PARABOLIC TROFFER, 3" DEEP, 18 CELL LOW IRIDESCENT LOUVERS, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2PM3N G B 332 18LD 277 GEB	32W T8	3	1	86	3500K	277V	FIXTURE TYPE "C2": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
C1 (C3)	2'x4' RECESSED PARABOLIC TROFFER, 3" DEEP, 18 CELL LOW IRIDESCENT LOUVERS, 2 ELECTRONIC BALLASTS	LITHONIA OR APPROVED EQUAL	2PM3N G B 332 18LD 277 2GEB	32W T8	3	2	86	3500K	277V	FIXTURE TYPE "C3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
D (D2)	2'x4' RECESSED GRID TROFFER WITH #12 PATTERN, .125" ACRYLIC DIFFUSER, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2GT8 332 A12125 277 1/3GEB	32W T8	3	1	85	3500K	277V	FIXTURE TYPE "D2": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
D1 (D3)	2'x4' SURFACE MOUNT WRAPAROUND WITH FLAT BOTTOM PRISMATIC DIFFUSER, INJECTED MOLDED LUMINOUS ENDS, WHITE HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	AW 332 277 1/3GEB	32W T8	3	1	85	3500K	277V	FIXTURE TYPE "D3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
E (E2)	4' FIXTURE IN CONTINUOUS RUN (LENGTH AS SHOWN ON FLOOR PLAN) INDIRECT/DIRECT, CABLE MOUNT, SPECULAR LOUVER WITH OPAL INLAY, ELECTRONIC BALLAST	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	SN2545 4 * D0 U C2 (2)	54W T5HO	2	1	110	3500K	277V	USE MOST FEASIBLE FIXTURE CONFIGURATION, AVOIDING 4' LENGTHS; MOUNT BOF AT 12'-0"AFF; * VERIFY COLOR WITH ARCHITECT; FIXTURE TYPE "E2": PROVIDE WITH STANDBY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
E1 (E3)	4' FIXTURE IN CONTINUOUS RUN (LENGTH AS SHOWN ON FLOOR PLAN) INDIRECT/DIRECT, CABLE MOUNT, SPECULAR LOUVER, ELECTRONIC BALLAST	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	SN2328 4 * D U C2 (2)	32W T8	2	1	64	3500K	277V	USE MOST FEASIBLE FIXTURE CONFIGURATION, AVOIDING 4' LENGTHS; MOUNT BOF AT 9'-0"AFF; * VERIFY COLOR WITH ARCHITECT; FIXTURE TYPE "E3": PROVIDE WITH STANDBY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B//E-031)
F (F1)	4' GENERAL PURPOSE INDUSTRIAL WITH STEEL CONSTRUCTION, 5% UPLIGHT, CHAIN HANGER ACCESSORY,, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	EJA 2 54T5HO 277 ES HC36 WGEJ	54W T5HO	2	1	110	3500K	277V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 10'-0"; PROVIDE WITH WIRE GUARD ACCESSORY; FIXTURE TYPE "F1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
G	4' WALL BRACKET WITH HEAVY DUTY GRADE STEEL AND RUST RESISTANCE FINISH, #12 PATTERN ACRYLIC DIFFUSER, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	WC 2 32 A12 277 ES	32W T8	3	2	64	3500K	277V	MOUNT BOF AT 7'-0"AFF
G2	4' WALL MOUNTED FIXTURE WITH METAL END CAPS, EXTRUDED 1/8" THICK CLEAR ACRYLIC DIFFUSER WITH MATTE FINISH, ELECTRONIC BALLAST	VISA LIGHTING OR PRE APPROVED EQUAL	CB6508-1FS54(277)-*-*	54W T5HO	1	1	56	3500K	277V	MOUNT BOF AT 7'-0"AFF, * VERIFY COLOR WITH ARCHITECT
H	7" ROUND COMPACT FLUORESCENT DOWNLIGHT, WET LOCATION APPROVED, VERTICAL LAMP, RECESSED WHITE DOOR, PRISMATIC LENS, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	LGFV 42TRT 7RW T73 277	42W TRT	1	1	42	3500K	277V	
J	4' EXTRUDED ALUMINUM ASYMMETRIC WALL MOUNT UPLIGHT WITH FOIL, SEMI SPECULAR REFLECTORS, ELECTRONIC BALLAST	PEERLESS LIGHTING	LF3FW 3 54T5HO U4 277 GEB10 SCT LP835 *	54W T5HO	3	1	185	3500K	277V	MOUNT BOF AT 10'-10"AFF IN LOBBY & 9'-0" IN RECEPTION; * VERIFY COLOR WITH ARCHITECT
K	12" ϕ SUSPENDED PENDANT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, AIRCRAFT CABLE MOUNTING, TRANSLUCENT ACRYLIC REFLECTOR	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CPAC1 CDTA	42W TT	1	1	47	3500K	277V	MOUNT BOF AT 10'-0"AFF IN REFERENCE LIBRARY AND 12'-0" IN VESTIBULE & LOBBY; VESTIBULE & LOBBY TO HAVE AIRCRAFT CONNECTION ON ANGLE AT JUNCTION BOX WHERE REQUIRED
K1	12" ϕ WALL BRACKET MOUNT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, TRANSLUCENT ACRYLIC REFLECTOR WITH ACRYLIC LENS	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CDWBR CDTA CDTL	42W TT	1	1	47	3500K	277V	MOUNT BOF AT 9'-0"AFF
K2	12" ϕ SUSPENDED PENDANT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, AIRCRAFT CABLE MOUNTING, TRANSLUCENT ACRYLIC REFLECTOR EMERGENCY FIXTURE	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CPAC1 CDTA	42W TT	1	1	47	3500K	277V	MOUNT BOF AT 12'-0" IN VESTIBULE & LOBBY; PROVIDE GUTH #GPCF INVERTER AND MOUNT WHERE SHOWN ON PLAN (SEE PLAN NOTES 9 AND 13 ON E-122); VESTIBULE & LOBBY TO HAVE AIRCRAFT CONNECTION ON ANGLE AT JUNCTION BOX WHERE REQUIRED
L	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, LUTRON DIMMING BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 2/42TRT 8AR 277 DMHL	42W TRT	2	1 DIMMING	95	3500K	277V	
M	8" COMPACT FLUORESCENT OPEN WALL WASH WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, LUTRON DIMMING BALLAST	GOTHAM OR PRE APPROVED EQUAL	AFW 2/42TRT 8AR 277 DMHL	42W TRT	2	1 DIMMING	95	3500K	277V	
N	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 1/42TRT 8AR 277	42W TRT	1	1	42	3500K	277V	
N2 (N3)	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 2/42TRT 8AR 277	42W TRT	2	1	95	3500K	277V	FIXTURE TYPE "N3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
P	LINEAR PENDANT WITH MATTE BIVERGENCE LOUVER, 4% INDIRECT COMPONENT, NATURAL ANODIZED ALUMINUM FINISH HOUSING, ELECTRONIC BALLAST	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	RX5-C1 RX5F 1545 4 277	54W T5HO	1	1	60	3500K	277V	MOUNT BOF AT 7'-0"AFF; PROVIDE COMPLETE WITH ALL TRUNKING COMPONENTS, FEELS AND SUSPENSIONS
Q	METAL HALIDE WALL MOUNT EXTERIOR WITH FORWARD THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 100MH FT 277 *	100W MH	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 14'-0"AFF
R	STANDARD TANDEM DOUBLE-LENGTH STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	TS 1 32 277 GEB SASR48WH	32W T8	2	1	68	3500K	277V	MOUNT IN CONTINUOUS ROWS AS SHOWN ON FLOOR PLAN; 1 LAMP IN CROSS SECTION, 2 PER FIXTURE
R1	STANDARD 4' STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	S 1 32 277 GEB SASR48WH	32W T8	1	1	34	3500K	277V	MOUNT IN SOFFIT SHOWN ON ARCHITECTURAL DETAIL 7/A-165
R2	STANDARD 2' STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	S 1 17 277 GEB SASR24WH	17W T8	1	1	18	3500K	277V	MOUNT IN SOFFIT SHOWN ON ARCHITECTURAL DETAIL 6/A-165
S	COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0° STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	2	1 COLD TEMP.**	84	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"AFF
S1	EMERGENCY COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0° STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	2	1 COLD TEMP.**	84	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"AFF; ** PROVIDE WITH ONE LAMP ON EMERGENCY BALLAST AT EGRESS DOORS INSIDE DOOR ABOVE CEILING TILES OR AS SHOWN ON FLOOR PLAN- REMOTE LITHONIA #PSDL3 (SEE DETAIL 2/E-031)
T	LOW PROFILE, FLUORESCENT UNDER CABINET WITH SOLID FRONT WHITE GLOSS ENAMEL FINISH, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	N2S 17 277 GEB	17W T8	1	1	18	3500K	277V	
U	EXTERIOR WALL MOUNT WITH ALUMINUM ALLOY DIECAST HOUSING, ARM MOUNT UP LIGHT	HYDREL LIGHTING	"G2 EDGE" G2EW-UP-70M -277-SP- -*	70W MH E17	1	1	85	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 7'-0"AFF WITH THE FIXTURES AT THE FRONT ENTRY DOOR AIMING UP
V	8' LINEAR TRUNKING SYSTEM SUSPENDED FROM UNISTRUT WITH 2 RUNS - ONE WITH 2 ARCADE FIXTURES & 2 PROTON FIXTURES AND ONE WITH 4 PROTON FIXTURES, SINGLE CIRCUIT WITH ALL NECESSARY FEEDS, HANGERS, COVERS, HANGERS & CONNECTS FOR OPERATION	ZUMTOBEL/STAFF OR PRE APPROVED EQUAL	STRAIGHT TRACK: 58081-* ARCADE 2': 942-1-24-* PROTON: 974-1-MH070-*	24W T5HO, 70W PAR-30	2, 6	2	2@26 & 6@85	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOTTOM OF TRACK AT 14'-6"AFF; PROVIDE A TOTAL OF 2- 8' TRACKS WITH 2- ARCADE FIXTURES & 6- PROTON FIXTURES- SEE PLAN FOR LAYOUT
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT
WB	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 70M FT 480 *	70W ED17 MH	1	1	95	--	277V	* VERIFY COLOR WITH ARCHITECT
X1 & X2	LIGHT TRUSS 2 LIGHTING SYSTEM, SUSPENDED, WITH 3 LAMPING OPTIONS (X1, X2, X3) AND EXTRUDED 1.5"D ALUMINUM TUBES, PREWIRED AND FACTORY ASSEMBLED, DIE CAST ALUMINUM BULKHEADS AND WIREWAY, SYMMETRIC REFLECTORS WITH CLEAR TEMPERED GLASS LENS	SPI LIGHTING	(X1) 2 LAMP- LFB5601; (X2) 1 LAMP- LFB2601	400W BT28 MH	(X1)2, (X2)1	1 EACH	(X1)916, (X2)458	--	277V	* COLOR YE427; PROVIDE COMPLETE WITH ALL NECESSARY COMPONENTS TO INSTALL FIXTURES AT ELEVATIONS SHOWN ON PLAN IN MOST ECONOMICAL WAY. (LIGHT TRUSS REFERENCE ID #LT120450)
X3	LIGHT TRUSS 2 LIGHTING SYSTEM, SUSPENDED, WITH COMPACT FLUORESCENT LAMPING AND EXTRUDED 1.5"D ALUMINUM TUBES, PREWIRED AND FACTORY ASSEMBLED, DIE CAST ALUMINUM BULKHEADS AND WIREWAY, SYMMETRIC REFLECTORS WITH CLEAR TEMPERED GLASS LENS	SPI LIGHTING	4 LAMP CF- LFL2881 WITH LOUVER	40W TT	4	1 EACH	160	3500K	277V	* COLOR YE427; PROVIDE FIXTURE WITH IOTA BATTERY PACK #I-1-80-DL FOR EMERGENCY LIGHTING; PROVIDE COMPLETE WITH ALL NECESSARY COMPONENTS TO INSTALL FIXTURES AT ELEVATIONS SHOWN ON PLAN IN MOST ECONOMICAL WAY. (LIGHT TRUSS REFERENCE ID #LT120450)
EX	THERMOPLASTIC LED EXIT WITH STENCIL FACE, WHITE HOUSING, SINGLE FACE WITH EXTRA FACE PLATE, LED LETTERS, UNIVERSAL MOUNT, NI-CAD BATTERY	LITHONIA OR PRE APPROVED EQUAL	LQM S W 3 R 120/277 ELN	LED	--	--	.69	--	277V	CONNECT EXIT LIGHTS TO SAME NON-SWITCHED CIRCUIT AS LIGHT FIXTURE IN THE SAME SPACE

PLAN NOTES:

1. SINGLE FACE WALL MOUNT EXIT LIGHT @ 94"AFF TO CENTER OF FIXTURE, MOUNT ON WALL ABOVE DOOR.
2. SINGLE FACE WALL MOUNT EXIT LIGHT @ 120"AFF TO CENTER LINE OF FIXTURE, MOUNT ON SOFFIT WALL.
3. SINGLE FACE CEILING MOUNT EXIT LIGHT.
4. DOUBLE FACE CEILING MOUNT EXIT LIGHT.
5. SINGLE FACE CEILING MOUNT EXIT LIGHT, MOUNT ON BOTTOM OF SOFFIT.
6. DOUBLE FACE END MOUNT EXIT LIGHT @ 120"AFF TO CENTER LINE OF FIXTURE, MOUNT ON WALL BELOW FIXTURE TYPE "J".
7. MOUNT EMERGENCY BALLAST ABOVE DOOR . VERIFY LOCATION WITH ARCHITECT. CABLE LENGTH BETWEEN BALLAST AND LIGHT FIXTURE NOT TO EXCEED MANUFACTURERS RECOMMENDATIONS.
8. CONNECT TO LIGHT CIRCUIT LP2-7 VIA CORRIDOR 125 LIGHT SWITCH.
9. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
10. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-031.
11. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXTURES IN THE SAME SPACE.
12. REFER TO TIMER T4 SCHEDULE THIS SHEET.

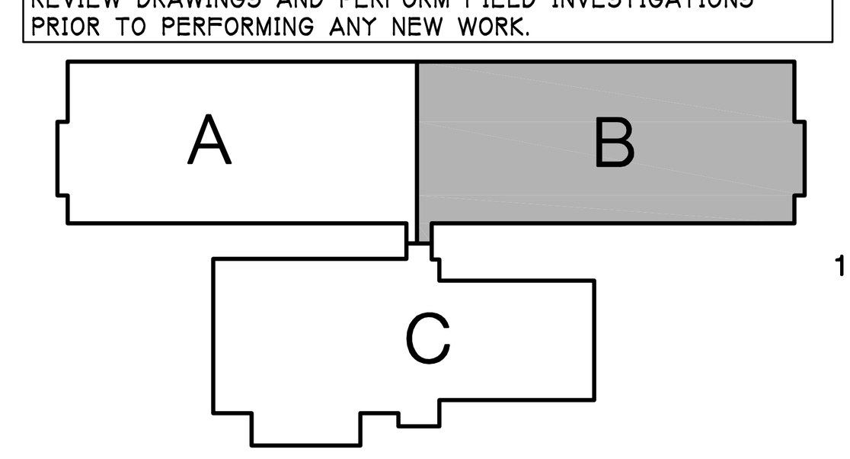
OCCUPANCY SENSOR LEGEND

SYMBOL	DESCRIPTION
$OC	PASSIVE INFRARED WALL SWITCH WITH ADAPTABILITY
OC HB	WALL MOUNTED HIGH BAY PASSIVE INFRARED
OC LR	WALL MOUNTED LONG RANGE PASSIVE INFRARED
OC 450	CEILING MOUNTED ULTRASONIC, 450 SQ. FT.
OC 450PIR	CEILING MOUNTED PASSIVE INFRARED, 450 SQ. FT.
OC 450MT	CEILING MOUNTED MULTI-TECHNOLOGY, 450 SQ. FT.
OC 500MT	WALL MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 500	CEILING MOUNTED ULTRASONIC, 500 SQ. FT.
OC 500MT	CEILING MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 1000	CEILING MOUNTED ULTRASONIC, 1000 SQ. FT.
OC 1000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 1000 SQ. FT.
OC 2000	CEILING MOUNTED ULTRASONIC, 2000 SQ. FT.
OC 2000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 2000 SQ. FT.
OC 1200MT	WALL MOUNTED MULTI-TECHNOLOGY, 1200 SQ. FT.

NOTES:
1. ALL POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED WITH ALL OCCUPANCY SENSORS.
2. ALL OCCUPANCY SENSORS SHALL BE MOUNTED 3'-5' AWAY FROM DIRECT AIR FLOW. VERIFY FINAL LOCATIONS IN FIELD.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.



NORTH

KEY PLAN

SCALE - N.T.S.

	AS BUILTS	9-10-2008
M	SUPP. INSTR. 13	2-6-2007
12	PROPOSAL REQUEST 12	2-6-2007
G	SUPP. INSTR. 7	9-21-2006
	CONTRACT SET	2-6-2006
A	POST ADDENDUM 1	12-15-2005
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

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PROJECT

CONSULTANT

OPERATIONS LIGHTING FLOOR PLAN - PART 'B'

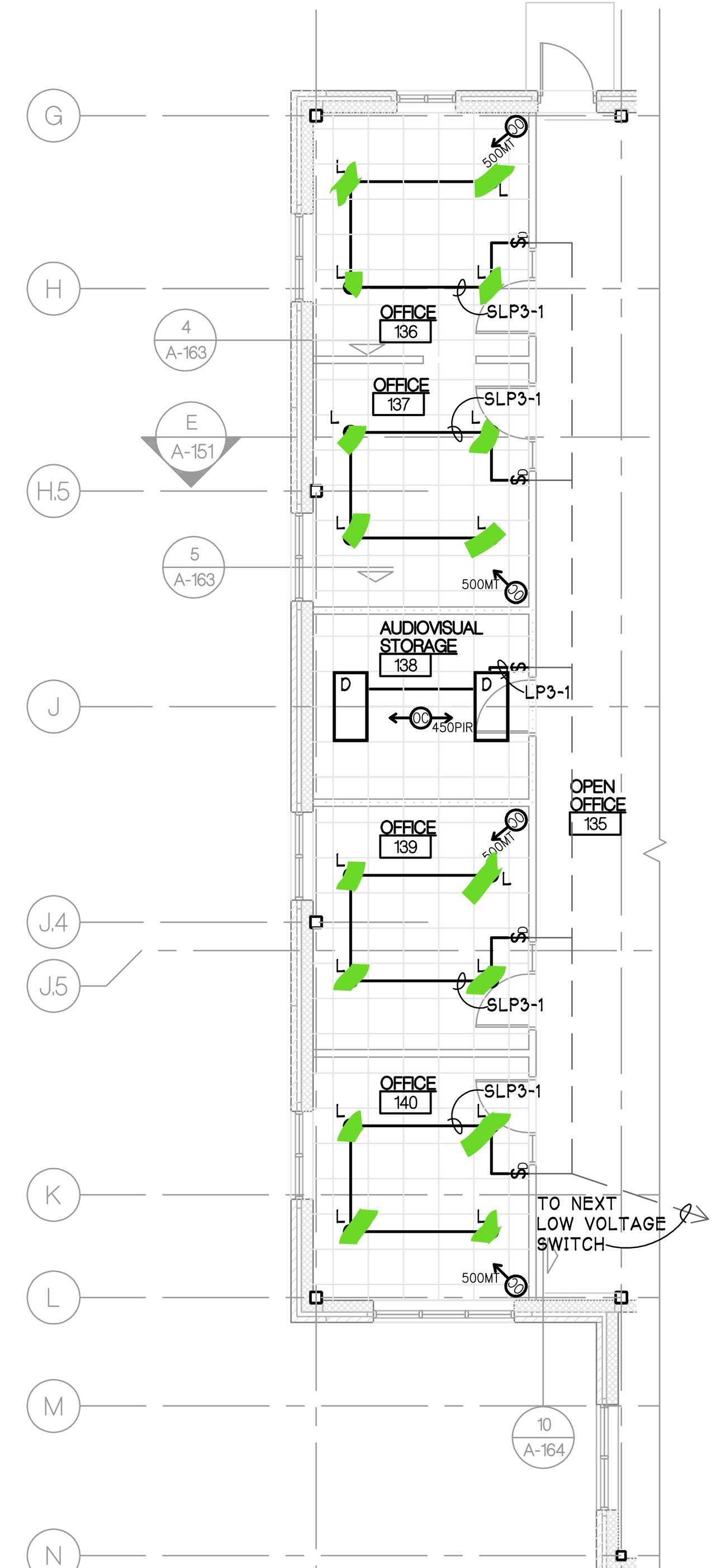
SHEET TITLE

05-309

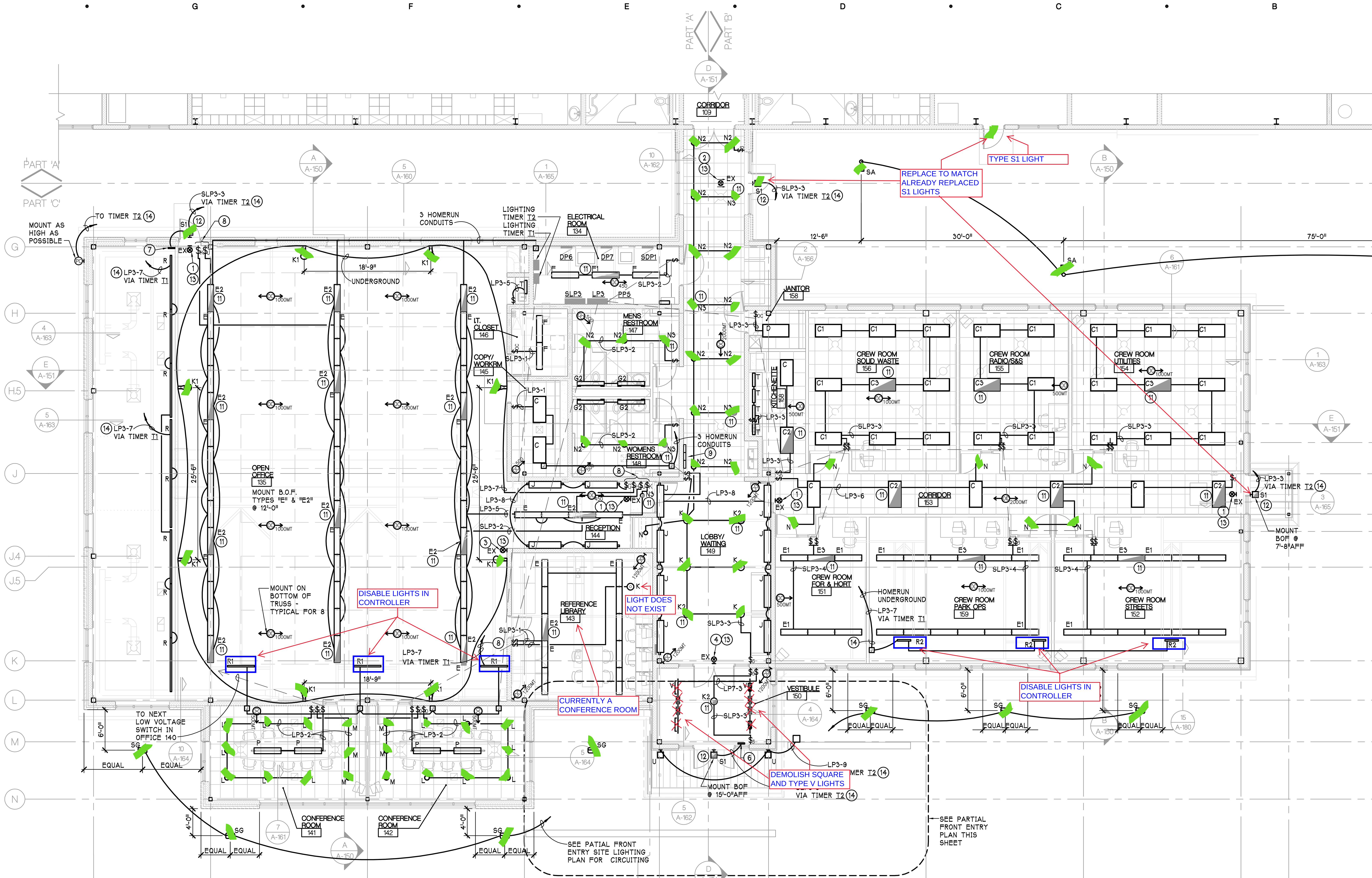
PROJECT NUMBER

E-121

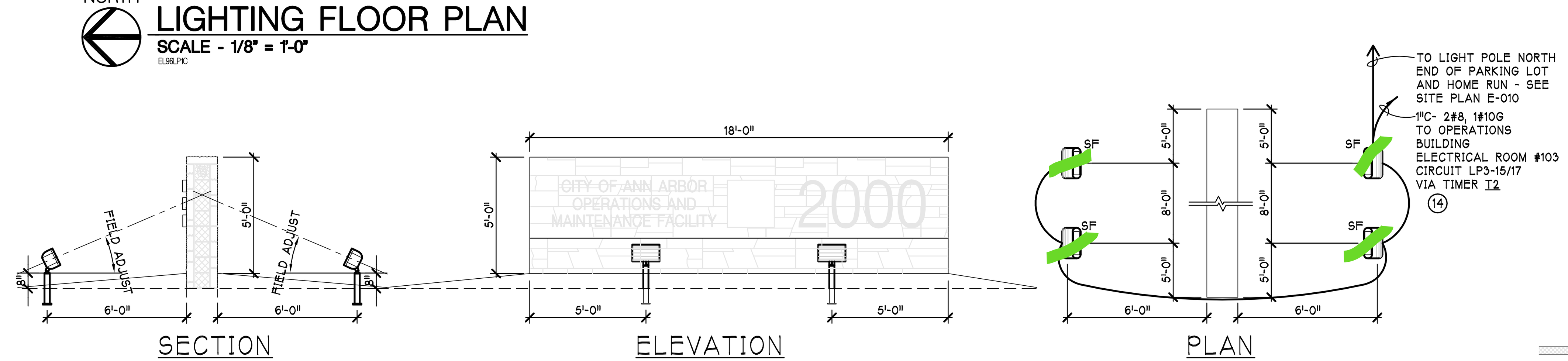
SHEET NUMBER



NORTH
PARTIAL LIGHTING FLOOR PLAN
SCALE - 1/8" = 1'-0"



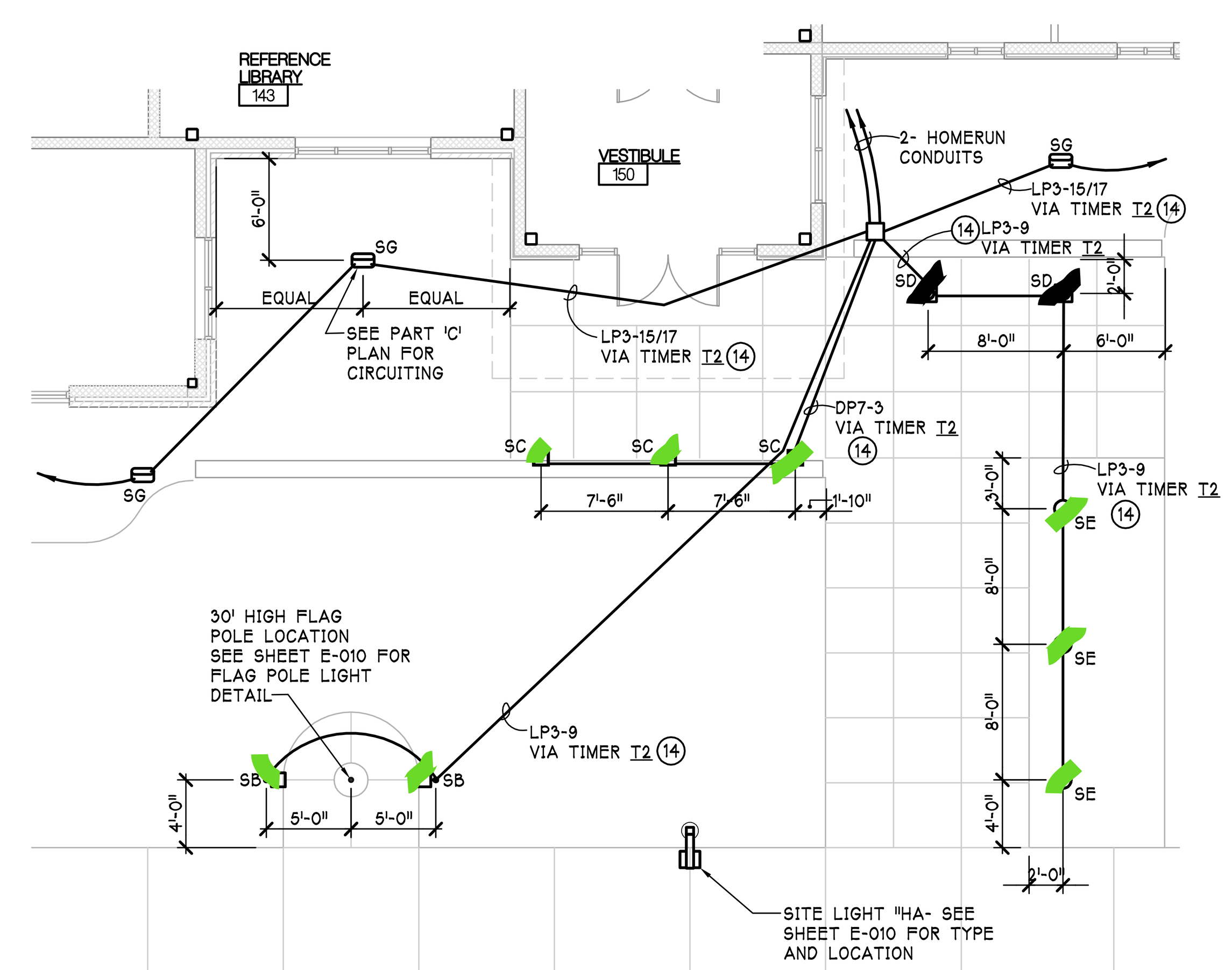
NORTH
OPERATIONS BUILDING LIGHTING FLOOR PLAN - PART 'C'
SCALE - 1/8" = 1'-0"



SITE SIGN LIGHTING DETAILS
SCALE - NONE

SITE LIGHTING - OPERATIONS BUILDING LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
SA	SINGLE HEAD, SQUARE POLE MOUNT AREA LIGHT WITH TYPE V LIGHT DISTRIBUTION, ALUMINUM ALLOY DIECAST HOUSING, HIGH POWER FACTOR BALLAST	HYDREL LIGHTING	"G2 EDGE" G2XW-100M-277-SR5S-SPA -LPI-*	100W MH E17	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT POLE BASE FLUSH WITH PATIO GRADE ON 12' POLE
SB	FLAG POLE STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, **SPOT DISTRIBUTION, INTEGRAL SOURCE SHIELD, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-70M-277-**SP-KM-SMSA12-ISS-LPI-*	70W MH ED17	1	1	85	--	277V	* VERIFY COLOR WITH ARCHITECT; ** VERIFY NARROW SPOT OR SPOT DISTRIBUTION WITH LIGHTING REPRESENTATIVE
SC	EXTERIOR RECESSED WALL LIGHT WITH DIE CAST COPPER FREE ALUMINUM SEMI- SPECULAR ALUMINUM REFLECTOR, CONCAVE GLASS DIFFUSER WITH SATIN FINISH, RAPID START ELECTRONIC BALLAST WITH -18° MINIMUM STARTING TEMPERATURE	PRISMA LIGHTING OR PRE APPROVED EQUAL	07395*-	18W 2G11 BASE	1	1	20	3500K	120v	MOUNT CENTER OF FIXTURE AT 24"AFF; * VERIFY COLOR WITH ARCHITECT
SD	IN GRADE FLUSH MOUNT SQUARE BUILDING UPLIGHT WALL WASH WITH CAST ALUMINUM SEALED HOUSING, WALL WASH REFLECTOR, WALL WASH INTERNAL LOUVER, 3/4" CONDUIT CONNECTION STANDARD, LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	9150-1-100M-277-WWD-34BNPT-WWL	100W MH E17	1	1	120	--	277V	COORDINATE INSTALLATION WITH CONCRETE FLATWORK CONTRACTOR- GROUT MASK "GM" OPTIONAL
SE	44" HIGH BOLLARD WITH ASYMMETRICAL LIGHT DISTRIBUTION, STEP BAFFLE FACEPLATE, CLEAR TEMPERED GLASS, INTERNAL OPTICS, ANCHORAGE KIT, HIGH POWERED BALLAST	BEGA LIGHTING OR PRE APPROVED EQUAL	8534MH 895A	39W T6 MH	1	1	277	--	277V	* VERIFY COLOR WITH ARCHITECT
SF	SITE SIGN STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, HORIZONTAL SPOT DISTRIBUTION, INTEGRAL SOURCE SHIELD, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-100M-277-HSP-KM-SMSA12-ISS-LPI-*	100W MH ED17	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT; FIELD ADJUST BEAM
SG	BUILDING STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, VERTICAL FLOOD DISTRIBUTION, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-100M-277-VFL-KM-SMSA12-LPI-*	100W MH ED17	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT; FIELD ADJUST BEAM



NORTH
PARTIAL FRONT ENTRY SITE LIGHTING PLAN - PART 'C'
SCALE - 1/8" = 1'-0"

PLAN NOTES:

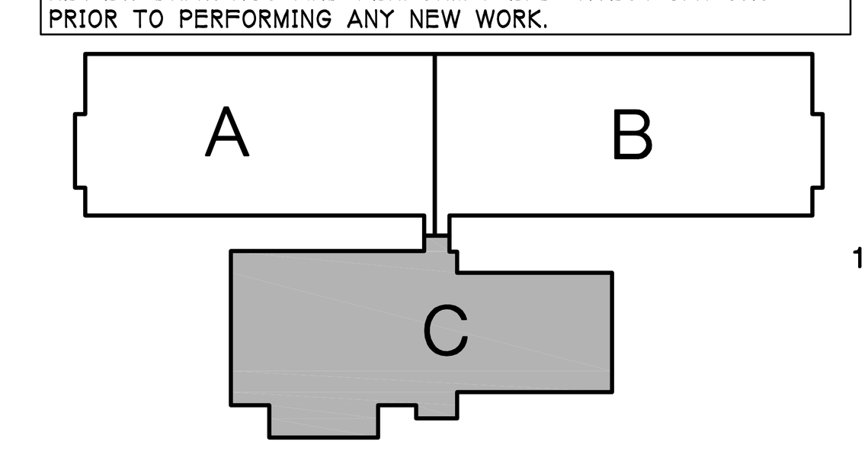
1. SINGLE FACE WALL MOUNT EXIT LIGHT @ 94"AFF TO CENTER OF FIXTURE, MOUNT ON WALL ABOVE DOOR.
2. DOUBLE FACE CEILING MOUNT EXIT LIGHT.
3. SINGLE FACE WALL MOUNT EXIT LIGHT @ 94"AFF TO CENTER OF FIXTURE.
4. SINGLE FACE WALL MOUNT EXIT LIGHT @ 94"AFF TO CENTER OF FIXTURE, MOUNT ABOVE DOOR.
5. SINGLE FACE CEILING MOUNT EXIT LIGHT.
6. MOUNT EMERGENCY BALLAST ON TOP OF TUBE STEEL. VERIFY LOCATION WITH ARCHITECT. CABLE LENGTH BETWEEN BALLAST AND LIGHT FIXTURE NOT TO EXCEED MANUFACTURERS RECOMMENDATIONS.
7. MOUNT EMERGENCY BALLAST ON TOP OF OFFICE CEILING. VERIFY LOCATION WITH ARCHITECT. CABLE LENGTH BETWEEN BALLAST AND LIGHT FIXTURE NOT TO EXCEED MANUFACTURERS RECOMMENDATIONS.
8. USE LOW VOLTAGE LIGHT SWITCHES FOR TIMER OVERRIDE. CONTROL IS BASED ON INTERMATIC MODEL #ET71615CR CONTROLLER WITH 16 CIRCUIT OVERRIDE ACCESSORY #156ET9403A. SEE TIMER T1 AND T2 SCHEDULES ON SHEET E-120.
9. SURFACE MOUNT INVERTERS FOR EMERGENCY LIGHTS ON WALL ABOVE CEILING PER MANUFACTURERS REQUIREMENTS.
10. IN OPEN OFFICE 135 AND CREW ROOMS 151, 152 AND 159 NO CONDUITS AND/OR WIRING ARE TO BE INSTALLED BELOW THE BOTTOM CORD OF THE ROOF TRUSS.
11. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
12. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-031.
13. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXTURES IN THE SAME SPACE.
14. REFER TO TIMER T1/2 SCHEDULES ON SHEET E-120 & TIMER T4 SCHEDULE ON SHEET E-121
15. ~~PROVIDE A 277-VOLT TO 120-VOLT SINGLE PHASE, 1500-VA TRANSFORMER CONCEALED IN THE ROOF STRUCTURE OF VESTIBULE 150. ENSURE TO INCLUDE NEC REQUIRED DISCONNECTS AND CIRCUIT PROTECTION.~~

OCCUPANCY SENSOR LEGEND

$OC	PASSIVE INFRARED WALL SWITCH WITH ADAPTABILITY
OC HB	WALL MOUNTED HIGH BAY PASSIVE INFRARED
OC LR	WALL MOUNTED LONG RANGE PASSIVE INFRARED
OC 450	CEILING MOUNTED ULTRASONIC, 450 SQ. FT.
OC 450PIR	CEILING MOUNTED PASSIVE INFRARED, 450 SQ. FT.
OC 450MT	CEILING MOUNTED MULTI-TECHNOLOGY, 450 SQ. FT.
OC 500MT	WALL MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 500	CEILING MOUNTED ULTRASONIC, 500 SQ. FT.
OC 500MT	CEILING MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OC 1000	CEILING MOUNTED ULTRASONIC, 1000 SQ. FT.
OC 1000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 1000 SQ. FT.
OC 2000	CEILING MOUNTED ULTRASONIC, 2000 SQ. FT.
OC 2000MT	CEILING MOUNTED MULTI-TECHNOLOGY, 2000 SQ. FT.
OC 1200MT	WALL MOUNTED MULTI-TECHNOLOGY, 1200 SQ. FT.

NOTES:
1. ALL POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED WITH ALL OCCUPANCY SENSORS.
2. ALL OCCUPANCY SENSORS SHALL BE MOUNTED 3'-5' AWAY FROM DIRECT AIR FLOW. VERIFY FINAL LOCATIONS IN FIELD.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH
KEY PLAN
SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
12 PROPOSAL REQUEST 12	2-6-2007
G SUPP. INSTR. 7	9-21-2006
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

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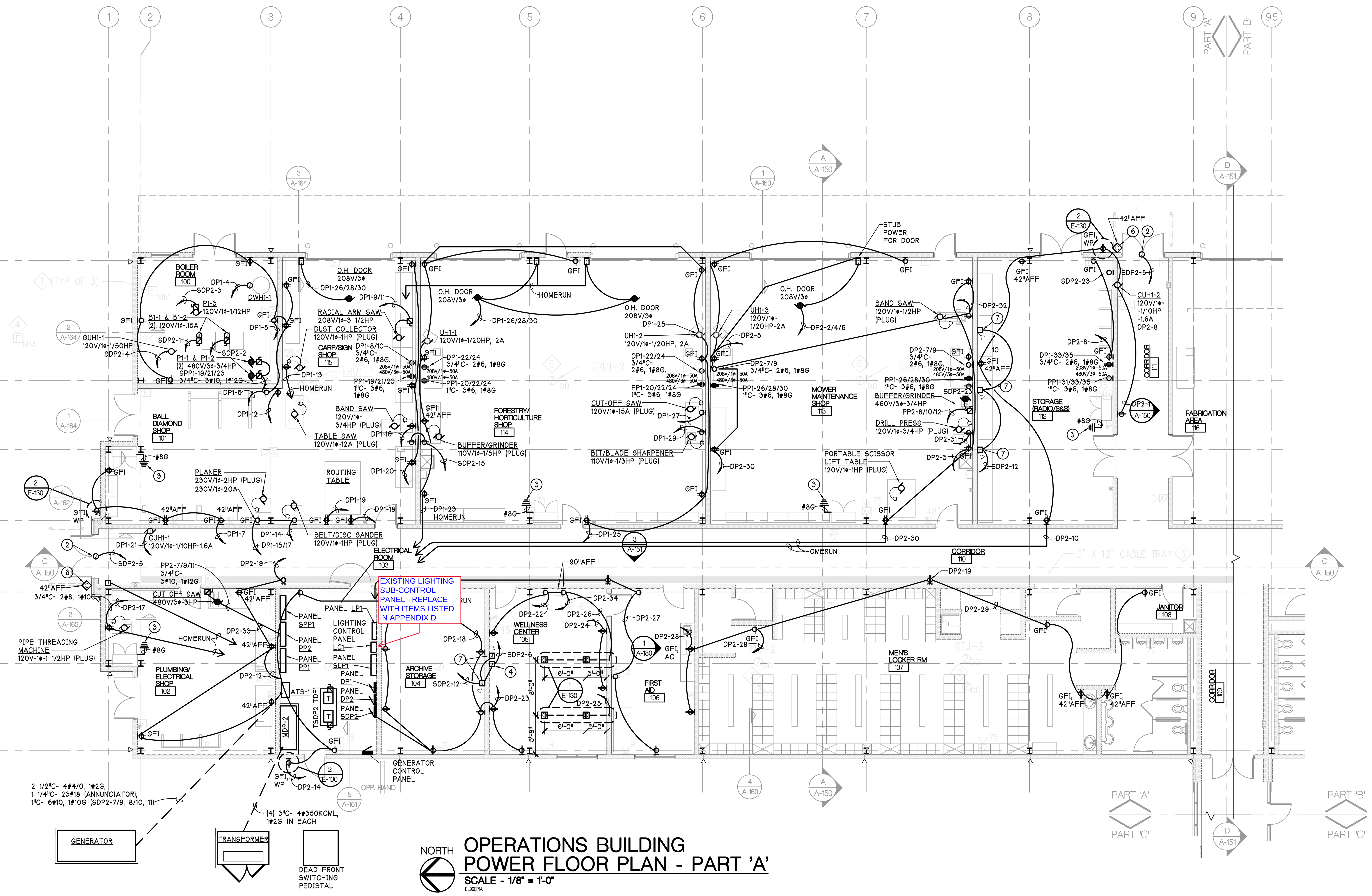
PROJECT

CONSULTANT

OPERATIONS LIGHTING FLOOR PLAN - PART 'C'
SHEET TITLE

05-309
PROJECT NUMBER

E-122
SHEET NUMBER



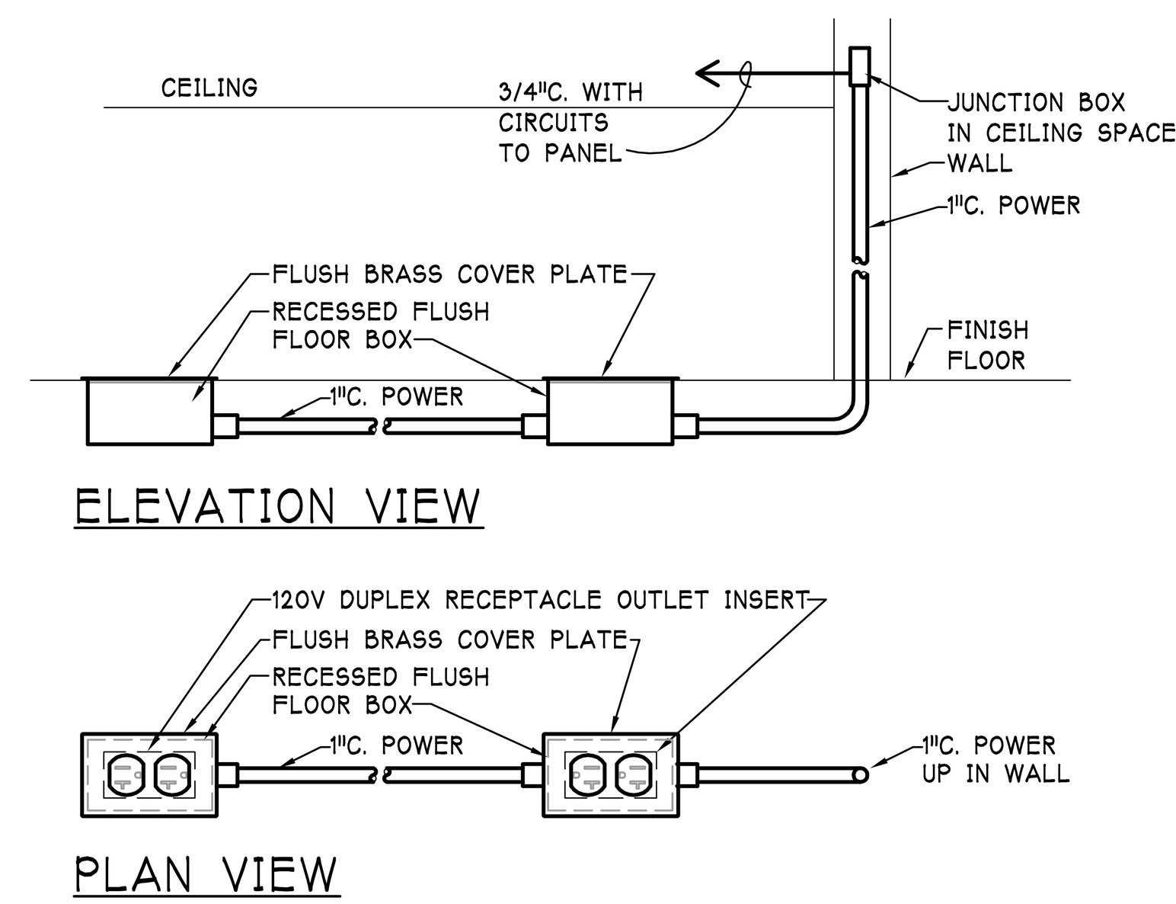
NORTH

OPERATIONS BUILDING POWER FLOOR PLAN - PART 'A'

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

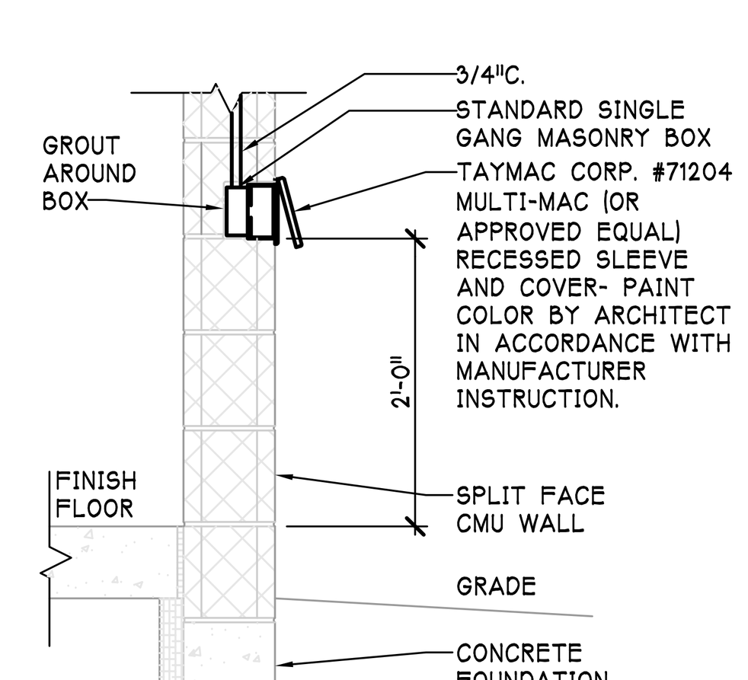
PLAN NOTES:

1. ALL RACEWAYS TO BE COORDINATED WITH OTHER DIVISIONS TO AVOID CONFLICTS PRIOR TO INSTALLATION.
2. JUNCTION BOX WITH 120 VOLT CIRCUIT FOR SECURITY ACCESS. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
3. FLAMMABLE MATERIALS STORAGE CABINETS TO BE GROUNDED TO PREVENT STATIC ELECTRICITY BUILD-UP.
4. DURESS PUSH-BUTTON, EMERGENCY SPEAKER PHONE POWER. COORDINATE WITH VENDOR FOR EXACT INSTALLATION.
5. ERA UNIT CONTROL PANEL, FURNISHED WITH THE UNIT. CONNECTION TO BE IN 3/4" CONDUIT WITH 3 #10 AND 1 #12 GROUND. VERIFY LOCATION WITH MECHANICAL CONTRACTOR.
6. CARD READER JUNCTION BOX MOUNTED FLUSH WITH WALL AND 3/4" CONDUIT ROUTED INTO CEILING CAVITY ON SECURE SIDE OF DOOR. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
7. PROVIDE 120 VOLT POWER TO SMOKE DAMPERS AS INDICATED. COORDINATE WITH FIRE ALARM CONTRACTOR AND MECHANICAL CONTRACTOR FOR EXACT INSTALLATION.

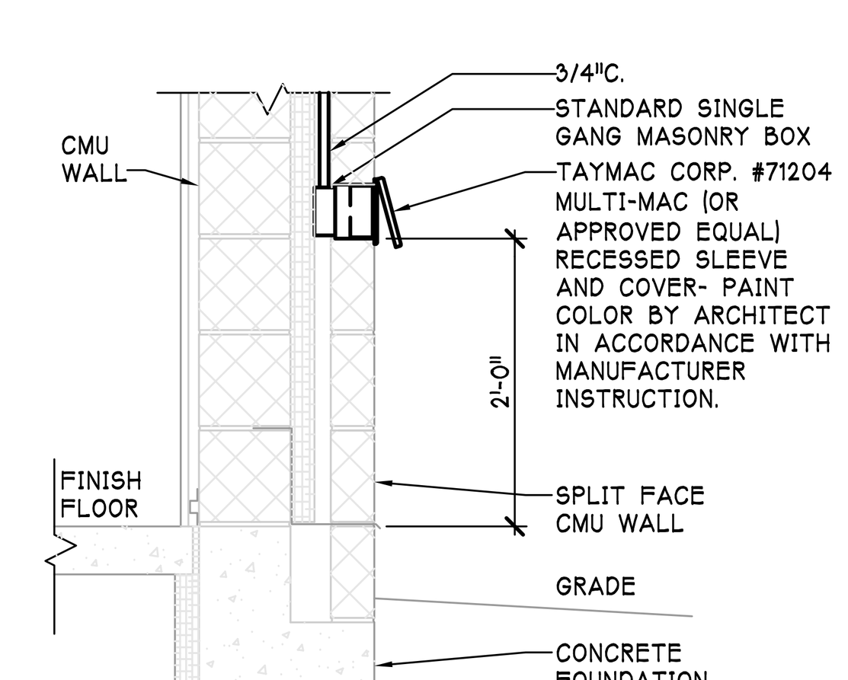


NOTE:
CONNECTIONS TO OUTLETS SHOWN ON FLOOR PLAN ARE CIRCUITING REFERENCE ONLY. ELECTRICAL CONTRACTOR SHALL DETERMINE FINAL ROUTING AND SAW CUTTING REQUIREMENTS. VERIFY EXACT LOCATIONS OF OUTLETS WITH OWNER.

