CHAMPAIGN COUNTY BOARD
FACILITIES COMMITTEE
County of Champaign, Urbana, Illinois
Tuesday, August 5, 2014, 6:00 pm

Lyle Shields Meeting Room
Brookens Administrative Center
1776 E. Washington St., Urbana

Committee Members:

Stan James - Chair
James Quisenberry – Vice-Chair
Josh Hartke
Jeff Kibler
Gary Maxwell
Giraldo Rosales
Rachel Schwartz

AGENDA **Page**

I. Call to Order

II. Roll Call

III. Approval of Minutes
   A. Facilities Committee Meeting – July 15, 2014 1

IV. Approval of Agenda/Addenda

V. Public Participation

VI. Communications

VII. Brief tour of Satellite Jail Pre-Cast Panels – Transportation provided by Deb Busey, Van Anderson and Dana Brenner. This brief tour should last 15-20 minutes. Upon conclusion of tour we will return to Brookens for the remainder of our meeting.

VIII. Approval of the contract for the Concrete Wall Panel Cracking Investigation at the Champaign County Satellite Jail by Engineering Resource Associates, Inc. 5

IX. Approval of the Brookens Administrative Center Energy Efficiency Contract by Alpha Controls & Services, LLC 8

X. Approval of ITB 2014-007 Installation of a Generator Backup System for the IT Network at the Brookens Administrative Center 15

XI. Facilities Director's Report
   A. Update on the Brookens chiller project
   B. Update on the ILEAS demolition project
   C. Update on the Courthouse compressor
   D. Update on the Courthouse masonry project
   E. FY2015 Capital Asset Projects

XII. Other Business

XIII. Chair's Report
   A. Future Meeting – Tuesday, September 2, 2014 at 6:00 pm

XIV. Designation of Items to be Placed on the Consent Agenda

XV. Adjournment

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Champaign County Board Facilities Committee
County of Champaign, Urbana, Illinois

MINUTES – SUBJECT TO REVIEW AND APPROVAL

DATE:	Tuesday, July 15, 2014
TIME:	6:00 p.m.
PLACE:	Lyle Shields Meeting Room Brookens Administrative Center 1776 E. Washington, Urbana, IL 61802

Committee Members

Present	Absent
Stan James (Chair)	
James Quisenberry (Vice Chair)	
Josh Hartke	
	Jeff Kibler
Gary Maxwell	
Giraldo Rosales	
	Rachel Schwartz

County Staff: Dana Brenner (Facilities Director); Deb Busey (County Administrator); Van Anderson (Deputy County Administrator of Finance); Sheriff Dan Walsh, Chief Deputy Allen Jones and Captain Shane Cook (Sheriff's Office); Linda Lane (Recording Secretary); members of the public

Others Present: Aaron Esry, Stan Harper, John Jay, Alan Kurtz, Jim McGuire, and Pattsi Petrie (Champaign County Board); Charles Reifsteck (Gorski Reifsteck Architects, Inc.), Dennis Kimme (Kimme & Associates), members of the public

MINUTES

I. Call to Order

Committee Chair James called the meeting to order at 6:00 p.m.

II. Roll Call

A verbal roll call was taken and a quorum was declared present.

III. Approval of Minutes

A. June 3, 2014

MOTION by Mr. Rosales to approve the minutes of the June 3, 2014 meeting as distributed; seconded by Mr. Quisenberry. Upon vote, the **MOTION CARRIED unanimously.**

IV. Approval of Agenda

MOTION by Mr. Maxwell to approve the agenda; seconded by Mr. James. Upon vote, the **MOTION CARRIED unanimously.**

V. Public Participation

Dorothy Vura-Weis commented that she was surprised at the proposed cost of the consultant services for the Sheriff's Operations Master Planning and that there would be an additional $5-40,000 more if any buildings other than the jails were to be evaluated for repurposing. She stated that at a previous meeting she thought it was stated that there was $50-60,000 budgeted for this and wanted to know where the rest of the money is coming from. Ms. Vura-Weis stated that a large portion of the ILPP recommendations covered changes in citing and booking

procedures, provision of services to address the underlying mental health and substance use problems, and development of re-entry programs to reduce recidivism. She noted that there a many factors that are within the control of the local County decision making and that Champaign County has already started to make some changes in processes. She summarized several factors that would decrease the number of jail beds needed.

VI. Communications

None

VII. Sheriff's Operations Master Planning for the County of Champaign (RFQ 2014-005): Recommendation of Award of Contract to Gorski Reifsteck Architects, Inc.

Mr. James asked for a motion of approval. **MOTION** by Mr. Quisenberry to approve the recommendation of award of contract to Gorski Reifsteck; seconded by Mr. Maxwell.

Mr. Maxwell is concerned about the cost but stated that he intends to support this because they have some immediate problems that needs to be addressed. He felt it was time to move on and find some solutions to these problems.

Mr. Hartke stated that his goal has been to close the downtown jail. He said he was not in favor of the team picked to do the study. He stated he wanted to see more information about programming space, medical space, etc. Mr. Hartke felt they have picked a qualified team and that he looks forward to the results, therefore he will support the issuing of this contract at this time.

Mr. Quisenberry referred to information supplied by Dr. Kalmanoff regarding an upside pyramid of costs associated with a justice facility, where operational expenses are always the largest cost. He said he has been focused on why they have two facilities when they would gain efficiency with just one. He thinks the cost is high because of the downtown jail evaluation. He said they don't want to overlook the value of an existing building that has some sound parts of the structure.

Mr. James thought this is a good price compared to other studies and things the County Board has done. He said they aren't just looking at buildings, but at a master plan for the Sheriff's office that will encompass staff, time tables, etc. Mr. James remarked that all the options they are hearing from the public are nice, but what they have to think about is cost, staff, utilities and all the other things that go with that. He pointed out that the Sheriff is also mandated by certain State laws. He felt they would get a good in-depth study and confirmed his support.

Mr. Rosales stated that he had requested a rescheduling of this meeting because he wanted to be able to follow due process. He wanted public participation so that later it wouldn't appear that the Board was rushing through and hiding behind closed doors. Mr. Rosales said he is looking forward to supporting this proposal. Mr. Quisenberry agreed that this process needed to go through committee. He thanked Mr. Anderson for the analysis of what they think this project does in terms of the ILPP recommendations. Mr. Quisenberry pointed out that this is acting on some of the recommendations from the ILPP report.

Mr. Kurtz commented that there seems to be a change in the culture of the justice system with social programs becoming more important. He noted that neither current jail facility can accommodate the culture of today's incarceration and follow the new rules and regulations. Mr. Kurtz stated he is interested in both social and facility issues and noted that the Board had put aside $150,000 for the re-entry program. He said he would like to see a unanimous vote of recommendation of approval.

Ms. Petrie wanted a better understanding of the concept of the master plan. Mr. Kimme stated they are working together to conclude what is the best long-term facility option for the County. It involves the quality of the spaces, the environment in which the inmates live and the staff work, the technical fitness of the facility, and what it will take to bring either or both facilities up to a point where they are buildings that can be relied on for the next 20 years. Mr. Kimme said they will also look at staff efficiency. He said the options they come up with will chart a course for developing the needed facilities over the next 20-30 years. Ms. Petrie commented that Mr. Anderson's memo mentioned, that with no study, any use of the space at JDC and any empty space at the Nursing Home have been put aside. She asked how this was decided. Mr. Anderson responded that there was a long discussion with GHR, who is familiar with the ILEAS facility, and Mr. Kimme, who is aware of the

housing requirements at JDC. He explained that the ILEAS facility is leased with multiple three year options that won't be exercised until the beginning of 2017. Mr. Anderson summarized security and quality issues of the building. He stated issues brought up in the ILPP study regarding the JDC were discussed, but noted that changes took effect January 1, 2014 regarding housing options. Ms. Petrie is concerned that the study isn't looking at the entire campus as a comprehensive plan as ILPP recommended. She said the plan is also missing how to repurpose the downtown jail for other things beginning in Urbana. Mr. James responded that the study will look at what is viable for the downtown jail. He said if everything had been put in now they would never get off the ground because the County doesn't have the money to do a study of all its buildings at this time.

Mr. Quisenberry pointed out that this committee is sending it to the full board with a recommendation or not, so it will be available to be discussed at the full board meeting. He stated that it can be taken off the consent agenda. Mr. Quisenberry didn't think doing this precludes any opportunity to take advantage of whatever changes may be taking place in Urbana. Upon vote, the **MOTION CARRIED unanimously.**

VIII. Facilities Director's Report

Mr. Brenner referred to handouts for the items below.

A. Update on the Brookens Administrative Center Chiller Project

Mr. Brenner explained the timeline of the project and said it will be done by August 13. Mr. James asked if done meant the fence as well. Mr. Brenner said no, but that the fence has been ordered.

B. Update on the ILEAS Demolition Project

Mr. Brenner reported that they had mobilized on the demolition and then found out they had to post a 45 day notice. He stated that the new start date is July 25 and the demolition should take about one week with clean up taking a little longer.

C. Brookens Generator Project

Mr. Brenner stated that this is tied to capital projects. He directed everyone to item D and explained that after some discussion it was felt that a generator is a necessity at Brookens because it is the hub IT services of communications for the court and sheriff's office. He said they are not looking to power the entire building, just IT along with the emergency lights should the power be out for an extended period. Mr. Brenner said the cost would be around $149,000 with some contingency built in. He also stated that the totals are under the available fund balance for capital asset replacement fund.

Mr. Quisenberry commented that there is contingency after contingency. He asked the generator rating for power. Mr. Brenner answered 60KVA. He also asked for clarification that the UPS is not supporting the same load as a generator would. Mr. Anderson replied that is correct. Mr. Quisenberry noted this would go one step towards the annual wrist slap from the auditor regarding disaster recovery.

Mr. Hartke asked if the servers and computers in the County Clerk's office that deal with election information would be covered. Mr. Brenner answered yes. He said they also looked at the Coroner's office which has election storage in part of the buildings. He stated that if there were a power outage on election day that Mr. Hulten would move the gathering area to the Highway Building which has a full building generator.

D. Update Summary of Prioritized Capital Fund Projects for FY2014

Mr. Brenner reported that the handout shows the actual costs to date. He noted that Brookens and ILEAS are showing actual costs, but the others are still estimates.

E. Update on the Courthouse Tuck Pointing and Expansion Joint Replacement Project

Mr. Brenner reported that there is about 1-1/2 weeks of work to be done on the Courthouse masonry project. He stated they think the project will come in at $215,000, which is under the bid. Mr. Kurtz asked if there was a problem with the roof leaking. Mr. Brenner explained that the water in room 332 came from either a window or a corner joint.

F. Status and Update on Courthouse (original) Windows

Mr. Brenner noted that there are 226 windows in the old section of the courthouse that were replaced in 1986, 58 of which have lost their ability to keep out mother nature. He stated have a price for replacing the glass on those 58. He noted the current glass isn't low-E glass but plain double paned, and that they are looking at

several options. Mr. Brenner stated that a dozen have actually cracked. Mr. James asked if there is money in the courthouse construction fund for this. Ms. Busey answered there was.

G. Update on Parking Lot Repairs

Mr. Brenner said that Highway is assisting with parking lot renovation and have almost completed their lot. He said they are trying to work with Highway on dates in August to work on the lot at Brookens. Mr. Brenner stated that parts of the lot that have to be removed have already been cut.

H. Update on the Clock Tower LED Lighting

Mr. Brenner said he added this in the handouts to share the costs. He stated that both Aladdin Electric and Springfield Electric worked very hard to come up with a light to meet the County's needs. Mr. Brenner reported that they will be replacing 30 fixtures and they will be ordered directly from Springfield Electric to avoid the markup. He stated that the Clock Tower Committee has agreed to pay for the project and that we will assist with the lift. He said the lights will be arriving within 10 days and Aladdin will install them.

IX. Other Business

Mr. Maxwell commented on the current contract with MPA that got them out of the maintenance at the nursing home and moved it to Physical Plant. He urged Mr. Brenner to keep up with the maintenance and redecorating. Mr. Brenner said GHR had been hired to do a thorough evaluation of the mechanicals and to prioritize the needs and provide cost estimates.

Mr. Rosales asked about the new rating the Nursing Home received. Mr. Hartke replied that the Nursing Home moved from three to four stars, which was one of the metrics the County Board set before the Nursing Home. He stated there are still some facility and dietary issues to deal with but that the Nursing Home is on a good track.

X. Chair's Report

A. Future Meetings:

Tuesday, August 5, 2014 – Lyle Shields Meeting Room, 6:00 pm

XI. Designation of Items to be Placed on the Consent Agenda

None. Mr. James stated that item VII is to be place on the County Board agenda.

XII. Adjournment

There being no further business, Mr. James adjourned the meeting at 6:55 p.m.

Terms and Conditions for Professional Services

Client: **Champaign County, The OWNER**
Brookens Administration Center
1776 E. Washington Street
Urbana, Illinois 61802

Project: **Concrete Wall Panel Cracking Investigation**
Champaign County Satellite Jail

Purpose

The Champaign County Facilities Director identified a suspicious cracking pattern in the precast prestressed concrete wall panels. The origin of the cracks aligns with the steel connection securing the bottom of the wall panels to the footing and at the level of the roof. These wall panels are loadbearing and form the lateral load resisting system of the building.

Drawings

The Architect's drawings depict a wall panel to foundation connection detail labeled Section 2 on Sheet S0401. A steel plate was shown to be embedded in a grout pocket at the bottom of the panel, connecting to an embedded plate in the cast-in-place concrete footing. After the connection was completed, the embedded plates were to be encased in grout. The alkalinity of the grout would react with the steel creating a passivation layer, protecting the below grade connection from corrosion.

The precaster's shop drawings show a connection substitution. The precaster proposed to embed a steel plate on the inside face of the wall panel at the bottom of the panel. An embedded steel plate was to be cast into the footing, located inside of the wall panel. A steel angle was then intended to be welded to the two plates, completing the connection. The connection was then backfilled without being encased in concrete leaving the connection potentially subject to corrosion during high groundwater and/or high subgrade moisture conditions.

Structural Integrity

The cracking pattern in the wall panels aligns with the wall panel connection at the footing. If these connections are corroding and if they become structurally compromised, collapse is possible. I am recommending a structural investigation to determine the following:

1. The condition of the wall panel to footing connection.

2. The condition of the roof plank connection to the wall panel.

3. The feasibility of a prototype repair to be performed from the outside of the structure.

Scope of Services

In order to accomplish the investigation, the following Scope of Services is required:

1. Excavate three locations along the south wall and the east wall on the exterior of the building, exposing the bottom of the wall panel and the footing.

2. Install a temporary structural connection between the panel and the footing.

3. To preserve the panel, core a 12 inch diameter hole at the bottom of the panel to the back of the embedded plate. Pneumatically hammer the core out of the panel and hammer the bottom of the opening.

4. Cut out the connection to inspect the condition of the steel components.

5. Grout the void closed.

6. Perform roofing and roof insulation cuts to determine the condition of the connection between the precast prestressed concrete roof planks and the wall panels. Replace the insulation and seal the roof subsequent to inspection.

The proposed Scope of Services will reveal the condition of the buried steel connection and will determine the feasibility of a potential rehabilitation method.

Fee Calculation

A Fee Calculation is presented to reflect the effort required to complete the Scope of Services:

Excavator Mobilization		$ 300
Excavator	24 Hours @ $50 =	$ 1,200
Core Drill	40 Hours @ $40 =	$ 1,600
Generator	40 Hours @ $15 =	$ 600
Air Hammers	40 Hours @ $15 =	$ 600
Rotohammer	40 Hours @ $10 =	$ 400
Roofers	3 Cuts @ $600 =	$ 1,800
2 Laborers	80 Hours @ $70 =	$ 5,600
Operator and Foreman	80 Hours @ $90 =	$ 7,200
Structural Engineer	90 Hours @ $230 =	$20,700
Engineer Intern	60 Hours @ $80 =	$ 4,800
Not to Exceed Fee Calculation		**$44,800**

Not included in the Fee Calculation is attendance at meetings, presentations at County Board or County Board Committee meetings, conferences with County legal counsel, forensic engineering opinions development, depositions, or court testimony. Labor and equipment rates are estimated to reflect the total cost of base rates, overhead, fringes, and profit. To cover insurance and overhead costs, all subcontract invoices will be marked up 10%, which is included in the rates shown above.

Disputes: If a dispute arises between the OWNER and ERA, then it is agreed that the dispute will be mediated by a mediator or mediators mutually agreed by the OWNER and ERA. The mediation will take place at the Brookens Administrative Center, 1776 East Washington Street, Urbana, IL. Each party will be responsible for their own cost of mediation with the cost of the mediator being split evenly between the OWNER and ERA.

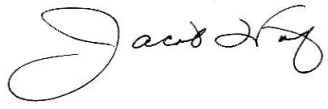
Rights and Benefits: ERA's services will be performed solely for the benefit of the OWNER and **not** for the benefit of any other persons or entities. Assignment of the rights of this contract is subject to the mutual agreement of the OWNER and ERA and shall not be assigned unilaterally.

We appreciate the opportunity to submit this professional services agreement and trust that it meets with your approval. If acceptable, please sign this Acceptance & Authorization Form where indicated and return one (1) copy for our files. Receipt of executed agreement will serve as authorization to proceed with the project to the full extent of the contract.

Acceptance & Authorization Form – July 30, 2014

Concrete Panel Wall Cracking Investigation
Champaign County Satellite Jail

ENGINEERING RESOURCE ASSOCIATES, INC.



Authorized Signature

Jacob Wolf, PE Principal/Project Manager
Printed Name and Title

July 30, 2014
Date

CHAMPAIGN COUNTY

_____
Authorized Signature

_____
Printed Name

_____
Date

CHAMPAIGN COUNTY ADMINISTRATIVE SERVICES
1776 East Washington Street, Urbana, Illinois 61802-4581
ADMINISTRATIVE, BUDGETING, PURCHASING, & HUMAN RESOURCE MANAGEMENT SERVICES
Debra Busey, County Administrator

To: Chair Stan James and the Members of the County Facilities Committee

From: Van A. Anderson, Deputy County Administrator of Finance V.A.A.