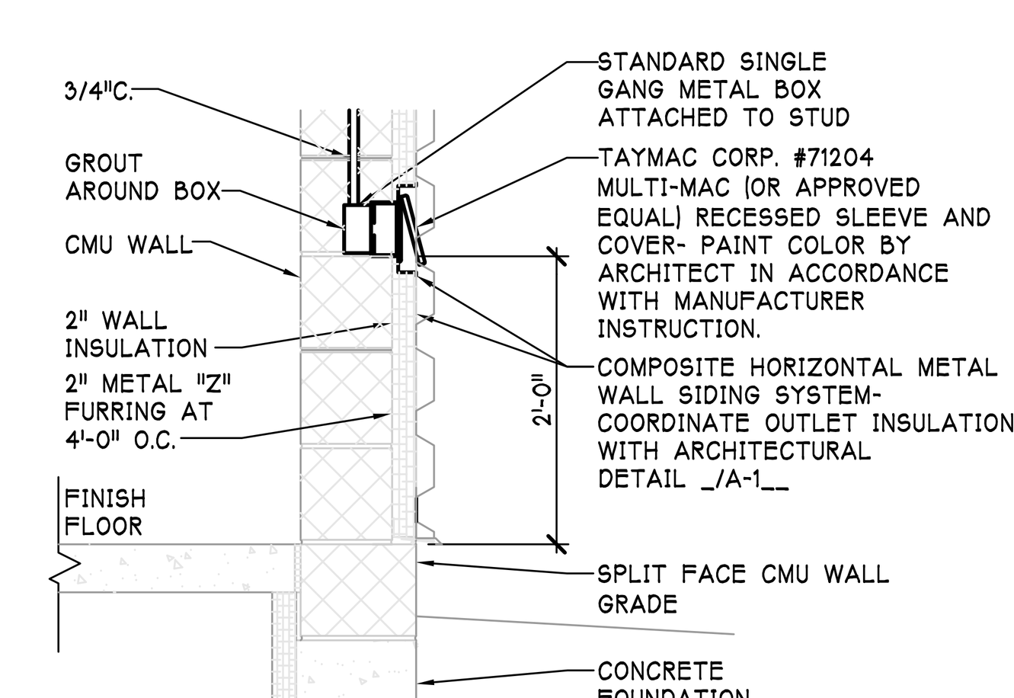
1 / E-130 RECESSED FLOOR BOX DETAIL
SCALE - NONE



2 / E-130 EXTERIOR NEMA-3R RECEPTACLE DETAIL
SCALE - NONE

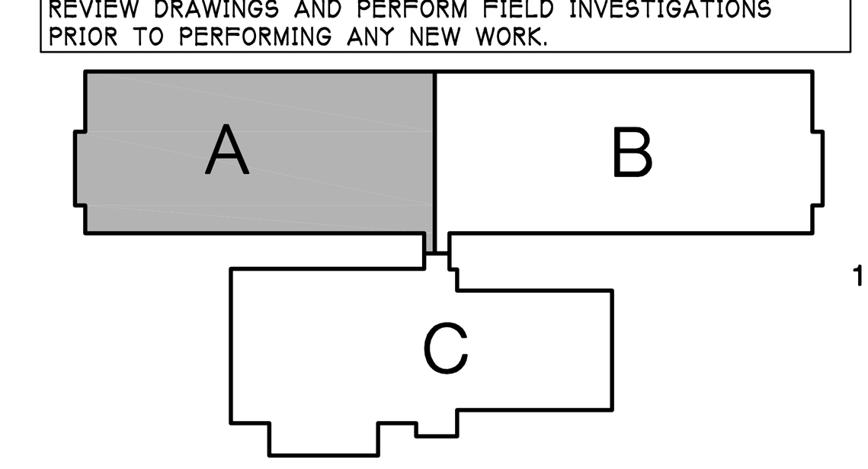


3 / E-130 EXTERIOR NEMA-3R RECEPTACLE DETAIL
SCALE - NONE



4 / E-130 EXTERIOR NEMA-3R RECEPTACLE DETAIL
SCALE - NONE

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN
SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
3 PROPOSAL REQUEST 3	6-2-2006
CONTRACT SET	2-6-2006
A POST ADDENDUM 1	12-15-2005
1 ADDENDUM 1	11-11-2005
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS POWER FLOOR PLAN - PART 'A'

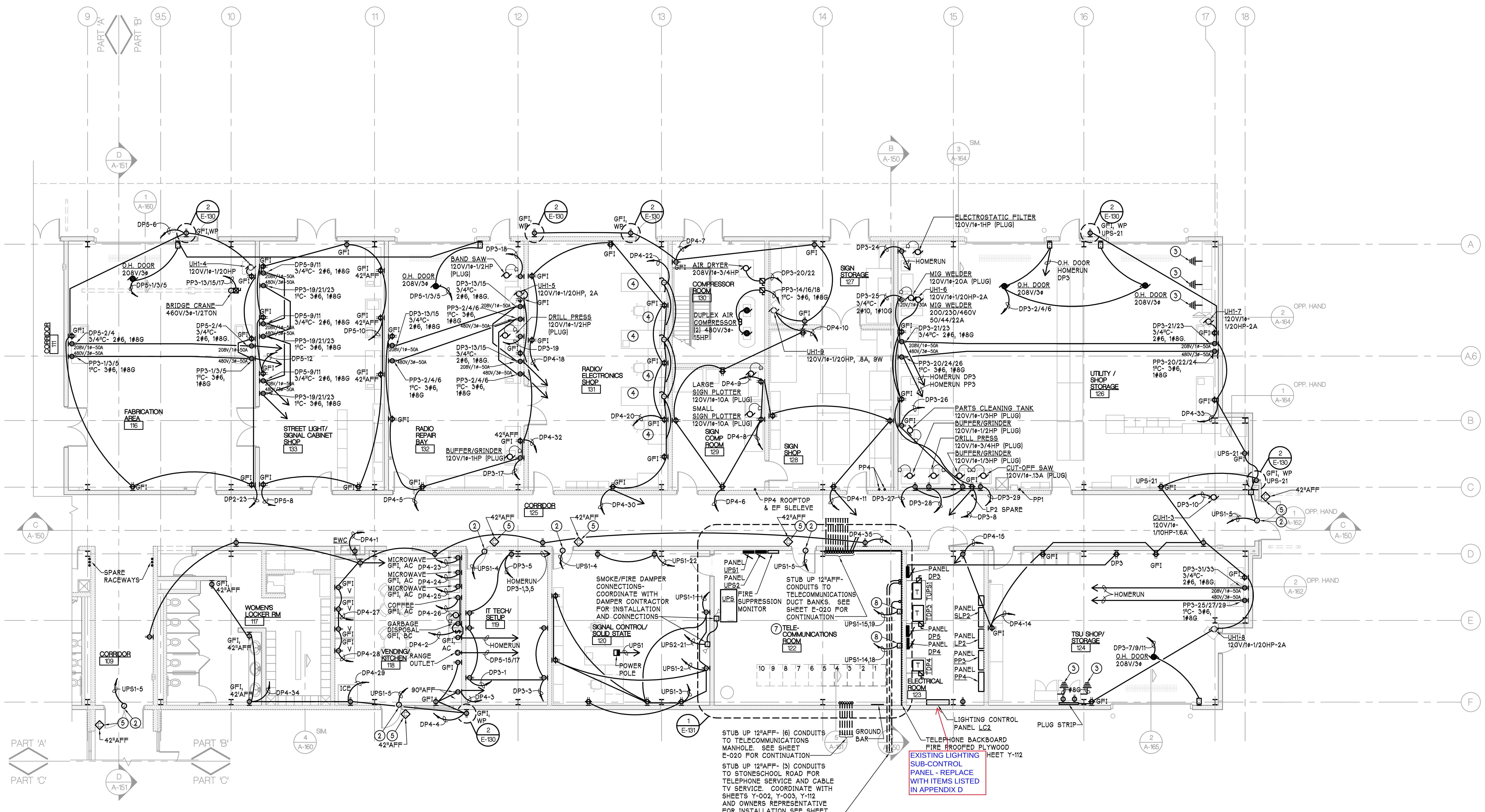
SHEET TITLE

05-309

PROJECT NUMBER

E-130

SHEET NUMBER



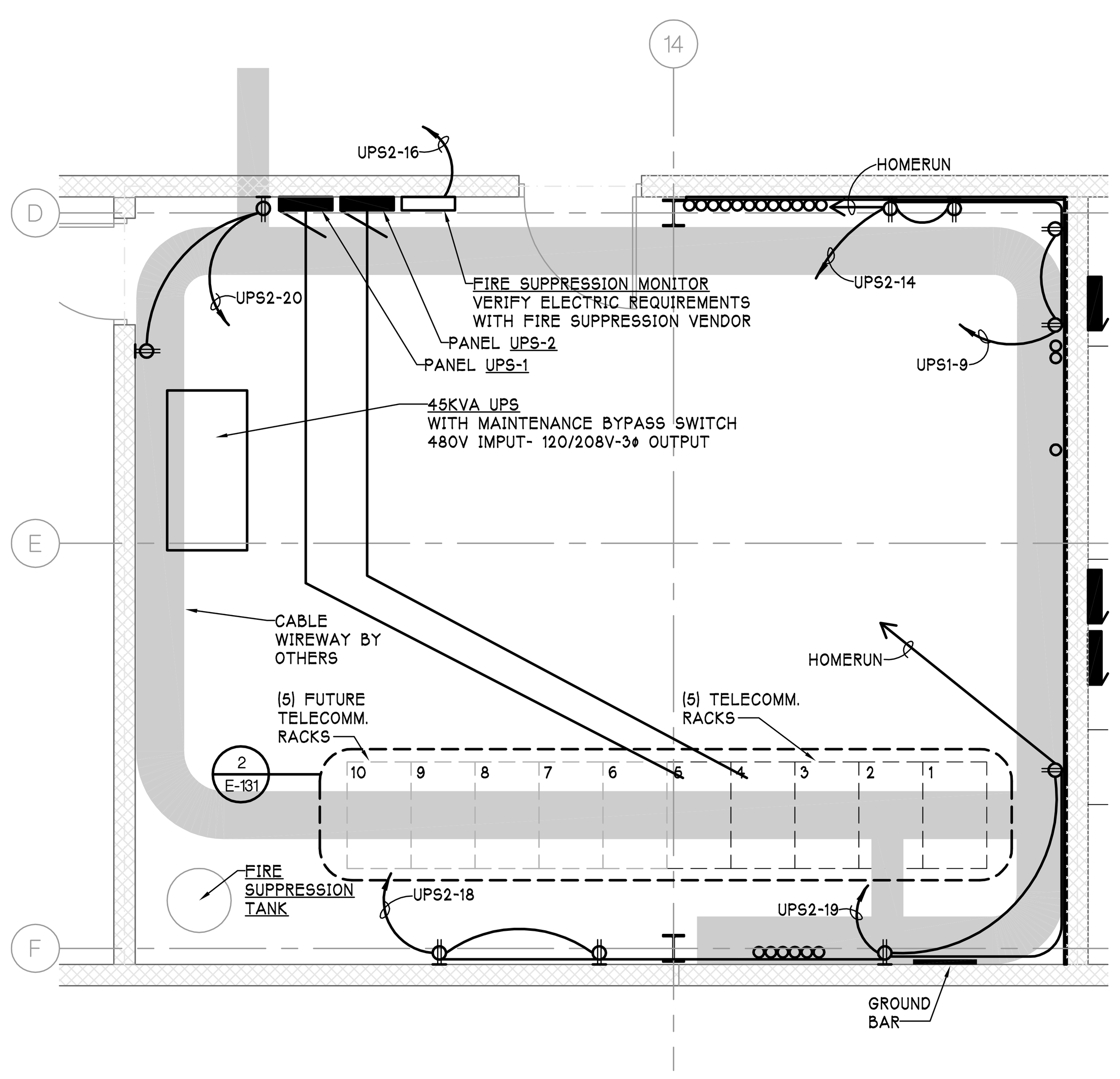
NORTH

OPERATIONS BUILDING POWER FLOOR PLAN - PART 'B'

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

PLAN NOTES:

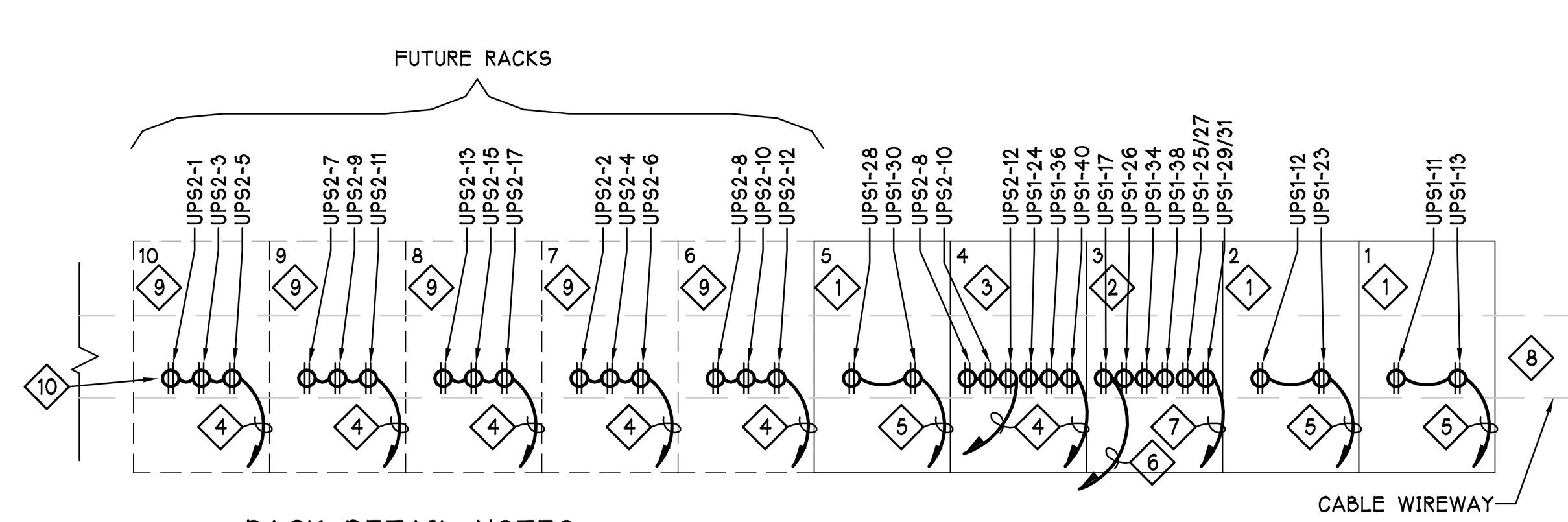
1. ALL RACEWAYS TO BE COORDINATED WITH OTHER DIVISIONS TO AVOID CONFLICTS PRIOR TO INSTALLATION.
2. JUNCTION BOX WITH 120 VOLT CIRCUIT FOR SECURITY ACCESS. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
3. FLAMMABLE MATERIALS STORAGE CABINETS TO BE GROUNDED TO PREVENT STATIC ELECTRICITY BUILD-UP.
4. COORDINATE CONNECTION OF BUILT-IN RECEPTACLES WITH FURNITURE INSTALLER.
5. CARD READER JUNCTION BOX MOUNTED FLUSH WITH WALL AND 3/4" CONDUIT ROUTED INTO CEILING CAVITY ON SECURE SIDE OF DOOR. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
6. ERA UNIT CONTROL PANEL, FURNISHED WITH THE UNIT. CONNECTION TO BE IN 3/4" CONDUIT WITH 3 #10 AND 1 #12 GROUND. VERIFY LOCATION WITH MECHANICAL CONTRACTOR.
7. COORDINATE INSTALLATION OF ALL ELECTRICAL AND ELECTRONIC EQUIPMENT AND COMPONENTS IN TELECOMMUNICATION ROOM 122 WITH SHEET Y-112 AND VENDOR REQUIREMENTS.
8. MOUNT JUNCTION BOXES BELOW CABLE RACEWAY. COORDINATE INSTALLATION WITH SECURITY, FIRE ALARM, EQUIPMENT RACK PROVIDERS AND WITH SHEET Y-112.



1 PARTIAL ENLARGED PLAN TELECOMMUNICATIONS ROOM 122

E-131

SCALE - 1/4" = 1'-0"



RACK DETAIL NOTES:

1. (2) L5-20R RECEPTACLES MOUNTED TO THE CABLE WIREWAY ABOVE THE RACK. COORDINATE RECEPTACLES WITH RACK LOCATIONS AND OWNERS REPRESENTATIVE. REFER TO SHEET Y-112.
2. (4) L5-20R RECEPTACLES AND (2) L6-30R RECEPTACLES MOUNTED TO THE CABLE WIREWAY ABOVE THE RACK. COORDINATE RECEPTACLES WITH RACK LOCATIONS AND THE OWNERS REPRESENTATIVE. REFER TO SHEET Y-112.
3. (6) L5-20R RECEPTACLES MOUNTED TO THE CABLE WIREWAY ABOVE THE RACK. COORDINATE RECEPTACLES WITH THE RACK LOCATIONS AND THE OWNERS REPRESENTATIVE. REFER TO SHEET Y-112.
4. 3/4"C WITH 6#10 AND 3#12G (NO COMMON NEUTRALS OR GROUNDS TO BE USED).
5. 3/4"C WITH 4#10 AND 2#12G (NO COMMON NEUTRALS OR GROUNDS TO BE USED).
6. 1"C WITH 8#10 AND 4#12G (NO COMMON NEUTRALS OR GROUNDS TO BE USED).
7. 1"C WITH 4#6 AND 2#10G (NO COMMON NEUTRALS OR GROUNDS TO BE USED).
8. RECEPTACLES AND CONDUIT MOUNTED TO CABLE WIREWAY TO BE INSTALLED IN A MANNER THAT DOES NOT INTERFERE WITH THE CABLES ROUTED BETWEEN THE WIREWAY AND THE RACKS.
9. (3) L5-20R RECEPTACLES PER FUTURE RACK. INSURE THAT EACH RECEPTACLE IS ON A DIFFERENT PHASE. MOUNT TO BOTTOM OF CABLE WIREWAY ABOVE THE RACK. COORDINATE RECEPTACLES WITH RACK LOCATIONS AND THE OWNERS REPRESENTATIVE. REFER TO SHEET Y-112.
10. RECEPTACLES MOUNTED TO THE CABLE TRAY TO BE LOCATED ON THE WEST SIDE OF THE TRAY.

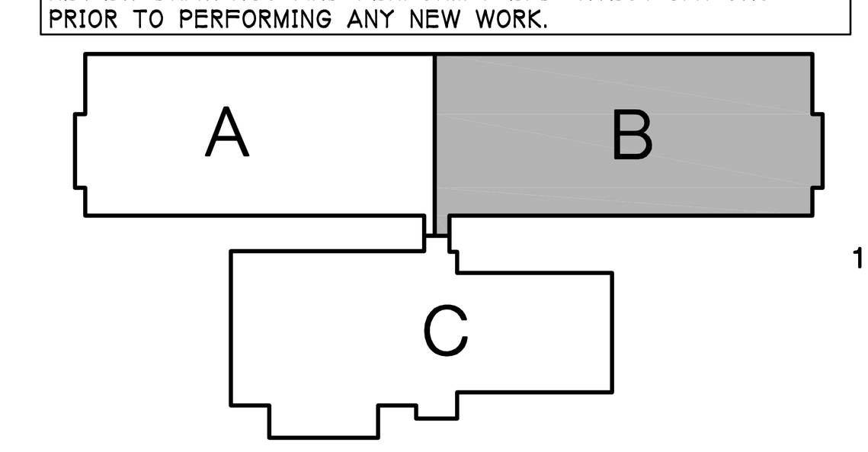
2 TELECOMMUNICATION RACKS DETAIL

E-131

SCALE - NONE

EL48EP01

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS POWER FLOOR PLAN - PART 'B'

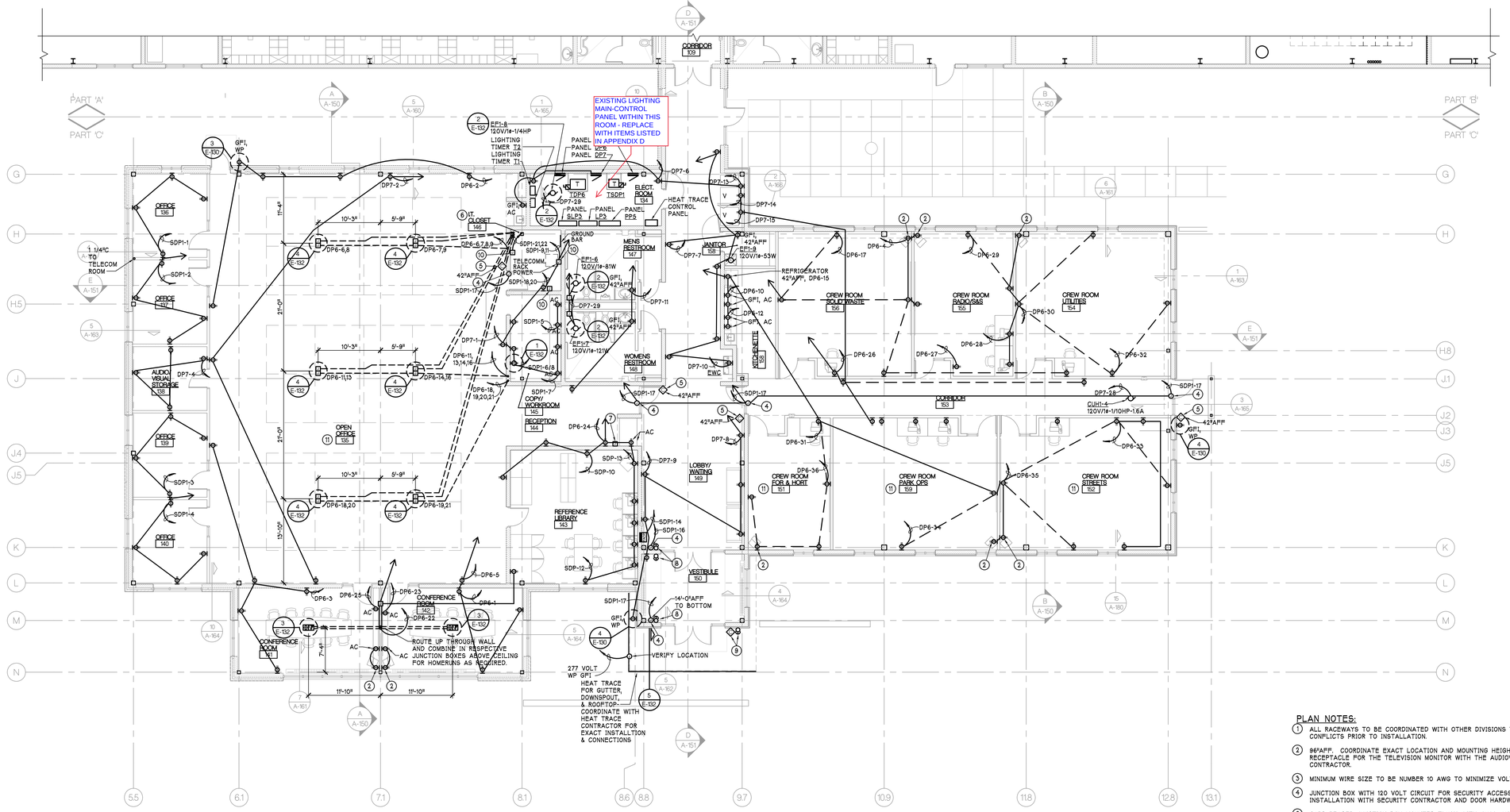
SHEET TITLE

05-309

PROJECT NUMBER

E-131

SHEET NUMBER

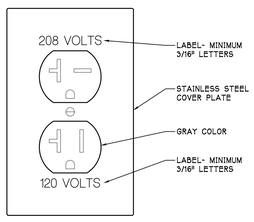


NORTH

OPERATIONS BUILDING POWER FLOOR PLAN - PART 'C'

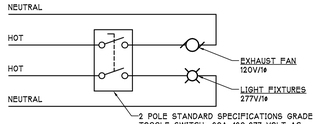
SCALE - 1/8" = 1'-0"

E1.96EPC



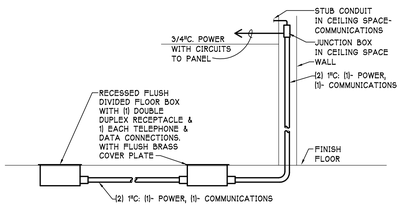
1 E-132 TYPICAL NEMA 5-20R/NEMA 6-20R DUPLEX RECEPTACLE (COPIER)

SCALE - NONE



2 E-132 TYPICAL TOILET EXHAUST FAN/ LIGHT SWITCH WIRING DIAGRAM

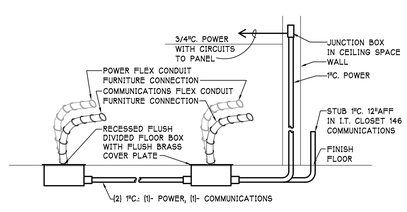
SCALE - NONE



3 E-130 CONFERENCE ROOMS 141 & 142 RECESSED FLOOR BOX DETAIL

SCALE - NONE

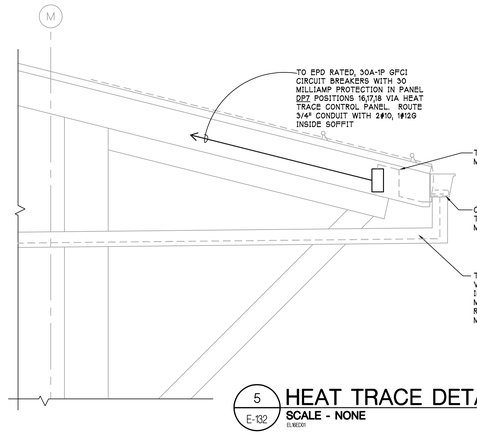
E1.24EDD3



4 E-130 OPEN OFFICE 135 RECESSED FLOOR BOX DETAIL

SCALE - NONE

E1.24EDD4



5 E-132 HEAT TRACE DETAIL

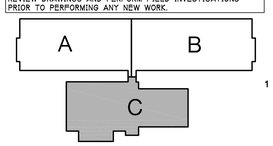
SCALE - NONE

E1.96EDD1

PLAN NOTES:

1. ALL RACEWAYS TO BE COORDINATED WITH OTHER DIVISIONS TO AVOID CONFLICTS PRIOR TO INSTALLATION.
2. 96"A/FF. COORDINATE EXACT LOCATION AND MOUNTING HEIGHT OF THE DUPLEX RECEPTACLE FOR THE TELEVISION MONITOR WITH THE AUDIOVISUAL/COMMUNICATIONS CONTRACTOR.
3. MINIMUM WIRE SIZE TO BE NUMBER 10 AWG TO MINIMIZE VOLTAGE DROP.
4. JUNCTION BOX WITH 120 VOLT CIRCUIT FOR SECURITY ACCESS. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
5. CARD READER JUNCTION BOX MOUNTED FLUSH WITH WALL AND 3/4" CONDUIT ROUTED INTO CEILING CAVITY ON SECURE SIDE OF DOOR. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
6. COORDINATE INSTALLATION OF ALL ELECTRICAL AND ELECTRONIC EQUIPMENT AND COMPONENTS IN TELECOMMUNICATION ROOM 122 WITH SHEET Y-112 AND VENDOR REQUIREMENTS.
7. COORDINATE INSTALLATION OF THE TWO DOOR PUSH BUTTONS AT RECEPTION DESK WITH SECURITY CONTRACTOR.
8. BARRIER FREE ACCESS PUSH BUTTON MOUNTED AT 42"A/FF. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR.
9. ACCESS CONTROL DEVICE AND BARRIER FREE PUSH BUTTON MOUNTED AT 42"A/FF. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR.
10. MOUNT JUNCTION BOXES BELOW CABLE RACEWAY. COORDINATE INSTALLATION WITH SECURITY, FIRE ALARM, EQUIPMENT RACK PROVIDERS AND WITH SHEET Y-112.
11. IN OPEN OFFICE 135 AND CREW ROOMS 151, 152 AND 159 NO CONDUITS AND/OR WIRING ARE TO BE INSTALLED BELOW THE BOTTOM CORD OF THE ROOF TRUSS.
12. IN LOBBY/WAITING 149, CONDUIT TO DEVICES LOCATED WITHIN THE AREA WILL BE ROUTED BELOW THE FLOOR SLAB.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

E1.96KPD

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
2	SUPP. INSTR. 5	6-7-2006
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90X OWNER REVIEW	8-29-2005
	50X OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS POWER FLOOR PLAN - PART 'C'

SHEET TITLE

05-309

PROJECT NUMBER

E-132

SHEET NUMBER

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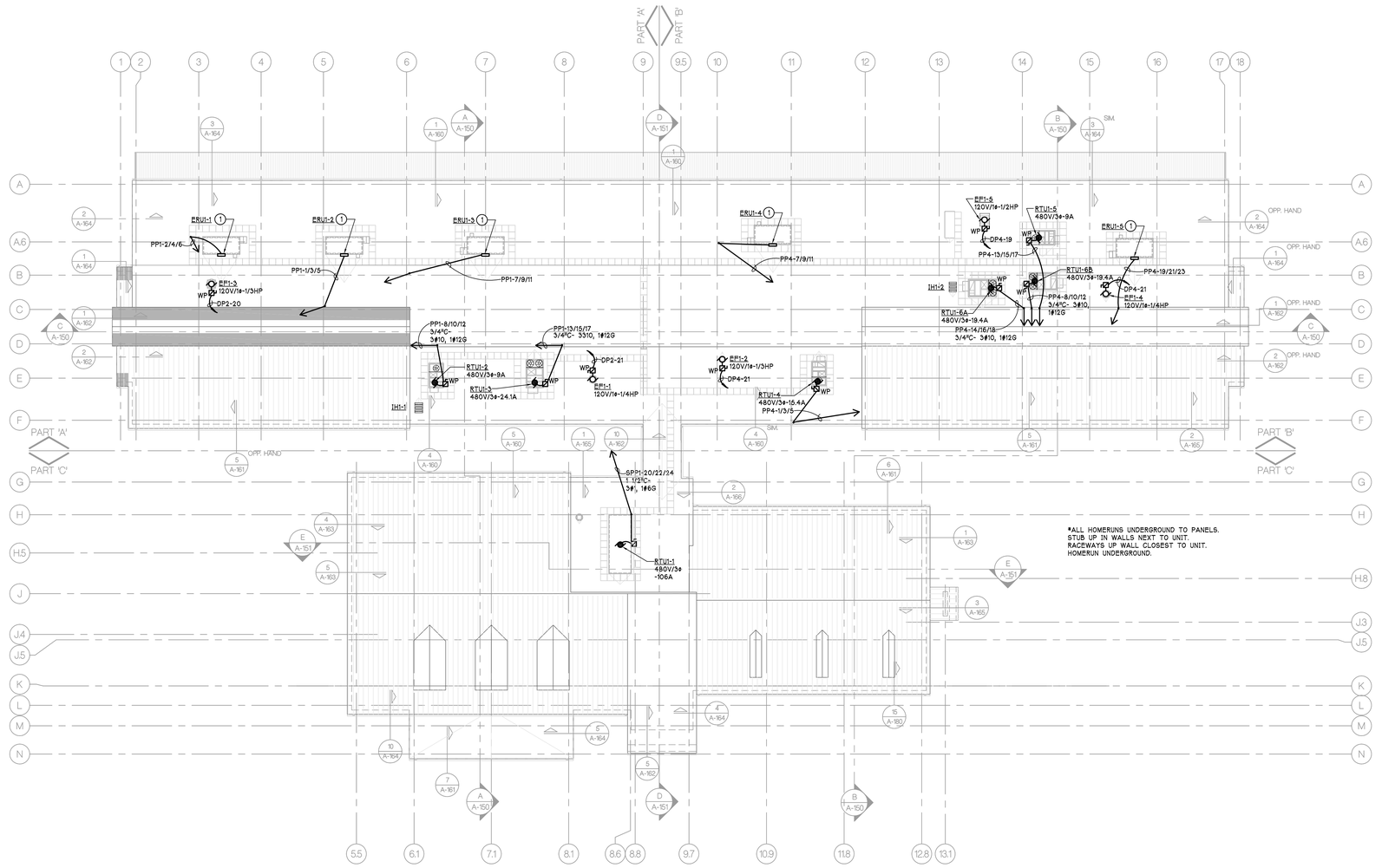
Date: Sep 10, 2008, 3:14pm Layout: 42x30-Layout Plotted by: sueh



NORTH

OPERATIONS BUILDING POWER ROOF PLAN

SCALE - 1/16" = 1'-0"

E.060101

GENERAL PLAN NOTES:

(1) ERA UNIT CONTROL PANEL, FURNISHED WITH THE UNIT. CONNECTION TO BE IN 3/4" CONDUIT WITH 3 #10 AND 1 #10 GROUND. VERIFY LOCATION WITH MECHANICAL CONTRACTOR.

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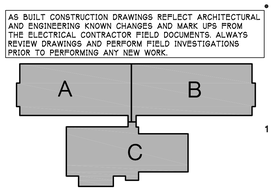

NORTH

KEY PLAN

SCALE - N.T.S.

E.060KP1D

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
	CONTRACT SET	2-6-2006
A	POST ADDENDUM 1	12-15-2005
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005

DATE ISSUED

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PROJECT

CONSULTANT

OPERATIONS
ELECTRICAL
ROOF PLAN

SHEET TITLE

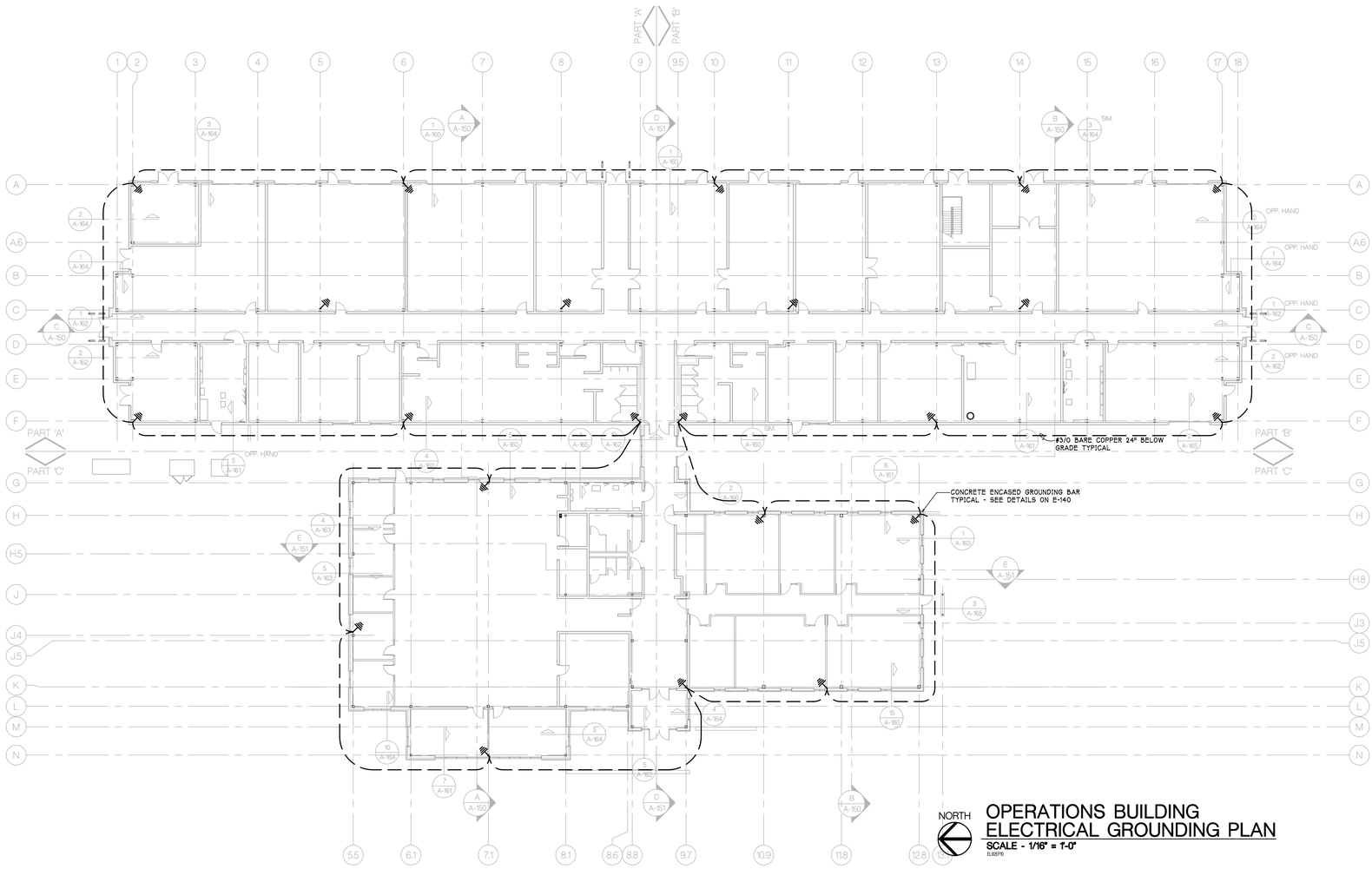
05-309

PROJECT NUMBER

E-133

SHEET NUMBER

Drawing: P:\2005\05309\dwg\ACD\OPERATIONS BUILDING\Sheet\E133.dwg
Date: Sep 10, 2008, 3:14pm Layout: 42x30-Layout Plotted by: saeli



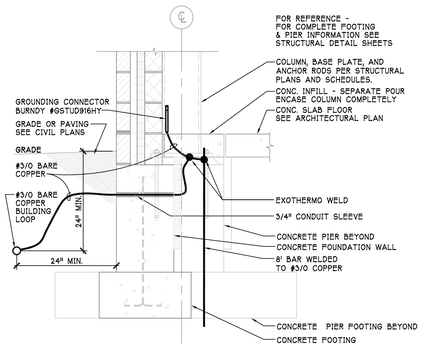
OPERATIONS BUILDING ELECTRICAL GROUNDING PLAN

NORTH

SCALE - 1/16" = 1'-0"

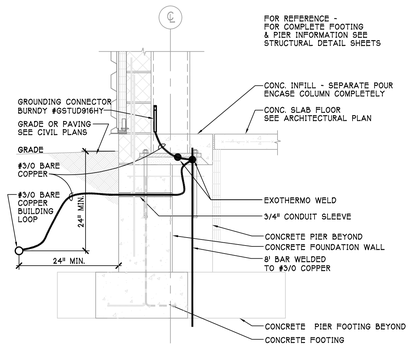
GENERAL PLAN NOTES:

1. INSTALL GROUNDING PER NEC AND VENDOR RECOMMENDATIONS.
2. LIGHTNING PROTECTION SHALL BE INSTALLED PRE SPECIFICATIONS AND VENDOR GUIDELINES.
3. LIGHTNING PROTECTION SYSTEM SHALL BE CONNECTED TO THE GROUNDING SYSTEM PER NEC AND VENDOR RECOMMENDATIONS.



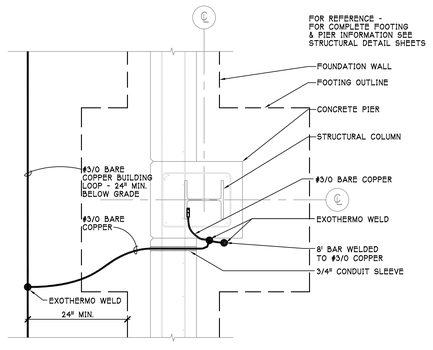
1 E-140 — GROUNDING DETAIL- TYPICAL EXTERIOR PIER DETAIL

3/4" = 1'-0"



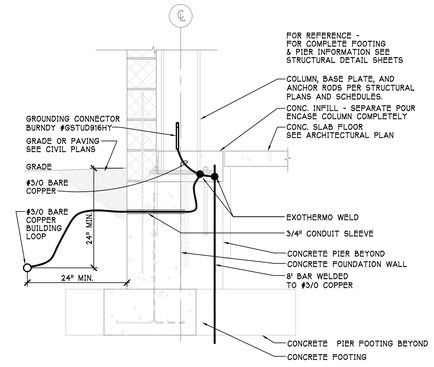
2 E-140 — GROUNDING DETAIL- TYPICAL EXTERIOR PIER DETAIL

3/4" = 1'-0"



3 E-140 — GROUNDING DETAIL- TYPICAL PLAN PIER DETAIL

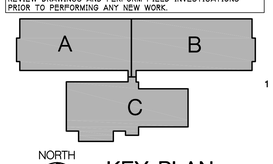
3/4" = 1'-0"



4 E-140 — GROUNDING DETAIL- TYPICAL EXTERIOR PIER DETAIL

3/4" = 1'-0"

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005

DATE ISSUED

NAJ

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STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS ELECTRICAL GROUNDING PLAN

SHEET TITLE

05-309

PROJECT NUMBER

E-134

SHEET NUMBER

Drawing: P:\2005\05309\dwg\CD\10-OPERATIONS BUILDING\Sec01\SHE134.dwg
Date: Sep 10, 2008, 3:15pm Layout: 42x30-Layout Plotted by: scott

PNL: MDP-2

LOCATED: ELEC RM 103, OPERATIONS BLDG — 1200AMP MAIN BREAKER, 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	AMPS		BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	PANEL PP-1 (PART 'A')	63584.9	MISC	4	3	10	63.6	76		125	1	---	6	1 1/2	0.0%
2	PANEL PP-2 (PART 'A')	132566.6	MISC	4	3	10	132.6	159		200	3/0	---	6	2 1/2	0.0%
3	PANEL LP-1 (PART 'A')	29546.3	MISC	5	3	10	29.5	36		100	2	2	8	1 1/2	0.0%
4	PANEL SPP-1	240519.7	MISC	5	3	10	240.5	289		400	2-4/0	2-4/0	2-2	2-2 1/2	0.0%
5	PANEL PP-3 (PART 'B')	253285.4	MISC	4	3	10	253.3	305		400	500	---	3	3 1/2	0.0%
6	PANEL LP-2 (PART 'B')	33070.0	MISC	5	3	10	33.1	40		100	2	2	8	1 1/2	0.0%
7	PANEL PP-4 (PART 'B')	69859.7	MISC	4	3	10	69.9	84		100	2	---	8	1 1/4	0.0%
8	PANEL LP-3 (PART 'C')	36245.0	MISC	5	3	10	36.2	44		100	2	2	8	1 1/2	0.0%
9	PANEL PP-5 (PART 'C')	130889.7	MISC	4	3	10	130.9	157		200	3/0	---	6	2	0.0%
10					-	10	0.0								
11					-	10	0.0								
12					-	10	0.0								
13					-	10	0.0								
14					-	10	0.0								
15					-	10	0.0								
16					-	10	0.0								
17					-	10	0.0								
18					-	10	0.0								
19					-	10	0.0								
20					-	10	0.0								
21					-	10	0.0								
22					-	10	0.0								
23					-	10	0.0								
24					-	10	0.0								
25					-	10	0.0								
26					-	10	0.0								
27					-	10	0.0								
28					-	10	0.0								
29					-	10	0.0								
30					-	10	0.0								
	TOTALS		PANEL	7	3	50	989.6	1,190		1200	4-350	4-350		4 - 3	0.3%
										1200					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	989.6	100%	989.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		989.6	100%	989.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: PP-1

LOCATED: ELEC RM 103, OPERATIONS BLDG — 125 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	ERU 1-2	3	HP	4	3	50	4.0	5	6	20	12	---	12	3/4	0.1%
3	-----	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7	ERU 1-3	3	HP	4	3	120	4.0	5	6	20	12	---	12	3/4	0.2%
9	-----	-	-	-	-	-	0.0								
11	-----	-	-	-	-	-	0.0								
13	RTU 1-3	24.1	MCA	4	3	80	20.0	24	24	30	10	---	10	3/4	0.4%
15	-----	-	-	-	-	-	0.0								
17	-----	-	-	-	-	-	0.0								
19	(1) 480V RECEPTS, RM 115	10800	MISC	4	3	60	10.8	13	16	50	6	---	8	1	0.1%
21	-----	-	-	-	-	-	0.0								
23	-----	-	-	-	-	-	0.0								
25	SPARE			4	3		0.0			50					
27	-----	-	-	-	-	-	0.0								
29	-----	-	-	-	-	-	0.0								
31	(1) 480V RECEPTS, RM 112	10800	MISC	4	3	180	10.8	13	16	50	6	---	8	1	0.2%
33	-----	-	-	-	-	-	0.0								
35	-----	-	-	-	-	-	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	ERU 1-1	3	HP	4	3	50	4.0	5	6	20	12	---	12	3/4	0.1%
4	-----	-	-	-	-	-	0.0								
6	-----	-	-	-	-	-	0.0								
8	RTU 1-2	9	MCA	4	3	60	7.5	9	9	20	12	---	12	3/4	0.2%
10	-----	-	-	-	-	-	0.0								
12	-----	-	-	-	-	-	0.0								
14	P-1 & P-2, RM 100	1 1/2	HP	4	3	80	2.5	3	4	20	12	---	12	3/4	0.1%
16	-(2) @ 3/4HP	-	-	-	-	-	0.0								
18	-----	-	-	-	-	-	0.0								
20					3		0.0								
22					-		0.0								
24					-		0.0								
26					3		0.0								
28					-		0.0								
30					-		0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
	TOTALS		PANEL	4	3	50	63.6	76	76	125	1		6	1 1/2	0.1%
										125					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	14.5	100%	14.5
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	21.6	100%	21.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	27.5	100%	27.5
TOTALS		63.6	100%	63.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: PP-2

LOCATED: ELEC RM 103, OPERATIONS BLDG — 200 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	PNLS DP-1 & DP-2 VIA	84016	MISC	5	3	30	84.0	101	126	125	1		6	1 1/2	0.2%
3	XFMR TDP-1	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7	CUT OFF SAW RM 102	3	HP	4	3	40	4.0	5	6	20	12	---	12	3/4	0.1%
9	-----	-	-	-	-	-	0.0								
11	-----	-	-	-	-	-	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
25					1	10	0.0								
27					1	10	0.0								
29					1	10	0.0								
31					1	10	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2					1		0.0								
4					1		0.0								
6					1		0.0								
8	BUFFER/GRINDER RM 113	3/4	HP	4	3	120	1.3	2	2	20	12	---	12	3/4	0.1%
10	-----	-	-	-	-	-	0.0								
12	-----	-	-	-	-	-	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20	(2) 480V RECEPTS, RM 114	21615	MISC	4	3	140	21.6	26	32	50	6	---	8	1	0.3%
22	-----	-	-	-	-	-	0.0								
24	-----	-	-	-	-	-	0.0								
26	(2) 480V RECEPTS, RM 113	21615	MISC	4	3	140	21.6	26	32	50	6	---	8	1	0.3%
28	-----	-	-	-	-	-	0.0								
30	-----	-	-	-	-	-	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
	TOTALS		PANEL	4	3	50	132.6	159	159	200	3/0		6	2 1/2	0.2%
										200					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	5.3	100%	5.3
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	127.2	100%	127.2
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		132.6	100%	132.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: PP-3

LOCATED: ELEC RM 123, OPERATIONS BLDG — 400 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	(2) 480V RECEPTS, RM 116	21615	MISC	4	3	200	21.6	26	32	50	6	---	8	1	0.5%
3	-----	-	-	-	-	-	0.0			-					
5	-----	-	-	-	-	-	0.0			-					
7	PNLS DP-3 & DP-5 VIA	68231	MISC	4	3	30	68.2	82	103	125	1	---	6	1 1/2	0.1%
9	XFMR TDP-3	-	-	-	-	-	0.0								
11	-----	-	-	-	-	-	0.0								
13	BRIDGE CRANE RM 116	2/3	HP	4	3	140	0.9	1	1	20	12	---	12	3/4	0.1%
15	-----	-	-	-	-	-	0.0								
17	-----	-	-	-	-	-	0.0								
19	(3) 480V RECEPT RM 133	32400	MISC	4	3	120	32.4	39	49	50	6	---	8	1	0.4%
21	-----	-	-	-	-	-	0.0								
23	-----	-	-	-	-	-	0.0								
25	(1) 480V RECEPT RM 124	10800	MISC	4	3	80	10.8	13	16	50	6	---	8	1	0.1%
27	-----	-	-	-	-	-	0.0								
29	-----	-	-	-	-	-	0.0								
31					1	10	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	(3) 480V RECEPTS, RM 132	32400	MISC	4	3	150	32.4	39	49	50	6	---	8	1	0.5%
4	-----	-	-	-	-	-	0.0			-					
6	-----	-	-	-	-	-	0.0			-					
8	PANEL DP-4 VIA XFMR TDP-4	32054	MISC	5	3	30	32.1	39	48	80	4		8	1	0.1%
10	-----	-	-	-	-	-	0.0								
12	-----	-	-	-	-	-	0.0								
14	DUPLEX AIR COMPRESSOR	30	HP	4	3	100	33.3	40	50	50	6	---	10	1	0.4%
16	-RM 130	-	-	-	-	-	0.0								
18	-----	-	-	-	-	-	0.0								
20	(2) 480V RECEPTS. RM 126	21615	MISC	4	3	120	21.6	26	32	50	6	---	8	1	0.3%
22	-----	-	-	-	-	-	0.0								
24	-----	-	-	-	-	-	0.0								
26					1	10	0.0								
28					1	10	0.0								
30					1	10	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
	TOTALS		PANEL	4	3	350	253.3	305	305	400	500	---	3	3 1/2	1.1%
										400					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	34.2	100%	34.2
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	219.1	100%	219.1
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		253.3	100%	253.3