Subject: Energy Efficiency Upgrade for the Brookens Administrative Center

Date: July 31, 2014

cc: Debra Busey, County Administrator
Dana Brenner, Facilities Director

Summary

The Champaign County Facilities Committee is being asked to approve a contract with Alpha Controls & Services LLC in the amount of $139,670 to fund a project to improve the energy efficiency of the Brookens Administrative Center's (Brookens) heating, cooling, and ventilation (HVAC) system. The project is estimated to save up to 29% on electricity and 27% on natural gas costs annually providing an estimated project payback of thirty-six (36) months. To help fund the project, an Illinois Department of Commerce and Economic Opportunity (DCEO) Illinois Energy Now rebate application has been completed requesting $104,753 which is 75% of the project cost. If funded at that level, the estimated project payback would be reduced to nine (9) months. Pre-approval of the rebate by DCEO is a condition of proceeding with the project at this time.

Background

As Facilities planned the chillers' replacement project, options were explored for managing the project, energy efficiency, tie-ins to our green building initiative, and grant funding. The first step in accomplishing this was to initiate an energy model and financial analysis for Brookens. The energy model, using U.S. Department of Energy's approved software, allowed for a detailed analysis of energy usage and provides the basis for determining payback periods for energy-related projects like the proposed HVAC controller project. It also provided the information required for seeking grant funding from the DCEO.

There are two firms servicing Champaign County (County) facilities that could provide the needed energy-related services. Those firms are Alpha Controls & Services LLC (Champaign) and ENTEC Services Inc. (Peoria). Alpha provides the control technology for the Courthouse while ENTEC provides the control technologies for the Juvenile Detention Center and the Nursing Home. Based on the capabilities demonstrated by those firms in the work done in County of Champaign owned facilities, Alpha Controls & Services LLC was chosen for the pilot project for Brookens. Alpha completed a comprehensive HVAC analysis at Brookens, provided

the engineering services that formed the basis of the invitation to bid (ITB) for the chiller project, and worked with Facilities to seek grant funding/incentives from DCEO for that project. The ITB was written to ensure eligibility for DCEO funding and the County of Champaign was awarded a $19,000 grant, the maximum grant eligibility for the project.

The comprehensive HVAC analysis and review of electricity and natural gas usage at Brookens is the basis of the proposed energy efficiency project.

Project Description

The project will replace the HVAC pneumatic controls and 120v FAC controllers with a direct digital control (DDC) system for the buildings multi-zone units and fan coil units. The system will allow system setbacks based on occupancy schedules, eliminate simultaneous heating and cooling, and provide the ability to turn fans off when they are not needed. Thermostats will have a setback override button to allow employees to work in comfort outside the normal work hours with a simple touch of the button.

The project will reduce energy costs and reduce temperature and humidity variations in the building. Temperatures are expected to be within 2 degrees of the thermostat set point. The outcome will boost the Energy Star score of the building which is a measure of energy efficiency.

Project Cost and Payback

The contract cost of the project is $139,670. The DCEO Illinois Energy Now Public Sector Energy Efficiency Program provides incentives for local government projects that increase the energy efficiency of facilities. The 2014-2015 Electric and Natural Gas program provides incentives of up to 75% of the cost of the project as a grant (projects over $150,000) or a rebate (projects less than or equal to $150,000). An application for the rebate has been completed requesting the maximum 75% or $104,753. If awarded at the maximum amount, the final project cost to the County would be $34,917.

Based on an estimated 29% savings on electricity and a 27% savings on natural gas annually, the project would provide an estimated annual energy cost savings of $46,575 at current rates. Based on that savings, the payback period at the full project cost of $139,670 would be thirty-six (36) months. If the County receives the maximum rebate from DCEO for the project, the project payback would be reduced by 75% to nine (9) months.

Recommendation

Based on the information above, it is recommended that the County Board approve the attached contract with Alpha Controls and Services LLC, 411 Devonshire Drive, Champaign, IL, in the amount of $139,670 for the energy efficiency upgrade for the Brookens Administrative Center.

Attachment

Alpha Controls & Services, L.L.C.
411 Devonshire Dr
Champaign, Illinois 61820
Point of Contact: Jason Vogelbaugh

Date: 7/17/14
Proposal #: 14JV025

Subject: Champaign County – Brookens Admin Center

Get $104,753 in DCEO grants & save $40,757 in annual utility bills to be *green* & *comfortable*.

Target: Address excessive energy costs and reduce temperature and humidity variations to boost the **Energy Star** score utilizing public sector incentives to fund the project

- As compared to current usage this proposal will *save 29% on electricity and 27% on natural gas* costs annually
- Utilize public sector incentives to become a **green** facility
- Environmental conditions will stabilize; temps will be within 2 degrees of set point. All graphics to be browser based, with alarm generation and remote accessibility.

The Illinois Energy Conversation Code became law in Illinois on January 1st, 2013 adopting the American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Energy Standard for Buildings 90.1 as the new standard for commercial buildings in Illinois. Given this standard and lack of application of current ASHRAE Standard 90.1 this facility is inefficient and is out of date in regards to energy performance. Updating the facility to these standards will improve energy efficiency and environmental comfort.

Over the past 12 months energy costs have been higher than the Energy Star average for office buildings in the region by 165%. Similar projects have resulted in energy savings of 42% electrical and of 36% in natural gas costs in a 62,000 square foot building in Effingham, IL. In addition the Owner report a high degree of satisfaction in environmental conditions and is available as a reference.

Financial: Project first cost is estimated at $139,670. An analysis of the 10 year life cycle cost indicates the cost of **doing nothing is $272,803.**

Simple payback	0.9 years	Net Present Value	$272,803
Return On Investment	116.7%	Savings to Investment Ratio	8.8
Internal Rate of Return	119.7%	Modified Internal Rate of Return	35.5%

Status: We have prepared a detailed specification for the project to implement ventilation improvements, DDC controls upgrades for the multi zone units and fan coil units. We propose to provide equipment operation that will reduce energy savings while making the facility more comfortable. We have completed an energy model and analysis and have a turnkey solution ready for installation in 6 weeks from date of authorization to proceed.

Proposed by: Jason Vogelbaugh	**Accepted by:**
Director of Energy Solutions	**Signature:**
jasonv@alphaacs.com (217) 299-1379	**Date:**
Date: July 22, 2014	**Title:**

ALPHA controls&services LLC™

Financial Analysis of Efficiency Improvements

Simulating Streams of Cash Inflows and Outflows

Discount Rate:	8%
Finance Rate:	10%
Reinvestment Rate:	10%
Inflation Rate	3%

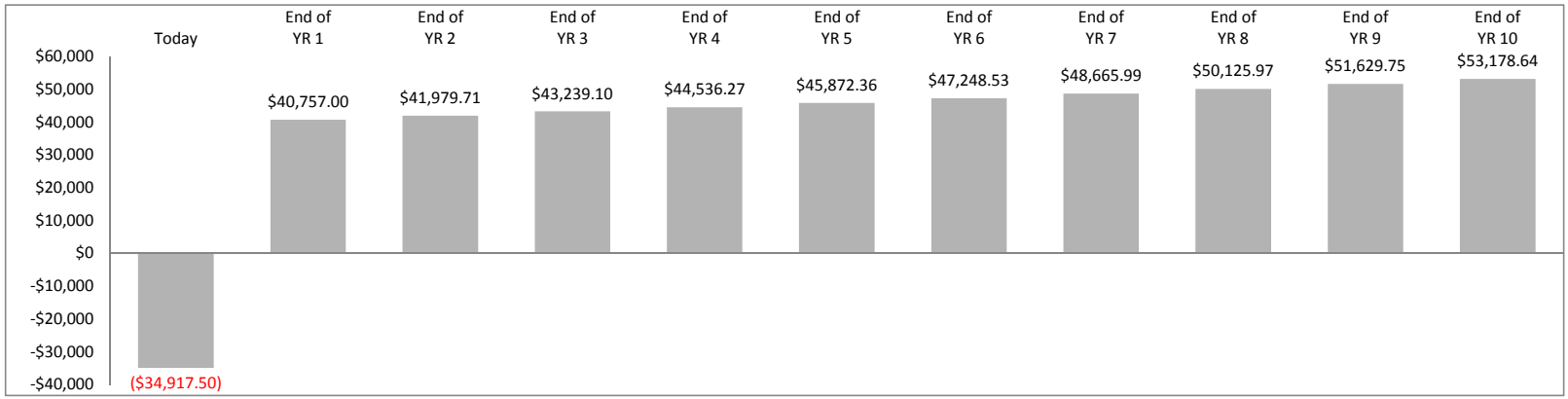
	Today	End of YR 1	End of YR 2	End of YR 3	End of YR 4	End of YR 5	End of YR 6	End of YR 7	End of YR 8	End of YR 9	End of YR 10
Date:	0	1	2	3	4	5	6	7	8	9	10
CASH OUTFLOWS											
Single investment	$ (139,670)										
Phased investment											
Financed investment											
SUBTOTAL OUTFLOWS	$ (139,670)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
CASH INFLOWS											
Rebate/incentive rec'd	$ 104,753										
Energy savings		$ 40,757	$ 41,980	$ 43,239	$ 44,536	$ 45,872	$ 47,249	$ 48,666	$ 50,126	$ 51,630	$ 53,179
Maintenance savings			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
SUBTOTAL INFLOWS	$ 104,753	$ 40,757	$ 41,980	$ 43,239	$ 44,536	$ 45,872	$ 47,249	$ 48,666	$ 50,126	$ 51,630	$ 53,179
Annual Cash Flow	**($34,917.50)**	**$40,757.00**	**$41,979.71**	**$43,239.10**	**$44,536.27**	**$45,872.36**	**$47,248.53**	**$48,665.99**	**$50,125.97**	**$51,629.75**	**$53,178.64**
Annual Present Value	**($34,917.50)**	**$37,737.96**	**$35,990.84**	**$34,324.59**	**$32,735.49**	**$31,219.96**	**$29,774.59**	**$28,396.14**	**$27,081.50**	**$25,827.73**	**$24,632.00**

	10-YEAR	NOTE THAT CERTAIN RETURNS VARY DEPENDING ON THE LENGTH OF THE ANALYSIS TERM									
		1-YEAR	2-YEAR	3-YEAR	4-YEAR	5-YEAR	6-YEAR	7-YEAR	8-YEAR	9-YEAR	10-YEAR
NPV	$ 272,803	$2,820.46	$38,811.30	$73,135.89	$105,871.38	$137,091.34	$166,865.93	$195,262.07	$222,343.57	$248,171.30	$272,803.30
SPP	0.9										
ROI	116.7%										
IRR	119.7%	16.7%	82.6%	104.9%	113.4%	116.9%	118.4%	119.1%	119.4%	119.6%	119.7%
MIRR	35.5%	16.7%	57.7%	58.4%	54.1%	49.7%	45.9%	42.6%	39.8%	37.5%	35.5%
SIR	8.8	1.1	2.1	3.1	4.0	4.9	5.8	6.6	7.4	8.1	8.8

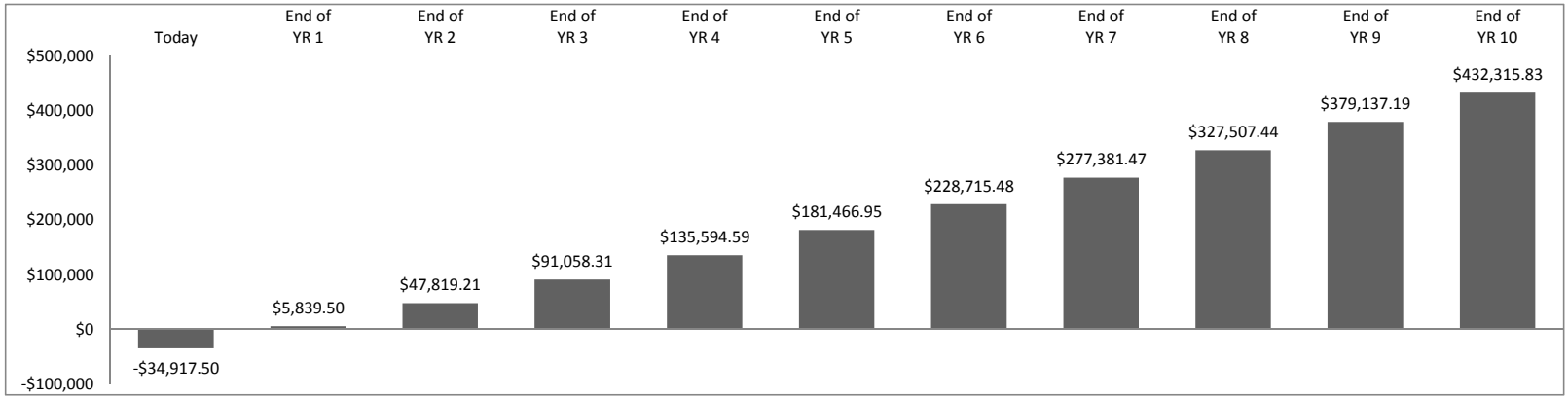
Financial Analysis of Efficiency Improvements

Simulating Streams of Cash Inflows and Outflows

10-year Cash Flow



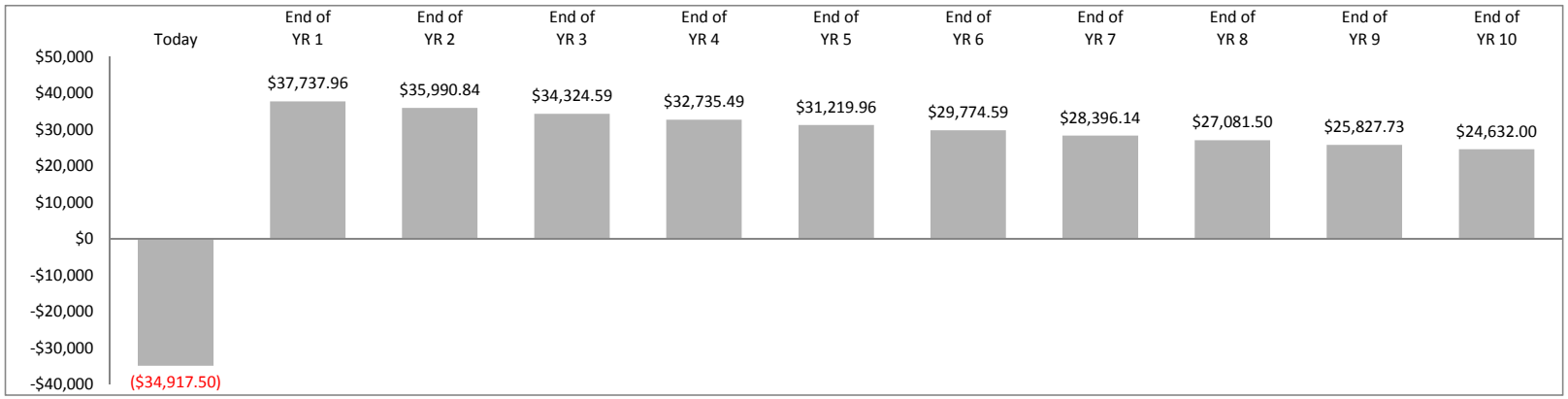
Cumulative 10-year Cash Flow



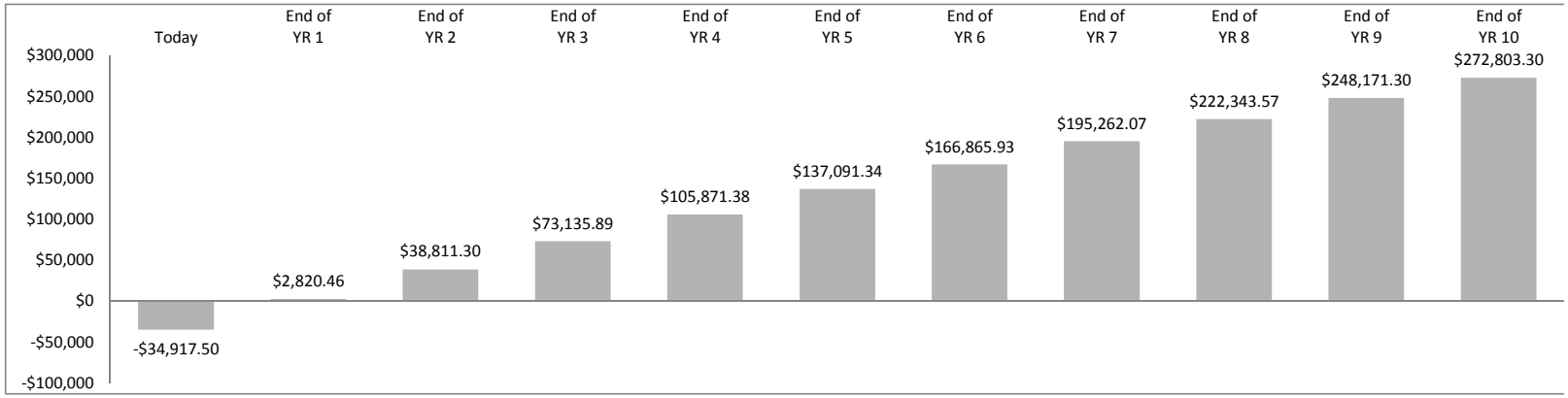
Financial Analysis of Efficiency Improvements

Simulating Streams of Cash Inflows and Outflows

10-year Present Value



Cumulative 10-year Present Value



All goods, services, and Firmware furnished by Alpha Controls & Services ("Supplier") are governed by these standard terms and conditions, and every agreement or other undertaking by Supplier is expressly conditioned on assent hereto by the buyer, and any end user with whom Supplier undertakes to deal, of Supplier's goods, services, and Firmware ("Customer"). These standard terms and conditions supersede all inconsistent printed terms submitted by Customer prior to Supplier's order acknowledgment. They may be varied only by a typed or legibly handwritten notation on the face of Supplier's quotation or order acknowledgment, Customer's purchase order form, or similar documents. Product and sales policy sheets and the like published from time to time by Supplier shall supplement but not supersede these standard terms and conditions. SUPPLIER IS NOT BOUND TO FURNISH ITS GOODS, SERVICES OR FIRMWARE EXCEPT IN ACCORDANCE WITH THE TERMS OF ITS ORDER ACKNOWLEDGMENT, FIRM QUOTATION, OR OTHER SIMILAR DOCUMENT ISSUED OVER THE SIGNATURE OF AN AUTHORIZED EMPLOYEE OF SUPPLIER. SUPPLIER'S REPRESENTATIVES, DISTRIBUTORS, DEALERS AND OTHER NON-EMPLOYEES HAVE NO AUTHORITY TO BIND SUPPLIER.