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: PP-4

LOCATED: ELEC RM 123, OPERATIONS BLDG — 125 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	RTU 1-4	19.4	MCA	4	3	140	16.1	19	19	25	10	---	10	3/4	0.6%
3	-----	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7	ERU 1-4	3	HP	4	3	140	4.0	5	6	20	12	---	12	3/4	0.2%
9	-----	-	-	-	-	-	0.0								
11	-----	-	-	-	-	-	0.0								
13	RTU 1-5	9	MCA	4	3	80	7.5	9	9	15	12	---	12	3/4	0.3%
15	-----	-	-	-	-	-	0.0								
17	-----	-	-	-	-	-	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
25					1	10	0.0								
27					1	10	0.0								
29					1	10	0.0								
31					1	10	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	RADIO TOWER BUILDING B	10000	MISC	5	3	300	10.0	12	15	20	10	10	12	1	1.4%
4	-----	-	-	-	-	-	0.0								
6	-----	-	-	-	-	-	0.0								
8	RTU 6B	19.4	MCA	4	3	140	16.1	19	19	25	10	---	10	3/4	0.6%
10	-----	-	-	-	-	-	0.0								
12	-----	-	-	-	-	-	0.0								
14	RTU 6A	19.4	MCA	4	3	140	16.1	19	19	25	10	---	10	3/4	0.6%
16	-----	-	-	-	-	-	0.0								
18	-----	-	-	-	-	-	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
26					1	10	0.0								
28					1	10	0.0								
30					1	10	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
	TOTALS		PANEL	4	3	50	69.9	84	84	125	2	---	8	1 1/4	0.2%
										125					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	4.0	100%	4.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	10.0	100%	10.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	55.9	100%	55.9
TOTALS		69.9	100%	69.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: PP-5

LOCATED: ELEC RM 134, OPERATIONS BLDG — 200 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	PNLS DP-6 & DP-7 VIA	42763	MISC	4	3	30	42.8	51	64	125	1	---	6	1 1/2	0.1%
3	XFMR TDP-6	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7					1	10	0.0								
9					1	10	0.0								
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
25					1	10	0.0								
27					1	10	0.0								
29					1	10	0.0								
31					1	10	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2						15	0.0								
4						-	0.0								
6						-	0.0								
8	RTU 1-1	106	MCA	4	3	50	88.1	106	106	125	1/0	---	6	2	0.1%
10	-----	-		-	-	-	0.0								
12	-----	-	-	-	-	-	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
26					1	10	0.0								
28					1	10	0.0								
30					1	10	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
	TOTALS		PANEL	4	3	50	130.9	157	157	200	3/0	---	6	2	0.2%
										200					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	42.8	100%	42.8
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	88.1	100%	88.1
TOTALS		130.9	100%	130.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: LP-1

LOCATED: ELEC RM 103, OPERATIONS BLDG — 100 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 101, 115	2541	LTS	3	1	140	2.5	9	11	20	12	12	12	3/4	1.6%
3	LTS RM 112, 113	3267	LTS	3	1	140	3.3	12	15	20	12	12	12	3/4	2.0%
5	LTS CORR 110	3720	LTS	3	1	200	3.7	13	17	20	10	10	12	3/4	2.1%
7	LTS EXTERIOR	1036	LTS	3	1	250	1.0	4	5	20	12	12	12	3/4	1.1%
9					1	10	0.0								
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
2	LTS RM 114	3267	LTS	3	1	100	3.3	12	15	20	12	12	12	3/4	1.4%
4	LTS RM 102, 104, 105, 106	2366	LTS	3	1	140	2.4	9	11	20	12	12	12	3/4	1.5%
6	LTS CORR 110	3720	LTS	3	1	180	3.7	13	17	20	12	12	12	3/4	3.0%
8	LTS CORR 110, 111	3720	LTS	3	1	180	3.7	13	17	20	12	12	12	3/4	3.0%
10					1	10	0.0								
12					1	10	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
	TOTALS		PANEL	5	3	50	29.5	36	36	100	2	2	8	1 1/2	0.1%
										100					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	23.6	125%	29.5
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		23.6	125%	29.5

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: LP-2

LOCATED: ELEC RM 123, OPERATIONS BLDG — 100 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 116, 133	3630	LTS	3	1	160	3.6	13	16	20	12	12	12	3/4	2.6%
3	LTS RM 127, 128, 129, 130	1831	LTS	3	1	150	1.8	7	8	20	12	12	12	3/4	1.2%
5	LTS RM 124	1440	LTS	3	1	80	1.4	5	6	20	12	12	12	3/4	0.5%
7	LTS CORR 125	3720	LTS	3	1	200	3.7	13	17	20	10	10	12	3/4	2.1%
9	LTS EXTERIOR	988	LTS	3	1	200	1.0	4	4	20	12	12	12	3/4	0.9%
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
2	LTS RM 131, 132	2675	LTS	3	1	200	2.7	10	12	20	12	12	12	3/4	2.4%
4	LTS RM 126	3267	LTS	3	1	140	3.3	12	15	20	12	12	12	3/4	2.0%
6	LTS RM 118, 119	1000	LTS	3	1	200	1.0	4	5	20	12	12	12	3/4	0.9%
8	LTS CORR 125	3720	LTS	3	1	200	3.7	13	17	20	10	10	12	3/4	2.1%
10	LTS CORR 109, 125	4185	LTS	3	1	200	4.2	15	19	20	10	10	12	3/4	2.4%
12					1	10	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
	TOTALS		PANEL	5	3	50	33.1	40	40	100	2	2	8	1 1/2	0.1%
										100					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	26.5	125%	33.1
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		26.5	125%	33.1

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: LP-3

LOCATED: ELEC RM 134, OPERATIONS BLDG — 100 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 138, 145	1842	LTS	3	1	300	1.8	7	8	20	12	12	12	3/4	2.4%
3	LTS RM 154, 155, 156, 158, 159	2480	LTS	3	1	260	2.5	9	11	20	12	12	12	3/4	2.9%
5	LTS RM 135, 144	2902	LTS	3	1	200	2.9	10	13	20	12	12	12	3/4	2.6%
7	LTS RM 135, 144, 150	2600	LTS	3	1	300	2.6	9	12	20	10	10	12	3/4	2.2%
9	LTS EXTERIOR	1400	LTS	3	1	300	1.4	5	6	20	12	12	12	3/4	1.9%
11	LTS PARKING LOT	5180	LTS	3	2	1300	5.2	11	13	20	6	---	12	1	2.6%
13	-----	-	-	-	-	-	0.0								
15	LTS GROUND SIGN	1000	LTS	3	2	1000	1.0	2	3	20	12	---	12	3/4	1.5%
17	-----	-	-	-	-	-	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
2	LTS RM 141, 142	2080	LTS	3	1	230	2.1	8	9	20	12	12	12	3/4	2.1%
4	LTS RM 151, 152	2064	LTS	3	1	270	2.1	7	9	20	12	12	12	3/4	2.5%
6	LTS RM 153	768	LTS	3	1	150	0.8	3	3	20	12	12	12	3/4	0.5%
8	LTS RM 144, 149	2400	LTS	3	1	180	2.4	9	11	20	12	12	12	3/4	1.9%
10	LTS PATIO	480	LTS	3	1	150	0.5	2	2	20	12	12	12	3/4	0.3%
12	LTS PARKING LOT	3800	LTS	3	2	1700	3.8	8	10	20	6	---	12	1	2.5%
14	-----	-	-	-	-	-	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
	TOTALS		PANEL	5	3	50	36.2	44	44	100	2	2	8	1 1/2	0.2%
										100					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	29.0	125%	36.2
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		29.0	125%	36.2

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: SLP-1

LOCATED: ELEC RM 103, OPERATIONS BLDG — 50 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 100, 103, 110	1630	LTS	3	1	300	1.6	6	7	20	12	12	12	3/4	2.2%
3					1	10	0.0								
5					1	10	0.0								
7					1	10	0.0								
9					1	10	0.0								
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
2	LTS RM 107, 111	2265	LTS	3	1	300	2.3	8	10	20	10	10	12	3/4	1.9%
4					1	10	0.0								
6					1	10	0.0								
8					1	10	0.0								
10					1	10	0.0								
12					1	10	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
	TOTALS		PANEL	5	3	50	4.9	6	6	50	6	6	10	1	0.0%
										50					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	3.9	125%	4.9
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		3.9	125%	4.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: SLP-2

LOCATED: ELEC RM 123, OPERATIONS BLDG — 50 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 117, 120, 122, 123	2700	LTS	3	1	180	2.7	10	12	20	12	12	12	3/4	2.2%
3					1	10	0.0								
5					1	10	0.0								
7					1	10	0.0								
9					1	10	0.0								
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
2	LTS CORR 109, 125	920	LTS	3	1	200	0.9	3	4	20	12	12	12	3/4	0.8%
4					1	10	0.0								
6					1	10	0.0								
8					1	10	0.0								
10					1	10	0.0								
12					1	10	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
	TOTALS		PANEL	5	3	50	4.5	5	5	50	6	6	10	1	0.0%
										50					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	3.6	125%	4.5
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		3.6	125%	4.5

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: SLP-3

LOCATED: ELEC RM 134, OPERATIONS BLDG — 50 AMP MAIN LUGS ONLY

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	WIRE SIZE N	WIRE SIZE GRD	CND	% DROP
1	LTS RM 136, 137, 139, 140, 143	1100	LTS	3	1	270	1.1	4	5	20	12	12	12	3/4	1.3%
3	LTS RM 149	3134	LTS	3	1	220	3.1	11	14	20	10	10	12	3/4	2.0%
5					1	10	0.0								
7					1	10	0.0								
9					1	10	0.0								
11					1	10	0.0								
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
2	LTS RM 135, 144, 147, 148	2600	LTS	3	1	320	2.6	9	12	20	10	10	12	3/4	2.4%
4					1	10	0.0								
6					1	10	0.0								
8					1	10	0.0								
10					1	10	0.0								
12					1	10	0.0								
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
	TOTALS		PANEL	5	3	50	8.5	10	10	50	6	6	10	1	0.1%
										50					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	6.8	125%	8.5
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		6.8	125%	8.5

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

	AS BUILTS	9-10-2008
5	PROPOSAL REQUEST 5	7-27-2006
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005

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PROJECT

CONSULTANT

OPERATIONS BLDG.
POWER
SCHEDULES

SHEET TITLE

05-309

PROJECT NUMBER

E-150

SHEET NUMBER

PNL: **DP-1** LOCATED: ELEC RM 103, OPERATIONS BLDG 150 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	BOILER B-1 RM 100	0.15	MCA	3	1	70	0.0	0	0	20	12	12	12	3/4	0.0%
3	PUMP P-3 RM 100	2	MCA	3	1	70	0.2	2	2	20	12	12	12	3/4	0.4%
5	REC RM 100	4	REC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
7	REC RM 101 & EXTERIOR	7	REC	3	1	70	1.3	11	13	20	12	12	12	3/4	2.1%
9	RADIAL ARM SAW RM 115	3 1/2	HP	3	2	70	3.9	19	23	25	10	---	10	3/4	1.4%
11	-----	-	-	-	-	-	0.0								
13	DUST COLLECTOR RM 115	1	HP	3	1	60	1.9	16	20	20	12	12	12	3/4	2.7%
15	PLANER RM 115	2	HP	3	2	60	2.7	13	17	20	12	---	12	3/4	1.3%
17	-----	-	-	-	-	-	0.0								
19	REC RM 115	4	REC	3	1	60	0.7	6	8	20	12	12	12	3/4	1.0%
21	CUH 1-1 RM 110	1.6	MCA	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
23	UH 1-1 & (6) REC RM 114	1360	MISC	3	1	120	1.4	11	14	20	10	10	12	3/4	2.5%
25	UH 1-2 & (7) REC RM 114	1540	MISC	3	1	120	1.5	13	16	20	10	10	12	3/4	2.8%
27	CUT-OFF SAW RM 114	15	MCA	3	1	100	1.8	15	15	20	10	10	12	3/4	2.8%
29	BIT/BLADE SHARPENER R 114	1/3	HP	3	1	100	0.9	7	9	20	12	12	12	3/4	2.0%
31	GEN 120V CKT	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
33	(3) 208 V RECEPTS RM 112	8000	MISC	3	2	140	8.0	38	48	50	6	---	8	3/4	2.3%
35	-----	-	-	-	-	-	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	BOILER B-2 RM 100	0.15	MCA	3	1	70	0.0	0	0	20	12	12	12	3/4	0.0%
4	DWH-1 RM 100	100	MISC	3	1	80	0.1	1	1	20	12	12	12	3/4	0.2%
6	REC RM 101	5	REC	3	1	70	0.9	8	9	20	12	12	12	3/4	1.5%
8	208 V REC RM 115	4000	MISC	3	2	60	4.0	19	24	50	6	---	8	3/4	0.5%
10	-----	-	-	-	-	-	0.0								
12	TABLE SAW RM 115	12	MCA	3	1	60	1.4	12	12	20	12	12	12	3/4	2.0%
14	BELT/DISC SANDER RM 115	1	HP	3	1	50	1.9	16	20	20	12	12	12	3/4	2.3%
16	BAND SAW RM 115	3/4	HP	3	1	50	1.7	14	17	20	12	12	12	3/4	2.0%
18	ROUTER TABLE RM 115	1	HP	3	1	50	1.9	16	20	20	12	12	12	3/4	2.3%
20	REC RM 115	6	REC	3	1	60	1.1	9	11	20	12	12	12	3/4	1.5%
22	(2) 208 V RECEPTS RM 114	8000	MISC	3	2	100	8.0	38	48	50	6	---	8	3/4	1.7%
24	-----	-	-	-	-	-	0.0								
26	OVERHEAD DOORS	1/2	HP	4	3	120	2.6	7	9	20	12	---	12	3/4	0.7%
28	OPERATORS	1/2	HP												
30	-RM 114 & RM 115	1/2	HP												
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	7	3	50	50.1	139	139	150	1/0	1/0	6	2	0.8%
										150					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	4.7	100%	4.7
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	17.5	100%	17.5
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	24.2	100%	24.2
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	3.7	100%	3.7
TOTALS		50.1	100%	50.1

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-2** LOCATED: ELEC RM 103, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY AND ISOLATED GROUND BUS

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 111 & EXT	5	REC	3	1	120	0.9	8	9	20	12	12	12	3/4	2.6%
3	REC RM 113	6	REC	3	1	140	1.1	9	11	20	10	10	12	3/4	2.3%
5	REC RM 113, UH 1-3	1320	MISC	3	1	130	1.3	11	14	20	10	10	12	3/4	2.6%
7	(2) 208 V RECEPTS RM 113	8000	MISC	3	2	140	8.0	38	48	50	6	---	8	3/4	2.3%
9	-----	-	-	-	-	-	0.0								
11	REC RM 112	6	REC	3	1	140	1.1	9	11	20	10	10	12	3/4	2.3%
13							0.0								
15		-	-	-	-	-	0.0								
17	PIPE TH'DING MACH. RM 102	1 1/2	HP	3	1	40	2.4	20	25	40	8	8	10	3/4	0.9%
19	REC RM 110	3	REC	3	1	120	0.5	5	6	20	12	12	12	3/4	1.5%
21	EF 1-1 RM 106	1/4	HP	3	1	80	0.7	6	7	20	12	12	12	3/4	1.3%
23	REC RM 105	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
25	REC RM 105 (FLOOR)	1200	MISC	3	1	60	1.2	10	13	20	12	12	12	3/4	1.7%
27	REC RM 106	3	REC	3	1	80	0.5	5	6	20	12	12	12	3/4	1.0%
29	REC RMS 107 & 108	5	REC	3	1	110	0.9	8	9	20	12	12	12	3/4	2.3%
31	DRILL PRESS RM 113	3/4	HP	3	1	120	1.7	14	17	20	8	8	12	3/4	1.9%
33	REC RM 102	4	REC	3	1	60	0.7	6	8	20	12	12	12	3/4	1.0%
35	ROOFTOP REC	6	REC	3	1	180	1.1	9	11	20	10	10	12	3/4	3.0%
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	OH DOOR RM 113	1/2	HP	3	3	100	0.9	2	3	20	12	12	12	3/4	0.2%
4	-----	-	-	-	-	-	0.0								
6	-----	-	-	-	-	-	0.0								
8	REC RM 112 & CUH 1-2	1092	MISC	3	1	140	1.1	9	11	20	10	10	12	3/4	2.3%
10	REC RM 112	6	REC	3	1	140	1.1	9	11	20	10	10	12	3/4	2.3%
12	REC RM 102	6	REC	3	1	60	1.1	9	11	20	12	12	12	3/4	1.5%
14	REC RM 103 & EXT	3	REC	3	1	40	0.5	5	6	20	12	12	12	3/4	0.5%
16	REC RM 104	3	REC	3	1	60	0.5	5	6	20	12	12	12	3/4	0.8%
18	REC RM 104	3	REC	3	1	60	0.5	5	6	20	12	12	12	3/4	0.8%
20	EF 1-3 RM 115	1/3	HP	3	1	60	0.9	7	9	20	12	12	12	3/4	1.2%
22	REC RM 105	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
24	REC RM 105	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
26	REC RM 105 (FLOOR)	1200	MISC	3	1	60	1.2	10	13	20	12	12	12	3/4	1.7%
28	REC RM 106	2	REC	3	1	80	0.4	3	4	20	12	12	12	3/4	0.7%
30	PORTABLE SIS LIFT RM 113	1	HP	3	1	100	1.9	16	20	20	10	10	12	3/4	2.9%
32	BAND SAW RM 113	1/2	HP	3	1	120	1.2	10	12	20	10	10	12	3/4	2.2%
34	TV ROOM 105	500	MISC	3	1	60	0.5	4	5	20	12	12	12	3/4	0.7%
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	7	3	50	33.9	94	94	100	3	3	8	1 1/4	0.9%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	12.1	91%	11.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	9.6	100%	9.6
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	13.3	100%	13.3
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		34.9	97%	33.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-3** LOCATED: ELEC RM 123, OPERATIONS BLDG 150 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 119	5	REC	3	1	100	0.9	8	9	20	12	12	12	3/4	2.1%
3	REC RM 119	6	REC	3	1	100	1.1	9	11	20	12	12	12	3/4	2.6%
5	WRK STA CONNECTION RM 11	8	REC	3	1	100	1.4	12	15	20	10	10	12	3/4	2.2%
7	OVER HEAD DOOR	1/2	HP	4	3	80	0.9	2	3	20	12	---	12	3/4	0.2%
9	-RM 124	-	-	-	-	-	0.0								
11	-----	-	-	-	-	-	0.0								
13	(3) 208V RECEPT RM 132	8000	MISC	3	2	140	8.0	38	48	50	6	---	8	3/4	2.3%
15	-----	-	-	-	-	-	0.0								
17	BUFFER/GRINDER RM 132	1	HP	3	1	100	1.9	16	20	20	10	10	12	3/4	2.9%
19	DRILL PRESS RM 132	1/2	HP	3	1	100	1.2	10	12	20	12	12	12	3/4	2.8%
21	(2) 208V RECEPT RM 126	8000	MISC	3	2	100	8.0	38	48	50	6	---	8	3/4	1.7%
23	-----	-	-	-	-	-	0.0								
25	MIG WELDER RM 126	20	MCA	3	1	80	2.4	20	20	30	10	10	10	3/4	2.9%
27	(2) BUFFER/GRINDERS RM 126	5/6	HP	3	1	80	1.7	14	17	20	10	10	12	3/4	2.0%
29	CUT-OFF SAW RM 126	0.13	MCA	3	1	80	0.0	0	0	20	12	12	12	3/4	0.0%
31	(1) 208V RECEPT RM 124	4000	MISC	3	2	60	4.0	19	24	50	6	---	8	3/4	0.5%
33	-----	-	-	-	-	-	0.0								
35					1		0.0								
37					1		0.0								
39					1		0.0								
41					1		0.0								
2	OVERHEAD DOORS	1	HP	4	3	100	1.7	5	6	20	12	---	12	3/4	0.4%
4	-RM 126	-	-	-	-	-	0.0								
6	-(2) @ 1/2HP	-	-	-	-	-	0.0								
8	UH1-6 & REC RM 126	1360	MISC	3	1	130	1.4	11	14	20	10	10	12	3/4	2.7%
10	CUH1-3 CORR 125	1 3/5	MCA	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
12							0.0								
14							0.0								
16							0.0								
18	BAND SAW RM 132	1/2	HP	3	1	100	1.2	10	12	20	12	12	12	3/4	2.8%
20	AIR DRYER RM 130	3/4	HP	3	2	80	1.6	8	10	20	12	---	12	3/4	1.0%
22	-----	-	-	-	-	-	0.0								
24	ELECTROSATIC FILTER RM126	1	HP	3	1	80	1.9	16	20	20	10	10	12	3/4	2.3%
26	GRINDER & CLEAN TNK RM126	2	HP	3	1	40	2.9	24	30	30	10	10	10	3/4	1.8%
28	DRILL PRESS RM 126	3/4	HP	3	1	80	1.7	14	17	20	10	10	12	3/4	2.0%
30					1		0.0								
32					1		0.0								
34					1		0.0								
36					1		0.0								
38					1		0.0								
40					1		0.0								
42					1		0.0								
TOTALS			PANEL	7	3	50	43.9	122	122	150	1/0	1/0	6	2	0.7%
										150					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	3.4	100%	3.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	16.5	100%	16.5
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	21.4	100%	21.4
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	2.6	100%	2.6
TOTALS		43.9	100%	43.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-4** LOCATED: ELEC RM 123, OPERATIONS BLDG 150 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	EWC CORR 125	500	MISC	3	1	100	0.5	4	5	20	12	12	12	3/4	1.2%
3	TV ROOM 118	500	MISC	3	1	80	0.5	4	5	20	12	12	12	3/4	0.9%
5	REC RM 132	6	REC	3	1	150	1.1	9	11	20	10	10	12	3/4	2.5%
7	REC RM 130 & EXTERIOR	3	REC	3	1	130	0.5	5	6	20	12	12	12	3/4	1.7%
9	LARGE SIGN PLOTTER RM 129	10	MCA	3	1	80	1.2	10	10	20	12	12	12	3/4	2.3%
11	REC RM 129	6	REC	3	1	80	1.1	9	11	20	12	12	12	3/4	2.0%
13	REC RM 126 & EXTERIOR	5	REC	3	1	140	0.9	8	9	20	12	12	12	3/4	3.0%
15	UH 1-8 & (6) REC RM 124 & 125	1360	MISC	3	1	80	1.4	11	14	20	12	12	12	3/4	2.6%
17					1	10	0.0								
19	EF 1-5 RM 130	1/2	HP	3	1	80	1.2	10	12	20	12	12	12	3/4	2.2%
21	EF 1-4 & EF 1-2 RM 123 (2)@1/	1/2	HP	3	1	60	1.2	10	12	20	12	12	12	3/4	1.7%
23	MICROWAVE RM 118	1400	MISC	3	1	100	1.4	12	15	20	10	10	12	3/4	2.1%
25	MICROWAVE RM 118	1400	MISC	3	1	100	1.4	12	15	20	10	10	12	3/4	2.1%
27	(2) VENDING RM 118	1200	MISC	3	1	140	1.2	10	13	20	10	10	12	3/4	2.6%
29	ICE MACHINE RM 118	1000	MISC	3	1	100	1.0	8	10	20	12	12	12	3/4	2.4%
31					1		0.0								
33	UH 1-7 & (4) REC RM 126	1000	MISC	3	1	150	1.0	8	10	20	10	10	12	3/4	2.3%
35	REC RMS 109, 118 & 125	6	REC	3	1	130	1.1	9	11	20	10	10	12	3/4	2.1%
37					1		0.0								
39					1		0.0								
41					1		0.0								
2	DISPOSAL RM 118	3/4	HP	3	1	100	1.7	14	17	20	10	10	12	3/4	2.5%
4	REC RM 118 & EXTERIOR	4	REC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
6	REC RM 129	6	REC	3	1	80	1.1	9	11	20	12	12	12	3/4	2.0%
8	SMALL SIGN PLOTTER RM 129	10	MCA	3	1	80	1.2	10	10	20	12	12	12	3/4	2.3%
10	REC RM 127 & 128, UH 1-9	729	MISC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
12					1	10	0.0								
14	REC RM 125 & 124	7	MISC	3	1	80	0.0	0	0	20	12	12	12	3/4	0.0%
16	REC ROOF	4	REC	3	1	180	0.7	6	8	20	10	10	12	3/4	2.0%
18	REC RM 131	6	REC	3	1	80	1.1	9	11	20	12	12	12	3/4	2.0%
20	REC RM 131	6	REC	3	1	80	1.1	9	11	20	12	12	12	3/4	2.0%
22	FURN CONNECTION RM 131	12	REC	3	1	80	2.2	18	23	25	10	10	10	3/4	2.6%
24	MICROWAVE RM 118	1400	MISC	3	1	100	1.4	12	15	20	10	10	12	3/4	2.1%
26	COFFEE RM 118	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
28	(2) VENDING RM 118	1200	MISC	3	1	150	1.2	10	13	20	10	10	12	3/4	2.8%
30	REC RM 131	4	REC	3	1	80	0.7	6	8	20	12	12	12	3/4	1.4%
32	UH 1-5 & (6) REC RM 132	1360	MISC	3	1	120	1.4	11	14	20	10	10	12	3/4	2.5%
34	REC RM 117	3	REC	3	1	120	0.5	5	6	20	12	12	12	3/4	1.5%
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	7	3	50	32.1	89	89	150	1/0	1/0	6	2	0.5%
										150					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	12.8	89%	11.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	4.0	100%	4.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	14.3	100%	14.3
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	2.4	100%	2.4
TOTALS		33.4	96%	32.1

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-5** LOCATED: ELEC RM 123, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	(2) OH DOORS RM 116 & 132	1	HP	4	3	220	1.7	5	6	20	12	---	12	3/4	0.8%
3	-----	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7	REC RM 116	6	REC	3	1	200	1.1	9	11	20	8	8	12	3/4	2.1%
9	208V REC RM 133	8000	MISC	3	2	175	8.0	38	48	50	6	---	8	3/4	2.9%
11	-----	-	-	-	-	-	0.0								
13	13.2KV SWGR COND HEATER	1200	MISC	3	1	200	1.2	10	13	20	8	8	12	3/4	2.3%
15					1		0.0								
17					1		0.0								
19					1		0.0								
21					1		0.0								
23					1		0.0								
25					1		0.0								
27					1		0.0								
29					1		0.0								
31					1		0.0								
33					1		0.0								
35					1		0.0								
37					1		0.0								
39					1		0.0								
41					1		0.0								
2	208V REC RM 116	8000	MISC	3	2	100	8.0	38	48	50	6	---	8	3/4	1.7%
4	-----	-	-	-	-	-	0.0								
6	REC & UH1-5 RM 116	1360	MISC	3	1	160	1.4	11	14	20	8	8	12	3/4	2.1%
8	REC RM 133	6	REC	3	1	120	1.1	9	11	20	10	10	12	3/4	2.0%
10	REC RM 133	5	REC	3	1	120	0.9	8	9	20	12	12	12	3/4	2.6%
12	REC RM 133	6	REC	3	1	160	1.1	9	11	20	10	10	12	3/4	2.6%
14					1		0.0								
16					1		0.0								
18					1		0.0								
20					1		0.0								
22					1		0.0								
24					1		0.0								
26					1		0.0								
28					1		0.0								
30					1		0.0								
32					1		0.0								
34					1		0.0								
36					1		0.0								
38					1		0.0								
40					1		0.0								
42					1		0.0								
TOTALS			PANEL	7	3	50	24.4	68	68	100	3	3	8	1 1/4	0.7%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	4.1	100%	4.1
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	1.7	100%	1.7
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	18.6	100%	18.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		24.4	100%	24.4

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-6** LOCATED: ELEC RM 134, OPERATIONS BLDG 150 AMP MAIN LUGS ONLY & ISOLATED GROUND BUS

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 142	3	REC	3	1	130	0.5	5	6	20	12	12	12	3/4	1.7%
3	REC RM 141	3	REC	3	1	130	0.5	5	6	20	12	12	12	3/4	1.7%
5	REC RM 135	3	REC	3	1	110	0.5	5	6	20	12	12	12	3/4	1.4%
7	FLOOR BOX RM 135	5	REC	3	1	45	0.9	8	9	20	12	12	12	3/4	1.0%
9	FLOOR BOX RM 135	5	REC	3	1	45	0.9	8	9	20	12	12	12	3/4	1.0%
11	FLOOR BOX RM 135	5	REC	3	1	70	0.9	8	9	20	12	12	12	3/4	1.5%
13	FLOOR BOX RM 135	5	REC	3	1	50	0.9	8	9	20	12	12	12	3/4	1.1%
15	REFRIGERATOR RM 159	700	MISC	3	1	60	0.7	6	7	20	12	12	12	3/4	1.0%
17	REC RM 156	2	REC	3	1	100	0.4	3	4	20	12	12	12	3/4	0.9%
19	FLOOR BOX RM 135	5	REC	3	1	130	0.9	8	9	20	12	12	12	3/4	2.8%
21	FLOOR BOX RM 135	5	REC	3	1	90	0.9	8	9	20	12	12	12	3/4	1.9%
23	REC RM 142	3	REC	3	1	90	0.5	5	6	20	12	12	12	3/4	1.1%
25	REC RM 141	3	REC	3	1	90	0.5	5	6	20	12	12	12	3/4	1.1%
27	TV & REC RM 155	960	MISC	3	1	100	1.0	8	10	20	12	12	12	3/4	2.3%
29	REC RM 155	2	REC	3	1	120	0.4	3	4	20	12	12	12	3/4	1.0%
31	(3) COMPUTER STA RM 151	1440	MISC	3	1	120	1.4	12	15	20	10	10	12	3/4	2.6%
33	REC RM 152	2	REC	3	1	140	0.4	3	4	20	12	12	12	3/4	1.2%
35	TV & REC RM 152	960	MISC	3	1	140	1.0	8	10	20	10	10	12	3/4	2.1%
37					1	10	0.0								
39							0.0								
41					1	10	0.0								
2	REC RM 135 & EXTERIOR	5	REC	3	1	100	0.9	8	9	20	12	12	12	3/4	2.1%
4	TV & REC RM 156	960	MISC	3	1	120	1.0	8	10	20	12	12	12	3/4	2.7%
6	FLOOR BOX RM 135	5	REC	3	1	60	0.9	8	9	20	12	12	12	3/4	1.3%
8	FLOOR BOX RM 135	5	REC	3	1	60	0.9	8	9	20	12	12	12	3/4	1.3%
10	COFFEE RM 159	500	MISC	3	1	60	0.5	4	5	20	12	12	12	3/4	0.7%
12	MICROWAVE RM 159	1200	MISC	3	1	60	1.2	10	13	20	12	12	12	3/4	1.7%
14	FLOOR BOX RM 135	5	REC	3	1	90	0.9	8	9	20	12	12	12	3/4	1.9%
16	FLOOR BOX RM 135	5	REC	3	1	110	0.9	8	9	20	12	12	12	3/4	2.3%
18	FLOOR BOX RM 135	5	REC	3	1	110	0.9	8	9	20	12	12	12	3/4	2.3%
20	FLOOR BOX RM 135	5	REC	3	1	110	0.9	8	9	20	12	12	12	3/4	2.3%
22	FLOOR BOXES RM 141 & 142	4	REC	3	1	120	0.7	6	8	20	12	12	12	3/4	2.0%
24	REC RM 144	2	REC	3	1	80	0.4	3	4	20	12	12	12	3/4	0.7%
26	(3) COMP STA RM 152,154,156	1440	MISC	3	1	150	1.4	12	15	20	8	8	12	3/4	2.1%
28	(2) COMPUTER STA RM 155	960	MISC	3	1	140	1.0	8	10	20	10	10	12	3/4	2.1%
30	TV & REC RM 154	960	MISC	3	1	140	1.0	8	10	20	10	10	12	3/4	2.1%
32	REC RM 154	2	REC	3	1	140	0.4	3	4	20	12	12	12	3/4	1.2%
34	TV & REC RM 151	960	MISC	3	1	160	1.0	8	10	20	10	10	12	3/4	2.3%
36	TV & REC RM 151	960	MISC	3	1	140	1.0	8	10	20	10	10	12	3/4	2.1%
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	7	3	50	25.5	71	71	150	1/0	1/0	6	2	0.4%
										150					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	16.9	80%	13.5
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	12.0	100%	12.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		28.9	88%	25.5

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-7** LOCATED: ELEC RM 134, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY / BREAKER

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 145 & 146	4	REC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
3	LTS INGROUND WALL WASH	1000	LTS	3	1	120	1.0	8	10	20	12	12	12	3/4	2.8%
5					1	10	0.0								
7	REC RM 149 & EF 1-9	1133	MISC	3	1	100	1.1	9	12	20	12	12	12	3/4	2.7%
9	REC RM 149, 150 & EXT	4	REC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
11	REC RM 147 & 148	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
13	VENDING	1200	MISC	3	1	50	1.2	10	13	20	12	12	12	3/4	1.4%
15	VENDING	1200	MISC	3	1	50	1.2	10	13	20	12	12	12	3/4	1.4%
**17	HEAT TRACE	1650	MISC	3	1	120	1.7	14	17	30	8	8	10	3/4	1.9%
19				3	1	10	0.0								
21				3	1	10	0.0								
23				3	1	10	0.0								
25				3	1	10	0.0								
27	DOWNSPOUT HEAT TRACE	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
29	EF1-6, EF1-7, EF1-8	898	MISC	3	1	80	0.9	7	9	20	12	12	12	3/4	1.7%
31					1	10	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	REC RM 135	3	REC	3	1	100	0.5	5	6	20	12	12	12	3/4	1.3%
4	REC RM 138	4	REC	3	1	100	0.7	6	8	20	12	12	12	3/4	1.7%
6	REC RM 134 & 135	3	REC	3	1	100	0.5	5	6	20	12	12	12	3/4	1.3%
8	REC RM 149	3	REC	3	1	100	0.5	5	6	20	12	12	12	3/4	1.3%
10	EWC RM 149	500	MISC	3	1	100	0.5	4	5	20	12	12	12	3/4	1.2%
12	REC RM 153 & EXT	3	REC	3	1	140	0.5	5	6	20	12	12	12	3/4	1.8%
14	VENDING	1200	MISC	3	1	50	1.2	10	13	20	12	12	12	3/4	1.4%
**16	HEAT TRACE	1650	MISC	3	1	120	1.7	14	17	30	8	8	10	3/4	1.9%
**18	HEAT TRACE	550	MISC	3	1	120	0.6	5	6	30	10	10	10	3/4	1.0%
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
26					1	10	0.0								
28	CUH1-4	1.6	MCA	3	1	160	0.2	2	2	20	12	12	12	3/4	0.7%
30					1	10	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	7	3	50	17.3	48	48	100	3	3	8	1 1/4	0.5%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	1.0	125%	1.3
REC	RECEPTACLES	4.7	100%	4.7
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	11.2	100%	11.2
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.2	100%	0.2
TOTALS		17.1	101%	17.3

** EDP Rated GFCI Circuit Breaker With 30 Milliamp

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SPP-1** LOCATED: ELEC RM 103, OPERATIONS BLDG 400 AMP MAIN LUGS ONLY

CKT	277/480	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	UPS ROOM 122	59102	MISC	4	3	50	59.1	71	89	80	3	---	8	1 1/4	0.2%
3	-----	-	-	-	-	-	0.0								
5	-----	-	-	-	-	-	0.0								
7	PNL SDP-1 VIA XFMR TSDP-1	20640	MISC	4	3	10	20.6	25	31	50	6	---	10	3/4	0.0%
9	-----	-	-	-	-	10	0.0								
11	-----	-	-	-	-	10	0.0								
13	PNL SLP-3	8543	LTS	5	3	10	8.5	10	13	50	6	6	10	1	0.0%
15	-----	-	-	-	-	10	0.0								
17	-----	-	-	-	-	10	0.0								
19	PMPS P1 & P2 RM 100	1 1/2	HP	4	3	80	2.5	3	4	20	12	---	12	3/4	0.1%
21	-----	-	-	-	-	-	0.0								
23	-----	-	-	-	-	-	0.0								
25	RTU 1-6A	19.4	MCA	4	3	100	16.1	19	19	25	10	---	10	3/4	0.4%
27	-----	-	-	-	-	-	0.0								
29	-----	-	-	-	-	-	0.0								
31	RADIO TOWER BUILDING A	10000	MISC	5	3	300	10.0	12	15	20	10	10	12	1	1.4%
33	-----	-	-	-	-	-	0.0								
35	-----	-	-	-	-	-	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	PNL SLP-1	4869	LTS	5	3	10	4.9	6	7	50	6	6	10	1	0.0%
4	-----	-	-	-	-	10	0.0								
6	-----	-	-	-	-	10	0.0								
8	PNL SLP-2	4525	MISC	5	3	10	4.5	5	7	50	6	6	10	1	0.0%
10	-----	-	-	-	-	10	0.0								
12	-----	-	-	-	-	10	0.0								
14	PNL SDP-2 VIA XFMR TSDP-2	6610	MISC	4	3	10	6.6	8	10	50	6	---	10	3/4	0.0%
16	-----	-	-	-	-	10	0.0								
18	-----	-	-	-	-	10	0.0								
20	RTU 1-1	106	MCA	4	3	100	88.1	106	106	125	1/0	---	6	2	0.3%
22	-----	-	-	-	-	-	0.0								
24	-----	-	-	-	-	-	0.0								
26	RTU 1-6B	19.4	MCA	4	3	100	16.1	19	19	25	10	---	10	3/4	0.4%
28	-----	-----	-	-	-	-	0.0								
30	-----	-----	-	-	-	-	0.0								
32					1	10	0.0								
34					1	10	0.0								
36					1	10	0.0								
38					1	10	0.0								
40					1	10	0.0								
42					1	10	0.0								
TOTALS			PANEL	5	3	50	240.5	289	289	400	2-4/0	2-4/0	2-2/0	2-2 1/2	0.2%
										400					

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	13.4	125%	16.8
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	2.5	100%	2.5
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	100.9	100%	100.9
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	120.4	100%	120.4
TOTALS		237.2	101%	240.5

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **UPS-1** LOCATED: TELECOM RM 122, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 120	5	REC	3	1	120	0.9	8	9	20	12	12	12	3/4	2.6%
3	REC RM 120	8	REC	3	1	100	1.4	12	15	20	10	10	12	3/4	2.2%
5	(3) SEC DRS RM 109, 122, 125	240	MISC	3	1	120	0.2	2	3	20	12	12	12	3/4	0.7%
7	SPARE				1	10	0.0								
9	REC BACKBOARD RM 122	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
11	RECEPT FOR RACK #1	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
13	RECEPT FOR RACK #1	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
15	J-BOX SOUTH WALL RM 122	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
17	RECEPT FOR RACK #3	24	MCA	3	1	60	2.9	24	24	30	10	10	10	3/4	2.6%
19	J-BOX SOUTH WALL RM 122	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
21	SPARE				1	10	0.0								
23	RECEPT FOR RACK #2	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
25	RECEPT FOR RACK #3	24	MCA	3	2	60	5.0	24	24	30	10	---	10	3/4	1.5%
27	-----	-	-	-	-	-	0.0								
29	RECEPT FOR RACK #3	24	MCA	3	2	60	5.0	24	24	30	10	---	10	3/4	1.5%
31	-----	-		-	-	-	0.0								
33					1	10	0.0								
35					1	10	0.0								
37					1	10	0.0								
39					1	10	0.0								
41					1	10	0.0								
2	REC RM 120	6	REC	3	1	80	1.1	9	11	20	12	12	12	3/4	2.0%
4	(3) SEC DRS RM 119, 120	360	MISC	3	1	120	0.4	3	4	20	12	12	12	3/4	1.0%
6	REC RM 121	2	REC	3	1	80	0.4	3	4	20	12	12	12	3/4	0.7%
8	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
10	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
12	RECEPT FOR RACK #2	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
14	J-BOX SOUTH WALL RM 122	16	MCA	3	1	30	1.9	16	16	20	12	12	12	3/4	1.4%
16	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
18	J-BOX SOUTH WALL RM 122	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
20					1	10	0.0								
22	REC RM 120	2	REC	3	1	80	0.4	3	4	20	12	12	12	3/4	0.7%
24	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
26	RECEPT FOR RACK #3	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
28	RECEPT FOR RACK #5	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
30	RECEPT FOR RACK #5	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
32					1	10	0.0								
34	RECEPT FOR RACK #3	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
36	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
38	RECEPT FOR RACK #3	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
40	RECEPT FOR RACK #4	16	MCA	3	1	60	1.9	16	16	20	12	12	12	3/4	2.7%
42					1	10	0.0								
TOTALS			PANEL	7	3	50	54.4	151	151	100	2	2	8	1 1/2	1.3%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	4.5	100%	4.5
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.6	100%	0.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	49.3	100%	49.3
TOTALS		54.4	100%	54.4

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **UPS-2** LOCATED: TELECOM RM 122, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	RECEPT - FUTURE RACK #10	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
3	RECEPT - FUTURE RACK #10	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
5	RECEPT - FUTURE RACK #10	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
7	RECEPT - FUTURE RACK #9	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
9	RECEPT - FUTURE RACK #9	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
11	RECEPT - FUTURE RACK #9	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
13	RECEPT - FUTURE RACK #8	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
15	RECEPT - FUTURE RACK #8	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
17	RECEPT - FUTURE RACK #8	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
19	REC RM 122	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
**21	SMOKE/FIRE DAMPERS	38	MISC	3	1	100	0.0	0	0	20	12	12	12	3/4	0.1%
23							0.0								
25							0.0								
27							0.0								
29							0.0								
31							0.0								
33							0.0								
35							0.0								
37							0.0								
39							0.0								
41							0.0								
2	RECEPT - FUTURE RACK #7	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
4	RECEPT - FUTURE RACK #7	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
6	RECEPT - FUTURE RACK #7	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
8	RECEPT - FUTURE RACK #6	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
10	RECEPT - FUTURE RACK #6	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
12	RECEPT - FUTURE RACK #6	1	REC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
14	REC RM 122	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
16	FIRE SUPPRESSION MONITOR	1200	MISC	3	1	60	1.2	10	13	20	12	12	12	3/4	1.7%
18	REC RM 122	2	1	3	1	60	0.0								
20	REC RM 122	2	1	3	1	60	0.0								
22							0.0								
24							0.0								
26							0.0								
28							0.0								
30							0.0								
32							0.0								
34							0.0								
36							0.0								
38							0.0								
40							0.0								
42							0.0								
TOTALS			PANEL	7	3	50	4.7	13	13	100	2	2	8	1 1/4	0.1%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	3.4	100%	3.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	1.2	100%	1.2
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		4.7	100%	4.7

** PROVIDE BREAKER WITH LOCK ON DEVICE

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-1** LOCATED: ELEC RM 134, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	REC RM 136	4	REC	3	1	120	0.7	6	8	20	12	12	12	3/4	2.0%
3	REC RM 139	4	REC	3	1	180	0.7	6	8	20	10	10	12	3/4	2.0%
5	120/208V REC RM 145	1	REC	4	2	60	0.2	1	1	20	12	12	12	3/4	0.1%
7	-----	-	-	-	-	-	0.0								
9	JB S WALL RM 146 RACK PWR	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
11	JB S WALL RM 146 RACK PWR	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
13	REC RM 143	3	REC	3	1	80	0.5	5	6	20	12	12	12	3/4	1.0%
15	REC RTU 1-1	1	REC	3	1	100	0.2	2	2	20	12	12	12	3/4	0.4%
17	(4) SEC DOORS 144, 146, 149,	480	MISC	3	1	200	0.5	4	5	20	12	12	12	3/4	2.3%
19	DOOR OPERATOR RM 150	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
21	J-BOX NORTH WALL RM 146	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
23					1	10	0.0								
25					1	10	0.0								
27					1	10	0.0								
29					1	10	0.0								
2	REC RM 137	4	REC	3	1	140	0.7	6	8	20	12	12	12	3/4	2.4%
4	REC RM 140	4	REC	3	1	200	0.7	6	8	20	10	10	12	3/4	2.2%
6	120/208V REC RM 145	1	REC	4	2	60	0.2	1	1	20	12	12	12	3/4	0.1%
8	-----	-	-	-	-	-	0.0								
10	REC RM 143	3	REC	3	1	80	0.5	5	6	20	12	12	12	3/4	1.0%
12	REC RM 143	3	REC	3	1	80	0.5	5	6	20	12	12	12	3/4	1.0%
14	FACP RM 149	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
16	DOOR OPERATOR RM 149	1200	MISC	3	1	100	1.2	10	13	20	12	12	12	3/4	2.8%
18	J-BOX WEST WALL RM 146	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
20	J-BOX WEST WALL RM 146	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
22	J-BOX NORTH WALL RM 146	16	MCA	3	1	40	1.9	16	16	20	12	12	12	3/4	1.8%
24					1	10	0.0								
26					1	10	0.0								
28					1	10	0.0								
30					1	10	0.0								
TOTALS			PANEL	7	3	50	20.6	57	57	100	2	2	8	1 1/2	0.5%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	5.0	100%	5.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	4.1	100%	4.1
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	11.5	100%	11.5
TOTALS		20.6	100%	20.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-2** LOCATED: ELEC RM 103, OPERATIONS BLDG 100 AMP MAIN LUGS ONLY

CKT	120/208	LOAD	TYPE	WIRE	#	WIRE	LOAD	LOAD	DEMAND		WIRE & CONDUIT SIZE				%
#	DESCRIPTION			CODE	POLES	LENGTH	KVA	AMPS	AMPS	BKR	PH	N	GRD	CND	DROP
1	BOILER B1 RM 100	15	MCA	3	1	80	1.8	15	15	20	10	10	12	3/4	2.2%
3	PUMP P3 RM 100	200	MISC	3	1	80	0.2	2	2	20	12	12	12	3/4	0.4%
5	(2) SEC DOORS RM 110, 111	240	MISC	3	1	100	0.2	2	3	20	12	12	12	3/4	0.6%
7	GENERATOR HEATOR	1200	MISC	3	2	80	1.2	6	7	20	12	---	12	3/4	0.8%
9	-----	-	-	-	-	-	0.0								
11	GENERATOR RECEPTACLE	1	REC	3	1	80	0.2	2	2	20	12	12	12	3/4	0.3%
13					1	10	0.0								
15					1	10	0.0								
17					1	10	0.0								
19					1	10	0.0								
21					1	10	0.0								
23					1	10	0.0								
2	BOILER B2 RM 100	15	MCA	3	1	80	1.8	15	15	20	10	10	12	3/4	2.2%
4	UNIT HEATER RM 100	200	MISC	3	1	80	0.2	2	2	20	12	12	12	3/4	0.4%
6	DURESS PB RM 105	300	MISC	3	1	40	0.3	3	3	20	12	12	12	3/4	0.3%
8	GENERATOR BAT CHRGR	500	MISC	3	2	80	0.5	2	3	20	12	---	12	3/4	0.3%
10	-----	-	-	-	-	-	0.0								
** 12	SMOKE DAMPERS RM 104, 11	190	MISC	3	1	180	0.2	2	2	20	12	12	12	3/4	0.8%
14					1	10	0.0								
16					1	10	0.0								
18					1	10	0.0								
20					1	10	0.0								
22					1	10	0.0								
24					1	10	0.0								
TOTALS			PANEL	7	3	50	6.6	18	18	100	2	2	8	1 1/2	0.2%
										100					

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	0.2	100%	0.2
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	2.8	100%	2.8
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	3.6	100%	3.6
TOTALS		6.6	100%	6.6

** PROVIDE BREAKER WITH LOCK ON DEVICE

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

Drawing: P:\2005\05309\Dwgs\CD\10-OPERATIONS-BUILDING\Elec\ELSHE151.dwg
Date: Sep 10, 2008, 3:24pm Layout: 42x30-Layout Plotted by: szelt

	AS BUILTS	9-10-2008
5	PROPOSAL REQUEST 5	7-27-2006
3	PROPOSAL REQUEST 3	6-2-2006
	CONSTRUCTION	11-1-2005
A	POST BID ADDENDUM 1	12-15-2005
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS BLDG.
POWER
SCHEDULES

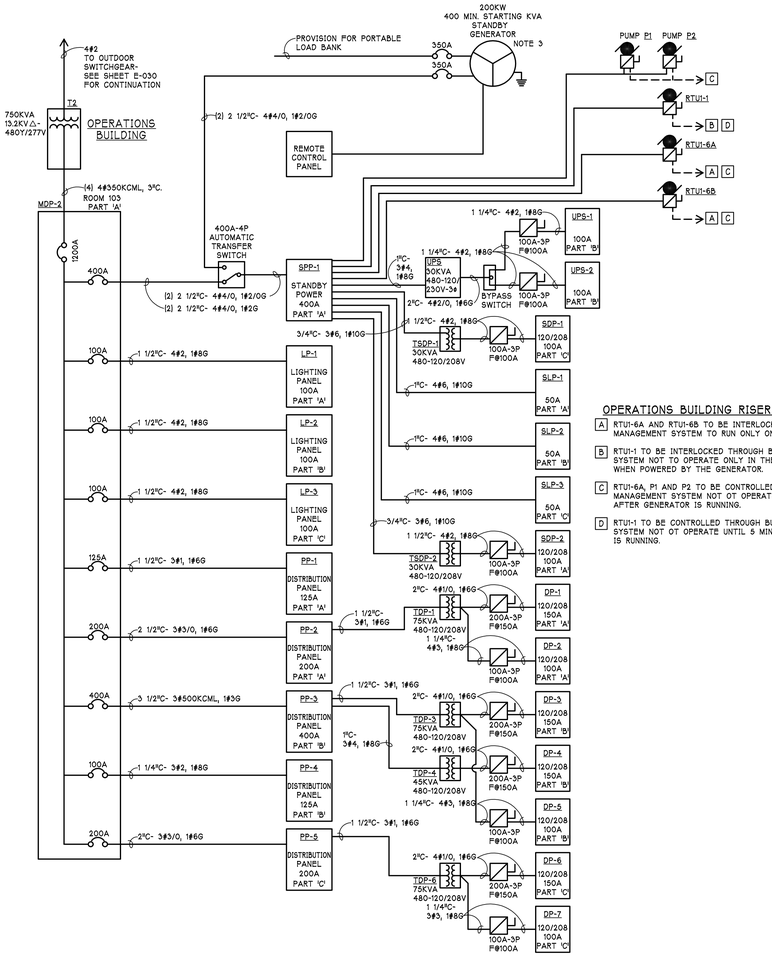
SHEET TITLE

05-309

PROJECT NUMBER

E-151

SHEET NUMBER



ELECTRICAL RISER DIAGRAM- OPERATIONS BUILDING

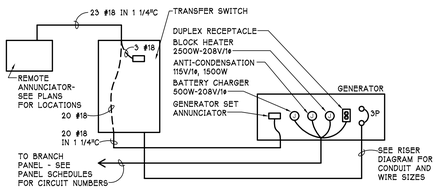
SCALE - NONE

ELECTRICAL PANEL NOTES:

1. ALL CIRCUIT BREAKERS SERVING MOTOR LOADS SHALL BE HACR RATED.
2. ALL CIRCUIT BREAKERS SERVING HID LIGHT FIXTURES SHALL BE HID RATED.
3. GENERATORS ARE FOR STANDBY USE TO KEEP THE BUILDINGS OPERATIONAL DURING PERIODS OF POWER LOSS. LIFE SAFETY SYSTEMS SUCH AS EMERGENCY EGRESS LIGHTING AND FIRE ALARM HAVE THEIR OWN EMERGENCY BATTERY SYSTEMS.