1. **Firmware.** The terms "goods" as used herein shall include Firmware which shall mean the set of instructions, consisting of symbolic language, processes, logic, routines, and programmed information in the form of firm or soft media relating to any of the goods and all revisions and modifications thereof.

2. **Price/Delivery Terms.** Unless otherwise provided on Supplier's order acknowledgment, price and delivery terms are FOB Supplier's plant and do not include sales, use, or other taxes. Supplier may, at its option, make partial shipments and invoice for same.

3. **Payment/Credit/Security.** Payment terms for buyers with a credit standing deemed adequate by Supplier are net 30 days from date of invoice. Supplier shall be entitled to charge interest thereafter at a rate permitted by law, but in no event to exceed 1-1/2% per month. Whenever Supplier in good faith deems itself insecure, Supplier may cancel any outstanding contracts with Customer, revoke its extension of credit to Customer, reduce any unpaid debt by enforcing its security interest, created hereby, in all goods (and proceeds therefrom) furnished by Supplier to Customer, and take any other steps necessary or desirable to secure Supplier with respect to Customer's payment for goods and services furnished or to be furnished by Supplier.

   In the event Customer for any reason withholds payment of any amount due Supplier, Supplier may declare itself insecure and suspend further shipment to Customer until Customer places the withheld amount in escrow and gives adequate security for further shipment or until Customer satisfies Supplier that Customer was entitled to withhold such amount. Supplier shall be entitled to recover from Customer all costs, including reasonable attorney's fees, incurred by Supplier in connection with the collection of any amount due Supplier.

4. **Cancellation by Customer**.
   (a). Except as provided in sub-paragraph (b) below, Customer's wrongful non-acceptance or repudiation of a contract to purchase Supplier's goods or services shall entitle Supplier to recover the price or, where an action for the price is not permitted by law, damages, as provided by law, including Supplier's lost profits. In this connection all goods purchased and all services furnished by Supplier in complete or partial fulfillment of a special order from Customer shall be deemed identified to the contract between Supplier and Customer.

   (b). Customer's wrongful non-acceptance or repudiation of a contract to purchase from Supplier goods which Supplier generally carries in inventory as stock items (or which are otherwise readily resaleable by Supplier at a reasonable price) shall entitle Supplier to recover damages, as provided by law, including Supplier's lost profits.

5. **Warranty.** Supplier warrants that all new and unused goods furnished by Supplier are free from defect in workmanship and material as of the time and place of delivery by Supplier. Except for goods and services furnished by Supplier through its employees arising out of orders solicited by Supplier's Representatives and duly accepted by Supplier, Supplier does not warrant, and shall not be liable for, the quality of any goods or services furnished or to be furnished by representatives, distributors, dealers or other non-employees of Supplier.

   As a matter of general warranty policy, Supplier honors an original buyer's warranty claim in the event of failure, within 12 months from the day of delivery by Supplier to the site for Alpha Controls & Services equipment and for Building Management Systems goods, which have been installed and operated under normal conditions and in accordance with generally accepted industry practices. This general warranty policy may be expanded or limited for particular categories of products or customers by information sheets published by Supplier from time to time:

   The express warranties provided above are in lieu of all other warranties, express or implied. IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES ARE EXCLUDED WITH RESPECT TO ANY AND ALL GOODS AND SERVICES FURNISHED BY SUPPLIER.

   In case of Supplier's breach of warranty or any other duty with respect to the quality of any goods, the sole and exclusive remedies therefore shall be, at Supplier's option, (1) repair, (2) replacement, or (3) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the non-conforming goods or parts.

   Return authorization must be obtained from Supplier prior to the return of any defective material. All unauthorized returns will be sent back, freight collect, to the Customer. All returns must be made with transportation prepaid by the Customer. Supplier's examination of the units must disclose to its satisfaction that defects exist and have not been caused by misuse, neglect, improper installation, repair, alteration or accident before replacement is made or credit issued.

6. **Force Majeur**. Supplier and Customer assume the non-occurrence of the following contingencies which, without limitation, might render performance by Supplier impractical: strike, riots, fires, war, late or non-delivery by suppliers to Supplier, and all other contingencies beyond the reasonable control of supplier.

7. **No Consequential Damages.** Under no circumstances shall Supplier be liable to any person (including distributor) for loss of use, income, or profit or for incidental, special or consequential or other similar damages, arising, directly or indirectly out of or occasioned by the sale, operation, use, installation, repair or replacement of the goods or services, whether such damages are based on a claim of breach of express or implied warranties (including merchantability or fitness for a particular purpose), tortious conduit (including negligence and strict liability) or any other cause of action, except only in the case of personal injury where applicable law requires such liability.

8. **Governing Law.** The law of the State of Illinois shall govern all transactions to which these standard terms and conditions apply.

9. **Prices** in this quotation remain in effect for 45 days from date of issue.

CHAMPAIGN COUNTY ADMINISTRATIVE SERVICES
1776 East Washington Street, Urbana, Illinois 61802-4581
ADMINISTRATIVE, BUDGETING, PURCHASING, & HUMAN RESOURCE MANAGEMENT SERVICES
Debra Busey, County Administrator

CHAMPAIGN COUNTY FACILITIES

INVITATION TO BID:

IT GENERATOR
AT
THE BROOKENS ADMINISTRATIVE CENTER

ITB Number 2014-007

ISSUE DATE: August 6, 2014

BID SUBMITTAL AND OPENING: Wednesday, August 27, 2014, 2:00 p.m.

BID SUBMITTAL

ITB 2014-007
Champaign County Administrative Services
ATTN: Dana Brenner
Brookens Administrative Center
1776 East Washington Street
Urbana, IL 61802

BID OPENING

Lyle Shields Meeting Room
Brookens Administrative Center
1776 East Washington Street
Urbana, IL 61802

County of Champaign, Illinois
1776 East Washington
Urbana, IL 61802
Ph 217.384.3720

IT GENERATOR

AT

BROOKENS ADMINISTRATIVE CENTER
1776 EAST WASHINGTON
URBANA, ILLINOIS 61802

FOR

COUNTY OF CHAMPAIGN
URBANA, ILLINOIS 61802

PROJECT MANUAL

August 6, 2014

County of Champaign, Illinois
1776 East Washington
Urbana, IL 61802
Ph 217.384.3720

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County of Champaign, Illinois
1776 East Washington
Urbana, IL 61802
Ph 217.384.3720

August 5, 2014

BID: County of Champaign, Illinois
Brookens Administrative Center IT Generator
THURSDAY, AUGUST 28, 2014
2:00 P.M., Public Opening
Lyle Shields Conference Room
Brookens Administrative Center
1776 East Washington
Urbana, Illinois 61802-4581

Dear Bidder:

The County of Champaign is inviting the submission of sealed bids for Brookens Administrative Center IT Generator at 1776 East Washington, Urbana, Illinois.

Specifications are prepared with the intent of offering equal opportunity to all bidders. No oral interpretations will be given to any bidder as to the meaning of the specifications. Requests for clarification must be submitted **in writing** via mail, fax or email to:

GHR Engineers and Associates, Inc.
Attn.: Lucas McGill, PE
1615 South Neil Street
Champaign, IL 61820
Fax: (217) 356-1092
Email: lmcgill@ghrinc.com

Clarification requests must be received no later than Monday, August 25, 2014, 12:00 pm to be considered.

Pursuant to the Illinois Prevailing Wage Act (820 ILCS 130/1 et seq.), not less than the prevailing rate of wages as determined by the Illinois Department of Labor, County of Champaign, or court on review shall be paid by the vendor/contractor to all laborers, workers and mechanics performing work under this purchase order.

All bids are to be sealed and in the hands of the undersigned by the due date and time stated above, at which time bids will be publicly opened. There will be no bids accepted after said date and time. Your bid is to be submitted on the bid form provided. The envelope containing your bid is to be sealed and marked in the lower left-hand corner: **"Sealed Bid: Brookens Administrative Center IT Generator".** Bids will not be accepted by FAX mail.

County of Champaign, Illinois
1776 East Washington
Urbana, IL 61802
Ph 217.384.3720

The Champaign County Board reserves the right to reject any or all bids, to accept the bids, or to waive any irregularities should it deem to be in the best interest of the County of Champaign to do so. The bids will be awarded to the lowest responsible bidder meeting specifications as determined by the Champaign County Board.

Sincerely,

Dana Brenner
Facilities Director

END OF NOTICE TO BIDDERS 00 0200

DOCUMENT 00 1116 - INVITATION TO BID

1.1 PROJECT INFORMATION

A. Notice to Bidders: Qualified bidders are invited to submit bids for Project as described in this Document.

B. Project Identification: **Brookens Administrative Center IT Generator**

1. Project Location:

Brookens Administrative Center
1776 East Washington
Urbana, Illinois 61802-4581

C. Owner: County of Champaign

1. Owner's Representative:

Dana Brenner, Facilities Director
1776 East Washington
Urbana, IL 61802-4581
Phone: (217) 384-3765
Fax: (217) 384-3896
Email: dbrenner@co-champaign.il.us

D. Project Design Team: GHR Engineers and Associates, Inc.

E. Project Description: Project consists of installing generator, ATS and UPS for County IT network emergency power.

F. Construction Contract: Bids will be received for the following Work:

General Contract (all trades).

1.2 BID SUBMITTAL AND OPENING

A. Owner will receive sealed bids until the bid time and date at the location indicated below. Owner will consider bids prepared in compliance with the Contract Documents issued by Owner, and delivered as follows:

1. **Bid Date: Thursday, August 28, 2014.**
2. **Bid Time: 2:00 p.m., local time.**

Location:

Lyle Shields Conference Room
Brookens Administration Center
1776 East Washington
Urbana, IL 61802

B. Bids will be thereafter opened in the presence of the bidders and read aloud.

1.3 BID SECURITY

A. Bid security in the form of a bank draft/cashier's check, certified check, U.S. money order, or bid bond **payable to County of Champaign** shall be submitted with each bid in the amount of **ten (10) percent** of the bid amount. No bids may be withdrawn for a period of **sixty (60) days** after opening of bids. Owner reserves the right to reject any and all bids and to waive informalities and irregularities.

1.4 PREBID CONFERENCE / SITE VISIT

A. A prebid conference for all bidders will be held at **Brookens Administrative Center, 1776 East Washington, Urbana, Illinois** on Tuesday, August 19, 2014 at 2:00 pm, local time. Meet at front entrance. Prospective bidders are **required** to attend.

1.5 DOCUMENTS

A. Documents can be procured by emailing Lucas McGill, lmcgill@ghrinc.com. All documents will be in pdf form by email only.

1.6 TIME OF COMPLETION

A. Bidders shall begin the Work on receipt of the Notice to Proceed and shall complete the Work within the Contract Time.

1. Anticipated Award of Contract: Board Meeting, Thursday, September 18, 2014.
2. Anticipated Letter of Notice of Award: On or about Friday, September 19, 2014.
3. Pre-Construction/Pre-Installation Meeting: TBD.
4. **Substantial Completion: Monday, December 1, 2014.**
5. Punch List: Issued on or about Monday, December 1, 2014.
6. **Final Completion: Friday, December 12, 2014.**

1.7 BIDDER'S QUALIFICATIONS

A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. **A Performance Bond, a separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.**

END OF DOCUMENT 00 1116

DOCUMENT 00 2213 - SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

1.1 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS - BIDDER'S REPRESENTATIONS

A. The Bidder has investigated all required fees, permits, and regulatory requirements of authorities having jurisdiction and has properly included in the submitted bid the cost of such fees, permits, and requirements not otherwise indicated as provided by Owner.

1. Permit Application: Complete building permit application and file with authorities having jurisdiction within five days of the Notice of Ward.

B. The Bidder is a properly licensed Contractor according to the laws and regulations of The State of Illinois and meets qualifications indicated in the Procurement and Contracting Documents.

C. The Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents.

1.2 BIDDING DOCUMENTS

A. Interpretation or Correction of Procurement and Contracting Documents:

1. Submit Bidder's Requests for Interpretation as outlined in the Notice to Bidders.

B. Submit Requests for Substitution on form provided. Substitution requests shall be accepted during bidding only.

C. Addenda:

1. Addenda may be issued at any time prior to the receipt of bids.

2. Owner may elect to waive the requirement for acknowledging receipt of Addenda as follows:

a. Information received as part of the Bid indicates that the Bid, as submitted, reflects modifications to the Procurement and Contracting Documents included in an unacknowledged Addendum.

b. Modifications to the Procurement and Contracting Documents in an unacknowledged Addendum do not, in the opinion of Owner, affect the Contract Sum or Contract Time.

1.3 BIDDING PROCEDURES

A. Preparation of Bids:

1. The Bid shall include unit prices when called for by the Procurement and Contracting Documents. Owner may elect to consider unit prices in the determination of award. Unit prices will be incorporated into the Contract.

2. Owner may elect to disqualify a bid due to failure to submit a bid in the form requested, failure to bid requested alternates or unit prices, failure to complete entries in all blanks in the Bid Form, or inclusion by the Bidder of any alternates, conditions, limitations or provisions not called for.

Retail sales tax will NOT be included in the bid amount. The Owner is exempted by Section 3 of the Illinois Use Tax Act (Section 3, House Bill 1610, approved July 31, 1961, Illinois Revised Statutes 1967, Chapter 120, Section 439.3) from paying any of the taxes imposed by the Act and sales to Owner are exempt by Section 2, House Bill 1609, approved July 31, 1961, Illinois Revised statutes 1967, Chapter 120, Section 441) from any of the taxes imposed by the Act. The Department of Revenue of the State of Illinois under Rule No. 15, issued August 9, 1961, has declared that sales of materials to construction contractors for conversion into real estate for schools, governmental bodies, agencies and instrumentalities are not taxable retail sales. **The Contractor shall be responsible for any sales, consumer, use and similar taxes for the Work.**

3. Owner is not responsible for any costs incurred by a Contractor in the preparation or delivery of bids. The Contractor shall be responsible for the actual delivery of bids during business hours to the address indicated. Any bid received after the delivery deadline will be disqualified.

4. Owner reserves the right to obtain clarification of any point in a Contractor submittal or to obtain additional information.

FOIA: As an independent Contractor of the District, records in the possession of the Contractor related to this Agreement may be subject to the Illinois Freedom of Information Act ("FOIA"), 5 ILCS 140/5-1 et seq.; 5 ILCS 140/7(2). The Contractor shall immediately provide the District with any such records

requested by the District in order to timely respond to any FOIA request received by the District.

B. Subcontractors, Suppliers, and Manufacturers List Bid Supplement:

1. Provide list of major subcontractors, suppliers, and manufacturers furnishing or installing products no later than **ten (10) business days** following Notice to Proceed. Do not change subcontractors, suppliers, and manufacturers from those submitted without approval of Owner.

1.4 CONSIDERATION OF BIDS

A. Rejection of Bids:

Owner reserves the right to reject a bid based on Owner's and Design Team's evaluation of qualification information submitted following opening of bids. Owner's evaluation of the Bidder's qualifications will include: status of licensure and record of compliance with licensing requirements, record of quality of completed work, record of Project completion and ability to complete, record of financial management including financial resources available to complete Project and record of timely payment of obligations, record of Project site management including compliance with requirements of authorities having jurisdiction, record of and number of current claims and disputes and the status of their resolution, and qualifications of the Bidder's proposed Project staff and proposed subcontractors.

1.5 PERFORMANCE BOND AND PAYMENT BOND

A. Both a Performance Bond and a Payment Bond will be required, each in an amount equal to 100 percent of the Contract Sum.

B. The Bidder shall deliver the required bonds to Owner no later than **ten (10)** days after the date of Notice of Intent to Award and no later than the date of execution of the Contract, whichever occurs first. Owner may deem the failure of the Bidder to deliver required bonds within the period of time allowed a default.

C. Bonds shall be executed and be in force on the date of the execution of the Contract.

1.6 INSURANCE

A. The Contractor shall take all necessary precautions and exercise due caution so as not to damage the premises or properties of others. The Contractor's signature on the bid sheet certifies to the District that the Contractor has adequate insurance coverage for any vehicle that may be utilized in the delivery of products or materials on the District's property. The Contractor shall submit evidence, satisfactory to the District, that the Contractor has coverage of General Liability Insurance, Worker's Compensation Insurance, and Automobile Liability Insurance to the limits described below with companies licensed to do business in Illinois with an A.M. Best rating of A that is satisfactory to the District. The certificates of such insurance shall carry an endorsement to the effect that the Insurance Company will defend the District as a party in the event the successful bidder becomes a party to any litigation as a result of the activities of the Contractor, subcontractor, or any direct or indirect employee of same under the terms of this contract for injuries to property or person. Such policies shall name the District, its Board, Board members, employees, agents, and successors as an additional insured and provide that it is primary to, and not contributing with, any policy carried by Contractor covering the same loss with a waiver of subrogation in favor of the School District. The Contractor shall provide Certificates of Insurance for:

1. Vehicular: It is required that the successful Contractor present to the District, before commencing delivery under this Contract, a Certificate of Insurance covering all vehicles that may be utilized. Said insurance is to provide a $1,000,000 combined single limit for bodily injury and property damage. All certificates shall indicate that the carrying company shall not cancel insurance coverage without giving Owner thirty (30) days written advance notification.

2. Liability: It is required that the successful Contractor present to the District, **before commencing delivery under this Contract**, a Certificate of Insurance for which coverage is included for contractor liability, contingent liability, contractual liability, and product liability. Bodily injury and property damage limits of $1,000,000 occurrence and $2,000,000 aggregate. Said Certificate shall indicate that the carrying company shall not cancel insurance coverage without giving District thirty (30) days written advance notice.