OPERATIONS BUILDING RISER NOTES:

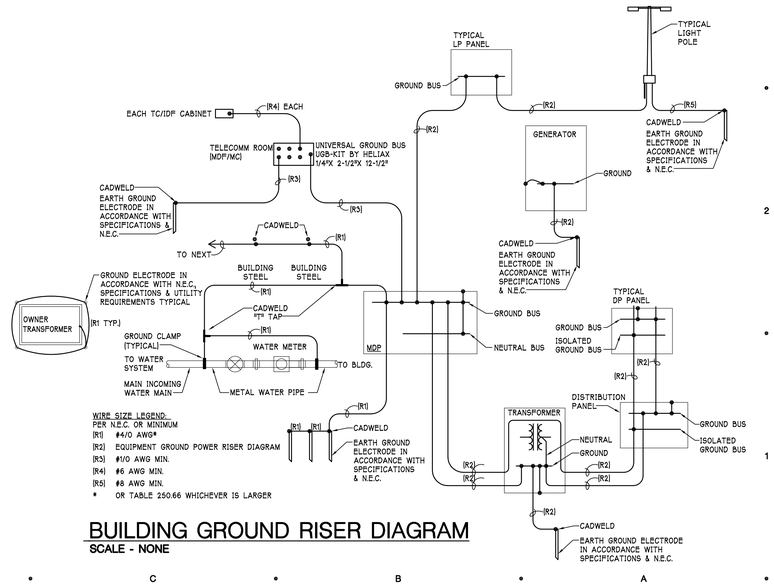
- A RTU1-6A AND RTU1-6B TO BE INTERLOCKED THROUGH BUILDING MANAGEMENT SYSTEM TO RUN ONLY ONE AT A TIME.
- B RTU1-1 TO BE INTERLOCKED THROUGH BUILDING MANAGEMENT SYSTEM NOT TO OPERATE ONLY IN THE HEAT/EXHAUST MODE WHEN POWERED BY THE GENERATOR.
- C RTU1-6A, P1 AND P2 TO BE CONTROLLED THROUGH BUILDING MANAGEMENT SYSTEM NOT OT OPERATE UNTIL 2 MINUTES AFTER GENERATOR IS RUNNING.
- D RTU1-1 TO BE CONTROLLED THROUGH BUILDING MANAGEMENT SYSTEM NOT OT OPERATE UNTIL 5 MINUTES AFTER GENERATOR IS RUNNING.



TYPICAL GENERATOR CONTROL & POWER WIRING SCHEMATIC

1 / E-160

SCALE - NONE



WIRE SIZE LEGEND:
PER N.E.C. OR MINIMUM

- [R1] #4/0 AWG*
- [R2] EQUIPMENT GROUND POWER RISER DIAGRAM
- [R3] #1/0 AWG MIN.
- [R4] #6 AWG MIN.
- [R5] #8 AWG MIN.
- * OR TABLE 250.66 WHICHEVER IS LARGER

BUILDING GROUND RISER DIAGRAM

SCALE - NONE

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

AS BUILTS	9-10-2008
5 PROPOSAL REQUEST 5	7-27-2006
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90X OWNER REVIEW	8-29-2005

DATE ISSUED

TH, NAJ
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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

OPERATIONS ELECTRICAL RISER DIAGRAM

SHEET TITLE

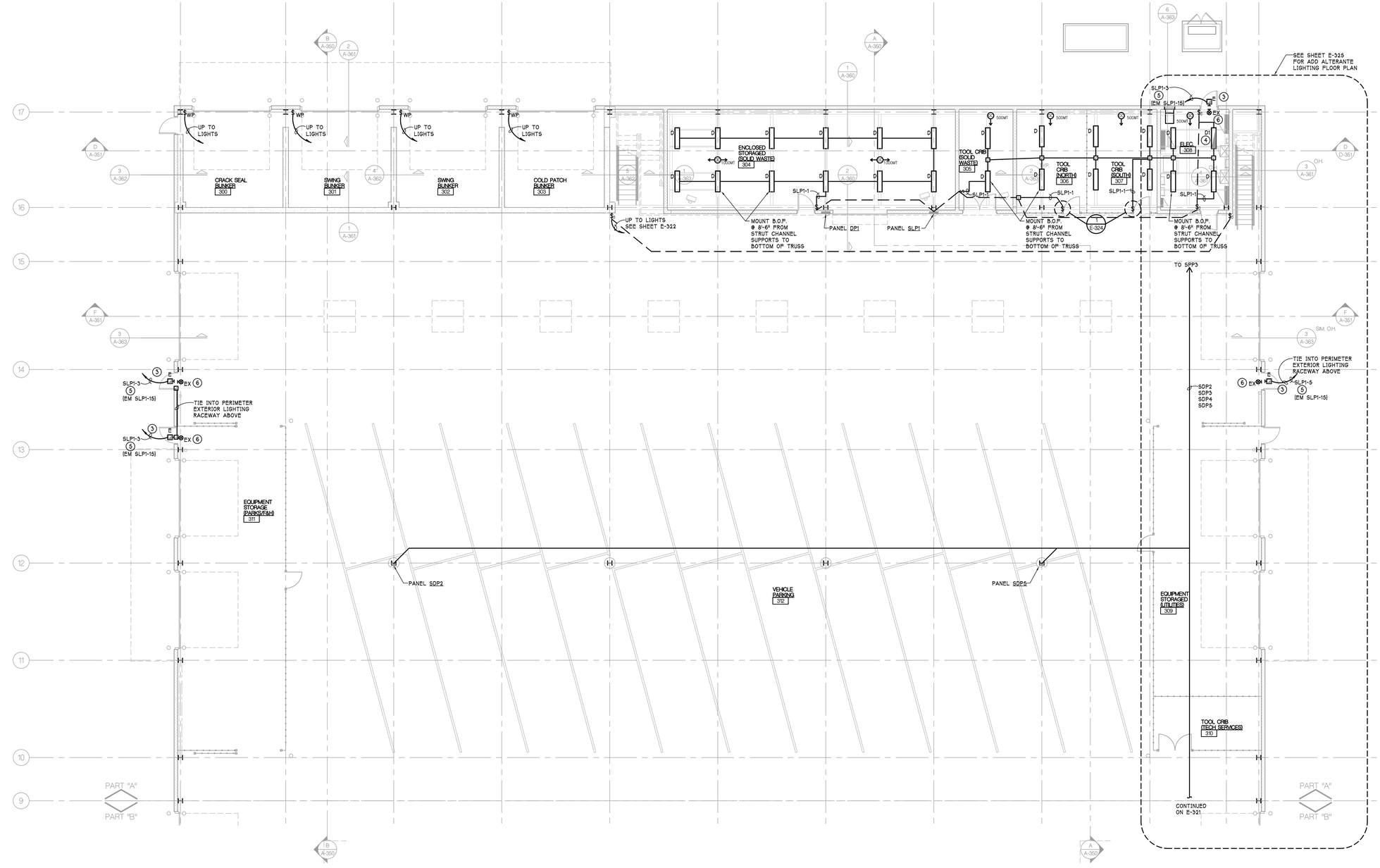
05-309

PROJECT NUMBER

E-160

SHEET NUMBER

Drawing: P:\2005\05-309\Dwgs\DGN\10-OPERATIONS BUILDING\Elec\ELSHT\E-160.dwg
Date: Sep 10, 2008, 3:25pm Layout: 42x30-Layout Plotted by: saet



NORTH

VEHICLE BUILDING 1ST FLOOR LIGHTING FLOOR PLAN - PART 'A'

SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

E360791

OCCUPANCY SENSOR LEGEND

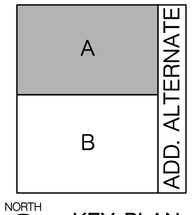
$OC	PASSIVE INFRARED WALL SWITCH WITH ADAPTABILITY
OCWT	WALL MOUNTED LONG RANGE PASSIVE INFRARED
OCUT	CEILING MOUNTED ULTRASONIC, 500 SQ. FT.
OCDT/MT	CEILING MOUNTED MULTI-TECHNOLOGY, 500 SQ. FT.
OCUT/MT	CEILING MOUNTED ULTRASONIC, 1000 SQ. FT.
OCDT/MT	CEILING MOUNTED MULTI-TECHNOLOGY, 1200 SQ. FT.
OCUT/MT	CEILING MOUNTED MULTI-TECHNOLOGY, 2000 SQ. FT.
HBO	HIGH BAY PIR MOUNTED TO ROOF STRUCTURE

NOTES:
1. ALL POWER SUPPLIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED WITH ALL OCCUPANCY SENSORS.
2. ALL OCCUPANCY SENSORS SHALL BE MOUNTED 3'-5' AWAY FROM DIRECT AIR FLOW. VERIFY FINAL LOCATIONS IN FIELD.

NOTES:

1. MOUNT EXIT LIGHT ON SIDE OF MEZZANINE STRUCTURE, APPROXIMATELY 11'-0"AFF TO CENTER LINE OF FIXTURE.
2. MOUNT EXIT LIGHT TO COLUMN WEB, APPROXIMATELY 11'-0"AFF TO CENTER LINE OF FIXTURE MAKING SURE FIXTURE IS VISIBLE OUT SIDE OF FLANGES.
3. EXTERIOR LIGHT CONTROLLED THROUGH PROGRAMMABLE LIGHTING PANEL WITH PHOTO CELL INPUT.
4. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
5. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-324 WHEN USING LIGHTING PANELS WITH CONTROLLABLE BREAKERS, REFER TO WIRING DIAGRAM 2/E-031 WHEN USING RELAY/CONTACTOR BASED LIGHTING CONTROL PANELS.
6. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS FEEDING THE BATTERY BACKUP BALLAST IN THE SAME SPACE.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

E360792

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
2 PROPOSAL REQUEST 12	2-6-2007
1 SUPP. INSTR. 7	9-21-2006
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

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PROJECT

CONSULTANT

VEHICLE BLDG. LIGHTING 1ST FL PLAN - PART 'A'

SHEET TITLE

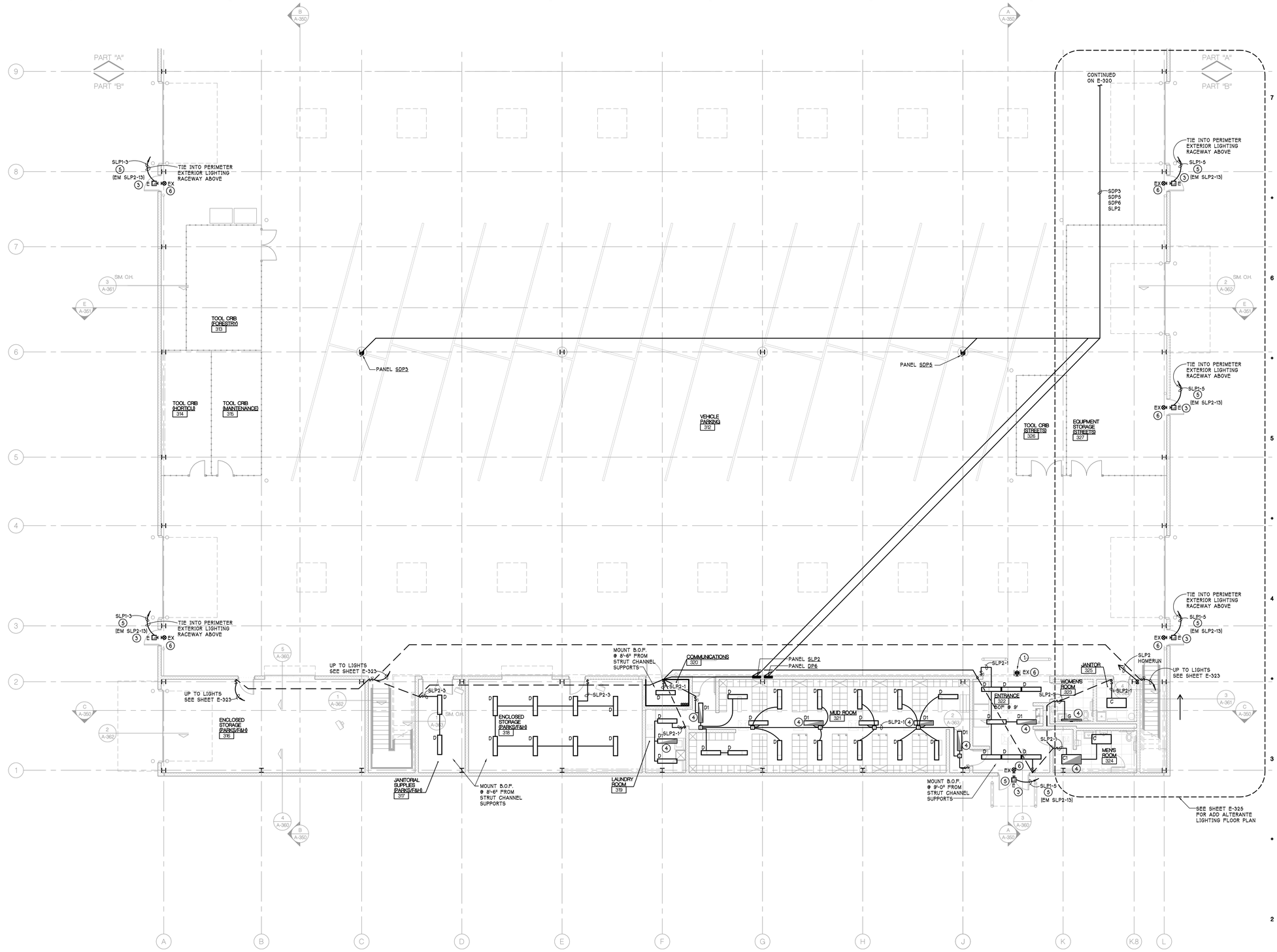
05-309

PROJECT NUMBER

E-320

SHEET NUMBER

Drawing: P:\2005\05309\dwg\CD\3D\VEHICLE BUILDING\Sec\E15\HE320.dwg
Date: Sep 11, 2006, 11:36am Layout: 42x30-Layout Plotted by: saris



NORTH

VEHICLE BUILDING 1ST FLOOR LIGHTING FLOOR PLAN - PART 'B'

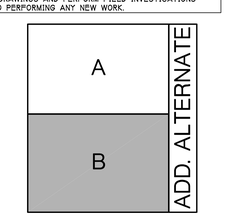
SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

ELWLP381

NOTES:

1. MOUNT EXIT LIGHT ON SIDE OF MEZZANINE STRUCTURE, APPROXIMATELY 11'-0"A.F.F. TO CENTER LINE OF FIXTURE.
2. MOUNT EXIT LIGHT TO COLUMN WEB, APPROXIMATELY 11'-0"A.F.F. TO CENTER LINE OF FIXTURE MAKING SURE FIXTURE IS VISIBLE OUT SIDE OF FLANGES.
3. EXTERIOR LIGHT CONTROLLED THROUGH LIGHTING CONTACTOR AND PHOTO CELL.
4. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
5. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-324 WHEN USING LIGHTING PANELS WITH CONTROLLABLE BREAKERS, REFER TO WIRING DIAGRAM 2/E-031 WHEN USING RELAY/CONTACTOR BASED LIGHTING CONTROL PANELS.
6. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS FEEDING THE BATTERY BACKUP BALLAST IN THE SAME SPACE AS LIGHT FIXTURES IN THE SAME SPACE.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

EL0KP350

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
2 PROPOSAL REQUEST 12	2-6-2007
1 SUPP. INSTR. 7	9-21-2006
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

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NAJ, DPD

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DP, DPD

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

VEHICLE BLDG. LIGHTING 1ST FL PLAN - PART 'B'

SHEET TITLE

05-309

PROJECT NUMBER

E-321

SHEET NUMBER

Drawing: P:\2005\05309\dwgs\CAD\0-VEHICLE BUILDING\Exc\E321Sht32.dwg
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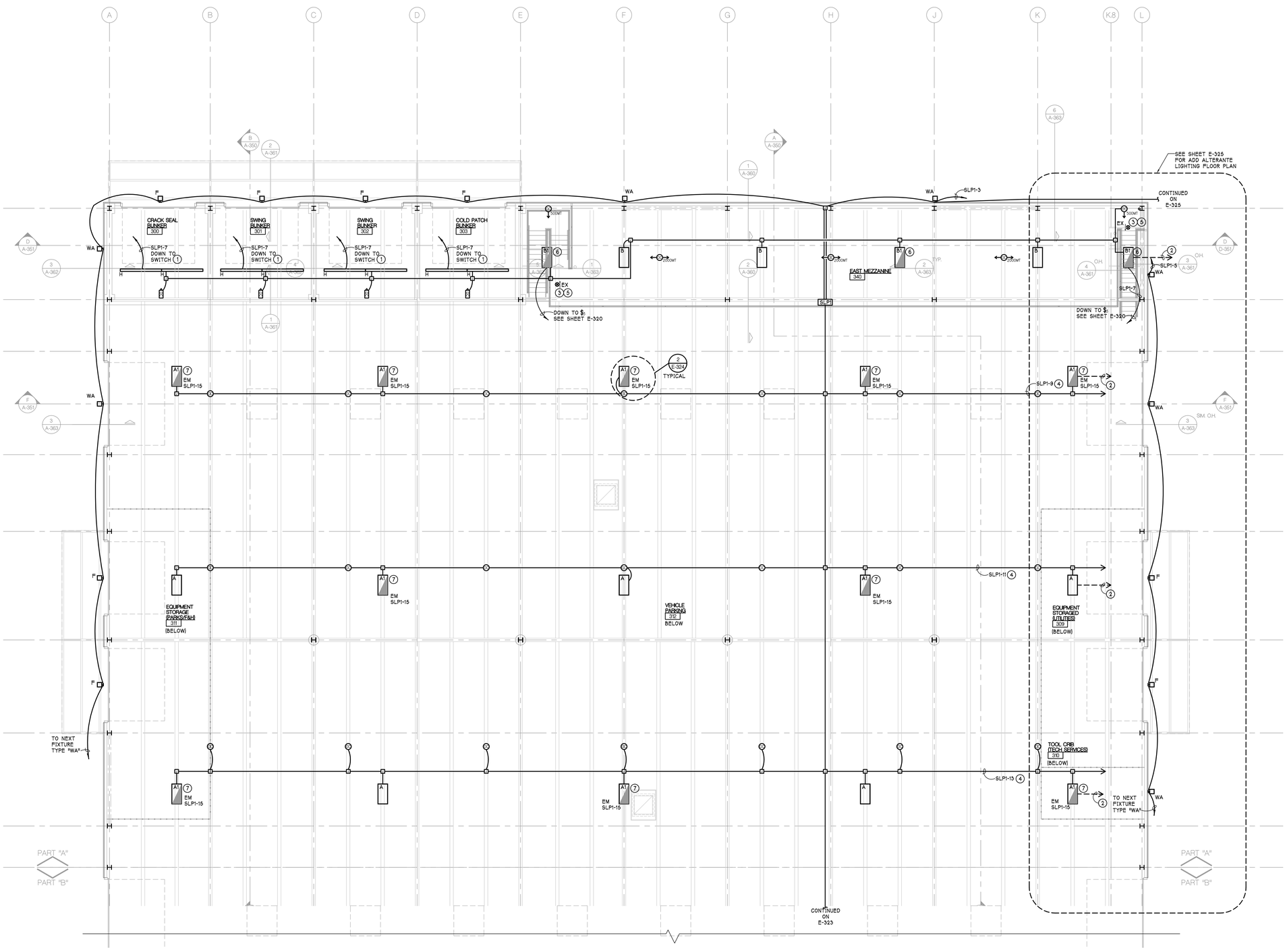


NORTH

VEHICLE BUILDING LIGHTING FLOOR PLAN - PART 'A'

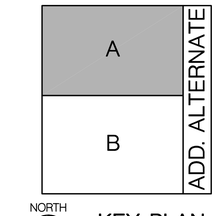
SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

ELWLP1A

NOTES:

1. CONNECT LIGHTS IN HEATED BUNKERS TO OVERHEAD DOOR OPERATOR TO ENERGIZE WHEN DOOR IS OPENED AND TO DEENERGIZE WHEN DOOR IS CLOSED.
2. TO NEXT FIXTURE OF THE ADD ALTERNATE - SHOWN ON SHEET E-326.
3. UTILIZE THE SAME NON-SWITCHED (LOCKED) CIRCUIT FOR BATTERY BACKUP EMERGENCY LIGHTS AS THE EXIT AND EXTERIOR EGRESS DOOR FIXTURES.
4. TO LIGHTING CONTROL PANEL.
5. PENDENT MOUNTED FROM ROOF STRUCTURE WITH RMC.
6. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
7. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-324 WHEN USING LIGHTING PANELS WITH CONTROLLABLE BREAKERS, REFER TO WIRING DIAGRAM 2/E-031 WHEN USING RELAY/CONTACTOR BASED LIGHTING CONTROL PANELS.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



NORTH

KEY PLAN

SCALE - N.T.S.

ELQKP1B

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

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VEHICLE BLDG. LIGHTING FLOOR PLAN - PART 'A'

SHEET TITLE

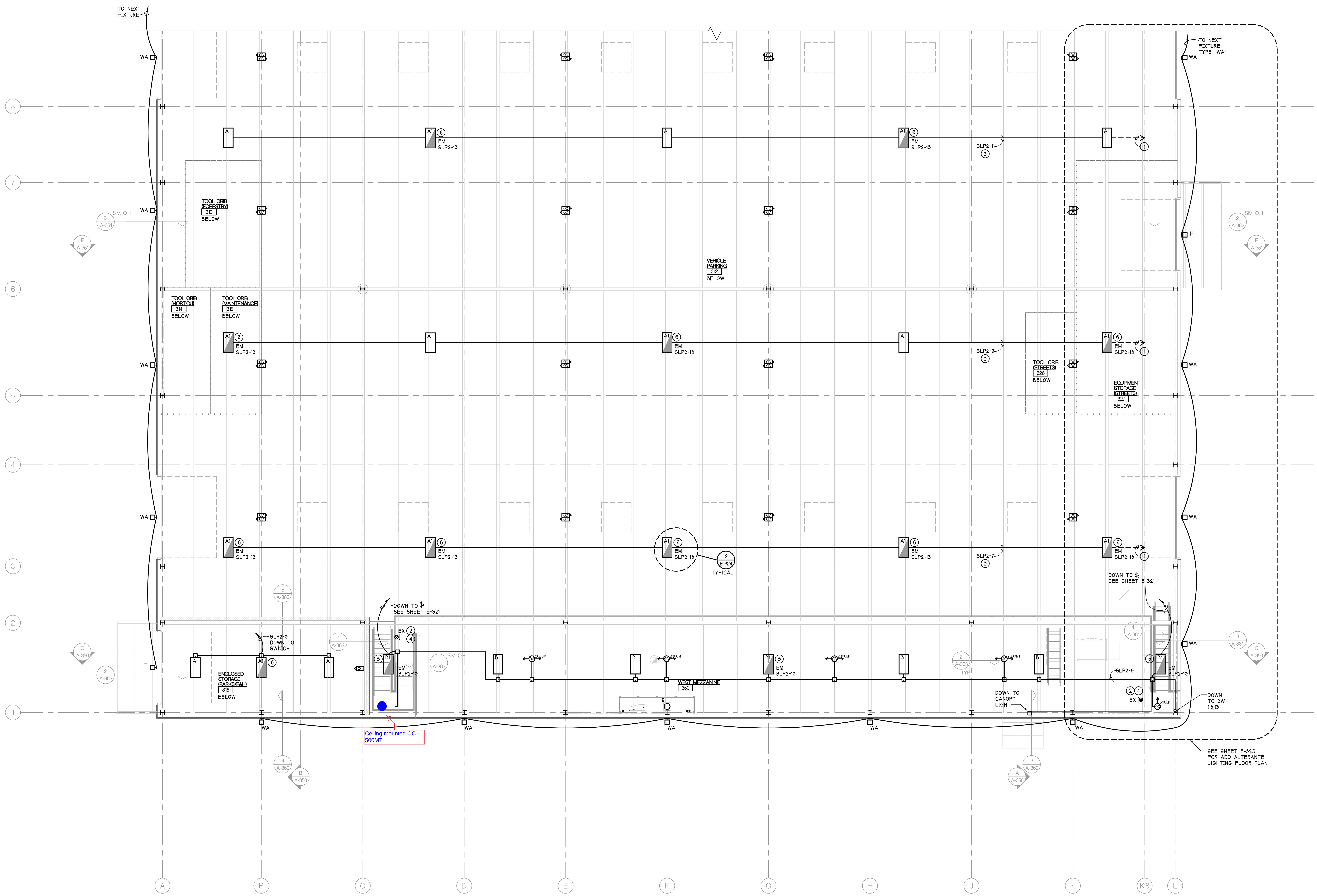
05-309

PROJECT NUMBER

E-322

SHEET NUMBER

Drawing: P:\2005\05309\Design\CAD\3D-VEHICLE BUILDING\Sheets\E-322.dwg
Date: Sep 11, 2006, 11:36am Layout: 42x30-Layout Plotted by: scott



VEHICLE BUILDING LIGHTING FLOOR PLAN - PART 'B'

NORTH

SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

NOTES:

1. TO NEXT FIXTURE OF THE ADD ALTERNATE - SHOWN ON SHEET E=325.
2. CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXTURES IN THE SAME SPACE.
3. TO LIGHTING PANEL
4. PENDENT MOUNTED FROM ROOF STRUCTURE WITH RMC
5. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO DETAILS 1A/E-031 OR 1B/E-031.
6. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-324 WHEN USING LIGHTING PANELS WITH CONTROLLABLE BREAKERS, REFER TO WIRING DIAGRAM 2/E-031 WHEN USING RELAY/CONTACTOR BASED LIGHTING CONTROL PANELS.

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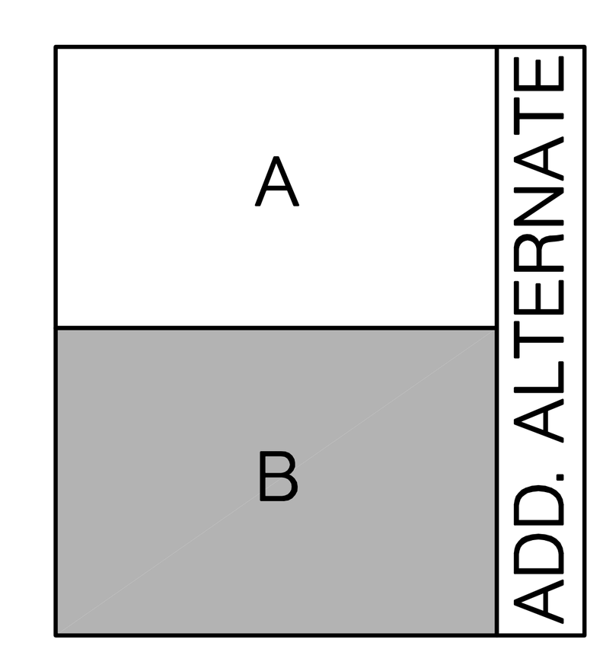

NORTH

KEY PLAN

SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
12 PROPOSAL REQUEST 12	2-6-2007
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PROJECT

CONSULTANT

VEHICLE BLDG. LIGHTING FLOOR PLAN - PART 'B'

SHEET TITLE

05-309

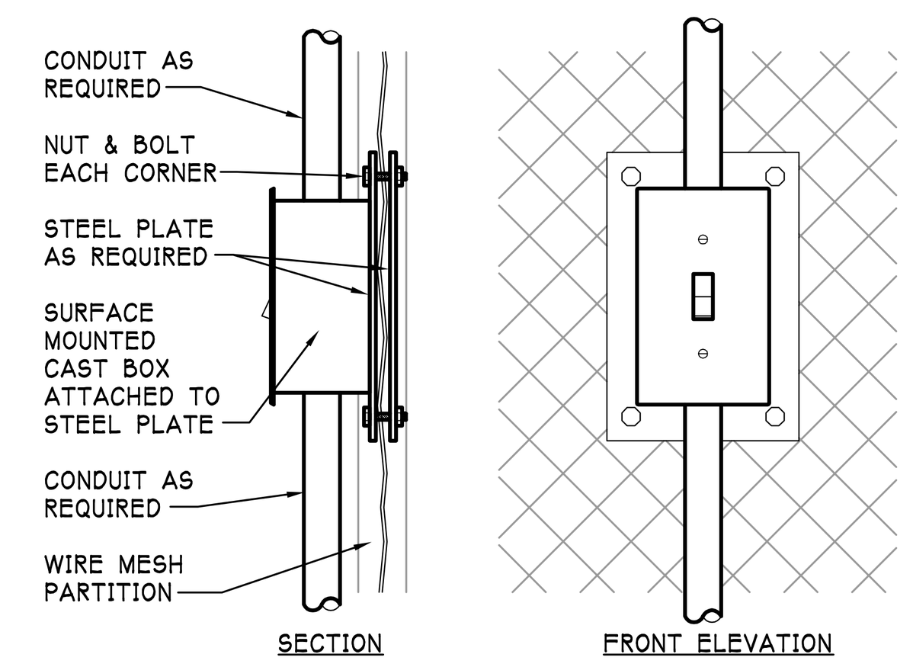
PROJECT NUMBER

E-323

SHEET NUMBER

VEHICLE STORAGE BUILDING LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A (A1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, BROAD BEAM DISTRIBUTION	HOLOPHANE OR PRE APPROVED EQUAL	HBS4-XSWGDU-K46MK32	54W T5HO	6	3	363	3500K	277V	BALLAST FOR DUEL LEVEL SWITCHING; 19'-0"AFF TO BOTTOM OF FIXTURE (EXCEPT WHERE NOTED); PROVIDE WITH WIRE GUARD; FIXTURE TYPE "A1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
B (B1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, BROAD BEAM DISTRIBUTION	HOLOPHANE OR PRE APPROVED EQUAL	HBS4-XSWGDU-K44MK22	54W T5HO	4	2	249	3500K	277V	19'-0"AFF TO BOTTOM OF FIXTURE (& 10'-0" ABOVE MEZZ. FLOOR @ MEZZ); PROVIDE WITH WIRE GUARD; FIXTURE TYPE "B1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
C	2'x4' RECESSED GRID TROFFER WITH #12 PATTERN, .125" ACRYLIC DIFFUSER, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2GT8 332 A12125 277 1/3GB	32W T8	3	1	85	3500K	277V	FIXTURE TYPE "C1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
D (D1)	4' SURFACE MOUNT SPECIFICATION GRADE WRAPAROUND WITH HIGH IMPACT, VANDAL RESISTANT ACRYLIC, PRISMATIC DIFFUSER, BACKED WHITE ENAMEL ON CODE GAUGE STEEL HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	CLM-232-277-GEB	32W T8	2	1	58	3500K	277V	FIXTURE TYPE "D1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN (SEE DETAIL 1A/E-031 OR 1B/E-031)
E	COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0° STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42TRT MD 277 *	42W TRT	2	1 COLD TEMP.**	84	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"AFF; PROVIDE WITH ONE LAMP ON EMERGENCY BALLAST AT EGRESS DOORS AS SHOWN ON FLOOR PLAN- LITHONIA #PSDL3 (SEE DETAIL 2/E-031)
F	METAL HALIDE WALL MOUNT EXTERIOR WITH FORWARD THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 100M FT 277 *	100W ED17	1	1	120	-	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT TOP OF FIXTURE IS TIGHT UP AGAINST BOTTOM OF CANOPY
G	4' WALL BRACKET WITH HEAVY DUTY GRADE STEEL AND RUST RESISTANCE FINISH, #12 PATTERN ACRYLIC DIFFUSERS, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	WC 2 32 A12 277 ES	32W T8	2	1	64	3500K	277V	MOUNT BOTTOM OF FIXTURE @ 7'-0"AFF; PROVIDE EMERGENCY BALLAST
H	TANDEM ENCLOSED & GASKETED INDUSTRIAL WITH HIGH IMPACT ACRYLIC DIFFUSER, INSTANT START BALLAST, FOR DAMP LOCATIONS, CHAIN HANGER ACCESSORIES	LITHONIA OR PRE APPROVED EQUAL	TDM 432 12 277 GEB10IS BCD HC36	32W T8	4	1	130	3500K	277V	PROVIDE WITH ALL NECESSARY COMPONENTS TO CHAIN HANG FIXTURE SO THAT BOTTOM OF FIXTURE IS AT 19'-0"AFF
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120	--	277V	VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 18'-0"AFF
EX	THERMOPLASTIC LED EXIT WITH STENCIL FACE, WHITE HOUSING, SINGLE FACE WITH EXTRA FACE PLATE, LED LETTERS, UNIVERSAL MOUNT, NI-CAD BATTERY	LITHONIA OR PRE APPROVED EQUAL	LQM S W 3 R 120/277 ELN	LED	--	--	.69	--	277V	CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXTURES IN THE SAME SPACE



1 / E-324 **LIGHT SWITCH MOUNTING DETAIL**

SCALE - NONE

ELSHE324

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AS BUILTS	9-10-2008
12 PROPOSAL REQUEST 12	2-6-2007
G SUPP. INSTR. 7	9-21-2006
CONTRACT SET	2-6-2006
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90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

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PROJECT

CONSULTANT

VEHICLE BLDG. LIGHT FIXTURE SCHEDULE & DETAILS

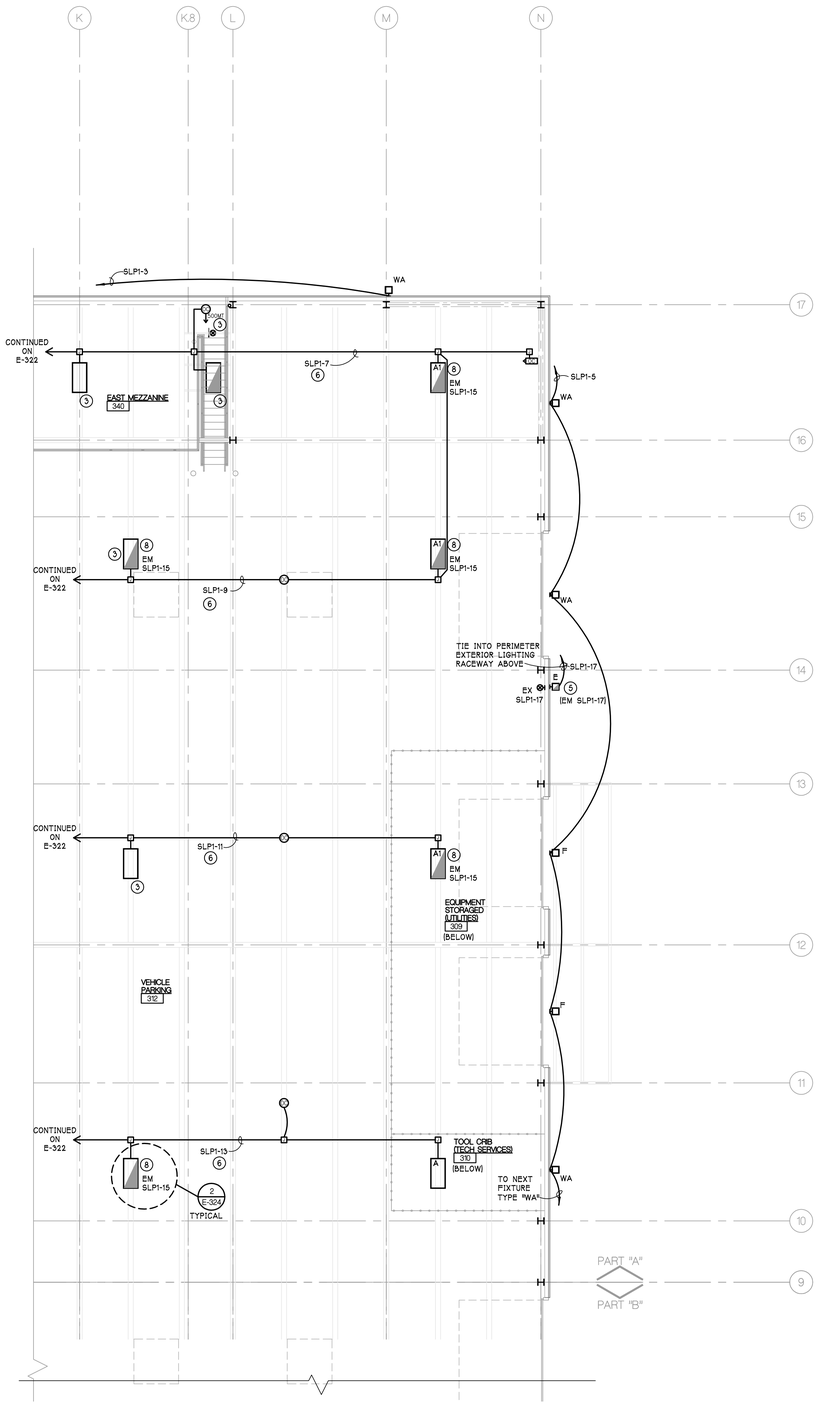
SHEET TITLE

05-309

PROJECT NUMBER

E-324

SHEET NUMBER

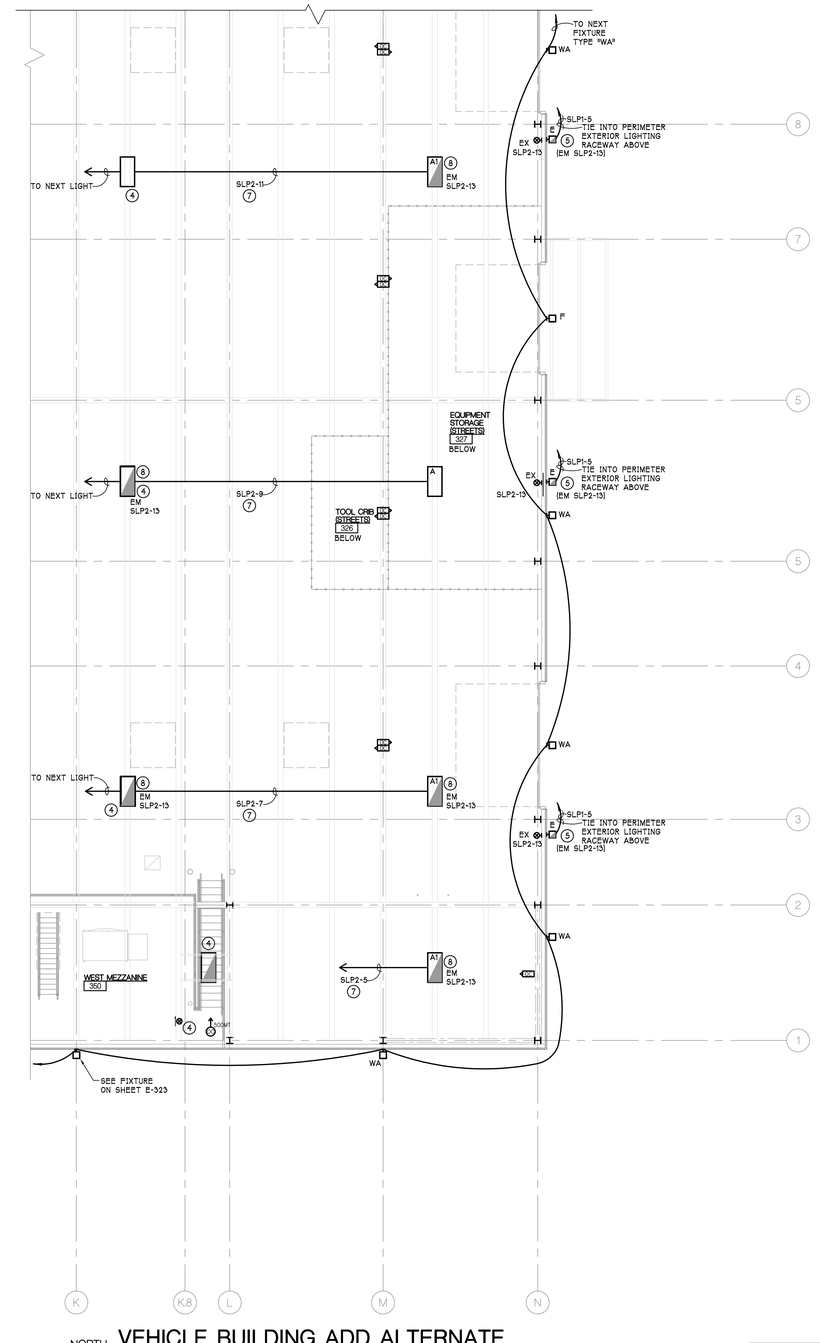


NORTH

VEHICLE BUILDING ADD ALTERNATE LIGHTING FLOOR PLAN - PART 'A'

SCALE - 1/8" = 1'-0" (THIS ALTERNATE WAS BUILT)

ELWLP3A



NORTH

VEHICLE BUILDING ADD ALTERNATE LIGHTING FLOOR PLAN - PART 'B'

SCALE - 1/8" = 1'-0" (THIS ALTERNATE WAS BUILT)

ELWLP3B

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

NOTES:

1. MOUNT EXIT LIGHT ON SIDE OF MEZZANINE STRUCTURE, APPROXIMATELY 11'-0"AFF TO CENTER LINE OF FIXTURE.
2. MOUNT EXIT LIGHT TO COLUMN WEB, APPROXIMATELY 11'-0"AFF TO CENTER LINE OF FIXTURE MAKING SURE FIXTURE IS VISIBLE OUT SIDE OF FLANGES.
3. SEE FIXTURE ON SHEET E-322.
4. SEE FIXTURE ON SHEET E-323.
5. SEE NOTE 3 ON SHEETS E-320 AND E-321.
6. TO LIGHTING CONTROL PANEL LCP1.
7. TO LIGHTING CONTROL PANEL LCP2.
8. TYPICAL FOR ALL SIMILAR EMERGENCY LIGHT FIXTURES. REFER TO WIRING DIAGRAM 2/E-324 WHEN USING LIGHTING PANELS WITH CONTROLLABLE BREAKERS, REFER TO WIRING DIAGRAM 2/E-031 WHEN USING RELAY/CONTACTOR BASED LIGHTING CONTROL PANELS.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

A
B
ADD. ALTERNATE

NORTH

KEY PLAN

SCALE - N.T.S.

ELKEYP3D

AS BUILTS	9-10-2008
2 PROPOSAL REQUEST 12	2-6-2007
1 SUPP. INSTR. 7	9-21-2006
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PROJECT

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VEHICLE BLDG. ALT. LIGHTING FLR. PLAN - 'A' & 'B'

SHEET TITLE

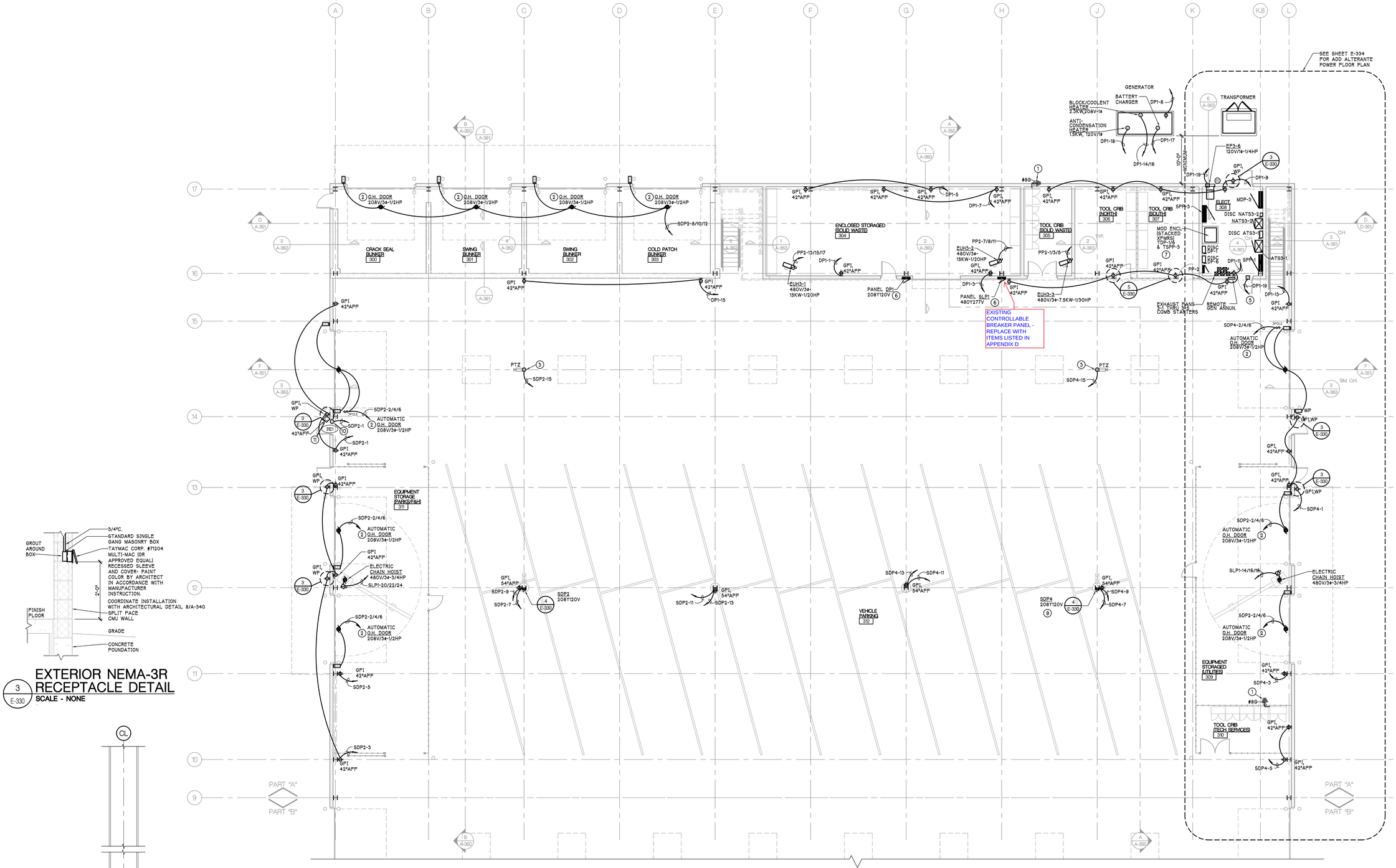
05-309

PROJECT NUMBER

E-325

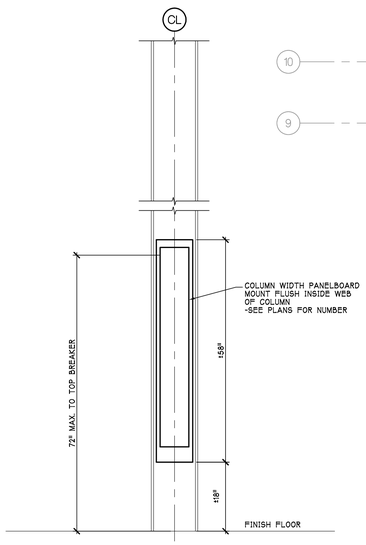
SHEET NUMBER

Drawing: P:\2005\05309\dwg\CD3D-VEHICLE BUILDING\Exc\E1SHT325.dwg
Date: Sep 11, 2006, 11:41 am Layout: 42x30-Layout Plotted by: saeb



3 E-330 EXTERIOR NEMA-3R RECEPTACLE DETAIL

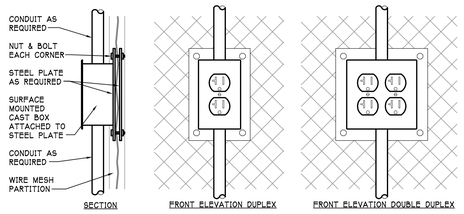
SCALE - NONE



4 E-330 COLUMN WIDTH PANEL DETAIL

NOT TO SCALE

ELW032



5 E-330 RECEPTACLE MOUNTING DETAIL

SCALE - NONE

ELW030

NORTH VEHICLE BUILDING POWER FLOOR PLAN - PART 'A'

SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

ELW075A

PLAN NOTES:

1. FLAMMABLE MATERIALS STORAGE CABINETS TO BE GROUNDED TO THE BUILDING GROUND FOR PREVENTION OF STATIC ELECTRICITY BUILD-UP.
2. ACTUAL DOOR OPERATOR VOLTAGE MAY BE DIFFERENT FROM SHOWN. COORDINATE WITH DOOR OPERATOR DOOR PLANS.
3. PROVISION FOR PTZ CAMERA POWER, COORDINATE WITH CAMERA INSTALLER. CAMERA PROVIDED BY OTHERS.
4. MINIMUM WIRE SIZE TO BE #10AWG TO MINIMIZE VOLTAGE DROP.
5. MOTORIZED DAMPER INTERLOCKED TO EXHAUST FAN EF3-6
6. GROUP OVERHEAD RACEWAYS UP COLUMN & EXTEND TO ROOF DECK. ALL RACEWAYS TO RUN PARALLEL OR PERPENDICULAR TO ROOF STRUCTURE
7. TRANSFORMERS TPD-1/6 & TSDP-3 STACKED IN A SINGLE ENCLOSURE (SO-D MODULAR ENCLOSURES)
8. COLUMN WIDTH PANEL
9. COLUMN WIDTH PANEL BASE BID LOCATION. SEE SHEET E-334 FOR ALTERNATE BID LOCATION
10. JUNCTION BOX WITH 120 VOLT CIRCUIT FOR SECURITY ACCESS. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
11. CARD READER JUNCTION BOX MOUNTED PLUSH WITH WALL AND 3/4" CONDUIT ROUTED INTO CEILING CAVITY ON SECURE SIDE OF DOOR. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.

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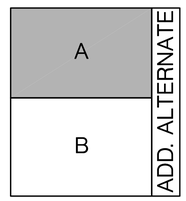

NORTH

KEY PLAN

SCALE - N.T.S.