3. Worker's Compensation: Statutory Limits.

1.7 STANDARD CONTRACT CONDITIONS

A. This contract shall be governed in all aspects as to validity, construction, capacity, performance, or otherwise by the laws of the State of Illinois.

B. Contractors shall comply with the Civil Rights Act of 1964, as amended, all applicable State and Federal non-discrimination laws including but not limited to the Family and Medical Leave Act, the Americans with Disabilities Act, the Age Discrimination in Employment Act and shall comply with the provisions of the Illinois Human Rights Act.

C. Contractors shall not assign, transfer, convey, sublet, or otherwise dispose of this contract, including any or all of it right, title or interest therein, or its power to execute such contract to any person, company or corporation, without prior written consent of The County of Champaign.

D. By submitting a bid the Contractor certifies that the Contractor is not barred from bidding on this contract as a result of a violation of either the bid-rigging or bid-rotating provisions of Article 33E of the Criminal Code of 1961, as amended.

By submitting a bid, the Contractor, having 25 or more employees, does hereby certify pursuant to Section 3 of the Illinois Drug-Free Workplace Act (30 ILCS 580/3) that it shall provide a drug-free workplace for all employees engaged in the performance of work under the contract by complying with the requirements of the Illinois Drug-Free Workplace Act and, further certifies, that it is not ineligible for award of this contract by reason of debarment for a violation of the Illinois Drug-Free Workplace Act.

E. By submitting a bid, the Contractor does hereby certify pursuant to Section 2-105 of the Illinois Human Rights Act (775 ILCS 5/2-105) that it has a written sexual harassment policy that includes, at a minimum, the following information: (i) the illegality of sexual harassment; (ii) the definition of sexual harassment under State law; (iii) a description of sexual harassment, utilizing examples; (iv) an internal complaint process including penalties; (v) the legal recourse, investigative and complaint process available through the Department of Human Rights and Human Rights Commission; (vi) direction on how to contact the Department of Human Rights and Human Rights Commission; and (vii) protection against retaliation.

1.8 STATEMENT OF NON-DISCRIMINATION

A. The Illinois Human Rights Acts prohibits discrimination on the basis of: “race, color, religion, sex, national origin, ancestry, age, order of protection status, marital status, physical or mental disability, military status, sexual orientation, or unfavorable discharge from military service in connection with employment, real estate transactions, access to financial credit, and the availability of public accommodations.” It also prohibits sexual harassment and discrimination in employment on the basis of citizenship status.

1.9 PREVAILING WAGE

A. This contract calls for the construction of a "public work" within the meaning of the Illinois Prevailing Wage Act, 920 ILCS 130/.01. The Act requires contractors and subcontractors to pay al laborers, workers and mechanics performing services on public works projects no less than the "prevailing rate of wages" (hourly cash wages plus fringe benefits) in the county where the work is performed. Each Contractor and Subcontractor rendering services under this contract must comply with all requirements of this Act. Each Contractor and Subcontractor shall keep records of the prevailing wages paid to their employees, submit a monthly certified payroll to County of Champaign, and make such records available to County of Champaign for inspection upon seven business days notice.

B. For information regarding the current prevailing wage rates for Champaign County, Illinois can be found at:

http://www.illinois.gov/idol/laws-rules/conmed/pages/rates.aspx.

C. Prevailing Wage Rates change periodically. Contractor shall verify and revise the prevailing wages on a regular basis.

1.10 FAILURE TO FULFILL CONTRACT

A. When any Contractor fails to provide a service or provides a service which does not conform to the specifications, County of Champaign may, at its sole discretion, annul and set aside the contract entered into with said Contractor, either in whole or in part, and make and enter into a new contract for the same services in such manner as seems to County of Champaign to be to its best advantage. Any failure to furnish services by reason of the failure of the Contractor, as stated above, shall be a liability against such Contractor and his sureties. County of Champaign reserves the right to cancel, without penalty, any services which the successful Contractor may be unable to furnish because of economic conditions, governmental regulations or other similar causes beyond the control of the Contractor provided satisfactory proof is furnished to County of Champaign if requested.

B. Without Cause Termination: The County may terminate its contract with the Contractor without cause after providing the Contractor with thirty (30) days written notice.

1.11 EXECUTION OF THE CONTRACT

A. Subsequent to the Notice of Intent to Award, and within **ten (10) business days** after the prescribed Form of Agreement is presented to the Awardee for signature, the Awardee shall execute and deliver the Agreement to Owner through Architect, in such number of counterparts as Owner may require.

B. Owner may deem as a default the failure of the Awardee to execute the Contract and to supply the required bonds and insurance when the Agreement is presented for signature within the period of time allowed.

C. Unless otherwise indicated in the Procurement and Contracting Documents of the executed Agreement, the date of commencement of the Work shall be the date of the executed Agreement.
In the event of a default, Owner may declare the amount of the Bid security forfeited and elect to either award the Contract to the next responsible bidder or re-advertise for bids.

1.12 INDEMNITY

A. To the fullest extent permitted by law, Contractor shall indemnify and hold harmless the Owner from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the work provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, but only to the extent caused by the negligent acts or omissions of the Contractor, a subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim damage, loss or expense is caused in part by a party indemnified hereunder.

END OF DOCUMENT 00 2213

DOCUMENT 00 4113 - BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: **Brookens Administrative Center IT Generator**

C. Project Location:

Brookens Administrative Center
1776 East Washington
Urbana, Illinois 61802-4581

D. Owner: County of Champaign

E. Building Design Team: GHR Engineers and Associates, Inc.

1.2 CERTIFICATIONS AND BASE BID

A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by the Design Team, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

1. _____Dollars ($_____).

Bidders Note: Show bid amount in both words and figures. All spaces must be completed.

1.3 BID GUARANTEE

A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within **ten (10)** days after a written Notice of Award, if offered within **sixty (60)** days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached bank draft/cashier's check, certified check, U.S. money order, or bid bond **payable to County of Champaign**, as liquidated damages for such failure, in an amount constituting **ten percent (10%)** of the Base Bid amount:

1. _____Dollars ($_____).

B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the bank draft/cashier's check, certified check, U.S. money order, or bid bond.

1.4 TIME OF COMPLETION

A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Owner, and shall fully complete the Work as indicated in the Invitation to Bid.

1.5 ACKNOWLEDGEMENT OF ADDENDA

A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

1. Addendum No. 1, dated _____.

2. Addendum No. 2, dated _____.

3. Addendum No. 3, dated _____.

1.6 CONTRACTOR'S LICENSE

A. The undersigned warrants that he/she is duly authorized to bind contractually the entity submitting this bid, to fully perform all duties and to deliver all services in accordance with the terms and conditions set forth herein. All signatures to be sworn before a Notary Public.

1.7 SUBMISSION OF BID

Respectfully submitted this ____ day of _____, 2014.

Submitted By: _____
(Name of bidding firm or corporation)

Authorized Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President)

Witness By: _____
(Handwritten signature)

Attest: _____
(Handwritten signature)

By: _____
(Type or print name)

Subscribed and sworn to before me this

_____Day of _____, 2014.

_____, Notary Public

(Affix Notary Seal Here)

END OF DOCUMENT 00 4113

DOCUMENT 00 4313 - BID SECURITY FORMS

1.1 BID FORM SUPPLEMENT

A. A completed bid bond form is required to be attached to the Bid Form.

1.2 BID BOND FORM

A. AIA Document A310, "Bid Bond," is the recommended form for a bid bond. A bid bond acceptable to Owner, is required to be attached to the Bid Form as a supplement.

B. Copies of AIA standard forms may be obtained from The American Institute of Architects; www.aia.org/contractdocs/purchase/index.htm; email: docspurchases@aia.org; (800) 942-7732.

END OF DOCUMENT 00 4313

County of Champaign, Illinois
1776 East Washington
Urbana, IL 61802
Ph 217.384.3720

SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. Project Identification: **Brookens Administrative Center IT Generator**

1. Project Location:

Brookens Adminstrative Center
1776 East Washington
Urbana, Illinois 61802-4581

B. Owner: County of Champaign

C. Design Team: GHR Engineers and Associates, Inc.

D. Project consists of installing generator, ATS and UPS for County IT network emergency power.

E. Work by Owner:

1. The Owner's Building Staff are anticipated to be on-site during the Work.
2. Demo of some items as shown on drawings.

1.2 WORK RESTRICTIONS

Contractor's Use of Premises: During construction, Contractor will have limited use of site and building indicated. Contractor's use of premises is limited only by Owner's right to perform work or employ other contractors on portions of Project and as follows:

1. Owner will occupy premises during construction. Perform construction only during normal working hours 8 AM to 5 PM Monday thru Friday, other than holidays, unless otherwise agreed to in advance by Owner. Clean up work areas and return to usable condition at the end of each work period.
2. Limits: Limit site disturbance.
3. Driveways, Walkways, and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees,

and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8 AM to 5 PM, Monday through Friday, unless otherwise indicated.

1. Weekend Hours: As permitted by Owner. Coordinate with Owner.
2. Early Morning Hours: 7 AM or as permitted by Owner. Coordinate with Owner.

C. Nonsmoking Building: Smoking is not permitted within the building or on the project site.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

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SECTION 01 2000 - PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 PAYMENT PROCEDURES

A. Submit a Schedule of Values at least **seven (7)** days before the initial Application for Payment. Break down the Contract Sum into at least one line item for each Specification Section in the Project Manual table of contents. Coordinate the schedule of values with Contractor's construction schedule.