ELGXKP90

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

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CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

NAJ, DPD

DRAWN BY

DP, DPD

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STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

VEHICLE BLDG. POWER FLOOR PLAN - PART 'A'

SHEET TITLE

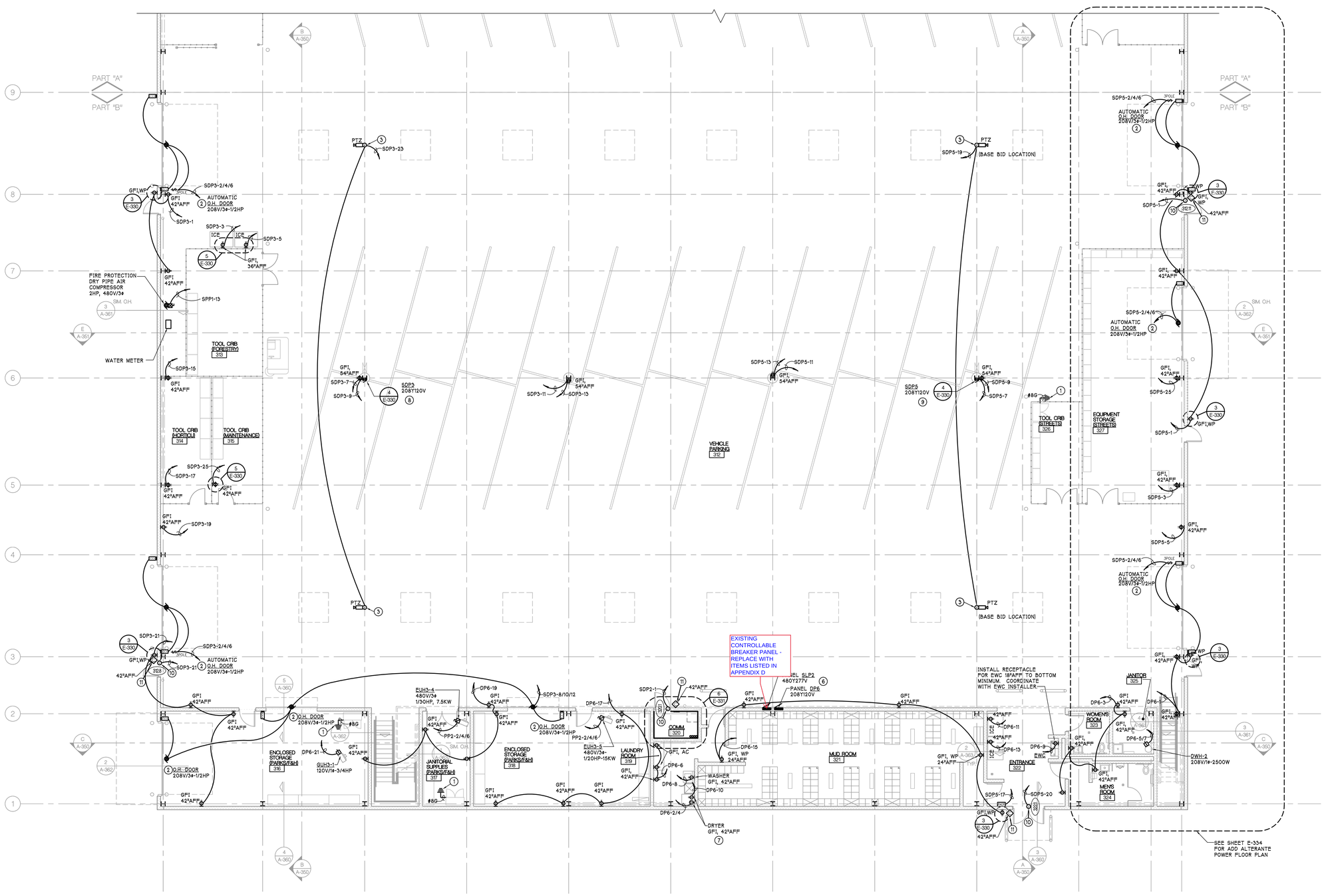
05-309

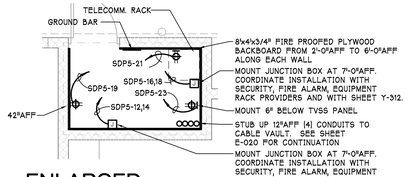
PROJECT NUMBER

E-330

SHEET NUMBER

Drawing: P:\2005\05309\dwgs\CD\30-VEHICLE BUILDING\Sheets\E330.dwg
Date: Sep 11, 2008, 11:42am Layout: 42x30-Layout Plotted by: sueh





ENLARGED COMM. 320 FLOOR PLAN

6 / E-331

SCALE - 1/4" = 1'-0"

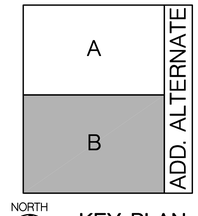
VEHICLE BUILDING POWER FLOOR PLAN - PART 'B'

SCALE - 1/8" = 1'-0" (SEE ALTERNATE)

PLAN NOTES:

1. FLAMMABLE MATERIALS STORAGE CABINETS TO BE GROUNDED TO THE BUILDING GROUND FOR PREVENTION OF STATIC ELECTRICITY BUILD-UP.
2. ACTUAL DOOR OPERATOR VOLTAGE MAY BE DIFFERENT FROM SHOWN. COORDINATE WITH DOOR OPERATOR DOOR PLANS.
3. PROVISION FOR PTZ CAMERA POWER, COORDINATE WITH CAMERA INSTALLER. CAMERA PROVIDED BY OTHERS.
4. MINIMUM WIRE SIZE TO BE #10AWG TO MINIMIZE VOLTAGE DROP.
5. NOT USED
6. GROUP OVERHEAD RACEWAYS UP COLUMN & EXTEND TO ROOF DECK. ALL RACEWAYS TO RUN PARALLEL OR PERPENDICULAR TO ROOF STRUCTURE
7. ROUGH-INS FOR BOTH GAS AND ELECTRIC DRYERS
8. COLUMN WIDTH PANEL
9. COLUMN WIDTH PANEL BASE BID LOCATION. SEE SHEET E-334 FOR ALTERNATE BID LOCATION
10. JUNCTION BOX WITH 120 VOLT CIRCUIT FOR SECURITY ACCESS. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.
11. CARD READER JUNCTION BOX MOUNTED FLUSH WITH WALL AND 3/4" CONDUIT ROUTED INTO CEILING CAVITY ON SECURE SIDE OF DOOR. COORDINATE INSTALLATION WITH SECURITY CONTRACTOR AND DOOR HARDWARE CONTRACTOR.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



KEY PLAN

SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
3	PROP REQ 13	2-19-2007
	CONTRACT SET	2-6-20056
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

VEHICLE BLDG. POWER FLOOR PLAN - PART 'B'

SHEET TITLE

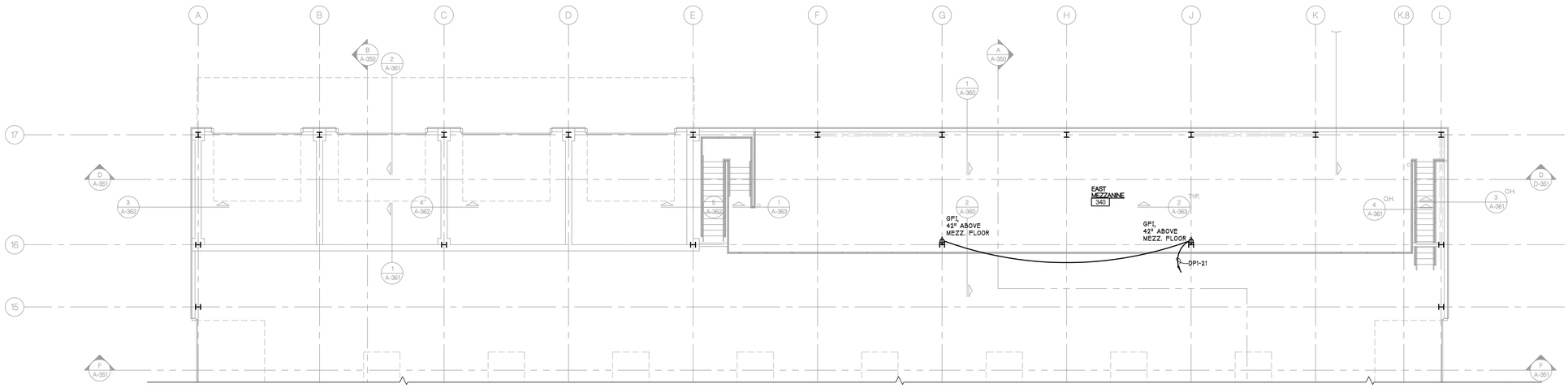
05-309

PROJECT NUMBER

E-331

SHEET NUMBER

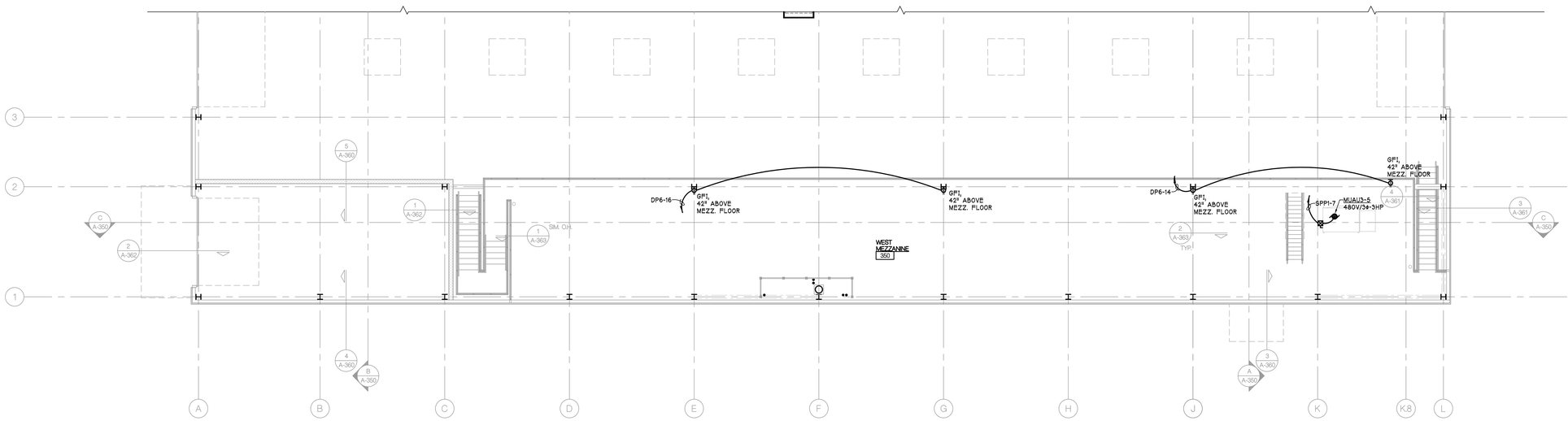
Drawing: P:\2005\05309\dwg\CAD\E-BUILDING\Elec\E-331.dwg
Date: Sep 11, 2008, 11:42am Layout: 42x30-Layout Plotted by: sadt



NORTH

VEHICLE BUILDING MEZZANINE POWER FLOOR PLAN - PART 'A'

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



NORTH

VEHICLE BUILDING MEZZANINE POWER FLOOR PLAN - PART 'B'

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

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A	ADD. ALTERNATE
B	

NORTH

KEY PLAN

SCALE - N.T.S.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

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PROJECT

CONSULTANT

VEHICLE BLDG. POWER FLOOR PLANS - MEZZ.

SHEET TITLE

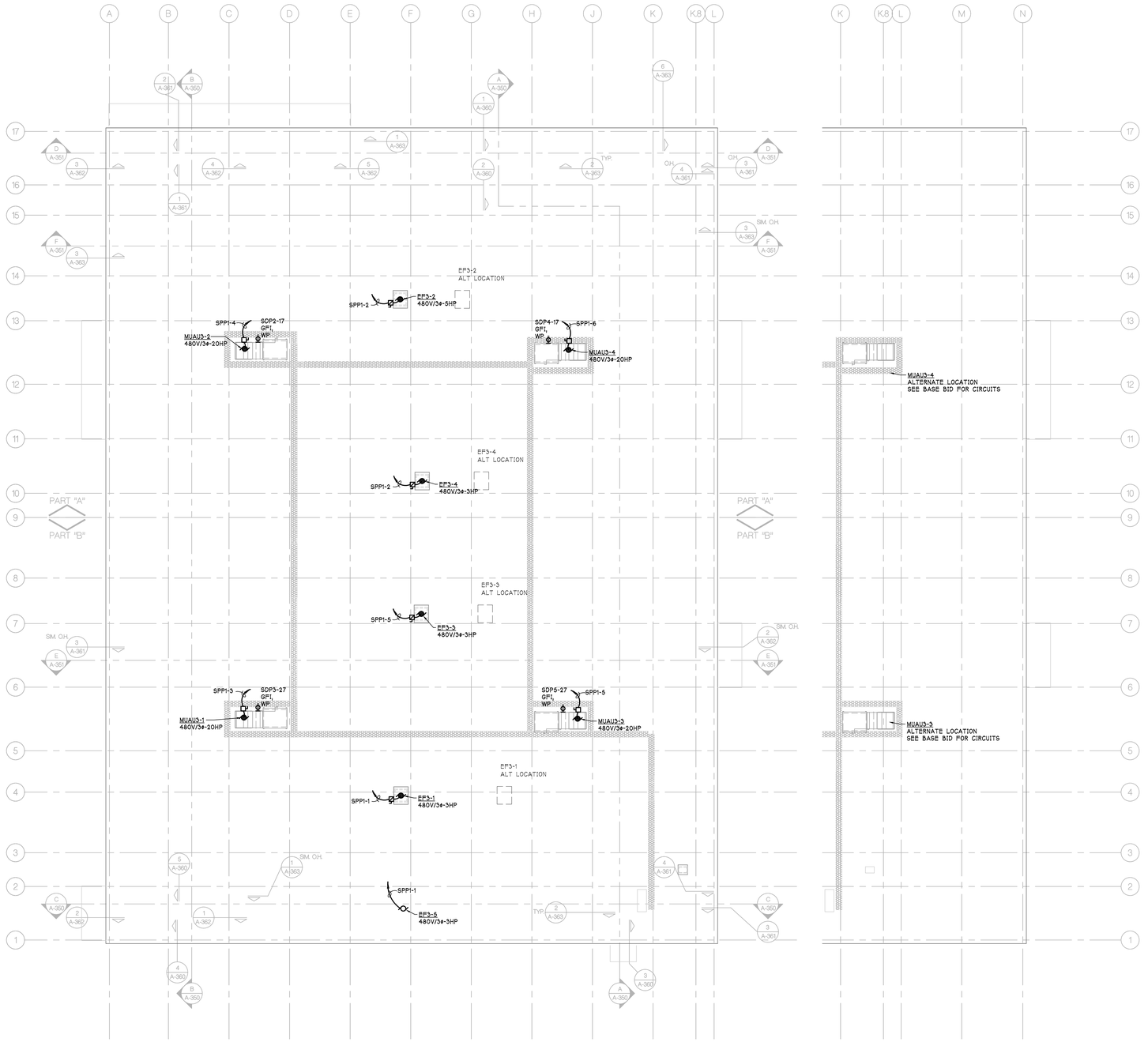
05-309

PROJECT NUMBER

E-332

SHEET NUMBER

Drawing: P:\2005\05309\dwg\ARCH\VEHICLE BUILDING\Sheet\E-SHEET332.dwg
Date: Sep 11, 2008, 11:43am Layout: 42x30-Layout Plotted by: saett



NORTH

VEHICLE BUILDING ELECTRICAL ROOF PLAN

SCALE - 1/16" = 1'-0" (SEE ALTERNATE)

NORTH

ADD ALTERANTE ELECTRICAL ROOF PLAN

SCALE - 1/16" = 1'-0" (THIS ALTERNATE WAS BUILT)

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005

DATE ISSUED

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PROJECT

CONSULTANT

VEHICLE BLDG. ELECTRICAL ROOF PLAN

SHEET TITLE

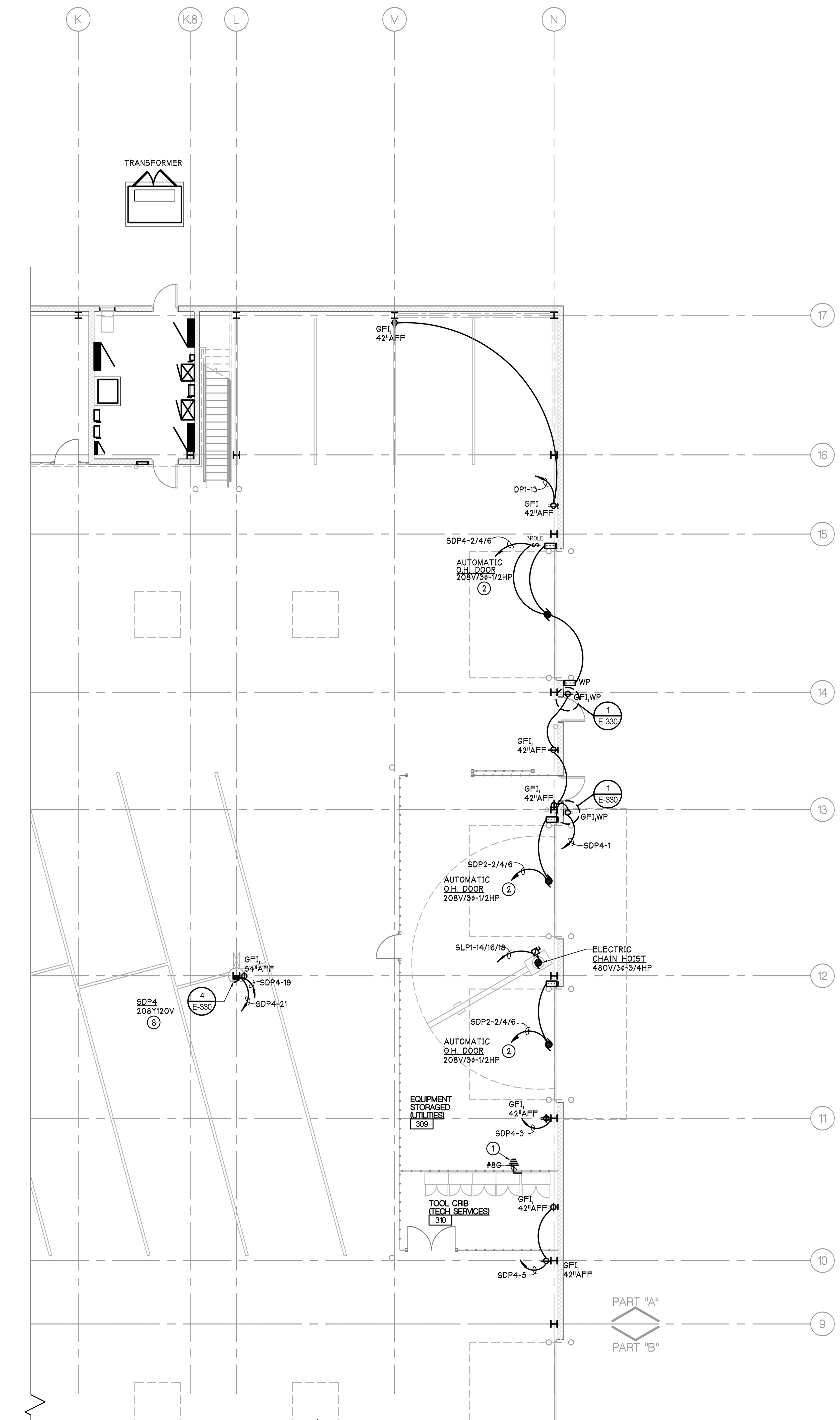
05-309

PROJECT NUMBER

E-333

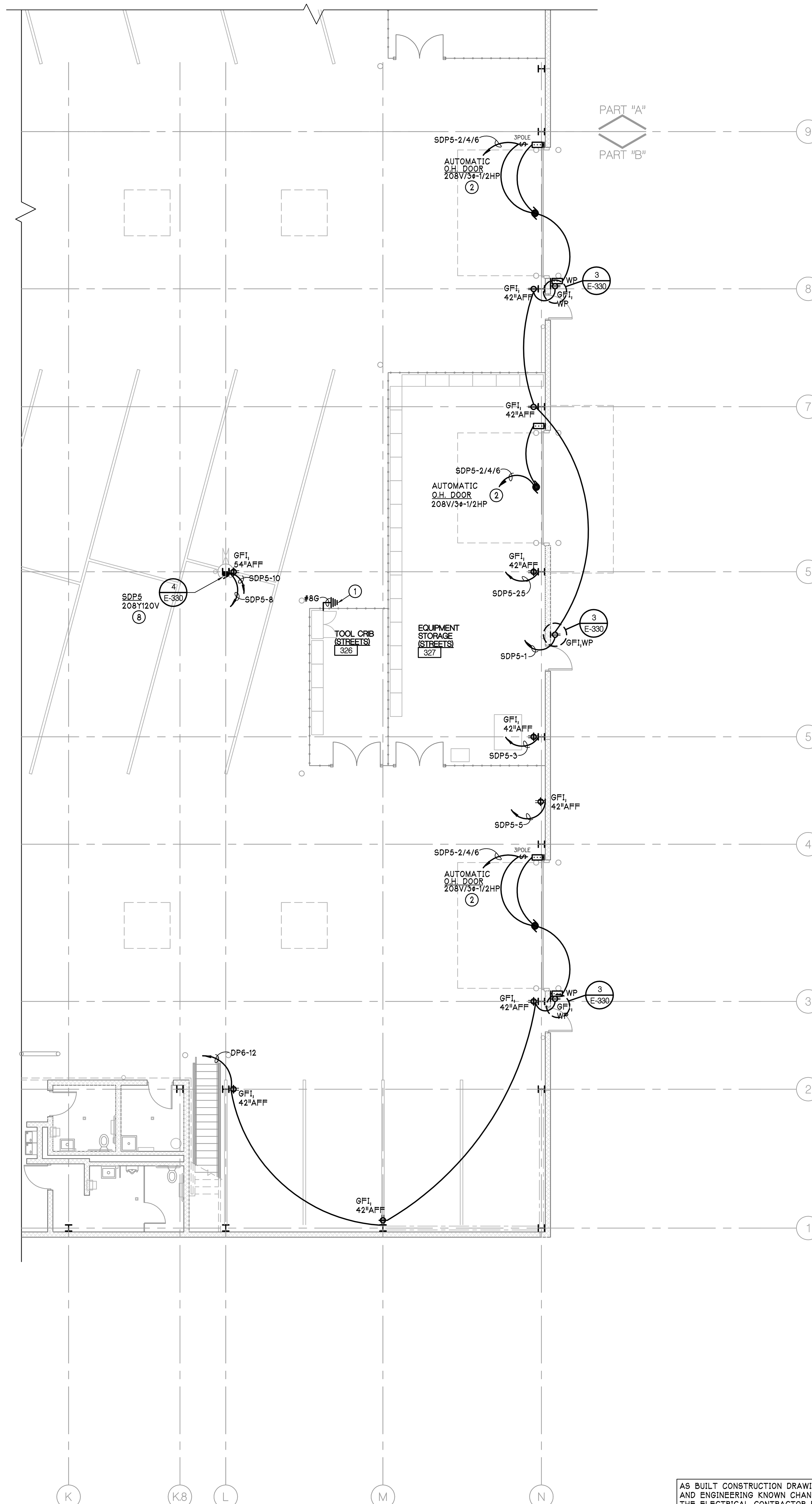
SHEET NUMBER

Drawing: P:\2005\05-309\dwgs\CD\30_VEHICLE BUILDING\Electrical\Sht\E333.dwg
Date: Sep 11, 2006, 11:44am Layout: 42x30-Layout Plotted by: scott



VEHICLE BUILDING POWER FLOOR PLAN - PART 'A'

SCALE - 1/8" = 1'-0" (THIS ALTERNATE WAS BUILT)



VEHICLE BUILDING ADD ALTERNATE POWER FLOOR PLAN - PART 'B'

SCALE - 1/8" = 1'-0" (THIS ALTERNATE WAS BUILT)

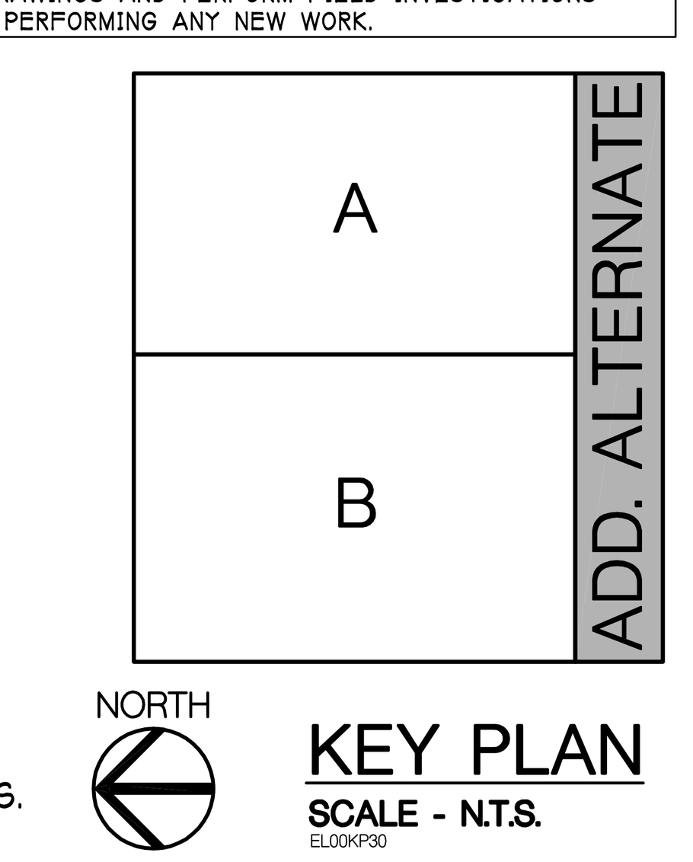
EL96EP3B

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

PLAN NOTES:

1. FLAMMABLE MATERIALS STORAGE CABINETS TO BE GROUNDED TO PREVENT STATIC ELECTRICITY BUILD-UP.
2. VEHICLE DETECTOR LOOP, INSTALL IN PAVEMENT AND CONNECT TO DOOR CONTROLLER PER VENDOR DIRECTIONS. USE VENDOR RECOMMENDED CABLE FOR THE INSTALLATION.
3. PROVISION FOR PTZ CAMERA POWER, COORDINATE WITH CAMERA INSTALLER. CAMERA PROVIDED BY OTHERS.
4. MINIMUM WIRE SIZE TO BE #10AWG TO MINIMIZE VOLTAGE DROP.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.



KEY PLAN

SCALE - N.T.S.

EL00KP30

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2005
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005

DATE ISSUED

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PROJECT

CONSULTANT

VEHICLE BLDG. ALT. POWER FLR. PLAN - 'A' & 'B'

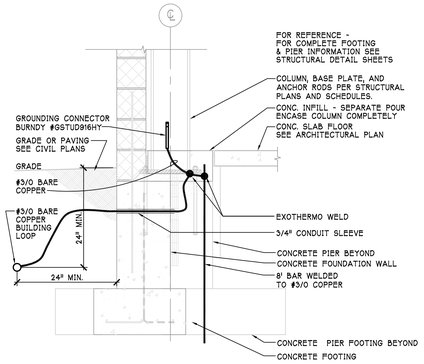
SHEET TITLE

05-309

PROJECT NUMBER

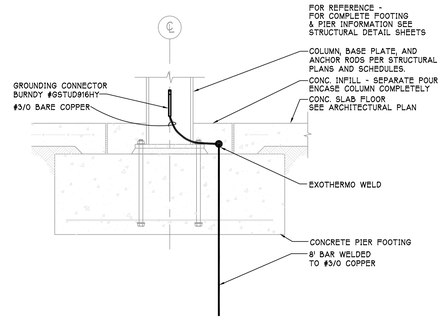
E-334

SHEET NUMBER



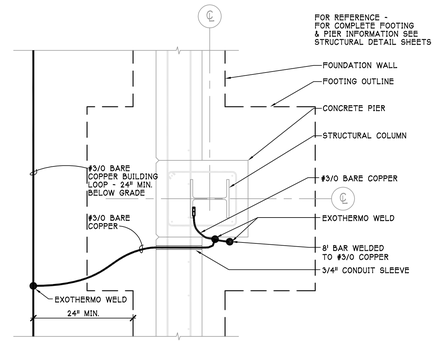
1 E-333 GROUNDING DETAIL- TYPICAL EXTERIOR PIER DETAIL

3/4" = 1'-0"



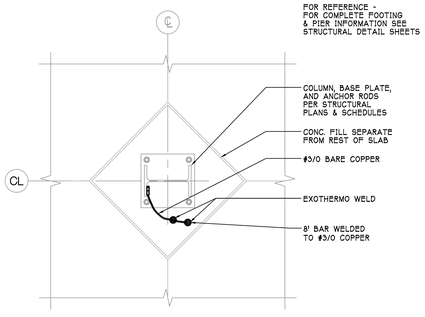
2 E-333 GROUNDING DETAIL- INTERIOR FOOTING DETAIL

3/4" = 1'-0"



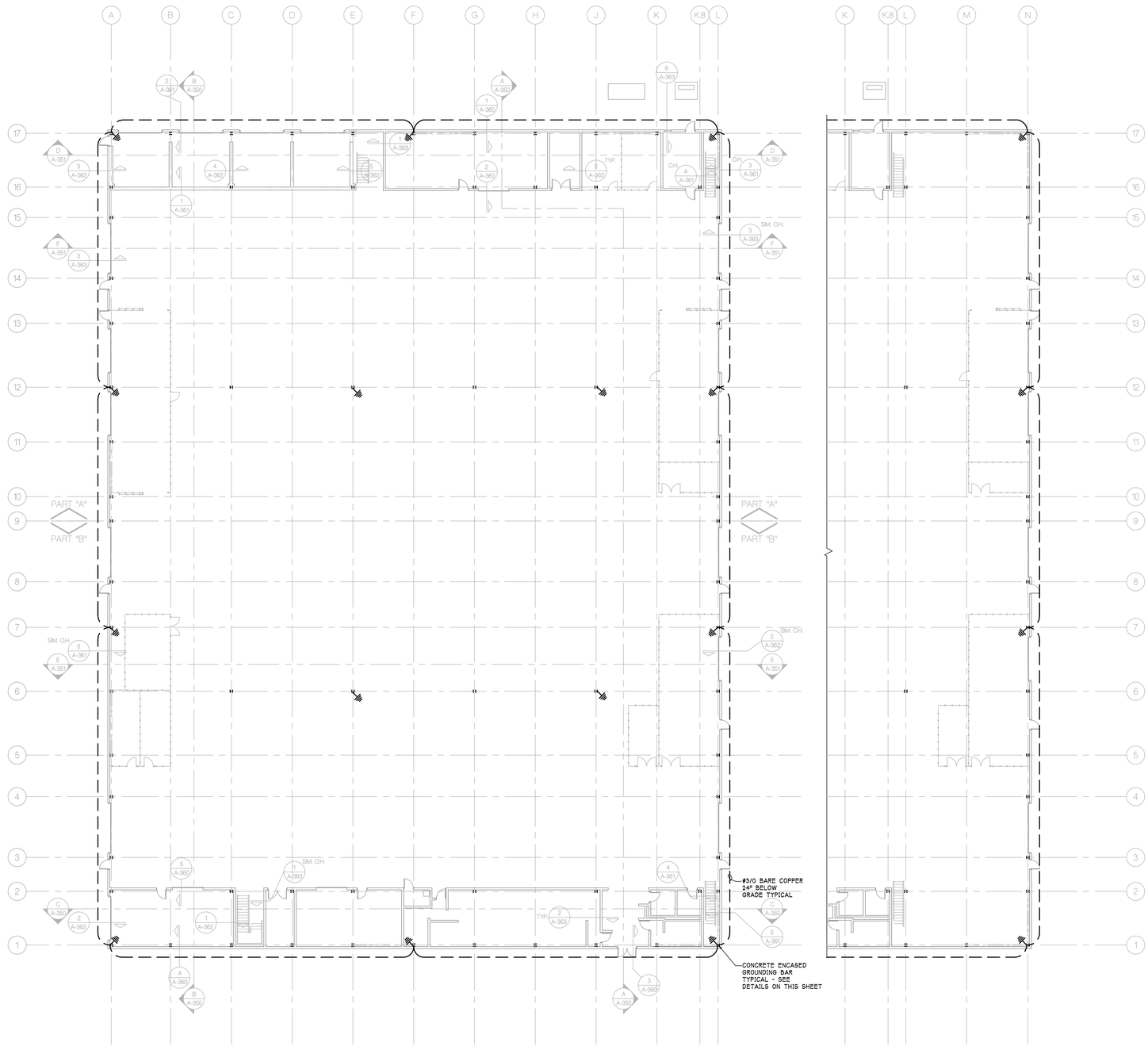
3 E-333 GROUNDING DETAIL- TYPICAL PLAN PIER DETAIL

3/4" = 1'-0"



4 E-333 INTERIOR ISOLATION JOINT DETAIL

3/4" = 1'-0"



NORTH

VEHICLE BUILDING ELECTRICAL GROUNDING PLAN

SCALE - 1/16" = 1'-0" (ALTERNATE WAS BUILT)

ELSEE700

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SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005

DATE ISSUED

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PROJECT

CONSULTANT

VEHICLE BLDG. ELECTRICAL GROUNDING PLAN

SHEET TITLE

05-309

PROJECT NUMBER

E-335

SHEET NUMBER

Drawing: P:\2005\05309\dwgs\CD\30-VEHICLE BUILDING\Elec\E335.dwg
Date: Sep 11, 2008, 11:46am Layout: 42x30 Layout Plotted by: sueh

PNL: **MDP-3** | LOCATED: VEHICLE BLDG -ELEC. 308 | 800 AMP MAIN CIRCUIT BREAKER 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	C	% DROP
1	SPP-1	302.5K	PANEL	7	3	50	302.5	364	364	400A	500	500	1/0	4	0.3%
2	TRANSFORMER DP-1/DP-6	75.0K	TRANS	4	3	50	30.5	37	46	125A	1/0	---	4	2	0.0%
3	FPP-1	43.4K	PANEL	7	3	1000	43.4	52	52	100A	3/0	3/0	6	2 1/2	1.8%
4	PP-2	72.7K	PANEL	5	3	50	72.7	87	87	150A	1/0	1/0	4	2	0.2%
5	TRANSFORMER GDP-1	12.5K	TRANS	4	3	1840	12.5	15	15	**30A**	1	---	8	1 1/2	0.9%
6	FUTURE 250A FRAME DISC						0.0								
7	FUTURE 250A FRAME DISC						0.0								
8	FUTURE 250A FRAME DISC						0.0								
9	FUTURE 250A FRAME DISC						0.0								
10	FUTURE 250A FRAME DISC						0.0								
11	FUTURE 250A FRAME DISC						0.0								
12	FUTURE 250A FRAME DISC						0.0								
	TOTALS		PANEL	7	3	75	455.9	548	548	800A	2-500	2-500		2 - 4	0.4%

800A

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	94.4	125%	118.1
REC	RECEPTACLES	22.3	72%	16.2
LHP	LARGEST MOTOR	22.4	125%	28.1
HP	MOTOR	141.5	100%	141.5
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	120.5	100%	120.5
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	31.7	100%	31.7
TOTALS		432.9	105%	455.9

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SPP-1** | LOCATED: VEHICLE BLDG -ELEC. 308 | 400 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	C	% DROP
1	2 - S. EXH FANS (EF 3-1, 3-3, 3-5)	3- 3	HP	4	3	150	12.0	14.4	18.0	30	10	---	10	3/4	0.5%
2	2 - N. EXH FANS (EF 3-2, 3-4)	2- 3	HP	4	3	250	8.0	9.6	12.0	20	10	---	10	3/4	0.6%
3	N/W MAKE UP AIR UNIT - 1	20	LHP	4	3	150	22.4	27.0	33.8	60	6	---	8	1	0.4%
4	N/E MAKE UP AIR UNIT - 2	20	HP	4	3	200	22.4	27.0	33.8	60	6	---	8	1	0.5%
5	S/W MAKE UP AIR UNIT - 3	20	HP	4	3	250	22.4	27.0	33.8	60	6	---	8	1	0.6%
6	S/E MAKE UP AIR UNIT - 4	20	HP	4	3	300	22.4	27.0	33.8	60	6	---	8	1	0.8%
7	MEZZ MAKE UP AIR UNIT	3	HP	4	3	300	4.0	4.8	6.0	20	10	---	10	3/4	0.3%
8	SOUTH ELEC. CHAIN HOIST	3/4	HP	4	3	250	1.3	1.6	2.0	20	10	---	12	3/4	0.1%
9	NORTH ELEC. CHAIN HOIST	3/4	HP	4	3	300	1.3	1.6	2.0	20	10	---	12	3/4	0.1%
10	SPP-3 W/ SHUNT TRIP	75K	TRANS	4	3	50	63.1	75.9	94.9	125	1/0	---	6	2	0.1%
11	SLP-1	97.3	PANEL	5	3	100	97.3	117.0	117.0	125	1	1	6	1 1/2	0.7%
12	SLP-2	17.7	PANEL	5	3	250	17.7	21.3	21.3	100	1	1	6	1 1/2	0.4%
13	FIRE PROT DRY PIPE AIR COM	2	HP	4	3	390	2.8	3.4	4.3	20	10	---	12	3/4	0.3%
14	FUTURE 125A FRAME BKR						0.0								
15	FUTURE 125A FRAME BKR						0.0								
16	FUTURE 125A FRAME BKR						0.0								
	TOTALS		PANEL	7	3	50	302.5	364	364	400	500	500	1/0	4	0.3%

400

	277/480	KVA	DEMAND	DKVA	GEN DKVA
LTS	LIGHTING	89.9	125%	112.3	89.9
REC	RECEPTACLES	11.0	96%	10.5	
LHP	LARGEST MOTOR	22.4	125%	28.1	22.4
HP	MOTOR	115.0	100%	115.0	33.7
K	KITCHEN EQUIPMENT	0.0	60%	0.0	
MISC	MISCELLANEOUS	36.6	100%	36.6	22.0
S	SPECIAL LOADS	0.0	100%	0.0	
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0	
TOTALS		274.9	110%	302.5	168.0

GEN DEMAND BASED ON ACTUAL LOADS w/LOAD SHEDDING. PROVIDE A 120V SHUNT TRIP BKR FOR

GEN
DEM
AMPS
202A

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **PP-2** | LOCATED: VEHICLE BLDG -ELEC RM 308 | 150 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	CND	% DROP
1	ELEC UNIT HTR 3-3	3,000	MISC	4	3	55	3.0	4	5	20	12	---	12	3/4	0.1%
3							0.0								
5							0.0								
7	ELEC UNIT HTR 3-2	15,000	MISC	4	3	65	15.0	18	23	30	10	---	10	3/4	0.3%
9							0.0								
11							0.0								
13	ELEC UNIT HTR 3-1	15,000	MISC	4	3	115	15.0	18	23	30	10	---	10	3/4	0.5%
15							0.0								
17							0.0								
19	SPACE						0.0								
21	SPACE						0.0								
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	ELECTRIC UNIT HEATERS	32,500	MISC	4	3	290	32.5	39	49	50	6	---	10	1	1.1%
4	EUH 3-4 (7.5KW)						0.0								
6	EUH 3-5 (25KW)						0.0								
8	MPZ-2 DECANT BLDG	6,860	TRANS	3	2	300	6.9	14	18	40	6	---	8	1	0.8%
10	-----	-	-	-	-	-	0.0								
12	SPACE						0.0								
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	5	3	50	72.7	87	87	150	1/0	1/0	4	2	0.2%

150

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	1.3	125%	1.6
REC	RECEPTACLES	0.4	100%	0.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	65.7	100%	65.7
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	5.0	100%	5.0
TOTALS		72.4	100%	72.7

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SPP-3** | LOCATED: VEHICLE BLDG -ELEC. 308 | 250 AMP MAIN BREAKER, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	C	% DROP
1	SDP-2	14.4	PANEL	7	3	230	14.4	39.9	39.9	100	1	1	6	1 1/2	1.2%
2	SDP-3	16.6	PANEL	7	3	370	16.6	46.0	46.0	100	1/0	1/0	6	2	1.8%
3	SDP-4	13.6	PANEL	7	3	150	13.6	37.7	37.7	100	1	1	6	1 1/2	0.8%
4	SDP-5	18.6	PANEL	7	3	255	18.6	51.7	51.7	100	1/0	1/0	6	2	1.4%
5	FUTURE 125A FRAME BKR						0.0								
6	FUTURE 125A FRAME BKR						0.0								
7	FUTURE 125A FRAME BKR						0.0								
8	FUTURE 125A FRAME BKR						0.0								
9	FUTURE 125A FRAME BKR						0.0								
10	FUTURE 125A FRAME BKR						0.0								
	TOTALS		PANEL	7	3	50	62.7	174	174	250	250	250	2	3	0.5%

250

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	11.0	96%	10.5
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	15.6	100%	15.6
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	36.6	100%	36.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		63.1	99%	62.7

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SLP-1** | LOCATED: VEHICLE BLDG -COL H-16 -RM 31 | 125 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	CND	% DROP
1	**E.STOR & ELEC RM 304-308	1560	LTS	3	1	250	1.6	6	7	20	12	12	12	3/4	1.7%
3	*N/E EXTERIOR	1610	LTS	3	1	580	1.6	6	7	20	10	10	12	3/4	2.7%
5	S/W EXTERIOR	2100	LTS	3	1	580	2.1	8	9	20	8	8	12	3/4	2.2%
7	**EAST BUNKERS MEZZ 300-30	2320	LTS	3	1	220	2.3	8	10	20	12	12	12	3/4	2.3%
9	*1ST ROOM EAST 312	2520	LTS	3	1	270	2.5	9	11	20	10	10	12	3/4	2.0%
11	*2ND ROW EAST 312	2520	LTS	3	1	320	2.5	9	11	20	10	10	12	3/4	2.3%
13	*CENTER ROW EAST 312	2520	LTS	3	1	370	2.5	9	11	20	10	10	12	3/4	2.7%
15	*EMER BATT BKUP CKT EAST	600	LTS	3	1	600	0.6	2	3	20	12	12	12	3/4	1.6%
17	SALT DOME & BUNKERS	4280	LTS	3	2	1000	4.3	9	11	20	8	---	12	3/4	2.6%
19	-----	-	-	-	-	-	0.0								
21	SPACE						0.0								
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	FUELING LANES ROAD	4800	LTS	3	2	1100	4.8	10	13	20	6	---	12	1	2.1%
4	-----	-	-	-	-	-	0.0								
6	BACK ROAD	43200	LTS	3	2	1080	43.2	90	113	125	250	---	6	2	3.0%
8	-----	-	-	-	-	-	0.0								
10	OPEN BUNKER ROAD	7680	LTS	3	2	1000	7.7	16	20	30	6	---	10	1	3.0%
12	-----	-	-	-	-	-	0.0								
14	SOUTH CHAIN HOIST	3/4	HP	4	3	120	1.3	2	2	20	12	---	12	3/4	0.1%
16	---						0.0								
18	---						0.0								
20	NORTH CHAIN HOIST	3/4	HP	4	3	200	1.3	2	2	20	12	---	12	3/4	0.1%
22	---						0.0								
24	---						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	5	3	100	97.3	117	117	125	1	1	6	1 1/2	0.7%

125

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	75.7	125%	94.6
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	2.7	100%	2.7
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		78.4	124%	97.3

SQ-D NF-G3 2000 MASTER. ALL BKRS CONTROLLABLE EXECPT WHEN NOTED BY ** PROVIDE PHOTO-CELL INPUT FOR EXTERIOR LIGHTS

* INCLUDES LIGHTING LOAD FOR ALT. ADD. BUILDING

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SLP-2** | LOCATED: VEHICLE BLDG -COL G-2 -RM 312 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	277/480 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE SIZE PH	N	GRD	CND	% DROP
1	TOIL, ENT, MUD, LAU 319-325	2015	LTS	3	1	200	2.0	7	9	20	12	12	12	3/4	1.8%
3	PARK STOR, JC, 316-317	1730	LTS	3	1	270	1.7	6	8	20	12	12	12	3/4	2.1%
5	*WEST MEZZ	2040	LTS	3	1	250	2.0	7	9	20	12	12	12	3/4	2.3%
7	*1ST ROW WEST 312	2520	LTS	3	1	270	2.5	9	11	20	10	10	12	3/4	2.0%
9	*2ND ROW WEST 312	2520	LTS	3	1	320	2.5	9	11	20	10	10	12	3/4	2.3%
11	*CENTER ROW WEST 312	2520	LTS	3	1	370	2.5	9	11	20	10	10	12	3/4	2.7%
13	*EMER BATT BKUP CKT WEST	800	LTS	3	1	600	0.8	3	4	20	12	12	12	3/4	2.1%
15	SPACE						0.0								
17	SPACE						0.0								
19	SPACE						0.0								
21	SPACE						0.0								
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	SPACE						0.0								
4	SPACE						0.0								
6	SPACE						0.0								
8	SPACE						0.0								
10	SPACE						0.0								
12	SPACE						0.0								
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	5	3	355	17.7	21	21	100	1	1	6	1 1/2	0.4%

100

	277/480	KVA	DEMAND	DKVA
LTS	LIGHTING	14.1	125%	17.7
REC	RECEPTACLES	0.0	100%	0.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.0	100%	0.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		14.1	125%	17.7

PANEL BASED ON SQ-D NF-G3 2000 SLAVE. LL BKRS CONTROLLABLE EXECPT WHEN NOTED BY **

* INCLUDES LIGHTING LOAD FOR ALT. ADD. BUILDING

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **MPZ-2** | LOCATED: DECANT STATION ELEC RM | 40 AMP MAIN BREAKER, 1 PHASE, 3 WIRE

CKT #	120/240 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	LIGHTS	1260	LTS	3	1	140	1.3	11	13	20	10	10	12	3/4	2.7%
3							0.0								
5	EUH 4-1	21	MCA	3	2	30	5.0	21	21	25	10	---	10	3/4	0.6%
7	-----	-	-	-	-	-	0.0								
9							0.0								
2	RMS 410 & 411 RECEPTACLES	2	REC	3	1	60	0.4	3	4	20	12	12	12	3/4	0.5%
4	RMS 410 & 411 LIGHTS	200	MISC	3	1	60	0.2	2	2	20	12	12	12	3/4	0.3%
6	SPACE						0.0								
8	SPACE						0.0								
10	SPACE						0.0								
	TOTALS		PANEL	3	2	125	7.2	30	30	40	6		8	1	1.4%

40

	120/240	KVA	DEMAND	DKVA
LTS	LIGHTING	1.3	125%	1.6
REC	RECEPTACLES	0.4	100%	0.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.0	100%	0.0
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	0.2	100%	0.2
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	5.0	100%	5.0
TOTALS		6.9	105%	7.2

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-1** | LOCATED: VEHICLE BLDG -COL G-16 -RM 31 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	ENCL STOR 304	2	REC	3	1	20	0.4	3	4	20	12	12	12	3/4	0.2%
3	ENCL STOR 304	2	REC	3	1	40	0.4	3	4	20	12	12	12	3/4	0.3%
5	ENCL STOR 304	2	REC	3	1	75	0.4	3	4	20	12	12	12	3/4	0.6%
7	ENCL STOR 304	2	REC	3	1	75	0.4	3	4	20	12	12	12	3/4	0.6%
9	RM'S 305, 306, & 307	5	REC	3	1	75	0.9	8	9	20	12	12	12	3/4	1.6%
11	RM'S 312, 305 306, 307	5	REC	3	1	75	0.9	8	9	20	12	12	12	3/4	1.6%
13	VEHICLE STORAGE 312	1	REC	3	1	100	0.2	2	2	20	10	10	12	3/4	0.3%
15	VEHICLE STORAGE 312	2	REC	3	1	70	0.4	3	4	20	12	12	12	3/4	0.6%
17	GENERATOR BATTERY	500	MISC	3	1	85	0.5	4	5	20	10	10	12	3/4	0.6%
19	EXH FAN (EF 3-6)	1/4	HP	3	1	40	0.7	6	7	20	12	12	12	3/4	0.7%
21	EAST MEZZ 340	2	REC	3	1	55	0.4	3	4	20	12	12	12	3/4	0.5%
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	GENERATOR BLOCK HEATER	2300	MISC	3	2	85	2.3	11	14	20	10	---	12	3/4	1.0%
4	--	--	--	--	--	--									
6	GENERATOR ANTI-CONDEN.	500	MISC	3	1	85	0.5	4	5	20	10	12	12	3/4	0.6%
8	GENERATOR	1	REC	3	1	85	0.2	2	2	20	12	12	12	3/4	0.4%
10	SPACE						0.0								
12	SPACE						0.0								
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	125	8.3	23	23	100	1	1	6	1 1/2"	0.4%

100

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	4.3	100%	4.3
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	0.7	100%	0.7
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	3.3	100%	3.3
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		8.3	100%	8.3

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-2** | LOCATED: VEHICLE BLDG -COL C-12 -RM 31 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	EXTERIOR & N/E WALL	4	REC	3	1	60	0.7	6	8	20	12	12	12	3/4	1.0%
3	EXTERIOR & N/E WALL	5	REC	3	1	70	0.9	8	9	20	12	12	12	3/4	1.5%
5	N/E WALL	2	REC	3	1	55	0.4	3	4	20	12	12	12	3/4	0.5%
7	COLUMN C-12	1500	MISC	3	1	75	1.5	13	16	20	12	12	12	3/4	2.7%
9	COLUMN C-12	1500	MISC	3	1	75	1.5	13	16	20	12	12	12	3/4	2.7%
11	COLUMN E-12	1500	MISC	3	1	115	1.5	13	16	20	10	10	12	3/4	2.6%
13	COLUMN E-12	1500	MISC	3	1	115	1.5	13	16	20	10	10	12	3/4	2.6%
15	N. EAST CCTV CAMERAS	1	REC	3	1	75	0.2	2	2	20	12	12	12	3/4	0.3%
17	ROOF TOP REC - (MUAH-3-2)	1	REC	3	1	40	0.2	2	2	20	12	12	12	3/4	0.2%
19	SPACE						0.0								
21	SPACE						0.0								
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	3- N/E OVERHEAD DOORS -	3- 1/2	HP	4	3	50	2.6	7	9	20	12	---	12	3/4	0.3%
4	VEHICLE PARKING														
6	ROOM 312														
8	OVERHEAD DOORS -	4- 1/2	HP	4	3	45	3.5	10	12	20	12	---	12	3/4	0.4%
10	BUNKERS 300-303														
12	ROOM 312														
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	230	14.4	40	40	100	1	1	6	1 1/2	1.2%

100

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	2.3	100%	2.3
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	6.1	100%	6.1
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	6.0	100%	6.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		14.4	100%	14.4

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-3** | LOCATED: VEHICLE BLDG -COL C-6 -RM 31 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	EXTERIOR & N/E WALL	3	REC	3	1	80	0.5	4.5	5.6	20	12	12	12	3/4	1.0%
3	NORTH ICE MACHINE	1500	MISC	3	1	65	1.5	12.5	15.6	20	12	12	12	3/4	2.3%
5	NORTH ICE MACHINE	1500	MISC	3	1	65	1.5	12.5	15.6	20	12	12	12	3/4	2.3%
7	COLUMN C-6	1500	MISC	3	1	10	1.5	12.5	15.6	20	12	12	12	3/4	0.4%
9	COLUMN C-6	1500	MISC	3	1	10	1.5	12.5	15.6	20	12	12	12	3/4	0.4%
11	COLUMN E-6	1500	MISC	3	1	55	1.5	12.5	15.6	20	12	12	12	3/4	1.9%
13	COLUMN E-6	1500	MISC	3	1	55	1.5	12.5	15.6	20	12	12	12	3/4	1.9%
15	N/E WALL	2	REC	3	1	50	0.4	3	4	20	12	12	12	3/4	0.4%
17	N/E WALL	2	REC	3	1	70	0.4	3	4	20	12	12	12	3/4	0.6%
19	N/E WALL	2	REC	3	1	80	0.4	3	4	20	12	12	12	3/4	0.7%
21	EXTR, N/E WALL 312 & STOR	4	REC	3	1	115	0.7	6	8	20	12	12	12	3/4	2.0%
23	N. WEST CCTV CAMERAS	2	REC	3	1	75	0.4	3	4	20	12	12	12	3/4	0.6%
25	TOOL CRIB 315	2	REC	3	1	65	0.4	3	4	20	12	12	12	3/4	0.6%
27	ROOF TOP REC - (MUAH-3-1)	1	REC	3	1	40	0.2	2	2	20	12	12	12	3/4	0.2%
29	SPACE						0.0								
2	N/W CTR OVERHEAD DOORS	2- 1/2	HP	4	3	90	1.7	4.8	6.0	20	12	---	12	3/4	0.4%
4	VEHICLE PARKING														
6	ROOM 312														
8	N/W & PARKS OVERHEAD DO	3- 1/2	HP	4	3	115	2.6	7.2	9.0	20	12	---	12	3/4	0.7%
10	VEHICLE PARKING														
12	ROOM 312														
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	370	16.6	46	46	100	1/0	1/0	6	2	1.8%

100

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	3.2	100%	3.2
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	4.3	100%	4.3
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	9.0	100%	9.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		16.6	100%	16.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-4** | LOCATED: VEHICLE BLDG -COL J-12 -RM 31 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	EXTERIOR & S/E WALL	4	REC	3	1	60	0.7	6	8	20	12	12	12	3/4	1.0%
3	S/E WALL	2	REC	3	1	70	0.4	3	4	20	12	12	12	3/4	0.6%
5	S/E WALL	3	REC	3	1	55	0.5	5	6	20	12	12	12	3/4	0.7%
7	COLUMN J-12	1500	MISC	3	1	115	1.5	13	16	20	10	10	12	3/4	2.6%
9	COLUMN J-12	1500	MISC	3	1	115	1.5	13	16	20	10	10	12	3/4	2.6%
11	COLUMN G-12	1500	MISC	3	1	155	1.5	13	16	20	8	8	12	3/4	2.3%
13	COLUMN G-12	1500	MISC	3	1	155	1.5	13	16	20	8	8	12	3/4	2.3%
15	S. EAST CCTV CAMERAS	1	REC	3	1	75	0.2	2	2	20	12	12	12	3/4	0.3%
17	ROOF TOP REC - (MUAH-3-4)	1	REC	3	1	40	0.2	2	2	20	12	12	12	3/4	0.2%
19	COLUMN L-12 (ALT BID)	1500	MISC	3	1	75	1.5	13	16	20	12	12	12	3/4	2.7%
21	COLUMN L-12 (ALT BID)	1500	MISC	3	1	75	1.5	13	16	20	12	12	12	3/4	2.7%
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	S/E OVERHEAD DOORS -	3- 1/2	HP	4	3	50	2.6	7	9	20	12	---	12	3/4	0.3%
4	VEHICLE PARKING														
6	ROOM 312														
8	SPACE						0.0								
10	SPACE						0.0								
12	SPACE						0.0								
14	SPACE						0.0								
16	SPACE						0.0								
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	150	13.6	38	38	100	1	1	6	1 1/2	0.8%

100

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	2.0	100%	2.0
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	2.6	100%	2.6
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	9.0	100%	9.0
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		13.6	100%	13.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **SDP-5** | LOCATED: VEHICLE BLDG -COL J-6 -RM 312 | 100 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	EXTERIOR & S/W WALL	4	REC	3	1	60	0.7	6.0	7.5	20	12	12	12	3/4	1.0%
3	S/W WALL	2	REC	3	1	70	0.4	3.0	3.8	20	12	12	12	3/4	0.6%
5	S/W WALL	2	REC	3	1	55	0.4	3.0	3.8	20	12	12	12	3/4	0.5%
7	COLUMN J-6	1500	MISC	3	1	75	1.5	12.5	15.6	20	12	12	12	3/4	2.7%
9	COLUMN J-6	1500	MISC	3	1	75	1.5	12.5	15.6	20	12	12	12	3/4	2.7%
11	COLUMN G-6	1500	MISC	3	1	115	1.5	12.5	15.6	20	10	10	12	3/4	2.6%
13	COLUMN G-6	1500	MISC	3	1	115	1.5	12.5	15.6	20	10	10	12	3/4	2.6%
15	S. WEST CCTV CAMERAS	2	REC	3	1	75	0.4	3.0	3.8	20	12	12	12	3/4	0.6%
17	FIRE ALARM PANEL	400	MISC	3	1	100	0.4	3.3	4.2	20	10	10	12	3/4	0.6%
19	COMM RM 320	2	REC	3	1	130	0.4	3.0	3.8	20	10	10	12	3/4	0.7%
21	COMM RM 320	2	REC	3	1	130	0.4	3.0	3.8	20	10	10	12	3/4	0.7%
23	COMM RM 320	2	REC	3	1	130	0.4	3.0	3.8	20	10	10	12	3/4	0.7%
25	S/W WALL	2	REC	3	1	50	0.4	3.0	3.8	20	12	12	12	3/4	0.4%
27	ROOF TOP REC - (MUAH-3-3)	1	REC	3	1	40	0.2	1.5	1.9	20	12	12	12	3/4	0.2%
29	SPACE						0.0								
2	S/W OVERHEAD DOORS -	3- 1/2	HP	4	3	50	2.6	7.2	9.0	20	12	---	12	3/4	0.3%
4	VEHICLE PARKING														
6	ROOM 312														
8	COLUMN L-6 (ALT BID)	1500	MISC	3	1	115	1.5	12.5	15.6	20	10	10	12	3/4	2.6%
10	COLUMN L-6 (ALT BID)	1500	MISC	3	1	115	1.5	12.5	15.6	20	10	10	12	3/4	2.6%
12	COMM 320 SEC/FA EQPT	1500	MISC	4	2	135	1.5	7.2	9.0	20	12	12	12	3/4	1.6%
14	---						0.0								
16	COMM 320 SEC/FA EQPT	1500	MISC	4	2	135	1.5	7.2	9.0	20	12	12	12	3/4	1.6%
18	---						0.0								
20	SEC DR LATCH PWR SUPPLIY	200	MISC	3	1	130	0.2	1.7	2.1	20	12	12	12	3/4	0.6%
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	255	18.6	52	52	100	1/0	1/0	6	2	1.4%

100

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	3.4	100%	3.4
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	2.6	100%	2.6
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	12.6	100%	12.6
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		18.6	100%	18.6

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

PNL: **DP-6** | LOCATED: VEHICLE BLDG -COL COLUMN N-10 | 150 AMP MAIN LUG, 3 PHASE, 4 WIRE

CKT #	120/208 DESCRIPTION	LOAD	TYPE	WIRE CODE	# POLES	WIRE LENGTH	LOAD KVA	LOAD AMPS	DEMAND AMPS	BKR	WIRE & CONDUIT SIZE PH	N	GRD	CND	% DROP
1	S/W CORNER	3	REC	3	1	90	0.5	5	6	20	10	10	12	3/4	0.7%
3	TOIL 323/324, JC 325, ENT 322, VEH 312	5	REC	3	1	75	0.9	8	9	20	12	12	12	3/4	1.6%
5	JAN 325 E. WTR HTR (DWH-2)	2500	MISC	3	2	85	2.5	12	15	20	12	---	12	3/4	1.7%
7	---	--	--	--	--	--	0.0				10	10			
9	ENTR 322 E. WTR COOLER	1200	MISC	3	1	80	1.2	10	13	20	12	12	12	3/4	2.3%
11	ENTR 322 ICE MACHINE	1500	MISC	3	1	80	1.5	13	16	20	12	12	12	3/4	2.8%
13	ENTR 322 ICE MACHINE	1500	MISC	3	1	80	1.5	13	16	20	12	12	12	3/4	2.8%
15	PKG 312, MUD RM 321, EXTR	5	REC	3	1	55	0.9	8	9	20	12	12	12	3/4	1.2%
17	ENCL STOR PARKS 318	4	REC	3	1	55	0.7	6	8	20	12	12	12	3/4	0.9%
19	STOR 316, JC 317, STOR 318, VEH 312	5	REC	3	1	65	0.9	8	9	20	12	12	12	3/4	1.4%
21	PARKS 316 GAS UNIT HTR 3-1	3/4	HP	3	1	125	1.7	14	17	20	8	8	12	3/4	2.0%
23	SPACE						0.0								
25	SPACE						0.0								
27	SPACE						0.0								
29	SPACE						0.0								
2	LAU RM 319 ELEC DRIER	5000	MISC	4	2	65	5.0	24	30	30	10	10	10	3/4	1.7%
4	--	--	-	--	--	--	0.0								
6	LAU RM 319	3	REC	3	1	45	0.5	5	6	20	12	12	12	3/4	0.6%
8	LAU RM 319 WASHER	1500	MISC	3	1	55	1.5	13	16	20	12	12	12	3/4	1.9%
10	LAU RM 319 GAS DRIER	1500	MISC	3	1	55	1.5	13	16	20	10	10	12	3/4	1.3%
12	SOUTHWEST STOR 312	4	REC	3	1	140	0.7	6	8	20	12	12	12	3/4	2.4%
14	WEST MEZZ 350	2	REC	3	1	75	0.4	3	4	20	12	12	12	3/4	0.6%
16	WEST MEZZ 350	2	REC	3	1	75	0.4	3	4	20	12	12	12	3/4	0.6%
18	SPACE						0.0								
20	SPACE						0.0								
22	SPACE						0.0								
24	SPACE						0.0								
26	SPACE						0.0								
28	SPACE						0.0								
30	SPACE						0.0								
	TOTALS		PANEL	7	3	355	22.3	62	62	150	3/0	3/0	4	2 1/2	1.7%

150

	120/208	KVA	DEMAND	DKVA
LTS	LIGHTING	0.0	125%	0.0
REC	RECEPTACLES	5.9	100%	5.9
LHP	LARGEST MOTOR	0.0	125%	0.0
HP	MOTOR	1.7	100%	1.7
K	KITCHEN EQUIPMENT	0.0	60%	0.0
MISC	MISCELLANEOUS	14.7	100%	14.7
S	SPECIAL LOADS	0.0	100%	0.0
MCA	MINIMUM CIRCUIT AMPS	0.0	100%	0.0
TOTALS		22.3	100%	22.3

WC	POLE	PH	N	200%N	EQ G	S G
3	1	1	1	---	1	---
3	2	2	---	---	1	---
4	2	2	1	---	1	---
4	3	3	---	---	1	---
5	3	3	1	---	1	---
6	3	3	---	2	1	---
7	3	3	1	---	---	1
8	3	3	---	2	---	1

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

	AS BUILTS	9-10-2008
5	PROPOSAL REQUEST 5	7-27-2006
2	PROPOSAL REQUEST 2	5-24-06
	CONTRACT SET	2-6-2005
A	POST BID ADDEDUM 1	12-15-2005
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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STONE SCHOOL ROAD
ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

VEHICLE BLDG.
POWER
SCHEDULES

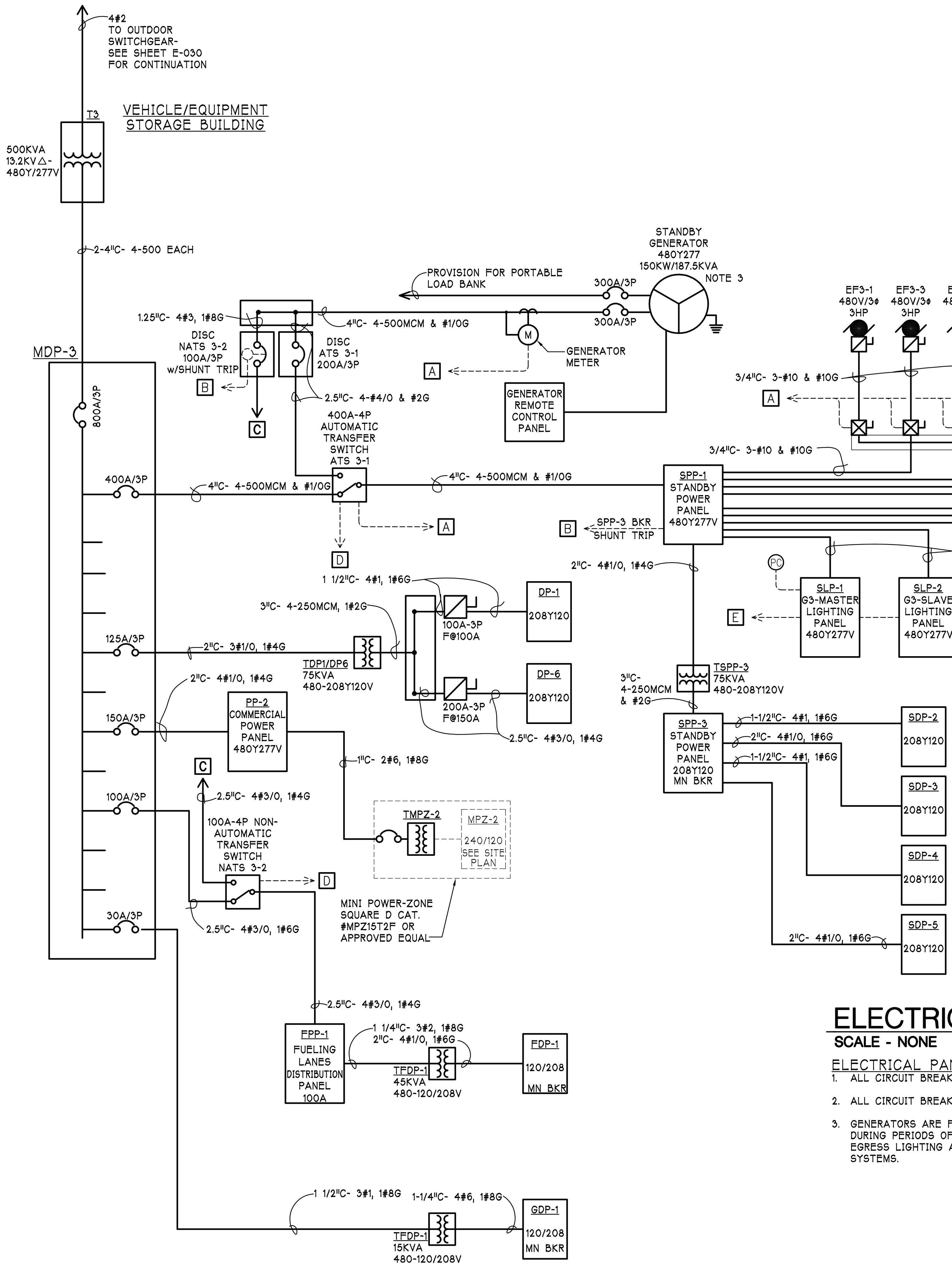
SHEET TITLE

05-309

PROJECT NUMBER

E-350

SHEET NUMBER



VEHICLE/EQUIPMENT STORAGE BUILDING RISER NOTES

[A] INTERLOCK TO BUILDING MANAGEMENT (TEMP CONTROL) SYSTEM FOR LOAD SHEDDING. REFER TO TEMPERATURE CONTROL AND SEQUENCE OF OPERATION SPECIFICATIONS IN DIVISION 15 AND AS NOTED BELOW.
LOAD SHED SEQUENCE:
1. UPON NOTIFICATION OF A GENERATOR OVERLOAD, SECURE EXHAUST FANS EF3-2. EF3-3, EF3-4 AND MAKE UP AIR UNITS MUAU3-2, MUAU3-3, MUAU3-4. SEQUENCE OPERATION OF EACH EXHAUST FAN AND MAKE UP AIR UNIT NOTED ABOVE EVERY 15 MINUTES UNTIL COMMERCIAL POWER IS RESTORED.
2. AFTER ONE MINUTE (60 SEC) OF A GENERATOR OVERLOAD, TRIP THE SHUNT TRIP BREAKER DISC NATS3-2.
3. AFTER TWO MINUTES (120 SEC) TRIP THE SHUNT TRIP BREAKER IN PANEL SPP-1 FEEDING TRANSFORMER TSPP-3.

[B] SHUNT TRIP CIRCUIT BREAKERS TO TRIP TRANSFORMER TSPP-3 AND NATS 3-2 UPON CLOSURE OF DRY CONTACT FROM BMS LOAD SHED SIGNAL

[C] CONTINUATION OF FEEDERS BETWEEN NATS 3-2 AND THE GENERATOR BREAKER.

[D] DELAY (5-MINUTE) INTERLOCK BETWEEN ATS 3-1 AND NATS 3-2

[E] PROGRAMMABLE PANEL TEMPERATURE CONTROL INTERFACE. TEMPERATURE CONTROL SHALL BE CAPABLE OF COMMUNICATING WITH THE PANEL CONTROL FOR SYSTEM TIME, PROGRAMING ETC.

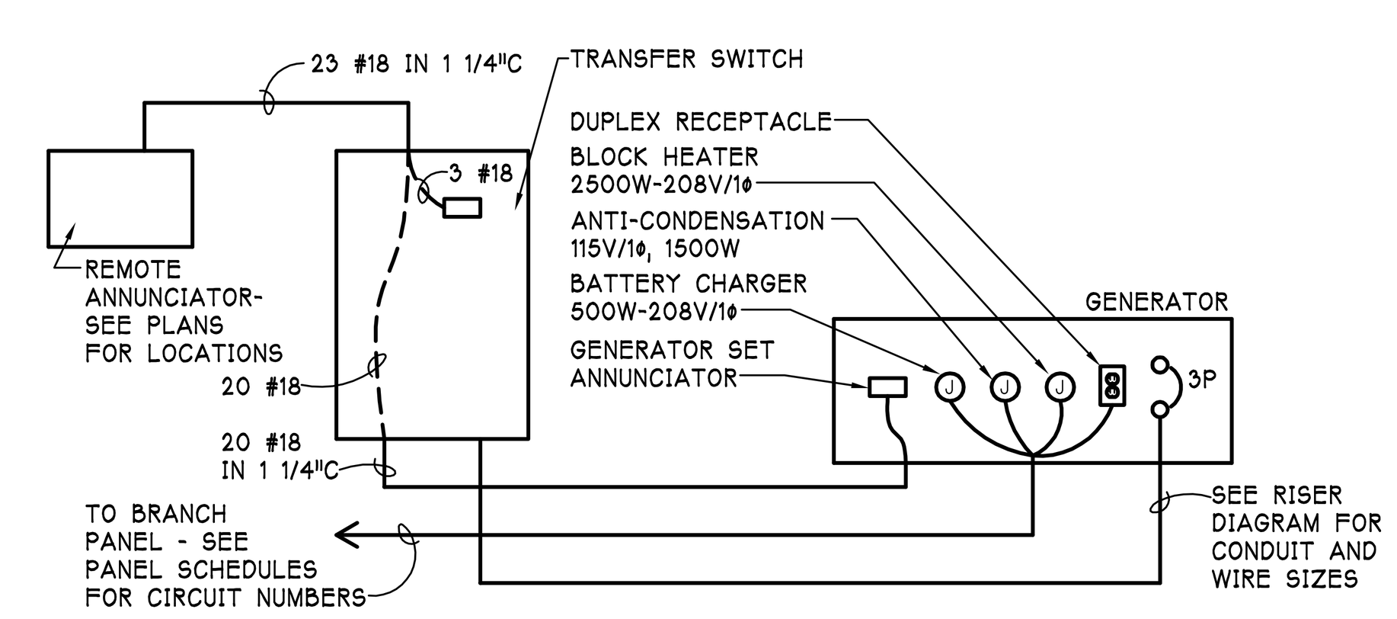
ELECTRICAL RISER DIAGRAM

SCALE - NONE

ELECTRICAL PANEL NOTES:

1. ALL CIRCUIT BREAKERS SERVING MOTOR LOADS SHALL BE HACR RATED.
2. ALL CIRCUIT BREAKERS SERVING HID LIGHT FIXTURES SHALL BE HID RATED.
3. GENERATORS ARE FOR STANDBY USE TO KEEP THE BUILDINGS OPERATIONAL DURING PERIODS OF POWER LOSS. LIFE SAFETY SYSTEMS SUCH AS EMERGENCY EGRESS LIGHTING AND FIRE ALARM HAVE THEIR OWN EMERGENCY BATTERY SYSTEMS.

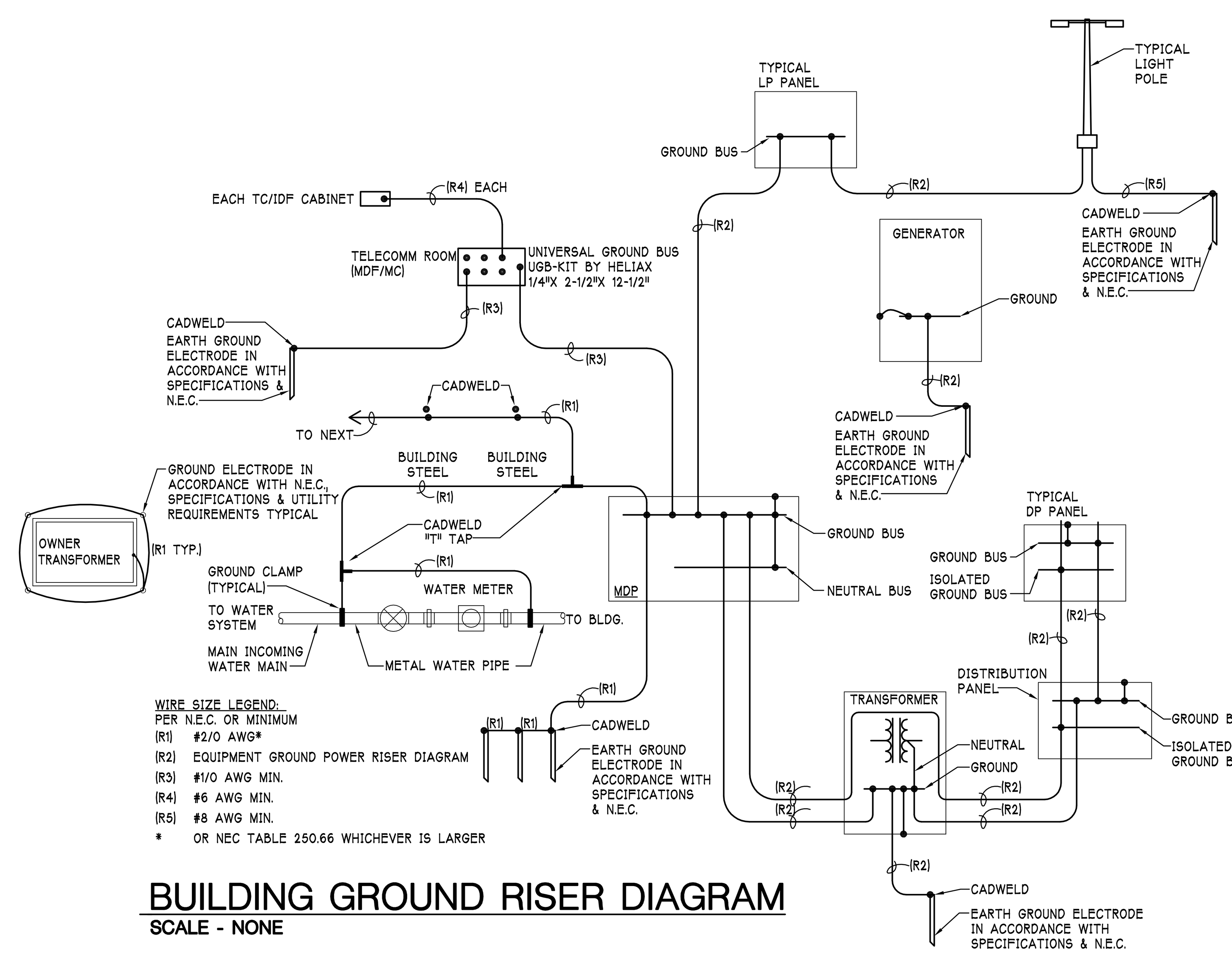
AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.



11
E-360

TYPICAL GENERATOR CONTROL & POWER WIRING SCHEMATIC

SCALE - NONE



WIRE SIZE LEGEND:
PER N.E.C. OR MINIMUM

(R1)	#2/0 AWG*
(R2)	EQUIPMENT GROUND POWER RISER DIAGRAM
(R3)	#1/0 AWG MIN.
(R4)	#6 AWG MIN.
(R5)	#8 AWG MIN.
*	OR NEC TABLE 250.66 WHICHEVER IS LARGER

BUILDING GROUND RISER DIAGRAM

SCALE - NONE

	AS BUILTS	9-10-2008
5	PROPOSAL REQUEST 5	7-27-2006
2	PROPOSAL REQUEST 2	5-24-06
1	PROPOSAL REQUEST 1	2-27-2006
	CONTRACT SET	2-6-2006
A	POST BID ADDENDUM 1	12-15-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

VEHICLE STORAGE ELECTRICAL RISER DIAGRAM

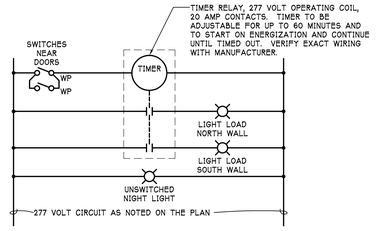
SHEET TITLE

05-309

PROJECT NUMBER

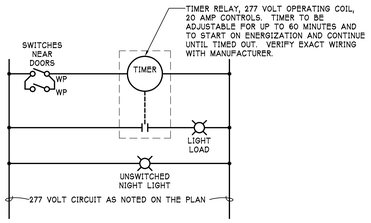
E-360

SHEET NUMBER



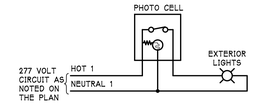
WASH BAY LIGHTS CONTROL WIRING DIAGRAM

SCALE - NONE



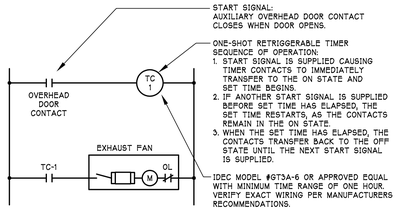
MECHANICAL ROOM LIGHTS CONTROL WIRING DIAGRAM

SCALE - NONE



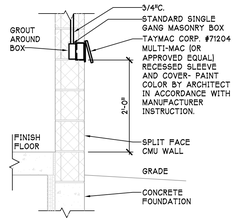
EXTERIOR LIGHTS CONTROL WIRING DIAGRAM

SCALE - NONE



EXHAUST FANS TIMER CONTROL WIRING DIAGRAM

SCALE - NONE TYPICAL FOR EF 4-1 & EF 4-2



1 / E-400

EXTERIOR NEMA-3R RECEPTACLE DETAIL

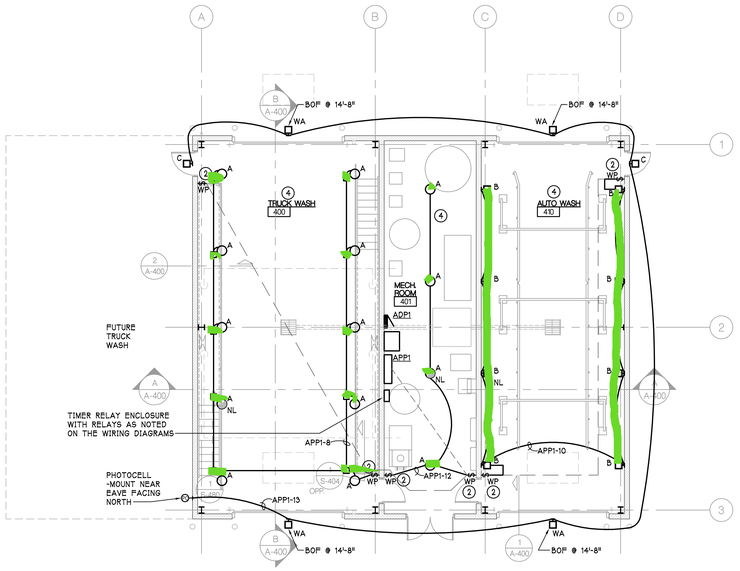
SCALE - NONE

AUTO WASH & TRUCK WASH BUILDING LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	LENSED LOW BAY WITH DIE CAST ALUMINUM HOUSING, VIRGIN ACRYLIC LENS, ALUMINUM REFLECTOR, CORROSION RESISTANT FINISH AND WET LOCATION UL LABEL OPTIONS	LITHONIA OR PRE APPROVED EQUAL	TXC 250M A23 277 CR WL	250W BT28 MH	1	1 HIGH POWER FACTOR	295	-	277V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 18'-0"AFF
B	METAL HALIDE WALL PACK WITH CORROSION RESISTANT DIE CAST ALUMINUM HOUSING & HARDWARE, ANODIZED ALUMINUM REFLECTOR, PRISMATIC BOROSILICATE GLASS SEALED REFRACTOR, WET LOCATION UL LABEL LISTED	LITHONIA OR PRE APPROVED EQUAL	MLHA8-96-F-*MW-PP-2-32-EB-1 -277	250W BT28 MH	1	1 HIGH POWER FACTOR	295	-	277V	MOUNT BOF AT 17'-0"AFF
C	COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0° STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	2	1 COLD TEMP.	84	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"AFF
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 14'-8"AFF

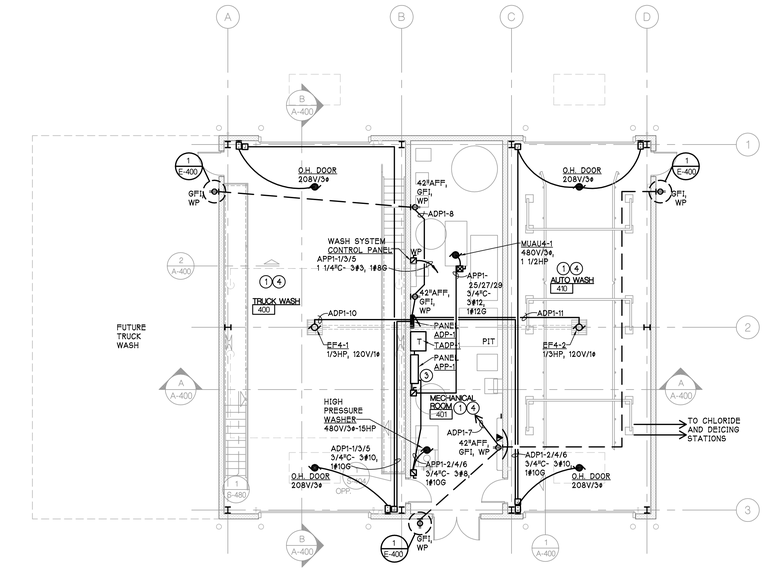
PLAN NOTES:

1. COORDINATE WITH WASH SYSTEM CONTRACTOR FOR INSTALLATION AND WIRING OF WASH SYSTEM AND RELATED COMPONENTS LOCATED IN THE EQUIPMENT ROOM AND IN THE WASH BAY.
2. LIGHT SWITCHES ARE TO BE WEATHER PROOF. RECEPTACLES ARE TO BE GFI TYPE WITH WEATHER PROOF COVER PLATES.
3. DISCONNECT SWITCHES, BRANCH CIRCUIT PANEL, TRANSFORMER AND POWER DISTRIBUTION PANEL ARE TO BE GASKETED NEMA TYPE 12.
4. CONDUIT TO BE RIGID GALVANIZED STEEL AND FITTINGS, INCLUDING JUNCTION BOXES, TO BE SEALED AND GASKETED FOR USE IN DAMP LOCATIONS.



TRUCK & AUTO WASH FLOOR PLAN - LIGHTING

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



TRUCK & AUTO WASH FLOOR PLAN - POWER

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

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SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
2	SUPP. INSTR. 7	9-21-2006
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

SITE STRUCTURE
AUTO & TRUCK WASH PLANS -ELEC.

SHEET TITLE

05-309

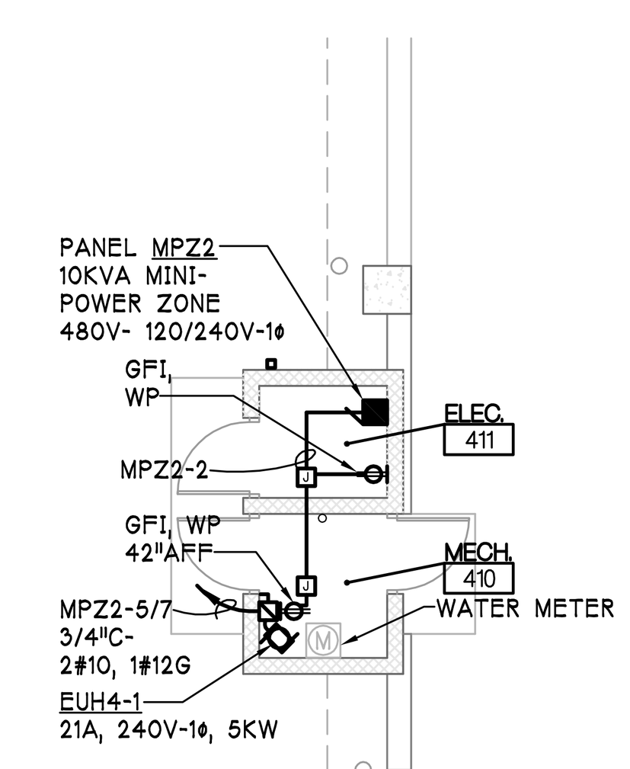
PROJECT NUMBER

E-400

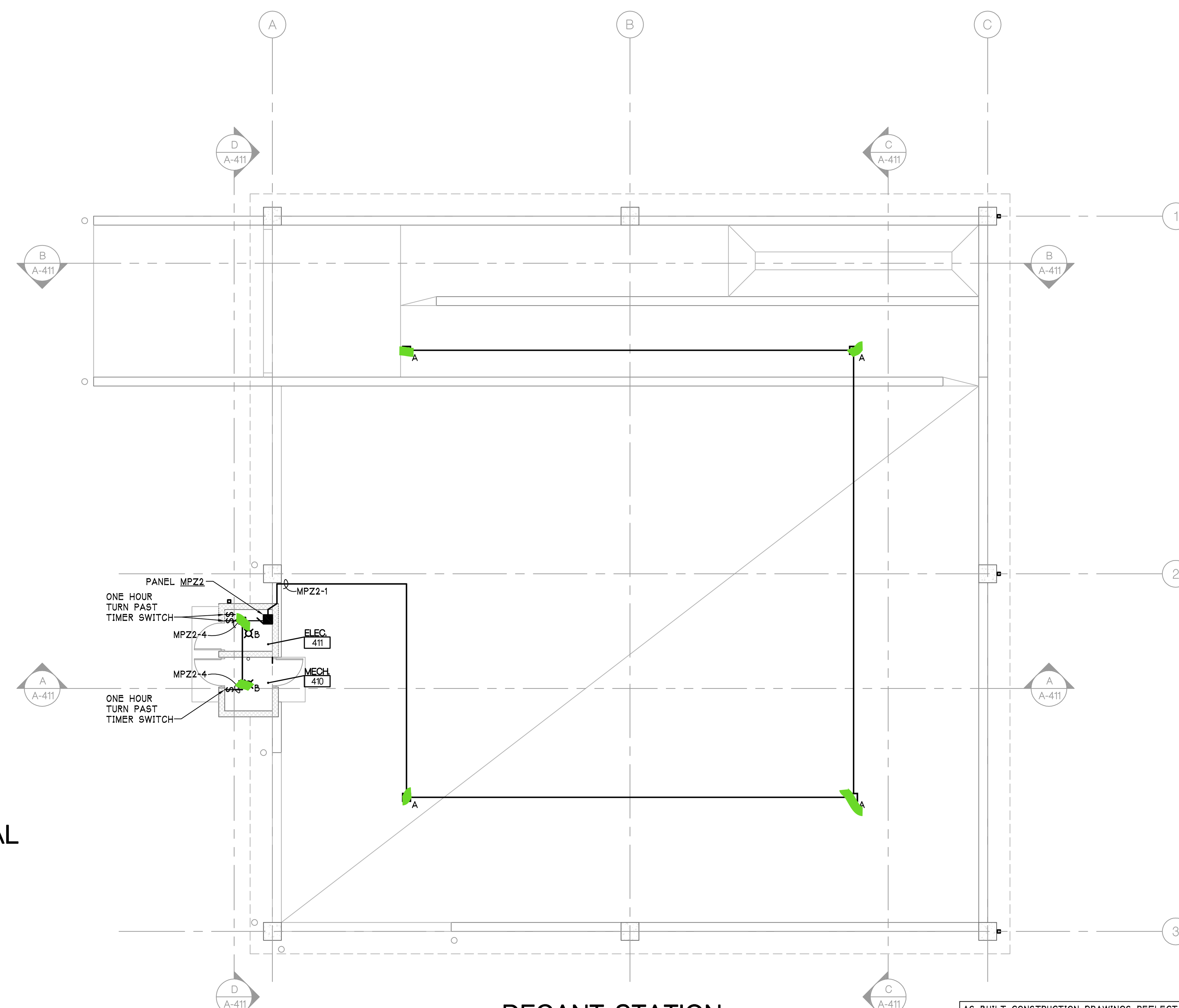
SHEET NUMBER

Drawing: P:\2005\05309\Dwg\CD40-SITE-STRUCTURE\Elec\E-SHT400.dwg
Date: Sep 11, 2006, 2:20pm Layout: 42x30-Layout Plotted by: satt

DECANT STATION BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	FLAT LENS CANOPY WITH RECESSED ONE PIECE ALUMINUM HOUSING, FLAT CLEAR TEMPERED GLASS LENS, INTEGRAL HINGED, DIE CAST ALUMINUM LENS DOOR FRAME, VERTICAL BURN OPTICAL SYSTEM REFLECTOR, PULSE START LAMP, HIGH POWER FACTOR BALLAST FOR -20°F OPERATION, WHITE FINISH	LSI LIGHTING OR APPROVED EQUAL	EC S 175 PSMV F MT WHT	175W PS MH	1	1	210	-	120V	
B	ENCLOSED AND GASKETED BOX MOUNTED INCANDESCENT	INTERMATIC OR PRE APPROVED EQUAL	VPXG-11	100W A19	1	-	100	-	120V	



NORTH
DECANT STATION PARTIAL FLOOR PLAN - POWER
SCALE - 1/8" = 1'-0"
EL96EP41



NORTH
DECANT STATION FLOOR PLAN - LIGHTING
SCALE - 1/8" = 1'-0"

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
1 ADDENDUM 1	11-11-2005
CONSTRUCTION	11-1-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

SITE STRUCTURE
DECANT STATION
PLANS -ELEC.

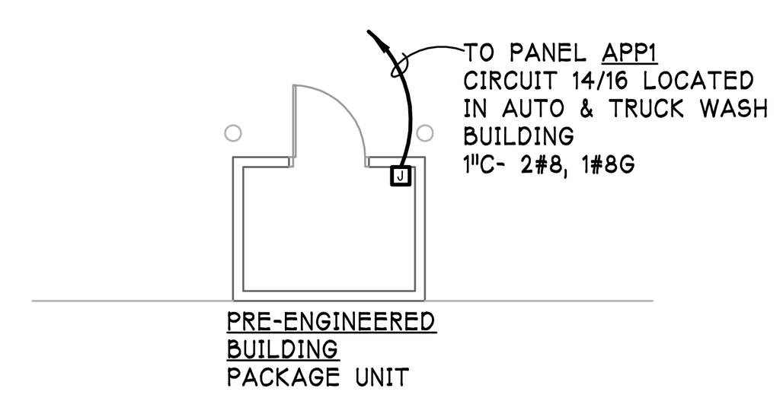
SHEET TITLE

05-309

PROJECT NUMBER

E-410

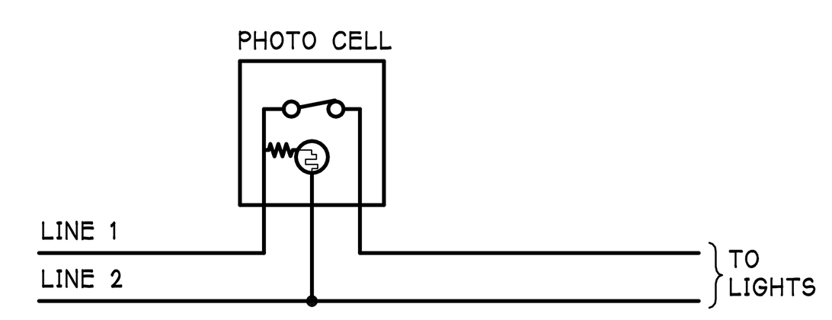
SHEET NUMBER



NORTH

PESTICIDE LOADING/ STORAGE FLOOR PLAN

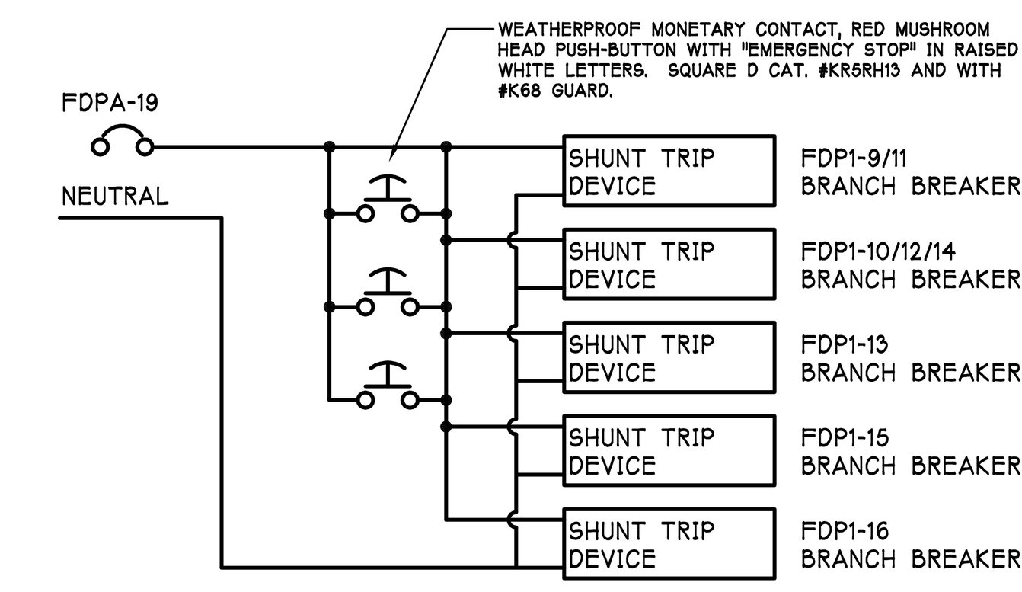
SCALE - 1/8" = 1'-0"



CANOPY LIGHTS CONTROL WIRING DIAGRAM

SCALE - NONE

FUELING STATION BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	FLAT LENS CANOPY WITH RECESSED ONE PIECE ALUMINUM HOUSING, FLAT CLEAR TEMPERED GLASS LENS, INTEGRAL HINGED, DIE CAST ALUMINUM LENS DOOR FRAME, VERTICAL BURN OPTICAL SYSTEM REFLECTOR, PULSE START LAMP, HIGH POWER FACTOR BALLAST FOR -20°F OPERATION, WHITE FINISH	LSI LIGHTING OR PRE APPROVED EQUAL	EC S 175 PSMV F MT WHT	175W PS MH	1	1	210	-	208V	
B	4' SURFACE MOUNT SPECIFICATION GRADE WRAPAROUND WITH HIGH IMPACT, VANDAL RESISTANT ACRYLIC, PRISMATIC DIFFUSER, BACKED WHITE ENAMEL ON CODE GAUGE STEEL HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	CLM-232-120-GEB	32W T8	2	1	58	3500K	120V	

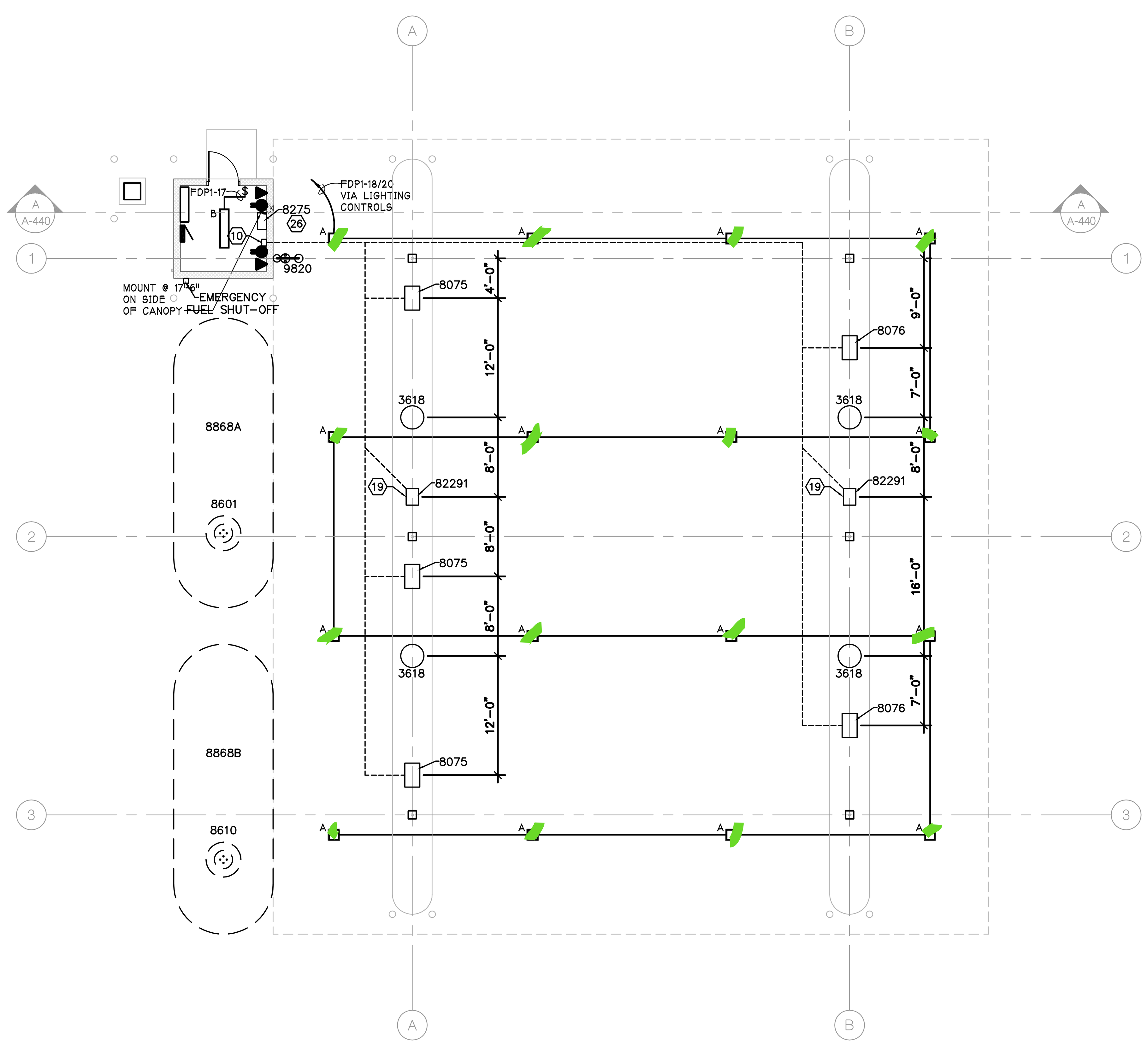


FUELING STATION EMERGENCY STOP SHUNT TRIP CONTROL WIRING DIAGRAM

SCALE - NONE

PLAN NOTES:

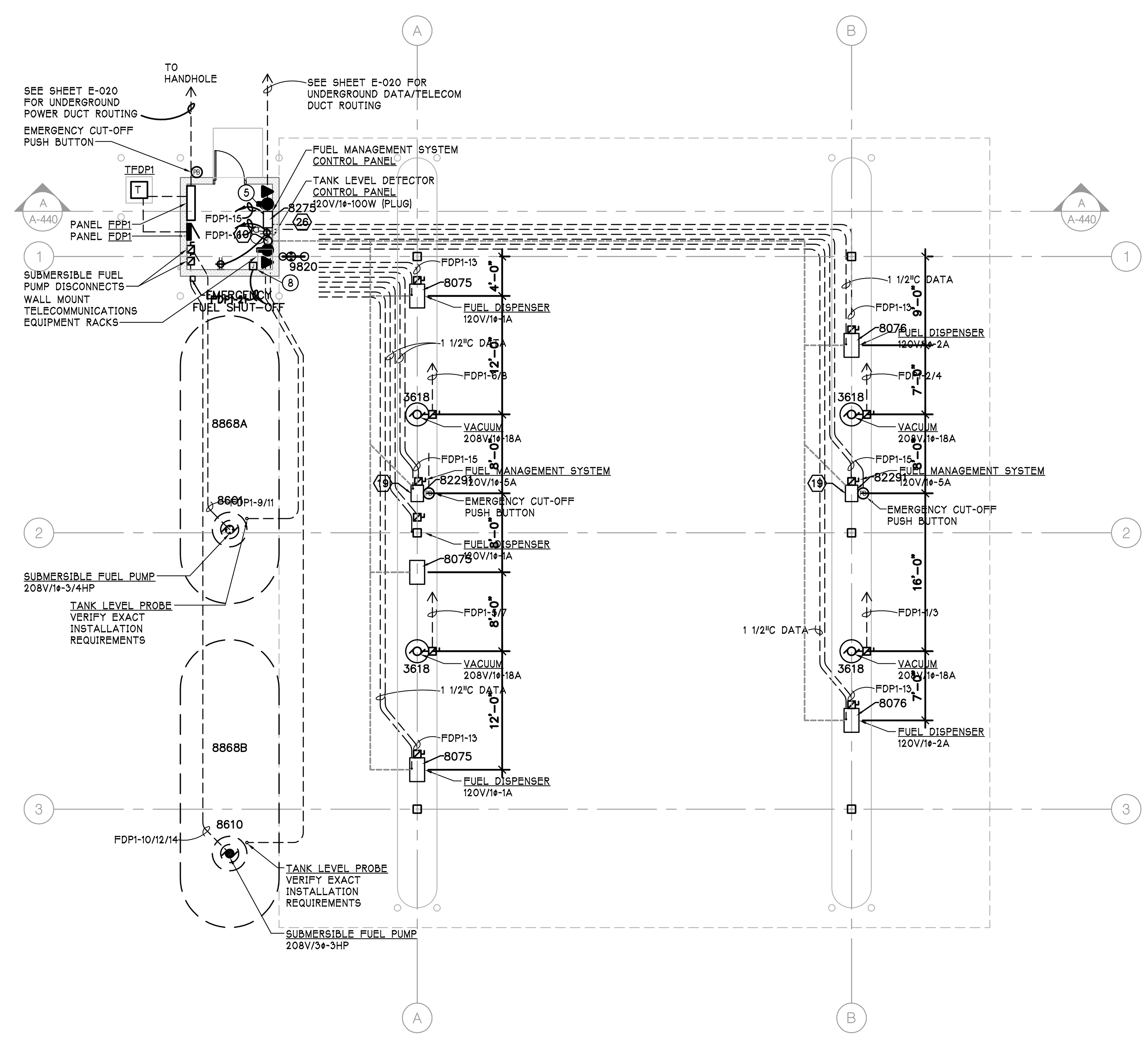
1. FUELING STATION IS CLASSIFIED AS CLASS I, DIVISIONS 1 AND 2. ALL DEVICES, COMPONENTS, FITTINGS, ETC. SHALL BE APPROVED FOR USE IN CLASS I, DIVISIONS 1 AND 2 AREAS.
2. VERIFY CONDUIT ROUTING AND SIZES WITH FUEL DISPENSER CONTRACTOR PRIOR TO PURCHASING AND INSTALLATION.
3. CONDUIT TO BE THREADED RIGID METAL WITH AT LEAST FIVE THREADS FULLY ENGAGED. EACH JOINT MUST BE MADE UP WRENCH TIGHT.
4. CONDUIT SEALS SHALL BE USED AT THE DIVISION 1 BOUNDARIES AND AT THE DIVISION 2 BOUNDARIES PASSING INTO AN UNCLASSIFIED AREA.
5. CONDUIT SEALS SHALL BE USED IN EACH CONDUIT RUN ENTERING OR LEAVING A DISPENSER.
6. VERIFY WIRING CONNECTION REQUIREMENTS WITH FUEL MANAGEMENT SYSTEM VENDOR DRAWINGS.
7. DO NOT INSTALL OR CONNECT ANY POTENTIAL ARC PRODUCING DEVICES SUCH AS SWITCHES, CONTACTS, MOTORS OR RECEPTACLES AT OR BELOW 18" ABOVE GRADE.
8. MOUNT JUNCTION BOX 7'-0"AFF. COORDINATE INSTALLTION WITH EQUIPMENT RACK PROVIDER AND WITH SHEET Y-401.



NORTH

FUELING STATION FLOOR PLAN - LIGHTING

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



NORTH

FUELING STATION FLOOR PLAN - POWER

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

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SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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PROJECT

CONSULTANT

SITE STRUCTURE FUELING STATION & PESTICIDE- ELEC.

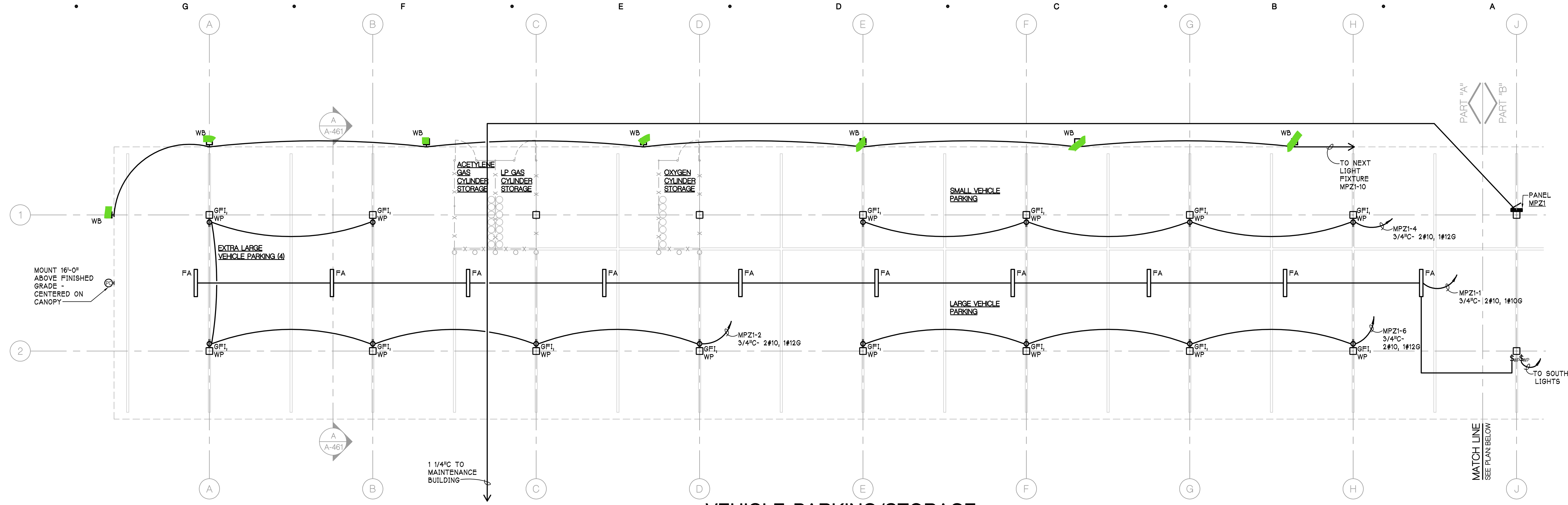
SHEET TITLE

05-309

PROJECT NUMBER

E-440

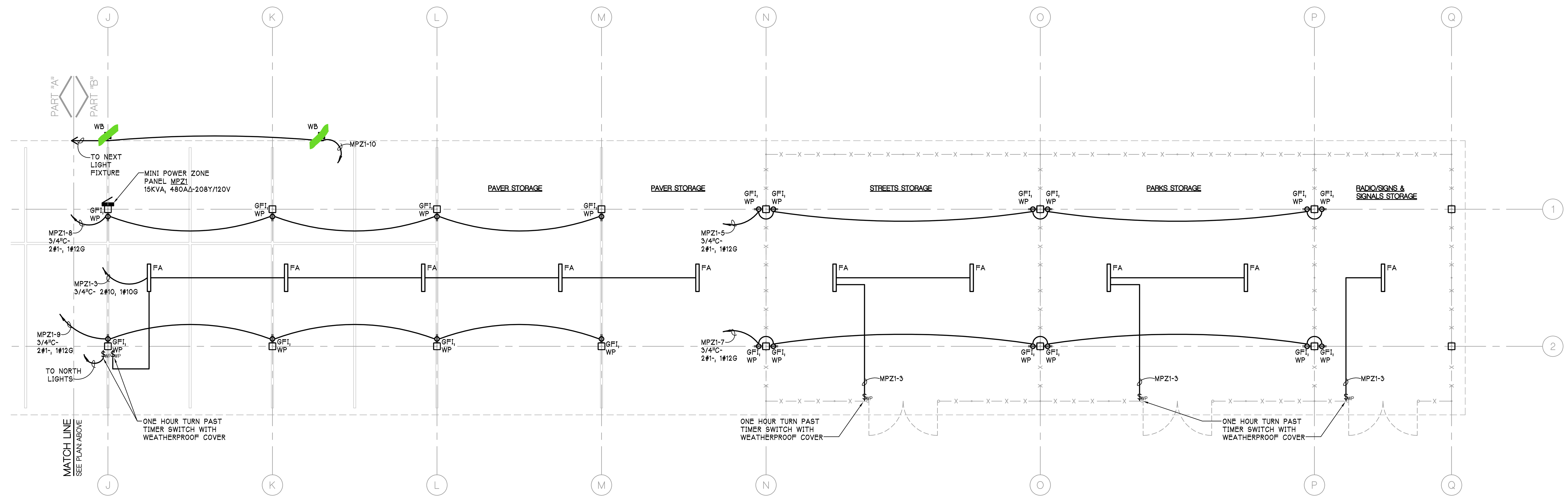
SHEET NUMBER



VEHICLE PARKING/STORAGE FLOOR PLAN - PART 'A' - ELECTRICAL

NORTH

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



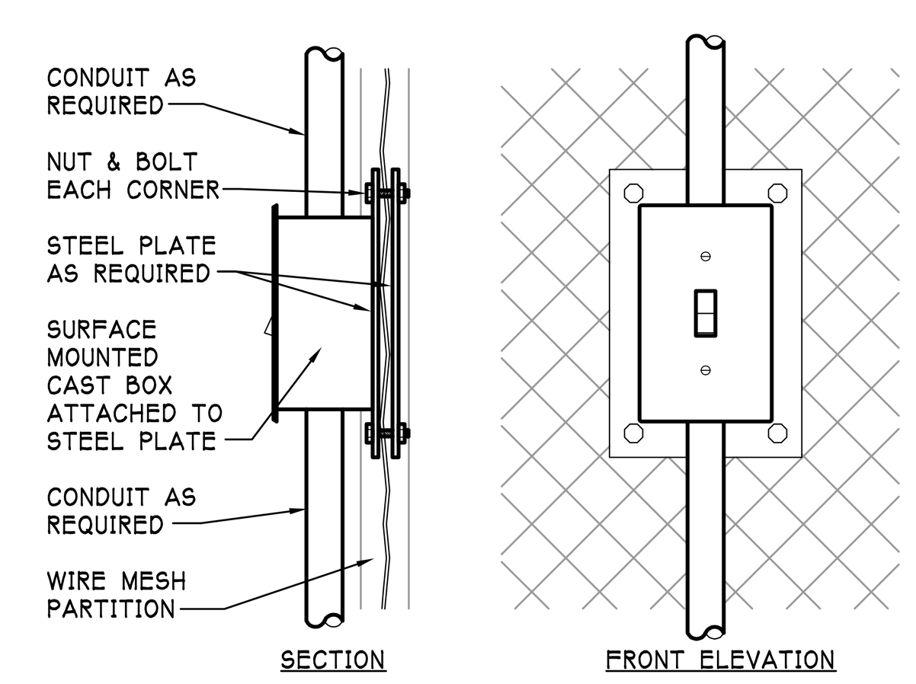
VEHICLE PARKING/STORAGE FLOOR PLAN - PART 'B' - ELECTRICAL

NORTH

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

EL96EP46

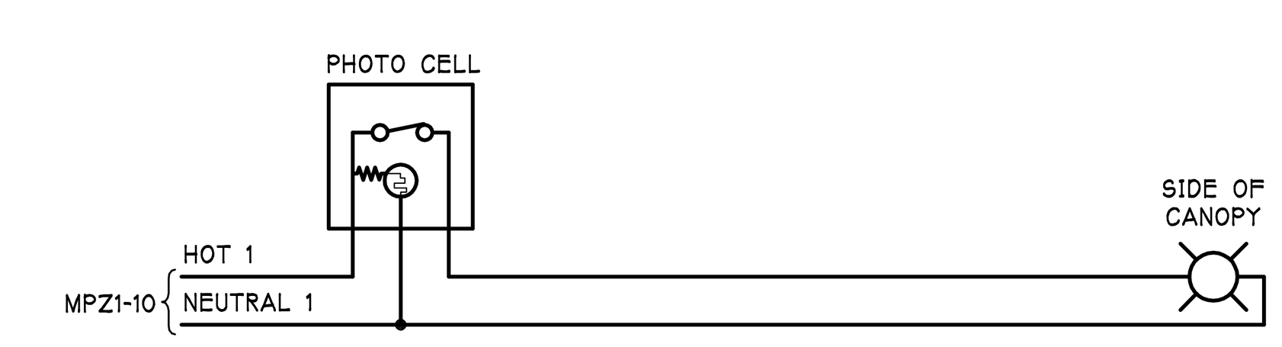
COVERED STORAGE & PARKING BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
FA	4' ENCLOSED INDUSTRIAL WITH IMPACT RESISTANT FIBERGLASS HOUSING, HIGH IMPACT ACRYLIC DIFFUSER, ELECTRONIC BALLAST FOR COLD TEMPERATURE APPLICATIONS, WET LOCATION UL LISTED	LITHONIA OR PRE APPROVED EQUAL	DMW 232 AR 120	32W T8	2	1 COLD TEMP.	74	3500	120V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT TO UNDERSIDE OF CANOPY
WB	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 70M FT 120 *	70W ED17	1	HIGH POWER FACTOR	95	--	120V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 15'-0"AFF



1 E-460

MOUNTING DETAIL

SCALE - NONE



LIGHTING CONTROL WIRING DIAGRAM

SCALE - NONE

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

	AS BUILTS	9-10-2008
	CONTRACT SET	2-6-2006
1	ADDENDUM 1	11-11-2005
	CONSTRUCTION	11-1-2005
	90% OWNER REVIEW	8-29-2005
	50% OWNER REVIEW	7-18-2005
	DD OWNER REVIEW	5-27-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

CONSULTANT

SITE STRUCTURE COVERED PARKING /STORAGE- ELEC

SHEET TITLE

05-309

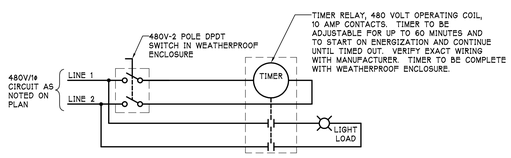
PROJECT NUMBER

E-460

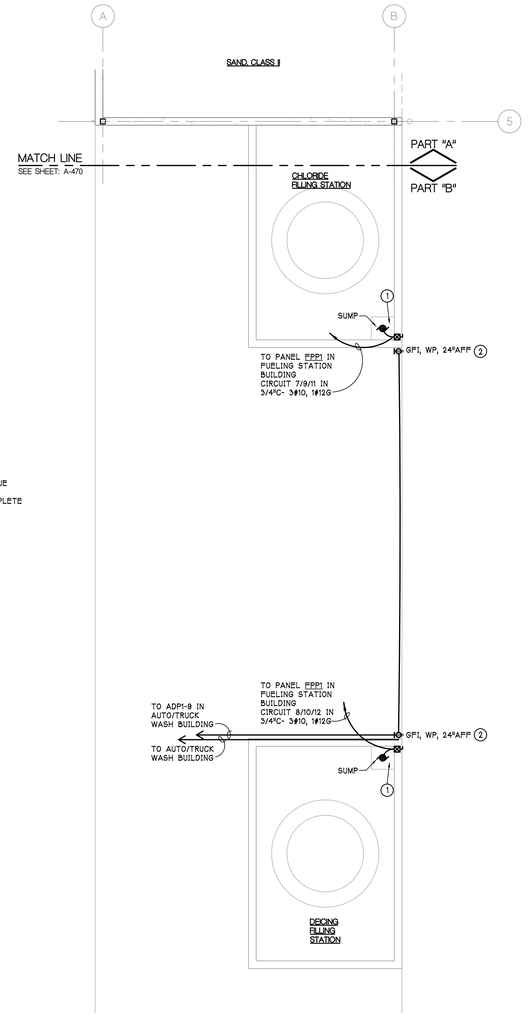
SHEET NUMBER

SAND/SALT BUNKER LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	ENCLOSED & GASKETED METAL HALIDE WITH PENDANT CONE MOUNTING, 1" HUB, UL LISTED FOR HAZARDOUS & WET LOCATIONS	APPLETON OR PRE APPROVED EQUAL	MERCMASTER III KPC-HH4010	250W MH	1	1 HIGH POWER FACTOR/ LOW TEMP	295	-	480V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 30'-0"AFF, SEE DETIAL 1/E-480 FOR MOUNTING
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 480 *	100W ED17	1	1	120	--	480V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 14'-8"AFF

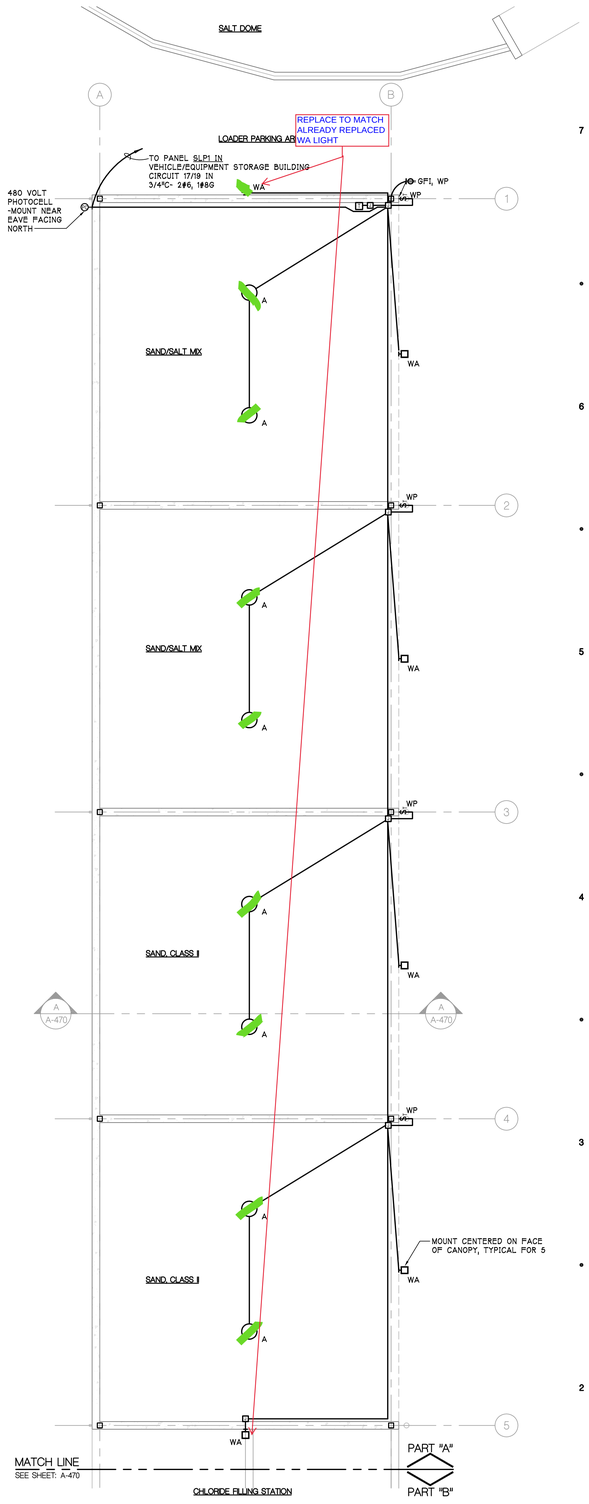


LIGHTING CONTROL WIRING DIAGRAM
SCALE - NONE — TYPICAL FOR 4 BUNKERS



NORTH

SAND/SALT BUNKER FLOOR PLAN - PART 'B'
SCALE - 1/8" = 1'-0"



NORTH

SAND/SALT BUNKER FLOOR PLAN - ELECTRICAL
SCALE - 1/8" = 1'-0"

1. COORDINATE INSTALLATION AND EXACT LOCATIONS OF OWNER PROVIDED PUMPS AND CONTROL STATIONS WITH OWNERS REPRESENTATIVE.
2. COORDINATE INSTALLATION AND EXACT LOCATION OF A GFI, WP DUPLEX RECEPTACLE, MOUNTED ON A PEDESTAL 24" ABOVE FINISH GRADE NEXT TO PUMP.

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
1 ADDENDUM 1	11-11-2005
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
DD OWNER REVIEW	5-27-2005

DATE ISSUED

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ANN ARBOR, MICHIGAN 48108

PROJECT

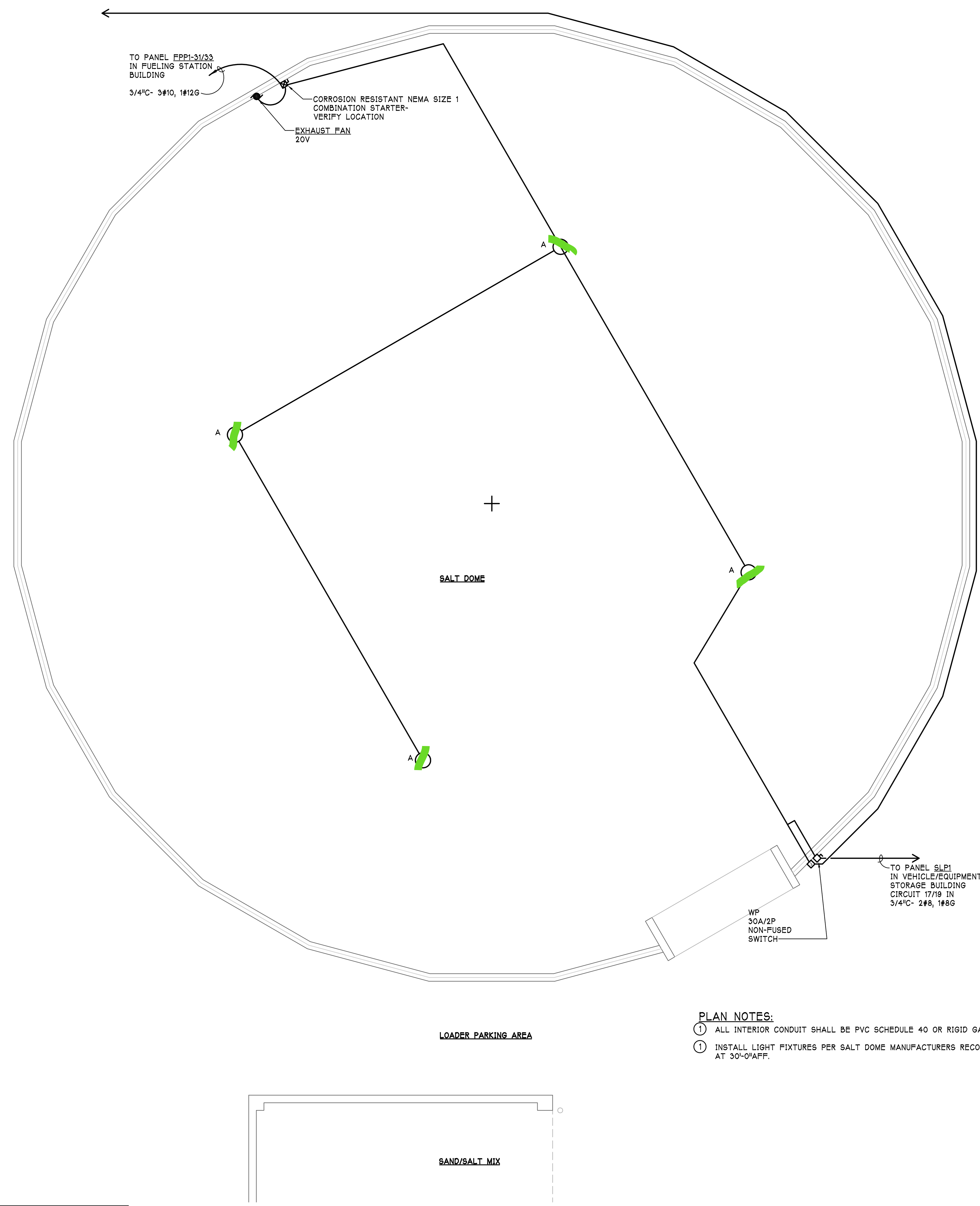
CONSULTANT

SITE STRUCTURE SAND/SALT BUNKERS- ELEC.
SHEET TITLE

05-309
PROJECT NUMBER

E-470
SHEET NUMBER

Drawing: P:\2005\05309\dwg\CD\40-SITE STRUCTURES\ExcELSht\E470.dwg
Date: Sep 11, 2006, 2:25pm Layout: 42x30-Layout Plotted by: saxis



PLAN NOTES:

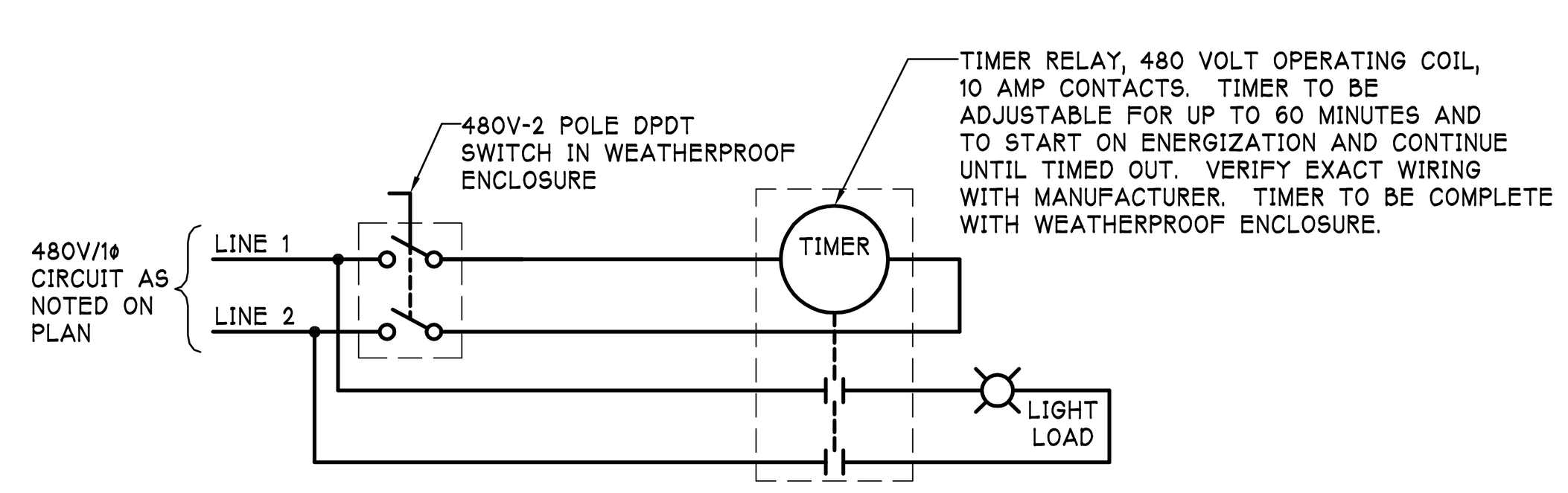
(1) ALL INTERIOR CONDUIT SHALL BE PVC SCHEDULE 40 OR RIGID GALVANIZED STEEL.

(1) INSTALL LIGHT FIXTURES PER SALT DOME MANUFACTURERS RECOMMENDATIONS AT 30'-0"AFF.

NORTH

SALT DOME FLOOR PLAN- ELECTRICAL

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



LIGHTING CONTROL WIRING DIAGRAM

SCALE - NONE

SALT DOME BUILDING LIGHT FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	LAMP QUANTITY	BALLAST	FIXTURE INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	ENCLOSED & GASKETED METAL HALIDE WITH PENDANT CONE MOUNTING, 1" HUB, UL LISTED FOR HAZARDOUS & WET LOCATIONS	APPLETON OR PRE APPROVED EQUAL	MERCMASTER III KPC-HH4010	250W MH	1	1 HIGH POWER FACTOR/ LOW TEMP	295	-	480V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 30'-0"AFF

AS BUILT CONSTRUCTION DRAWINGS REFLECT ARCHITECTURAL AND ENGINEERING KNOWN CHANGES AND MARK UPS FROM THE ELECTRICAL CONTRACTOR FIELD DOCUMENTS. ALWAYS REVIEW DRAWINGS AND PERFORM FIELD INVESTIGATIONS PRIOR TO PERFORMING ANY NEW WORK.

SEE SHEET E-031 FOR SYMBOL & ABBREVIATION LEGEND, TYPICAL MOUNTING HEIGHTS, AND GENERAL WIRING NOTES.

AS BUILTS	9-10-2008
CONTRACT SET	2-6-2006
1 ADDENDUM 1	11-11-2005
CONSTRUCTION	11-1-2005
90% OWNER REVIEW	8-29-2005
50% OWNER REVIEW	7-18-2005
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PROJECT

CONSULTANT

SITE STRUCTURES
SALT DOME
PLAN- ELEC.

SHEET TITLE

05-309

PROJECT NUMBER

E-480

SHEET NUMBER

Appendix B - Light Fixture and Lamp Replacement Schedule

Appendix B - Light Fixture and Lamp Replacement Schedule

MANUFACTURER	TYPE	CATALOG NUMBER	QUANITIY - REPLACE FIXTURE	QUANTITY - FIXTURES NEEDING LAMP REPLACEMENT	QUANTITY - NO CHANGE	COMMENTS
OVERALL SITE LIGHTING						
HYDREL LIGHTING	HA	G2XW-150M-480-SR3-SPA	19			
HYDREL LIGHTING	HA2	G2XW-150M-480-SR3-SPA (TWIN)	3			
LITHONIA LIGHTING	HD	KSF2 400M R4 SC			3	
LITHONIA LIGHTING	HD1	KSF2 400M R4 SC			3	
LITHONIA LIGHTING	HE	KSF2 400M R3 HS	1		5	NEW FIXTURES SHALL MATCH ALREADY REPLACED HE LIGHTS ON EAST END OF PROPERTY (SEE E-010)
LITHONIA LIGHTING	HG	KSF2 400M R5S			10	
LITHONIA LIGHTING	HG2	KSF2 400M R5S (TWIN)			3	
LITHONIA LIGHTING	HG3	KSF2 400M R5S (TRIPLE)			1	
LITHONIA LIGHTING	HG4	KSF2 400M R5S (QUAD)			4	
OPERATIONS SITE LIGHTING						
HYDREL LIGHTING	SA	"G2 EDGE" G2XW-100M-277-SR5S-SPA-LPI-*	3			
HYDREL LIGHTING	SB	7100-70M-277-**SP-KM-SMSA12-ISS-LPI-*	2			
PRISMA LIGHTING	SC	07395*-	3			
HYDREL LIGHTING	SD	9150-1-100M-277-WWD-34BNPT-WWL			2	
BEGA LIGHTING	SE	8534MH 895A	3			
HYDREL LIGHTING	SF	7100-100M-277-HSP-KM-SMSA12-ISS-LPI-*	4			

HYDREL LIGHTING	SG	7100-100M-277-HSP-KM-SMSA12-ISS-LPI-*	9			
AUTO WASH & TRUCK WASH LIGHTING						
LITHONIA LIGHTING	A	TXC 250M A23 277 CR WL	14			
LITHONIA LIGHTING	B	MLHA8-96-F-*MW-PP-2-32-EB-1-277	8			
LITHONIA LIGHTING	C	WST 2/42T MD 277 ELDW *			2	
LITHONIA LIGHTING	WA	WFL2 100M FT 277 *			4	
DECANT STATION						
LSI LIGHTING	A	EC S 175 PSMV F MT WHT	4			
INTERMATIC LIGHTING	B	VPXG-11	2			
FUELING STATION						
LSI LIGHTING	A	EC S 175 PSMV F MT WHT	16			
LITHONIA LIGHTING	B	CLM-232-120-GEB		1		
COVERED STORAGE AND PARKING BLDG						
LITHONIA LIGHTING	FA	DMW 232 AR 120		20		
LITHONIA LIGHTING	WB	WFL2 70M FT 120 *	9			
SALT/SAND BUNKER						
APPLETON LIGHTING	A	MERCMASTER III KPC-HH4010	8			
LITHONIA LIGHTING	WA	WFL2 100M FT 480 *	1		5	NEW FIXTURE SHALL MATCH LIGHT ON THE WEST END OF BUILDING (SEE E-470)
SALT DOME BUILDING						
APPLETON LIGHTING	A	MERCMASTER III KPC-HH4010	4			
VEHICLE STORAGE BUILDING						
HOLOPHANE LIGHTING	A (A1)	HBS4-XSWGDU-K46MK32		33		

HOLOPHANE LIGHTING	B (B1)	HBS4-XSWGDU-K44MK22		13		
LITHONIA LIGHTING	C (C1)	2GT8 332 A12125 277 1/3GB		3		
LITHONIA LIGHTING	D (D1)	CLM-232-277-GEB	33	32		
LITHONIA LIGHTING	E	WST 2/42TRT MD 277 *			10	
LITHONIA LIGHTING	F	WST 100M FT 277 *			10	
LITHONIA LIGHTING	G	WC 2 32 A12 277 ES		1		
LITHONIA LIGHTING	H	TDM 432 12 277 GEB10IS BCD HC36		8		
LITHONIA LIGHTING	WA	WFL2 100M FT 277 *			20	
OPERATIONS BUILDING						
HOLOPHANE LIGHTING OR LITHONIA LIGHTING	A (A1)	HBS24-XSWGNU-K46MK32		59		
HOLOPHANE LIGHTING OR LITHONIA LIGHTING	B (B1)	HBS24-XSWGNU-K44MK22		12		
LITHONIA LIGHTING	C (C2)	2PM3N G B 332 18LD 277 GEB		41		
LITHONIA LIGHTING	C1 (C3)	2PM3N G B 332 18LD 277 2GEB		44		
LITHONIA LIGHTING	D (D2)	2GT8 332 A12125 277 1/3GEB		46		
ZUMTOBL/STAFF LIGHTING	E (E2)	SN2545 4 * DO U C2 (2)		56		
ZUMTOBL/STAFF LIGHTING	E1 (E3)	SN2328 4 * D U C2 (2)		30		
LITHONIA LIGHTING	F (F1)	EJA 2 54T5HO 277 ES HC36 WGEJ		13		
LITHONIA LIGHTING	G	WC 2 32 A12 277 ES		6		
VISA LIGHTING	G2	CB6508-1FS54(277)-*-*		4		
GOTHAM LIGHTING	H	LGFV 42TRT 7RW T73 277		10		

PEERLESS LIGHTING	J	LF3LW 3 54T5HO U4 277 GEB10 SCT LP835 *		12		
ZUMTOBL/STAFF LIGHTING	K	CDTT 042 UNV CPAC1 CDTA	4			
ZUMTOBL/STAFF LIGHTING	K1	CDTT 042 UNV CDWBR CDTA CDTL	8			
ZUMTOBL/STAFF LIGHTING	K2	CDTT 042 UNV CPAC1 CDTA	3			
GOTHAM LIGHTING	L	AF 2/42TRT 8AR 277 DMHL	30			
GOTHAM LIGHTING	M	AFW 2/42TRT 8AR 277 DMHL	6			
GOTHAM LIGHTING	N	AF 1/42TRT 8AR 277	10			
GOTHAM LIGHTING	N2 (N3)	AF 2/42TRT 8AR 277	21			
ZUMTOBL/STAFF LIGHTING	P	RX5-C1 RX5F 1545 4 277		4		
LITHONIA LIGHTING	Q	WST 100MH FT 277 *			14	
LITHONIA LIGHTING	R	TS 1 32 277 GEB SASR48WH		8		
LITHONIA LIGHTING	R1	S 1 32 277 GEB SASR48WH	QUANTITY - 3 LIGHTS			ALL R1 LIGHTS SHALL BE DISABLED IN CONTROLLER (SEE E-122)
LITHONIA LIGHTING	R2	S 1 17 277 GEB SASR24WH	QUANTITY - 3 LIGHTS			ALL R2 LIGHTS SHALL BE DISABLED IN CONTROLLER (SEE E-122)
LITHONIA LIGHTING	S	WST 2/42T MD 277 ELDW *			2	
LITHONIA LIGHTING	S1	WST 2/42T MD 277 ELDW *	2		5	NEW FIXTURES SHALL MATCH ALREADY REPLACED S1 LIGHTS (SEE E-122)
LITHONIA LIGHTING	T	N2S 17 277 GEB		6		

HYDREL LIGHTING	U	"G2 EDGE" G2EW-UP-70M-277-SP- -*			2	
ZUMTOBL/STAFF LIGHTING	V	STRAIGHT TRACK: 58081-* - ARCADE 2': 942-1-24-* - PROTON: 974-1-MG070-*	QUANTITY - 2 LIGHTS			ALL V LIGHTS SHALL BE DEMOLISHED (SEE E-122)
LITHONIA LIGHTING	WA	WFL2 100M FT 277 *			6	
LITHONIA LIGHTING	WB	WFL2 70M FT 480 *			1	
SPI LIGHTING	X1 & X2	(X1) 2 LAMP- LFB5601; (X2) 1 LAMP- LFB2601		32		
SPI LIGHTING	X3	4 LAMP CF- LFL2881 WITH LOUVER		15		
VESTIBULE SQUARE LIGHTS			QUANTITY - 6 LIGHTS			ALL LIGHTS SHALL BE DEMOLISHED (SEE E-122)
CEILING MOUNT STRIP LIGHTS			3			GATED ROOM: UTILITY SHOP/STORAGE

Appendix C - Light Fixture and Lamp Replacement Schedule by Room

Appendix C - Light Fixture and Lamp Replacement Schedule by Room

Building	Room Number	Room Name	Lighting Types	Quantity	Comments
Operations Building - Area A	100	Boiler Room	B	1	Lamp Replacement
			B1	1	Lamp Replacement
	101, 115	Ball Diamond Shop + Carp/Sign Shop	A	6	Lamp Replacement
			A1	3	Lamp Replacement
	102	Plumbing/Electrical Shop (Meter Room)	B	3	Lamp Replacement
			B1	1	Lamp Replacement
	103	Electrical Room	F	4	Lamp Replacement
	104	Archive Storage	D	6	Lamp Replacement
	105	Wellness Center	C1	6	Lamp Replacement
	106	First Aid	C1	4	Lamp Replacement
			T	1	Lamp Replacement
	107	Men's Locker Room	D	14	Lamp Replacement
			D2	5	Lamp Replacement
			H	6	Lamp Replacement
			N	2	Replace fixture
			G	4	Lamp Replacement
	108	Janitor	D	1	Lamp Replacement
	110	Corridor	X1	7	Lamp Replacement
			X2	6	Lamp Replacement
			X3	6	Lamp Replacement
	111	Corridor	X2	3	Lamp Replacement
			X3	1	Lamp Replacement
	112	Storage (Radio/S&S)	A	2	Lamp Replacement
			A1	2	Lamp Replacement
	113	Mower Maintenance Shop	A	7	Lamp Replacement
			A1	2	Lamp Replacement
	114	Forestry/Horticulture Shop	A	7	Lamp Replacement
			A1	2	Lamp Replacement
		Exterior Lighting	WA	3	No Change
			S	2	No Change

			S1	2	No Change
			Q	7	No Change
Operations Building - Area B	109	Corridor	X2	2	Lamp Replacement
			X3	1	Lamp Replacement
	116	Fabrication Area	A	4	Lamp Replacement
			A1	2	Lamp Replacement
	117	Women's Locker Rm	D	3	Lamp Replacement
			D2	2	Lamp Replacement
			N	1	Replace fixture
			H	4	Lamp Replacement
			G	2	Lamp Replacement
	118	Vending / Kitchen	C	4	Lamp Replacement
			C2	2	Lamp Replacement
	119	IT Tech/Setup	C	5	Lamp Replacement
			C2	1	Lamp Replacement
	120	Signal Control Solid State	C	7	Lamp Replacement
			C2	2	Lamp Replacement
	122	Telecommunications Room	C	8	Lamp Replacement
			C2	2	Lamp Replacement
	123	Electrical Room	F	3	Lamp Replacement
			F1	1	Lamp Replacement
	124	TSU Shop/Storage	B	4	Lamp Replacement
			B1	2	Lamp Replacement
	125	Corridor	X1	9	Lamp Replacement
			X2	5	Lamp Replacement
			X3	7	Lamp Replacement
	126	Utility / Shop Storage	A	7	Lamp Replacement
			A1	2	Lamp Replacement
		Gated Storage Area Within Room	CEILING MOUNT STRIP LIGHTS		Replace fixture
	127	Sign Storage	A	1	Lamp Replacement
			A1	1	Lamp Replacement
	128	Sign Shop	D	6	Lamp Replacement
			D2	2	Lamp Replacement

	129	Sign Comp Room	D	4	Lamp Replacement
			D2	1	Lamp Replacement
	130	Compressor Room	A	1	Lamp Replacement
			A1	1	Lamp Replacement
	131	Radio/Electronics Shop	C1	8	Lamp Replacement
			C3	2	Lamp Replacement
	132	Radio Repair Bay	A	3	Lamp Replacement
			A1	2	Lamp Replacement
	133	Street Light/signal Cabinet Shop	A	2	Lamp Replacement
			A1	2	Lamp Replacement
		Exterior Lighting	Q	7	No Change
			WB	1	No Change
			WA	3	No Change
			S1	1	No Change
Operations Building - Area C	109	Corridor	N2	11	Replace fixture
			N3	3	Replace fixture
	134	Electrical Room	F	2	Lamp Replacement
			F1	1	Lamp Replacement
	135	Open Office	E2	12	Lamp Replacement
			E	30	Lamp Replacement
			K1	8	Replace fixture
			T	1	Lamp Replacement
			R1	3	Disable in controller
			R	8	Lamp Replacement
	136	Office	L	4	Replace fixture
	137	Office	L	4	Replace fixture
	138	Audiovisual Storage	D	2	Lamp Replacement
	139	Office	L	4	Replace fixture
	140	Office	L	4	Replace fixture
	141	Conference Room	P	2	Lamp Replacement
			L	7	Replace fixture
			M	3	Replace fixture
	142	Conference Room	P	2	Lamp Replacement

			L	7	Replace fixture
			M	3	Replace fixture
	143	Reference Library	E	9	Lamp Replacement
			E2	1	Lamp Replacement
	144	Reception	E2	1	Lamp Replacement
			E	3	Lamp Replacement
			J	4	Lamp Replacement
			N3	1	Replace fixture
			N	1	Replace fixture
	145	Copy/Work room	C	2	Lamp Replacement
	146	IT. Closet	F	2	Lamp Replacement
	147	Mens Restroom	N2	2	Replace fixture
			N3	1	Replace fixture
			G2	2	Lamp Replacement
	148	Womens Restroom	N2	2	Replace fixture
			G2	2	Lamp Replacement
			N3	1	Replace fixture
	149	Lobby/Waiting	K	4	Replace fixture
			K2	2	Replace fixture
			J	8	Lamp Replacement
	150	Vestibule	K2	1	Replace Fixture
			V	2	Lamp Replacement
			Square	6	Demolish
	151	Crew Room For & Hort	E1	5	Lamp Replacement
			E3	1	Lamp Replacement
	152	Crew Room Streets	E1	11	Lamp Replacement
			E3	1	Lamp Replacement
			R2	1	Disable in controller
	153	Corridor	C	3	Lamp Replacement
			C2	3	Lamp Replacement
			N	6	Replace fixture
	154	Crew Room Utilities	C1	8	Lamp Replacement
			C3	1	Lamp Replacement
	155	Crew Room Radio/S&S	C1	5	Lamp Replacement
			C3	1	Lamp Replacement

	156	Crew Room Solid Waste	C1	8	Lamp Replacement
			C3	1	Lamp Replacement
	158	Kitchenette	C	1	Lamp Replacement
			C2	1	Lamp Replacement
			T	4	Lamp Replacement
	158	Janitor	D	1	Lamp Replacement
	159	Crew Room Park OPS	E1	11	Lamp Replacement
			E3	1	Lamp Replacement
			R2	2	Disable in controller
		Front Entrance Exterior	SG	9	Replace fixture
			SB	2	Replace fixture
			SC	3	Replace fixture
			SD	2	No Change
			SE	3	Replace fixture
			S1	2	No Change
			U	2	No Change
		Courtyard Exterior	S1	2	Replace fixture
			SA	3	Replace fixture
		Site Sign Lighting	SF	4	Replace fixture
Truck & Auto Wash	400	Truck Wash	A	10	Replace fixture
	401	Mech Room	A	4	Replace fixture
	410	Auto Wash	B	8	Replace fixture
		Truck Wash Exterior	WA	4	No Change
			C	2	No Change
Fueling Station		Fueling Station Main Area	A	16	Replace Fixture
		Fueling Station Control Room	B	1	Lamp Replacement
Decant Facility		Decant Facility Main area	A	4	Replace fixture
	411	Electrical Room	B - gaskted box mounted incandescent	1	Replace fixture
	410	Mechanical Room	B	1	Replace fixture
Vehicle Parking/Storage		Main Storage Area	FA	20	Lamp Replacement
			WB	9	Replace fixture

Sand/Salt Bunker		Main Storage Area	A	8	Replace fixture
			WA	6	Replace 1 Fixture, 5 No Change
Salt Dome		Main Area	A	4	Replace fixture
Vehicle Storage Building		Exterior Lights	E	10	No Change
			F	10	No Change
			WA	20	No Change
	300	Crack Seal Bunker	H	2	Lamp Replacement
	301	Swing Bunker	H	2	Lamp Replacement
	302	Swing Bunker	H	2	Lamp Replacement
	303	Cold Patch Bunker	H	2	Lamp Replacement
	304	Enclosed Storage (Solid waste)	D	12	Lamp Replacement
	305	Tool Crib (Solid waste)	D	2	Lamp Replacement
	306	Tool Crib (North)	D	2	Replace fixture
	307	Tool Crib (South)	D	4	Replace fixture
	308	Elec.	D	3	Lamp Replacement
			D1	1	Lamp Replacement
	309,310,311,312	Main Area	A	10	Lamp Replacement
	313,314,315,326,327		A1	20	Lamp Replacement
	316	Enclosed Storage (Parks/F&H)	A	2	Lamp Replacement
			A1	1	Lamp Replacement
	317	Janitorial Supplies (parks/F&H)	D	2	Lamp Replacement
	318	Enclosed Storage (Parks/F&H)	D	8	Replace fixture
	319	Laundry Room	D	2	Lamp Replacement
			D1	1	Lamp Replacement
	320	Communications	D	1	Lamp Replacement
	321	Mud Room	D	15	Replace fixture
			D1	4	Replace fixture
	322	Entrance	D	7	Lamp Replacement
			D1	1	Lamp Replacement

	323	Women's Room	G	1	Lamp Replacement
	324	Men's Room	C	1	Lamp Replacement
			C1	1	Lamp Replacement
	325	Janitor	C	1	Lamp Replacement
	340	East Mezzanine	B	3	Lamp Replacement
			B1	3	Lamp Replacement
	350	West Mezzanine	B	4	Lamp Replacement
			B1	3	Lamp Replacement

Appendix D - Lighting Controller Schedule

APPENDIX D - LIGHTING CONTROLLER SCHEDULE

Room Number	Room Name	Panel Name	Type of Panel	Controller Quantity	Relay Panel Quantity	Controllable Breaker Panel Quantity	Action
Operations Building							
134	Electrical Room	--	Main Controller	1	1	0	Provide a new controller, main relay panel, and contact closures for each relay within the panel. Models specified in BOM. Connect via ethernet to subcontrollers and BMS. Programming shall match existing.
103	Electrical Room	LC1	Sub Controller	1	1	0	Provide a new controller, relay panel, and contact closures for each relay within the panel. Models specified in BOM. Connect via ethernet to main controllers. Programming shall match existing.
123	Electrical Room	LC2	Sub Controller	1	1	0	Provide a new controller, relay panel, and contact closures for each relay within the panel. Models specified in BOM. Connect via ethernet to main controllers. Programming shall match existing.
Vehicle Storage Building							
312	Vehicle Parking - East Wall	SLP-1	Sub Controller	1	0	1	Replace controllable breaker panel and controller with a new controller, relay panel, and contact closures for each relay within the panel, and a lighting panel. Models specified in BOM. Connect via ethernet to main controllers. Programming shall match existing.

312	Vehicle Parking - West Wall	SLP-2	Sub Controller	1	0	1	Replace controllable breaker panel and controller with a new controller, relay panel, and contact closures for each relay within the panel, and a lighting panel. Models specified in BOM. Connect via ethernet to main controllers. Programming shall match existing.

BILL OF MATERIALS					
Item	Manufacturer	Catalog Number	Voltage	Quantity	Description
Controller	Acuity Brands	nECY MVOLT BAC ENC	120-277VAC	5	nLight ECLYPSE system controller, BACnet/IP and MS/TP Enabled, NEMA Type 1 metal enclosure
Main Relay Panel	Acuity Brands	ARP INTENC32 NLT 32SPR MVOLT SC SM DTC	120-277VAC	1	32-Relay Enclosure, 32-Single Pole Relays, Screw Cover, Surface Mount Relay Panel with Digital Time Clock
Relay Panel	Acuity Brands	ARP INTENC16 NLT 16SPR MVOLT SC SM	120-277VAC	4	16-Relay Enclosure, 16-Single Pole Relays, Screw Cover, Surface Mount Relay Panel
Lighting Panel	Square D or equal	277/480VAC, 125A, 3Ph, 4W, 30CKT Panelboard		2	125A Main Breaker, 3 Phase, 4 Wire, 277/480V Panelboard with 30 Circuits
Contact Closure	Acuity Brands	nIO 1S		100	nLight nIO 1S contact closure. Provides network addressability for a variety of non-nLight devices, such as occupancy sensors

* Controller programming shall match existing controllers. See Appendix A for timer operations

NECY Controller Additional Options	
GFXK:	Touchscreen interface, PS 150 power supply, CAT5 Cable
Envysion Software:	Web-based visualization interface. Used to create visualizaton for BMS, lighting, and energy management systems.

Appendix E - Occupancy Sensor Replacement

Appendix E - Occupancy Sensor Replacements

Area	Room Number	Room Name	OS Quantity
OPERATIONS BUILDING			
	102	Plumbing/Electrical Shop (Meter Room)	2
	103	Electrical Room	2
	104	Archive Storage	1
	105	Wellness Center	2
	152	Crew Room Streets	1
	153	Corridor	1
	155	Crew Room Radio/S&S	1
	156	Crew Room Solid Waste	1
	159	Crew Room Park OPS	1
VEHICLE STORAGE BUILDING			
	305	Tool Crib (Solid waste)	1
	306	Tool Crib (North)	1
	307	Tool Crib (South)	1
	350	West Mezzanine	6

Appendix F - Emergency Battery Pack Replacement Schedule

Appendix F - Emergency Battery Pack Replacement Schedule

MANUFACTURER	TYPE	CATALOG NUMBER	QUANTITY
VEHICLE STORAGE BUILDING			
HOLOPHANE LIGHTING	A1	HBS4-XSWGDU-K46MK32	21
HOLOPHANE LIGHTING	B1	HBS4-XSWGDU-K44MK22	6
LITHONIA LIGHTING	C1	2GT8 332 A12125 277 1/3GB	1
LITHONIA LIGHTING	D1	CLM-232-277-GEB	7
OPERATIONS BUILDING			
HOLOPHANE LIGHTING OR LITHONIA LIGHTING	A1	HBS24-XSWGNU-K46MK32	19
HOLOPHANE LIGHTING OR LITHONIA LIGHTING	B1	HBS24-XSWGNU-K44MK22	4
LITHONIA LIGHTING	C2	2PM3N G B 332 18LD 277 GEB	11
LITHONIA LIGHTING	C3	2PM3N G B 332 18LD 277 2GEB	5
LITHONIA LIGHTING	D2	2GT8 332 A12125 277 1/3GEB	10
ZUMTOBL/STAFF LIGHTING	E2	SN2545 4 * DO U C2 (2)	13
ZUMTOBL/STAFF LIGHTING	E3	SN2328 4 * D U C2 (2)	3
LITHONIA LIGHTING	F1	EJA 2 54T5HO 277 ES HC36 WGEJ	2
GOTHAM LIGHTING	N3	AF 2/42TRT 8AR 277	6
SPI LIGHTING	X3	4 LAMP CF- LFL2881 WITH LOUVER	15

*See Appendix C for fixture room locations and quantity

Appendix G - Existing Lighting Fixture Schedule

Appendix G – Wheeler Existing Lighting Fixture Schedules

Note: When specifying manufacturers for new fixtures, refer to Specifications 26 51 19 and 26 56 19.

SITE LIGHT FIXTURE SCHEDULE									
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	VOLTAGE	REMARKS
HA	AREA LIGHT WITH MULTI FACETED SPECULAR/HAMMERTONE REFLECTOR, TYPE III DISTRIBUTION, CLEAR FLAT LENS, SQUARE POLE MOUNTED, SINGLE FIXTURE HEAD	HYDREL OR PRE APPROVED EQUAL	G2XW-150M-480-SR3-SPA	150W ED17 MH	1	HPF	185W	480V	14' MOUNTING HEIGHT: 12' POLE ON A 2' BASE
HA2	AREA LIGHT WITH MULTI FACETED SPECULAR/HAMMERTONE REFLECTOR, TYPE III DISTRIBUTION, CLEAR FLAT LENS, SQUARE POLE MOUNTED, TWIN FIXTURE HEAD	HYDREL OR PRE APPROVED EQUAL	G2XW-150M-480-SR3-SPA (TWIN)	150W ED17 MH	2	HPF	370W	480V	14' MOUNTING HEIGHT: 12' POLE ON A 2' BASE
HD	AREA LIGHT WITH TYPE 4 DISTRIBUTION, CUTOFF REFLECTOR, HOUSE SIDE SHIELD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R4 SC	400W ED28 MH	1	HPF	462W	480V	30' MOUNTING HEIGHT
HD1	AREA LIGHT WITH TYPE 4 DISTRIBUTION, CUTOFF REFLECTOR, HOUSE SIDE SHIELD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R4 SC	400W ED28 MH	1	HPF	462W	230V	30' MOUNTING HEIGHT; FURNISH WITH INTEGRAL PHOTOCELL
HE	AREA LIGHT WITH TYPE 3 DISTRIBUTION, SHORT CUTOFF REFLECTOR, HOUSE SIDE SHEILD, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R3 HS	400W ED28 MH	1	HPF	462W	480V	30' MOUNTING HEIGHT

HG	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, SINGLE FIXTURE HEAD	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S	400W ED28 MH	1	HPF	462W	480V	30' MOUNTING HEIGHT
HG2	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, TWO FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (TWIN)	400W ED28 MH	2	HPF	924W	480V	30' MOUNTING HEIGHT
HG3	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, THREE FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (TRIPLE)	400W ED28 MH	3	HPF	1386W	480V	30' MOUNTING HEIGHT
HG4	AREA LIGHT WITH TYPE 5 DISTRIBUTION AND SHORT CUTOFF REFLECTOR, CLEAR FLAT LENS, POLE MOUNTED, FOUR FIXTURE HEADS	LITHONIA OR PRE APPROVED EQUAL	KSF2 400M R5S (QUAD)	400W ED28 MH	4	HPF	1848W	480V	30' MOUNTING HEIGHT

SITE LIGHTING - OPERATIONS BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
SA	SINGLE HEAD, SQUARE POLE MOUNT AREA LIGHT WITH TYPE V LIGHT DISTRIBUTION, ALUMINUM ALLOY DIECAST HOUSING, HIGH POWER FACTOR BALLAST	HYDREL LIGHTING	"G2 EDGE" G2XW-100M-277-SR5S-SPA-LPI-*	100W E17 MH	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT POLE BASE FLUSH WITH PATIO GRADE ON 12' POLE
SB	FLAG POLE STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, **SPOT DISTRIBUTION, INTEGRAL SOURCE SHIELD, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-70M-277-**SP-KM-SMSA12-ISS-LPI-*	70W ED17 MH	1	1	85W	--	277V	* VERIFY COLOR WITH ARCHITECT; ** VERIFY NARROW SPOT OR SPOT DISTRIBUTION WITH LIGHTING REPRESENTATIVE
SC	EXTERIOR RECESSED WALL LIGHT WITH DIE CAST COPPER FREE ALUMINUM SEMI-SECULAR ALUMINUM REFLECTOR, CONCAVE GLASS DIFFUSER WITH SATIN FINISH, RAPID START ELECTRONIC BALLAST WITH ~18" MINIMUM STARTING TEMPERATURE	PRISMA LIGHTING OR PRE APPROVED EQUAL	07395*-	18W 2G11 BASE	1	1	20W	3500K	120V	MOUNT CENTER OF FIXTURE AT 24" AFF, *VERIFY COLOR WITH ARCHITECT
SD	IN GRADE FLUSH MOUNT SQUARE BUILDING UPLIGHT WALL WASH WITH CAST ALUMINUM SEALED HOUSING, WALL WASH REFLECTOR, WALL WASH INTERNAL LOUVER, 3/4" CONDUIT CONNECTION STANDARD, LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	9150-1-100M-277-WWD-34BNPT-WWL	100W E17 MH	1	1	120W	--	277V	COORDINATE INSTALLATION WITH CONCRETE FLATWORK CONTRACTOR-GROUT MASK "GM" OPTIONAL

SE	44" HIGH BOLLARD WITH ASYMMETRICAL LIGHT DISTRIBUTION, STEP BAFFLE FACEPLATE, CLEAR TEMPERED GLASS, INTERNAL OPTICS, ANCHORAGE KIT, HIGH POWERED BALLAST	BEGA LIGHTING OR PRE APPROVED EQUAL	8534MH 895A	39W T6 MH	1	1	277W	--	277V	* VERIFY COLOR WITH ARCHITECT
SF	SITE SIGN STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, HORIZONTAL SPOT DISTRIBUTION, INTEGRAL SOURCE SHIELD, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED, LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-100M-277-HSP-KM-SMSA12-ISS-LPI-*	100W ED17 MH	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; FIELD ADJUST BEAM
SG	BUILDING STANCHION MOUNT FLOOD LIGHT WITH KNUCKLE MOUNT, VERTICAL FLOOD DISTRIBUTION, FLAT TEMPERED GLASS, INTEGRALLY MOUNTED LOW TEMPERATURE BALLAST	HYDREL LIGHTING OR PRE APPROVED EQUAL	7100-100M-277-HSP-KM-SMSA12-ISS-LPI-*	100W ED17 MH	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; FIELD ADJUST BEAM

AUTO WASH & TRUCK WASH BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	LENSED LOW BAY WITH DIE CAST ALUMINUM HOUSING, VIRGIN ACRYLIC LENS, ALUMINUM REFLECTOR, CORROSION RESISTANT FINISH AND WET LOCATION UL LABEL OPTIONS	LITHONIA OR PRE APPROVED EQUAL	TXC 250M A23 277 CR WL	250W BT28 MH	1	1 HIGH POWER FACTOR	295W	--	277V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 18'0" AFF
B	METAL HALIDE WALL PACK WITH CORROSION RESISTANT DIE CAST ALUMINUM HOUSING & HARDWARE, ANODIZED ALUMINUM REFLECTOR, PRISMATIC BOROSILICATE GLASS SEALED REFRACTOR, WET LOCATION UL LABEL LISTED	LITHONIA OR PRE APPROVED EQUAL	MLHA8-96-F-*MW-PP-2-32-EB-1-277	250W BT28 MH	1	1 HIGH POWER FACTOR	295W	--	277V	MOUNT BOF AT 17'-0" AFF
C	COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDUIM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0 DEG STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	1	1 COLD TEMP	84W	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 8'-0" AFF
WA	ARCHITECHTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 14'-8" AFF

DECANT STATION BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	FLAT LENS CANOPY WITH RECESSED ONE PIECE ALUMINUM HOUSING, FLAT CLEAR TEMPERED GLASS LENS, INTEGRAL HINGED, DIE CAST ALUMINUM LENS DOOR FRAME, VERTICAL BURN OPTICAL SYSTEM REFLECTOR, PULSE START LAMP, HIGH POWER FACTOR BALLAST FOR -20 DEG F OPERATION, WHITE FINISH	LSI LIGHTING OR APPROVED EQUAL	EC S 175 PSMV F MT WHT	175W PS MH	1	1	210W	--	120V	
B	ENCLOSED AND GASKETED BOX MOUNTED INCANDESCENT	INTERMATIC OR PRE APPROVED EQUAL	VPXG-11	100W A19	1	--	100W	--	120V	

DECANT STATION BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	FLAT LENS CANOPY WITH RECESSED ONE PIECE ALUMINUM HOUSING, FLAT CLEAR TEMPERED GLASS LENS, INTEGRAL HINGED, DIE CAST ALUMINUM LENS DOOR FRAME, VERTICAL BURN OPTICAL SYSTEM REFLECTOR, PULSE START LAMP, HIGH POWER FACTOR BALLAST FOR -20 DEG F OPERATION, WHITE FINISH	LSI LIGHTING OR APPROVED EQUAL	EC S 175 PSMV F MT WHT	175W PS MH	1	1	210W	--	120V	
B	ENCLOSED AND GASKETED BOX MOUNTED INCANDESCENT	INTERMATIC OR PRE APPROVED EQUAL	VPXG-11	100W A19	1	--	100W	--	120V	

FUELING STATION BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	FLAT LENS CANOPY WITH RECESSED ONE PIECE ALUMINUM HOUSING, FLAT CLEAR TEMPERED GLASS LENS, INTEGRAL HINGED, DIE CAST ALUMINUM LENS DOOR FRAME, VERTICAL BURN OPTICAL SYSTEM REFLECTOR, PULSE START LAMP, HIGH POWER FACTOR BALLAST FOR -20 DEG F OPERATION, WHITE FINISH	LSI LIGHTING OR APPROVED EQUAL	EC S 175 PSMV F MT WHT	175W PS MH	1	1	210W	--	208V	
B	4' SURFACE MOUNT SPECIFICATION GRADE WRAPAROUND WITH HIGH IMPACT, VANDAL RESISTANT ACRYLIC, PRISMATIC DIFFUSER, BACKED WHITE ENAMEL ON CODE GAUGE STEEL HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	CLM-232-120-GEB	32W T8	2	1	58W	3500K	120V	

COVERED STORAGE & PARKING BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
FA	4' ENCLOSED INDUSTRIAL WITH IMPACT RESISTANT FIBERGLASS HOUSING, HIGH IMPACT ACRYLIC DIFFUSER, ELECTRONIC BALLAST FOR COLD TEMPERATURE APPLICATIONS, WET LOCATION UL LISTED	LITHONIA OR PRE APPROVED EQUAL	DMW 232 AR 120	32W T8	2	1 COLD TEMP	74W	3500K	120V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT TO UNDERSIDE OF CANOPY
WB	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 70M FT 120 *	70W ED17	1	HIGH POWER FACTOR	95W	--	120V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 15'-0" AFF

SAND/SALT BUNKER LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	ENCLOSED & GASKETED METAL HALIDE WITH PENDANT CONE MOUNTING, 1" HUB, UL LISTED FOR HAZARDOUS & WET LOCATIONS	APPLETON OR PRE APPROVED EQUAL	MERCMASTER III KPC-HH4010	250W MH	1	1 HIGH POWER FACTOR / LOW TEMP	295W	--	480V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 30'-0" AFF; SEE DETAIL 1/E-480 FOR MOUNTING
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 480 *	100W ED17	1	1	120W	--	480V	* VERIFY COLOR WITH ARCHITECTL MOUNT BOF AT 14'-8" AFF

SALT DOME BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A	ENCLOSED & GASKETED METAL HALIDE WITH PENDANT CONE MOUNTING, 1" HUB, UL LISTED FOR HAZARDOUS & WET LOCATIONS	APPLETON OR PRE APPROVED EQUAL	MERCMASTER III KPC-HH4010	250W MH	1	1 HIGH POWER FACTOR / LOW TEMP	295W	--	480V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 30'-0" AFF

VEHICLE STORAGE BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A (A1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, BORAD BEAM DISTRIBUTION	HOLOPHANE OR PRE APPROVED EQUAL	HBS4-XSWGDU-K46MK32	54W T5HO	6	3	363W	3500K	277V	BALLAST FOR DUEL LEVEL SWITCHING, 19'-0"AFF TO BOTTOM OF FIXTURE (EXCEPT WHERE NOTED); PROVIDE WITH WIRE GUARD; FIXTURE TYPE "A1"; PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
B (B1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, BORAD BEAM DISTRIBUTION	HOLOPHANE OR PRE APPROVED EQUAL	HBS4-XSWGDU-K44MK22	54W T5HO	4	2	249W	3500K	277V	19'-0"AFF TO BOTTOM OF FIXTURE (& 10'-0" ABOVE MEZZ. FLOOR @ MEZZ); PROVIDE WITH WIRE GUARD; FIXTURE TYPE "B1"; PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
C	2'x4' RECESSED GRID TROFFER WITH #12 PATTERN, 0.125" ACRYLIC DIFFUSER, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2GT8 332 A12125 277 1/3GB	32W T8	3	1	85W	3500K	277V	FIXTURE TYPE "C1"; PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN

D (D1)	4' SURFACE MOUNT SPECIFICATION GRADE WRAPAROUND WITH HIGH IMPACT, VANDAL RESISTANT ACRYLIC, PRISMATIC DIFFUSER, BACKED WHITE ENAMEL ON CODE GAUGE STEEL HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	CLM-232-277-GEB	32W T8	2	1	58W	3500K	277V	FIXTURE TYPE "D1"; PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
E	COMPACT FLOURESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0 DEG STARTING TEMPERATURE ELECTRIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42TRT MD 277 *	42W TRT	2	1 COLD TEMP **	84W	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"; PROVIDE WITH ONE LAMP ON EMERGENCY BALLAST AT EGRESS DOORS AS SHOWN ON FLOOR PLAN - LITHONIA #PSDL3
F	METAL HALIDE WALL MOUNT EXTERIOR WITH FORWARD THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LNS, HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 100M FT 277 *	100W ED17	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT TOP OF FIXTURE TIGHT UP AGAINST BOTTOM OF CANOPY
G	4' WALL BRACKET WITH HEAVY DUTY GRADE STEEL AND RUST RESISTANCE FINISH, #12 PATTERN ACRYLIC DIFFUSERS, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	WC 2 32 A12 277 ES	32W T8	2	1	64W	3500K	277V	MOUNT BOTTOM OF FIXTURE @ 7'-0"AFF; PROVIDE EMERGENCY BALLAST
H	TANDEM ENCLOSED & GASKETED INDUSTRIAL WITH HIGH IMPACT ACRYLIC DIFFUSER, INSTANT START BALLAST,	LITHONIA OR PRE APPROVED EQUAL	TDM 432 12 277 GEB10IS BCD HC36	32W T8	4	1	130W	3500K	277V	PROVIDE WITH ALL NECESSARY COMPONENTS TO CHAIN HANG FIXTURE SO THAT BOTTOM OF

	FOR DAMP LOCATIONS, CHAIN HANGER ACCESSORIES									FIXTURE IS AT 19'-0"AFF
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120W	--	277V	VERIFY COLOR WITH ARCHITECT; MOUNT BOF AT 18'-0"AFF
EX	THERMOPLASTIC LED EXIT WITH STENCIL FACE, WHITE HOUSING, SINGLE FACE WITH EXTRA FACE PLATE, LED LETTERS, UNIVERSAL MOUNT, NI-CAD BATTERY	LITHONIA OR PRE APPROVED EQUAL	LQM S W 3 R 120/277 ELN	LED	--	--	69W	--	277V	CONNECT EXIT LIGHT TO SAME NON-SWITCHED CIRCUITS AS LIGHT FIXURES IN THE SAME SPACE

OPERATIONS BUILDING LIGHT FIXTURE SCHEDULE										
TYPE	DESCRIPTION	MANUFACTURER	CATALOG NUMBER	LAMP TYPE	QUANTITY	BALLAST	INPUT WATTS	LAMP COLOR	VOLTAGE	REMARKS
A (A1)	2'x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22 GAUGE STEEL HOUSING, UPLIGHT SLOTS, SPREAD BEAM DISTRIBUTION, HIGH POWER FACTOR ELECTRONIC BALLAST	HOLOPHANE, LITHONIA OR PRE APPROVED EQUAL	HBS24-XSWGNU-K46MK32	54W T5HO	6	2	363W	3500K	277V	WIRE FOR DUEL LEVEL SWITCHING; MOUNT BOF AS INDICATED ON PLANS USING GRAPPLE HANGERS FROM STRUCTURE; PROVIDE WITH WIRE GUARD; FIXTURE TYPE "A1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
B (B1)	16"x4' COMMERCIAL GRADE HIGHBAY WITH PREMIUM MIRRO 4 SPECULAR ALUMINUM REFLECTOR, 22	HOLOPHANE, LITHONIA OR PRE APPROVED EQUAL	HBS24-XSWGNU-K44MK22	54W T5HO	4	1	249W	3500K	277V	MOUNT BOF AS INDICATED ON PLANS USING GRAPPLE HANGERS FROM STRUCTURE; PROVIDE WITH WIRE GUARD;

	GAUGE STEEL HOUSING, UPLIGHT SLOTS, SPREAD BEAM DISTRIBUTION, HIGH POWER FACTOR ELECTRONIC BALLAST									FIXTURE TYPE "B1"; PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
C (C2)	2'x4' RECESSED PARABOLIC TROFFER, 3" DEEP, 18 CELL LOW IRIDESCENT LOUVERS, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2PM3N G B 332 18LD 277 GEB	32W T8	3	1	86W	3500K	277V	FIXTURE TYPE "C2": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN
C1 (C3)	2'x4' RECESSED PARABOLIC TROFFER, 3" DEEP, 18 CELL LOW IRIDESCENT LOUVERS, 2 ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2PM3N G B 332 18LD 277 2GEB	32W T8	3	2	86W	3500K	277V	FIXTURE TYPE "C3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN
D (D2)	2'x4' RECESSED GRID TROFFER WITH #12 PATTERN, 0.125" ACRYLIC DIFFUSER, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	2GT8 332 A12125 277 1/3GEB	32W T8	3	1	85W	3500K	277V	FIXTURE TYPE "D2": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN
D1 (D3)	2'x4' SURFACE MOUNT WRAPAROUND WITH FLAT BOTTOM PRISMATIC DIFFUSER, INJECTED MOLDED LUMINOUS ENDS, WHITE HOUSING, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	AW 332 277 1/3GEB	32W T8	3	1	85W	3500K	277V	FIXTURE TYPE "D3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN
E (E2)	4' FIXTURE IN CONTINUOUS RUN (LENGTH AS SHOWN ON FLOOR PLAN) INDIRECT/DIRECT, CABLE MOUNT, SPECULAR LOUVER	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	SN2545 4 * DO U C2 (2)	54W T5H0	2	1	110W	3500K	277V	USE MOST FEASIBLE FIXTURE CONFIGURATION, AVOIDING 4' LENGTHS, MOUNT BOF AT 12'-0"AFF; * VERIFY COLOR WITH ARCHITECT; FIXTURE

	WITH OPAL INLAY, ELECTRONIC BALLAST									TYPE "E2": PROVIDE WITH STANDBY BATTERY PACK OPTION WHERE NOTED ON PLAN
E1 (E3)	4' FIXTURE IN CONTINUOUS RUN (LENGTH AS SHOWN ON FLOOR PLAN) INDIRECT/DIRECT, CABLE MOUNT, SPECULAR LOUVER, ELECTRONIC BALLAST	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	SN2328 4 * D U C2 (2)	32W T8	2	1	64W	3500K	277V	USE MOST FEASIBLE FIXTURE CONFIGURATION, AVOIDING 4' LENGTHS, MOUNT BOF AT 9'-0"AFF; * VERIFY COLOR WITH ARCHITECT; FIXTURE TYPE "E3": PROVIDE WITH STANDBY BATTERY PACK OPTION WHERE NOTED ON PLAN
F (F1)	4' GENERAL PURPOSE INDUSTRIAL WITH STEEL CONSTRUCTION, 5% UPLIGHT, CHAIN HANGER ACCESSORY, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	EJA 2 54T5HO 277 ES HC36 WGEJ	54W T5HO	2	1	110W	3500K	277V	PROVIDE WITH ALL NECESSARY ACCESSORIES TO MOUNT BOF AT 10'-0"; PROVIDE WITH WIRE GUARD ACCESSORY; FIXTURE TYPE "F1": PROVIDE WITH EMERGENCY BATTERY PACK WHERE NOTED ON PLAN
G	4' WALL BRACKET WITH HEAVY DUTY GRADE STEEL AND RUST RESISTANCE FINISH, #12 PATTERN ACRYLIC DIFFUSER, ENERGY SAVING BALLAST	LITHONIA OR PRE APPROVED EQUAL	WC 2 32 A12 277 ES	32W T8	3	2	64W	3500K	277V	MOUNT BOF AT 7'-0"AFF

G2	4' WALL MOUNTED FIXTURE WITH METAL END CAPS, EXTRUDED 1/8" THICK CLEAR ACRYLIC DIFFUSER WITH MATTE FINISH, ELECTRONIC BALLAST	VISA LIGHTING OR PRE APPROVED EQUAL	CB6508-1FS54(277)-*-*	54W T5HO	1	1	56W	3500K	277V	MOUNT BOF AT 7'-0"AFF, * VERIFY COLOR WITH ARCHITECT
H	7" ROUND COMPACT FLUORESCENT DOWNLIGHT, WET LOCATION APPROVED, VERTICAL LAMP, RECESSED WHITE DOOR, PRISMATIC LENS, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	LGFV 42TRT 7RW T73 277	42W TRT	1	1	42W	3500K	277V	
J	4' EXTRUDED ALUMINUM ASYMMETRIC WALL MOUNT UPLIGHT WITH FOIL, SEMI SPECULAR REFLECTORS, ELECTRONIC BALLAST	PEERLESS LIGHTING	LF3LW 3 54T5HO U4 277 GEB10 SCT LP835 *	54W T5HO	3	1	185W	3500K	277V	MOUNT BOF AT 10'-10"AFF IN LOBBY & 9'-0" IN RECEPTION; * VERIFY COLOR WITH ARCHITECT
K	12" SUSPENDED PENDANT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, AIRCRAFT CABLE MOUNTING, TRANSLUCENT ACRYLIC REFLECTOR	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CPAC1 CDTA	42W TT	1	1	47W	3500K	277V	MOUNT BOF AT 10'-0"AFF IN REFERENCE LIBRARY AND 12'-0" IN VESTIBULE & LOBBY; VESTIBULE & LOBBY TO HAVE AIRCRAFT CONNECTION ON ANGLE AT JUNCTION BOX WHERE REQUIRED
K1	12" WALL BRACKET MOUNT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, TRANSLUCENT	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CDWBR CDTA CDTL	42W TT	1	1	47W	3500K	277V	MOUNT BOF AT 9'-0"AFF

	ACRYLIC REFLECTOR WITH ACRYLIC LENS									
K2	12" SUSPENDED PENDANT COMPACT FLUORESCENT DOWNLIGHT WITH UNIVERSAL BALLAST, AIRCRAFT CABLE MOUNTING, TRANSLUCENT ACRYLIC REFLECTOR EMERGENCY FIXTURE	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	CDTT 042 UNV CPAC1 CDTA	42W TT	1	1	47W	3500K	277V	MOUNT BOF AT 12'-0" IN VESTIBULE & LOBBY; PROVIDE GUTH #GPCF INVERTER AND MOUNT WHERE SHOWN ON PLAN; VESTIBULE & LOBBY TO HAVE AIRCRAFT CONNECTION ON ANGLE AT JUNCTION BOX WHERE REQUIRED
L	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, LUTRON DIMMING BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 2/42TRT 8AR 277 DMHL	42W TRT	2	1 DIMMING	95W	3500K	277V	
M	8" COMPACT FLUORESCENT OPEN WALL WASH WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, LUTRON DIMMING BALLAST	GOTHAM OR PRE APPROVED EQUAL	AFW 2/42TRT 8AR 277 DMHL	42W TRT	2	1 DIMMING	95W	3500K	277V	
N	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 1/42TRT 8AR 277	42W TRT	1	1	42W	3500K	277V	

N2 (N3)	8" COMPACT FLUORESCENT OPEN DOWNLIGHT WITH CLEAR REFLECTOR, SPECULAR LOW IRIDESCENT FINISH, ELECTRONIC BALLAST	GOTHAM OR PRE APPROVED EQUAL	AF 2/42TRT 8AR 277	42W TRT	2	1	95W	3500K	277V	FIXTURE TYPE "N3": PROVIDE WITH EMERGENCY BATTERY PACK OPTION WHERE NOTED ON PLAN
P	LINEAR PENDANT WITH MATTE BIVERGENCE LOUVER, 4% INDIRECT COMPONENT, NATURAL ANODIZED ALUMINUM FINISH HOUSING, ELECTRONIC BALLAST	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	RX5-C1 RX5F 1545 4 277	54W T5HO	1	1	60W	3500K	277V	MOUNT BOF AT 7'-0"AFF; PROVIDE COMPLETE WITH ALL TRUNKING COMPONENTS, FEELS AND SUSPENSIONS
Q	METAL HALIDE WALL MOUNT EXTERIOR WITH FORWARD THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 100MH FT 277 *	100W MH	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 14'-0"AFF
R	STANDARD TANDEM DOUBLE-LENGTH STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	TS 1 32 277 GEB SASR48WH	32W T8	2	1	68W	3500K	277V	MOUNT IN CONTINUOUS ROWS AS SHOWN ON FLOOR PLAN; 1 LAMP IN CROSS SECTION, 2 PER FIXTURE
R1	STANDARD 4' STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	S 1 32 277 GEB SASR48WH	32W T8	1	1	34W	3500K	277V	MOUNT IN SOFFIT SHOWN ON ARCHITECTURAL DETAIL 7/A-165

R2	STANDARD 2' STRIP LIGHT WITH ASYMMETRIC REFLECTOR SURFACE MOUNT, ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	S 1 17 277 GEB SASR24WH	17W T8	1	1	18W	3500K	277V	MOUNT IN SOFFIT SHOWN ON ARCHITECTURAL DETAIL 6/A-165
S	COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0 DEG STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	2	1 COLD TEMP.**	84W	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOF @ 8'-0"AFF
S1	EMERGENCY COMPACT FLUORESCENT WALL MOUNT EXTERIOR WITH MEDIUM THROW DISTRIBUTION, SINGLE PIECE ALUMINUM HOUSING, 1/8" THICK TEMPERED GLASS LENS, 0 DEG STARTING TEMPERATURE ELECTRONIC BALLAST	LITHONIA OR PRE APPROVED EQUAL	WST 2/42T MD 277 ELDW *	42W TRT	2	1 COLD TEMP.**	84W	3500K	277V	*VERIFY COLOR WITH ARCHITECT; MOUNT BOF @8'-0"AFF; ** PROVIDE WITH ONE LAMP ON EMERGENCY BALLAST AT EGRESS DOORS INSIDE DOOR ABOVE CEILING TILES OR AS SHOWN ON FLOOR PLAN
T	LOW PROFILE, FLUORESCENT UNDER CABINET WITH SOLID FRONT WHITE GLOSS	LITHONIA OR PRE APPROVED EQUAL	N2S 17 277 GEB	17W T8	1	1	18W	3500K	277V	

	ENAMEL FINISH, ELECTRONIC BALLAST									
U	EXTERIOR EALL MOUNT WITH ALUMINUM ALLOY DIECAST HOUSING, ARM MOUNT UP LIGHT	HYDREL LIGHTING	"G2 EDGE" G2EW-UP-70M-277-SP- -*	70W MH E17	1	1	85W	--	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOTTOM OF FIXTURE AT 7'-0"AFF WITH THE FIXTURES AT THE FRONT ENTRY DOOR AIMING UP
V	8' LINEAR TRUCKING SYSTEM SUSPENDED FROM UNISTRUT WITH 2 RUNS - ONE WITH 2 ARCADE FIXTURES & 2 PROTON FIXTURS AND ONE WITH 4 PROTON FIXTURES, SINGLE CIRCUIT WITH ALL NECESSARY FEEDS, HANGERS, COVERS, HANGERS & CONNECTS FOR OPERATION	ZUMTOBL/STAFF OR PRE APPROVED EQUAL	STRAIGHT TRACK: 58081-* ARCADE 2': 942-1-24-* PROTON: 974-1-MG070-*	24W T5HO, 70W PAR-30	2, 6	2	2@26W & 6@85	3500K	277V	* VERIFY COLOR WITH ARCHITECT; MOUNT BOTTOM OF TRACK AT 14'-6"AFF; PROVIDE A TOTAL OF 2- 8' TRACKS WITH 2- ARCADE FIXTURES & 6- PROTON FIXTURES- SEE PLAN FOR LAYOUT
WA	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED ALUMINUM BODY AND HIGH POWER FACTOR BALLAST	LITHONIA OR PRE APPROVED EQUAL	WFL2 100M FT 277 *	100W ED17	1	1	120W	--	277V	* VERIFY COLOR WITH ARCHITECT
WB	ARCHITECTURAL BUILDING MOUNTED WITH FORWARD THROW DISTRIBUTION, EXTRUDED	LITHONIA OR PRE APPROVED EQUAL	WFL2 70M FT 480 *	70W ED17 MH	1	1	95W	--	277V	* VERIFY COLOR WITH ARCHITECT

	ALUMINUM BODY AND HIGH POWER FACTOR BALLAST									
X1 & X2	LIGHT TRUSS 2 LIGHTING SYSTEM, SUSPENDED, WITH 3 LAMPING OPTIONS (X1, X2, X3) AND EXTRUDED 1.5"D ALUMINUM TUBES, PREWIRED AND FACTORY ASSEMBLED, DIE CAST ALUMINUM BULKHEADS AND WIREWAY, SYMMETRIC REFLECTORS WITH CLEAR TEMPERED GLASS LENS	SPI LIGHTING	(X1) 2 LAMP-LFB5601; (X2) 1 LAMP-LFB2601	400W BT28 MH	(X1)2, (X2)1	1 EACH	(X1)916W, (X2)458W	--	277V	* COLOR YE427; PROVIDE COMPLETE WITH ALL NECESSARY COMPONENTS TO INSTALL FIXTURES AT ELEVATIONS SHOWN ON PLAN IN MOST ECONOMICAL WAY.
X3	LIGHT TRUSS 2 LIGHTING SYSTEM, SUSPENDED, WITH COMPACT FLUORESCENT LAMPING AND EXTRUDED 1.5"D ALUMINUM TUBES, PREWIRED AND FACTORY ASSEMBLED, DIE CAST ALUMINUM BULKHEADS AND WIREWAY, SYMMETRIC REFLECTORS WITH CLEAR TEMPERED GLASS LENS	SPI LIGHTING	4 LAMP CF-LFL2881 WITH LOUVER	40W TT	4	1 EACH	160W	3500K	277V	* COLOR YE427; PROVIDE FIXTURE WITH IOTA BATTERY PACK #1-I-80-DL FOR EMERGENCY LIGHTING; PROVIDE COMPLETE WITH ALL NECESSARY COMPONENTS TO INSTALL FIXTURES AT ELEVATIONS SHOWN ON PLAN IN MOST ECONOMICAL WAY.

EX	THERMOPLASTIC LED EXIT WITH STENCIL FACE, WHITE HOUSING, SINGLE FACE WITH EXTRA FACE PLATE, LED LETTERS, UNIVESAL MOUNT, NI-CAD BATTERY	LITHONIA OR PRE APPROVED EQUAL	LQM S W 3 E 120/277 ELN	LED	--	--	0.69W	--	277V	CONNECT EXIT LIGHTS TO SAME NON-SWITCHED CIRCUIT AS LIGHT FIXTURE IN THE SAME SPACE

ATTACHMENT B
GENERAL DECLARATIONS

City of Ann Arbor
Guy C. Larcom Municipal Building
Ann Arbor, Michigan 48107

Ladies and Gentlemen:

The undersigned, as Bidder, declares that this Bid is made in good faith, without fraud or collusion with any person or persons bidding on the same Contract; that this Bidder has carefully read and examined the bid documents, including City Nondiscrimination requirements and Declaration of Compliance Form, Living Wage requirements and Declaration of Compliance Form, Prevailing Wage requirements and Declaration of Compliance Form, Vendor Conflict of Interest Form, Notice of Pre-Bid Conference, General Information, Bid, Bid Forms, Contract, Bond Forms, General Conditions, Standard Specifications, Detailed Specifications, all Addenda, and the Plans (if applicable) and understands them. The Bidder declares that it conducted a full investigation at the site and of the work proposed and is fully informed as to the nature of the work and the conditions relating to the work's performance. The Bidder also declares that it has extensive experience in successfully completing projects similar to this one.

The Bidder acknowledges that it has not received or relied upon any representations or warrants of any nature whatsoever from the City of Ann Arbor, its agents or employees, and that this Bid is based solely upon the Bidder's own independent business judgment.

The undersigned proposes to perform all work shown on the plans or described in the bid documents, including any addenda issued, and to furnish all necessary machinery, tools, apparatus, and other means of construction to do all the work, furnish all the materials, and complete the work in strict accordance with all terms of the Contract of which this Bid is one part.

In accordance with these bid documents, and Addenda numbered _____, the undersigned, as Bidder, proposes to perform at the sites in and/or around Ann Arbor, Michigan, all the work included herein for the amounts set forth in the Bid Forms.

The Bidder declares that it has become fully familiar with the liquidated damage clauses for completion times and for compliance with City Code Chapter 112, understands and agrees that the liquidated damages are for the non-quantifiable aspects of non-compliance and do not cover actual damages that may be shown and agrees that if awarded the Contract, all liquidated damage clauses form part of the Contract.

The Bidder declares that it has become fully familiar with the provisions of Chapter 14, Section 1:320 (Prevailing wages) and Chapter 23 (Living Wage) of the Code of the City of Ann Arbor and that it understands and agrees to comply, to the extent applicable to employees providing services to the City under this Contract, with the wage and reporting requirements stated in the City Code provisions cited. Bidder certifies that the statements contained in the City Prevailing Wage and Living Wage Declaration of Compliance Forms are true and correct. Bidder further agrees that the cited provisions of Chapter 14 and Chapter 23 form a part of this Contract.

The Bidder declares that it has become familiar with the City Conflict of Interest Disclosure Form and certifies that the statement contained therein is true and correct.

The Bidder encloses a certified check or Bid Bond in the amount of 5% of the total of the Bid Price. The Bidder agrees both to contract for the work and to furnish the necessary Bonds and insurance documentation within 10 days after being notified of the acceptance of the Bid.

If this Bid is accepted by the City and the Bidder fails to contract and furnish the required Bonds and insurance documentation within 10 days after being notified of the acceptance of this Bid, then the Bidder shall be considered to have abandoned the Contract and the certified check or Bid Bond accompanying this Bid shall become due and payable to the City.

If the Bidder enters into the Contract in accordance with this Bid, or if this Bid is rejected, then the accompanying check or Bid Bond shall be returned to the Bidder.

In submitting this Bid, it is understood that the right is reserved by the City to accept any Bid, to reject any or all Bids, to waive irregularities and/or informalities in any Bid, and to make the award in any manner the City believes to be in its best interest.

SIGNED THIS _____ DAY OF _____, 202_.

_____	_____
Bidder's Name	Authorized Signature of Bidder
_____	_____
Official Address	(Print Name of Signer Above)
_____	_____
Telephone Number	Email Address for Award Notice

ATTACHMENT C
LEGAL STATUS OF BIDDER

(The bidder shall fill out the appropriate form and strike out the other three.)

Bidder declares that it is:

* A corporation organized and doing business under the laws of the State of _____, for whom _____, bearing the office title of_____, whose signature is affixed to this Bid, is authorized to execute contracts.

NOTE: If not incorporated in Michigan, please attach the corporation's Certificate of Authority

• A limited liability company doing business under the laws of the State of _____, whom _____ bearing the title of _____ whose signature is affixed to this proposal, is authorized to execute contract on behalf of the LLC.

* A partnership, organized under the laws of the state of _____ and filed in the county of _____, whose members are (list all members and the street and mailing address of each) (attach separate sheet if necessary):

_____

_____

_____

_____

_____

* An individual, whose signature with address, is affixed to this Bid: __ _____
(initial here)

Authorized Official

_____ **Date** _____**,** 202_

(Print) Name _____ Title _____

Company:

_____

Address:

_____

Contact Phone ( ) _____ Fax ( ) _____

Email _____

ATTACHMENT D
PREVAILING WAGE DECLARATION OF COMPLIANCE

The "wage and employment requirements" of Section 1:320 of Chapter 14 of Title I of the Ann Arbor City Code mandates that the city not enter any contract, understanding or other arrangement for a public improvement for or on behalf of the city unless the contract provides that all craftsmen, mechanics and laborers employed directly on the site in connection with said improvements, including said employees of subcontractors, shall receive the prevailing wage for the corresponding classes of craftsmen, mechanics and laborers, as determined by statistics for the Ann Arbor area compiled by the United States Department of Labor. Where the contract and the Ann Arbor City Code are silent as to definitions of terms required in determining contract compliance with regard to prevailing wages, the definitions provided in the Davis-Bacon Act as amended (40 U.S.C. 278-a to 276-a-7) for the terms shall be used. Further, to the extent that any employees of the contractor providing services under this contract are not part of the class of craftsmen, mechanics and laborers who receive a prevailing wage in conformance with section 1:320 of Chapter 14 of Title I of the Code of the City of Ann Arbor, employees shall be paid a prescribed minimum level of compensation (i.e. Living Wage) for the time those employees perform work on the contract in conformance with section 1:815 of Chapter 23 of Title I of the Code of the City of Ann Arbor.

At the request of the city, any contractor or subcontractor shall provide satisfactory proof of compliance with this provision.

The Contractor agrees:

(a) To pay each of its employees whose wage level is required to comply with federal, state or local prevailing wage law, for work covered or funded by this contract with the City,

(b) To require each subcontractor performing work covered or funded by this contract with the City to pay each of its employees the applicable prescribed wage level under the conditions stated in subsection (a) or (b) above.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the wage and employment provisions of the Chapter 14 of the Ann Arbor City Code. The undersigned certifies that he/she has read and is familiar with the terms of Section 1:320 of Chapter 14 of the Ann Arbor City Code and by executing this Declaration of Compliance obligates his/her employer and any subcontractor employed by it to perform work on the contract to the wage and employment requirements stated herein. The undersigned further acknowledges and agrees that if it is found to be in violation of the wage and employment requirements of Section 1:320 of the Chapter 14 of the Ann Arbor City Code it shall has be deemed a material breach of the terms of the contract and grounds for termination of same by the City.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email address

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500

ATTACHMENT E
LIVING WAGE ORDINANCE DECLARATION OF COMPLIANCE

The Ann Arbor Living Wage Ordinance (Section 1:811-1:821 of Chapter 23 of Title I of the Code) requires that an employer who is (a) a contractor providing services to or for the City for a value greater than $10,000 for any twelve-month contract term, or (b) a recipient of federal, state, or local grant funding administered by the City for a value greater than $10,000, or (c) a recipient of financial assistance awarded by the City for a value greater than $10,000, shall pay its employees a prescribed minimum level of compensation (i.e., Living Wage) for the time those employees perform work on the contract or in connection with the grant or financial assistance. The Living Wage must be paid to these employees for the length of the contract/program.

Companies employing fewer than 5 persons and non-profits employing fewer than 10 persons are exempt from compliance with the Living Wage Ordinance. If this exemption applies to your company/non-profit agency please check here [___] *No. of employees__*

The Contractor or Grantee agrees:

(a) To pay each of its employees whose wage level is not required to comply with federal, state or local prevailing wage law, for work covered or funded by a contract with or grant from the City, no less than the Living Wage. The current Living Wage is defined as $14.82/hour for those employers that provide employee health care (as defined in the Ordinance at Section 1:815 Sec. 1 (a)), or no less than $16.52/hour for those employers that do not provide health care. The Contractor or Grantor understands that the Living Wage is adjusted and established annually on April 30 in accordance with the Ordinance and covered employers shall be required to pay the adjusted amount thereafter to be in compliance with Section 1:815(3).

Check the applicable box below which applies to your workforce

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage without health benefits

[___] Employees who are assigned to any covered City contract/grant will be paid at or above the applicable living wage with health benefits

(b) To post a notice approved by the City regarding the applicability of the Living Wage Ordinance in every work place or other location in which employees or other persons contracting for employment are working.

(c) To provide to the City payroll records or other documentation within ten (10) business days from the receipt of a request by the City.

(d) To permit access to work sites to City representatives for the purposes of monitoring compliance, and investigating complaints or non-compliance.

(e) To take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee covered by the Living Wage Ordinance or any person contracted for employment and covered by the Living Wage Ordinance in order to pay the living wage required by the Living Wage Ordinance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services or agrees to accept financial assistance in accordance with the terms of the Living Wage Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Living Wage Ordinance, obligates the Employer/Grantee to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract or grant of financial assistance.

_____	_____
Company Name	Street Address
_____	_____
Signature of Authorized Representative Date	City, State, Zip
_____	_____
Print Name and Title	Phone/Email address

Attachment F

CITY OF ANN ARBOR
LIVING WAGE ORDINANCE

RATE EFFECTIVE APRIL 30, 2022 - ENDING APRIL 29, 2023

$14.82 per hour
If the employer provides health care benefits*

$16.52 per hour
If the employer does **NOT** provide health care benefits*

Employers providing services to or for the City of Ann Arbor or recipients of grants or financial assistance from the City of Ann Arbor for a value of more than $10,000 in a twelve-month period of time must pay those employees performing work on a City of Ann Arbor contract or grant, the above living wage.

ENFORCEMENT

The City of Ann Arbor may recover back wages either administratively or through court action for the employees that have been underpaid in violation of the law. Persons denied payment of the living wage have the right to bring a civil action for damages in addition to any action taken by the City.

Violation of this Ordinance is punishable by fines of not more than $500/violation plus costs, with each day being considered a separate violation. Additionally, the City of Ann Arbor has the right to modify, terminate, cancel or suspend a contract in the event of a violation of the Ordinance.

* Health Care benefits include those paid for by the employer or making an employer contribution toward the purchase of health care. The employee contribution must not exceed $.50 an hour for an average work week; and the employer cost or contribution must equal no less than $1/hr for the average work week.

The Law Requires Employers to Display This Poster Where Employees Can Readily See It.

For Additional Information or to File a Complaint contact
Colin Spencer at 734/794-6500 or cspencer@a2gov.org

Revised 2/1/2022

ATTACHEMENT G

Vendor Conflict of Interest Disclosure Form

All vendors interested in conducting business with the City of Ann Arbor must complete and return the Vendor Conflict of Interest Disclosure Form in order to be eligible to be awarded a contract. Please note that all vendors are subject to comply with the City of Ann Arbor's conflict of interest policies as stated within the certification section below.

If a vendor has a relationship with a City of Ann Arbor official or employee, an immediate family member of a City of Ann Arbor official or employee, the vendor shall disclose the information required below.

1. No City official or employee or City employee's immediate family member has an ownership interest in vendor's company or is deriving personal financial gain from this contract.
2. No retired or separated City official or employee who has been retired or separated from the City for less than one (1) year has an ownership interest in vendor's Company.
3. No City employee is contemporaneously employed or prospectively to be employed with the vendor.
4. Vendor hereby declares it has not and will not provide gifts or hospitality of any dollar value or any other gratuities to any City employee or elected official to obtain or maintain a contract.
5. Please note any exceptions below:

Conflict of Interest Disclosure*	
Name of City of Ann Arbor employees, elected officials or immediate family members with whom there may be a potential conflict of interest.	( ) Relationship to employee _____ ( ) Interest in vendor's company ( ) Other (please describe in box below)

*Disclosing a potential conflict of interest does not disqualify vendors. In the event vendors do not disclose potential conflicts of interest and they are detected by the City, vendor will be exempt from doing business with the City.

I certify that this Conflict of Interest Disclosure has been examined by me and that its contents are true and correct to my knowledge and belief and I have the authority to so certify on behalf of the Vendor by my signature below:		
Vendor Name	**Vendor Phone Number**	
Signature of Vendor Authorized Representative	**Date**	**Printed Name of Vendor Authorized Representative**

Questions about this form? Contact Procurement Office City of Ann Arbor Phone: 734/794-6500, procurement@a2gov.org

ATTACHMENT H

DECLARATION OF COMPLIANCE

Non-Discrimination Ordinance

The "non discrimination by city contractors" provision of the City of Ann Arbor Non-Discrimination Ordinance (Ann Arbor City Code Chapter 112, Section 9:158) requires all contractors proposing to do business with the City to treat employees in a manner which provides equal employment opportunity and does not discriminate against any of their employees, any City employee working with them, or any applicant for employment on the basis of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight. It also requires that the contractors include a similar provision in all subcontracts that they execute for City work or programs.

In addition the City Non-Discrimination Ordinance requires that all contractors proposing to do business with the City of Ann Arbor must satisfy the contract compliance administrative policy adopted by the City Administrator. A copy of that policy may be obtained from the Purchasing Manager

The Contractor agrees:

(a) To comply with the terms of the City of Ann Arbor's Non-Discrimination Ordinance and contract compliance administrative policy, including but not limited to an acceptable affirmative action program if applicable.

(b) To post the City of Ann Arbor's Non-Discrimination Ordinance Notice in every work place or other location in which employees or other persons are contracted to provide services under a contract with the City.

(c) To provide documentation within the specified time frame in connection with any workforce verification, compliance review or complaint investigation.

(d) To permit access to employees and work sites to City representatives for the purposes of monitoring compliance, or investigating complaints of non-compliance.

The undersigned states that he/she has the requisite authority to act on behalf of his/her employer in these matters and has offered to provide the services in accordance with the terms of the Ann Arbor Non-Discrimination Ordinance. The undersigned certifies that he/she has read and is familiar with the terms of the Non-Discrimination Ordinance, obligates the Contractor to those terms and acknowledges that if his/her employer is found to be in violation of Ordinance it may be subject to civil penalties and termination of the awarded contract.

_____
Company Name

_____
Signature of Authorized Representative Date

_____
Print Name and Title

_____
Address, City, State, Zip

_____
Phone/Email Address

Questions about the Notice or the City Administrative Policy, Please contact:
Procurement Office of the City of Ann Arbor
(734) 794-6500

ATTACHMENT I

CITY OF ANN ARBOR NON-DISCRIMINATION ORDINANCE

Relevant provisions of Chapter 112, Nondiscrimination, of the Ann Arbor City Code are included below. You can review the entire ordinance at www.a2gov.org/humanrights.

Intent: It is the intent of the city that no individual be denied equal protection of the laws; nor shall any individual be denied the enjoyment of his or her civil or political rights or be discriminated against because of actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight.

Discriminatory Employment Practices: No person shall discriminate in the hire, employment, compensation, work classifications, conditions or terms, promotion or demotion, or termination of employment of any individual. No person shall discriminate in limiting membership, conditions of membership or termination of membership in any labor union or apprenticeship program.

Discriminatory Effects: No person shall adopt, enforce or employ any policy or requirement which has the effect of creating unequal opportunities according to actual or perceived age, arrest record, color, disability, educational association, familial status, family responsibilities, gender expression, gender identity, genetic information, height, HIV status, marital status, national origin, political beliefs, race, religion, sex, sexual orientation, source of income, veteran status, victim of domestic violence or stalking, or weight for an individual to obtain housing, employment or public accommodation, except for a bona fide business necessity. Such a necessity does not arise due to a mere inconvenience or because of suspected objection to such a person by neighbors, customers or other persons.

Nondiscrimination by City Contractors: All contractors proposing to do business with the City of Ann Arbor shall satisfy the contract compliance administrative policy adopted by the City Administrator in accordance with the guidelines of this section. All city contractors shall ensure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity and tends to eliminate inequality based upon any classification protected by this chapter. All contractors shall agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of any applicable protected classification. All contractors shall be required to post a copy of Ann Arbor's Non-Discrimination Ordinance at all work locations where its employees provide services under a contract with the city.

Complaint Procedure: If any individual believes there has been a violation of this chapter, he/she may file a complaint with the City's Human Rights Commission. The complaint must be filed within 180 calendar days from the date of the individual's knowledge of the allegedly discriminatory action or 180 calendar days from the date when the individual should have known of the allegedly discriminatory action. A complaint that is not filed within this timeframe cannot be considered by the Human Rights Commission. To file a complaint, first complete the complaint form, which is available at www.a2gov.org/humanrights. Then submit it to the Human Rights Commission by e-mail (hrc@a2gov.org), by mail (Ann Arbor Human Rights Commission, PO Box 8647, Ann Arbor, MI 48107), or in person (City Clerk's Office). For further information, please call the commission at 734-794-6141 or e-mail the commission at hrc@a2gov.org.

Private Actions For Damages or Injunctive Relief: To the extent allowed by law, an individual who is the victim of discriminatory action in violation of this chapter may bring a civil action for appropriate injunctive relief or damages or both against the person(s) who acted in violation of this chapter.

THIS IS AN OFFICIAL GOVERNMENT NOTICE AND
MUST BE DISPLAYED WHERE EMPLOYEES CAN READILY SEE IT.

Michigan Department
Of Transportation
CP-347 (04/10)

MICHIGAN DEPARTMENT OF TRANSPORTATION

CERTIFIED PAYROLL

COMPLETION OF CERTIFIED PAYROLL FORM FULFILLS THE MINIMUM MDOT PREVAILING WAGE REQUIREMENTS

(1) NAME OF CONTRACTOR / SUBCONTRACTOR (CIRCLE ONE) (2) ADDRESS

(3) PAYROLL NO. (4) FOR WEEK ENDING (5) PROJECT AND LOCATION (6) CONTRACT ID

(a)	(b)	(c)	(d) DAY AND DATE							(e)	(f)	(g)	(h)	(i)	(j) DEDUCTIONS						(k)
EMPLOYEE INFORMATION	WORK CLASSIFICATION	Hour Type	HOURS WORKED ON PROJECT							TOTAL HOURS ON PROJECT	PROJECT RATE OF PAY	PROJECT RATE OF FRINGE PAY	GROSS PROJECT EARNED / GROSS WEEKLY EARNED	TOTAL WEEKLY HOURS WORKED ALL JOBS	FICA	FEDERAL	STATE		OTHER	TOTAL DEDUCT	TOTAL WEEKLY WAGES PAID FOR ALL JOBS
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											
NAME:										0			$0.00							$0.00	$0.00
ETH/GEN: ID #:	GROUP/CLASS #:	S								0											

Date _____

I, _____ _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

_____ on the
(Contractor or Subcontractor)

_____; that during the payroll period commencing on the
(Building or Work)

_____ day of _____, _____, and ending the _____ day of _____, _____,
all persons employed on said project have been paid the full weekly wages earned, that no rebates have been or will be made either directly or indirectly to or on behalf of said

_____ from the full
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part 3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948, 63 Start. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

_____

_____

_____

_____

(2) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the applicable wage rates contained in any wage determination incorporated into the contract; that the classifications set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

☐ – in addition to the basic hourly wage rates paid to each laborer or mechanic listed in the above referenced payroll, payments of fringe benefits as listed in the contract have been or will be made to appropriate programs for the benefit of such employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as listed in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE 31 OF THE UNITED STATES CODE.