1. Arrange schedule of values consistent with format of AIA Document G703.
2. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
3. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
4. Provide separate line items in the schedule of values for initial cost of materials and for total installed value of that part of the Work.
5. Provide a separate line item in the schedule of values for each allowance.

B. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 forms for Applications for Payment.

1. Anticipated Application for Payment Schedule:

   a. Application for Payment No. 01: once material is delivered to project site
   b. Application for Payment No. 02: upon completion of installation
   c. Application for Payment No. 03: Final payment upon completion of punch list, receipt of all close-out documents and completion of owner training

C. Submit **three (3)** copies of each application for payment according to the schedule established in Owner/Contractor Agreement.

1. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor.
2. With each Application for Payment, Contractor shall include the Contractor’s waiver of lien for the full amount and partial waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

3. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.

    a. Include insurance certificates, proof that taxes, fees, and similar obligations were paid, and evidence that claims have been settled.
    b. Include affidavit of payment of debts and claims on AIA Document G706.
    c. Include affidavit of release of liens on AIA Document G706A.
    d. Include consent of surety to final payment on AIA Document G707.

4. Certified Payroll Statements: The Contractor shall submit Certified Payroll Statements pursuant to Illinois Law-Public Act 94-0515 with each payment application. The *Certified Transcript of Payroll* statement forms are available through the Illinois Department of Labor website: http://www.state.il.us/agency/idol/forms/pdfs/IL452CM02.pdf. Certified payroll statements are required from the Contractor and each Subcontractor. The statements are to include the time period of the payment application. Payment Applications will not be processed without accompanying Certified Payroll Statements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2000

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SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 CONTRACT MODIFICATION PROCEDURES

A. Design Team will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

B. Owner-Initiated Proposal Requests: Design Team will issue a detailed description of proposed changes in the Work.

1. Proposal Requests are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time.

C. 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 Design Team.

D. On Owner's approval of a Proposal Request, Design Team will issue a Change Order for signatures of Owner and Contractor, for all changes to the Contract Sum or the Contract Time.

E. Design Team may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

F. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

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SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 PROJECT MANAGEMENT AND COORDINATION

A. Subcontract List: Submit a written summary identifying individuals or firms proposed for each portion of the Work.

B. Key Personnel Names: Within ten (10) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. List e-mail addresses and telephone numbers.

C. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.

D. Requests for Information (RFIs): On discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. Use forms acceptable to Design Team and Owner.

E. Schedule and conduct (2) progress meetings at Project site, coordinated with the Design Team and Owner. **Notify Owner of meeting dates and times.** Require attendance of each subcontractor or other entity concerned with current progress or involved in planning, coordination, or performance of future activities.

1.2 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

1. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
2. Submit two copies of each action submittal. Design Team will return one copy.
3. Submit one copy of each informational submittal. Design Team will not return copies.
4. Design Team will discard submittals received from sources other than Contractor.

B. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with unique identifier, including project identifier, Specification Section number, and revision identifier.
3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Design Team.

C. Identify options requiring selection by Design Team.

D. Identify deviations from the Contract Documents on submittals.

E. Contractor's Construction Schedule Submittal Procedure:

1. Submit required submittals in the following format:

a. PDF electronic file.

2. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files to Shannon Hicks at GHR Engineers and Associates, Inc.: shicks@ghrinc.com.

a. Design Team will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2.2 ACTION SUBMITTALS

A. Submit two paper copies of each submittal unless otherwise indicated. Design Team will return one copy.

B. Product Data: Mark each copy to show applicable products and options. Include the following:

1. Manufacturer's written recommendations, product specifications, and installation instructions.
2. Wiring diagrams showing factory-installed wiring.
3. Printed performance curves and operational range diagrams.
4. Testing by recognized testing agency.
5. Compliance with specified standards and requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Submit on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches. Include the following:

1. Dimensions and identification of products.
2. Fabrication and installation drawings and roughing-in and setting diagrams.
3. Wiring diagrams showing field-installed wiring.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

2.3 INFORMATIONAL SUBMITTALS

A. Informational Submittals: Submit one paper copy of each submittal unless otherwise indicated. Design Team will not return copies.

B. Qualification Data: Include lists of completed projects with project names and addresses, names and addresses of Design Team and owners, and other information specified.

C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

PART 3 - EXECUTION

3.1 SUBMITTAL REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Design Team.

B. Design Team will review each action submittal, make marks to indicate corrections or modifications required, will stamp each submittal with an action stamp, and will mark stamp appropriately to indicate action.

C. Informational Submittals: Design Team will review each submittal and will not return it, or will return it if it does not comply with requirements. Design Team will forward each submittal to appropriate party.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 3000

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SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Testing and inspecting 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.

B. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements, comply with the most stringent requirement. Refer uncertainties to Design Team for a decision.

C. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum. The actual installation may exceed the minimum within reasonable limits. Indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Design Team for a decision.

D. 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, and telephone number 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 inspecting.
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.

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

F. Testing Agency Qualifications: An independent agency with the experience and capability to conduct testing and inspecting indicated; and where required by authorities having jurisdiction, that is acceptable to authorities.

G. 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.

H. Testing Agency Responsibilities: Cooperate with Design Team and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Design Team and Contractor of irregularities or deficiencies in the work observed during performance of its services.
2. Do not release, revoke, alter or increase requirements of the Contract Documents or approve or accept any portion of the work.
3. Do not perform any duties of Contractor.

I. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

J. Tests and Inspections: Owner will engage a qualified inspector to conduct inspections required by authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

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

B. Contractor will maintain a safe work site at all times. When the project is complete, Contractor shall return the work site and the surrounding areas to the same condition as they were prior to the beginning of the project.

END OF SECTION 01 4000

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

B. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced.

1. Show compliance with requirements for comparable product requests.
2. Design Team will review the proposed product and notify Contractor of its acceptance or rejection.

C. Basis-of-Design Product Specification Submittal: Show compliance with requirements.

D. Compatibility of Options: If Contractor is given option of selecting between two or more products, select product compatible with products previously selected.

E. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Deliver products to Project site in manufacturer's original sealed container or packaging, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
3. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
4. Store materials in a manner that will not endanger Project structure.
5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

F. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Provide products that comply with the Contract Documents, are undamaged, and, unless otherwise indicated, are new at the time of installation.

1. Provide products complete with accessories, trim, finish, and other devices and components needed for a complete installation and the intended use and effect.
2. Where products are accompanied by the term "as selected," Owner will make selection.
3. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Where the following headings are used to list products or manufacturers, the Contractor's options for product selection are as follows:

1. Products:

a. Where requirements include "one of the following," provide one of the products listed that complies with requirements.
b. Where requirements do not include "one of the following," provide one of the products listed that complies with requirements or a comparable product.

2. Manufacturers:

a. Where requirements include "one of the following," provide a product that complies with requirements by one of the listed manufacturers.
b. Where requirements do not include "one of the following," provide a product that complies with requirements by one of the listed manufacturers or another manufacturer.

3. Basis-of-Design Product: Provide the product named, or indicated on the Drawings, or a comparable product by one of the listed manufacturers.

2.2 COMPARABLE PRODUCTS

A. Design Team will consider Contractor's request for comparable product during Bidding only when the following conditions are satisfied:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications.
3. List of similar installations for completed projects, if requested.
4. Samples, where applicable.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

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SECTION 01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 - GENERAL

1.1 EXECUTION REQUIREMENTS

A. Cutting and Patching:

1. Structural Elements: When cutting and patching structural elements, notify Design Team of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.2 CLOSEOUT SUBMITTALS

A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

B. Certified List of Incomplete Items: Final submittal at Final Completion.

C. Operation and Maintenance Data: Submit two (2) copies of manual.

D. PDF Electronic File: Assemble manual into a composite electronically indexed file. Submit two (2) copies on digital media.

E. Record Product Data: Submit two (2) paper copies and annotated PDF electronic files and directories of each submittal.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.

B. Submittals Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Submit closeout submittals specified in other sections, including project record documents, operation and maintenance manuals, similar final record information, warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
2. Submit maintenance material submittals specified in other sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner.
3. Submit test/adjust/balance records.

C. Procedures Prior to Substantial Completion: Before requesting Substantial Completion inspection, complete the following:

1. Complete startup and testing of systems and equipment.
2. Perform preventive maintenance on equipment used prior to Substantial Completion.
3. Remove temporary facilities and controls.
4. Complete final cleaning requirements, including touchup painting.
5. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will proceed with inspection or advise Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting inspection for determining final completion, complete the following:

1. Submit a final Application for Payment.

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

B. Submit a written request for final inspection for acceptance. On receipt of request, Design Team will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare final Certificate for Payment after inspection or will advise Contractor of items that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.2 OPERATION AND MAINTENANCE DOCUMENTATION

A. Directory: Prepare a single, comprehensive directory of operation and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system.

1. Dividers: Provide heavy paper dividers with celluloid-covered tabs for each separate Section. Mark each tab to indicate contents. Provide a typed description of the product and major parts of equipment included in the Section on each divider.

C. Organize data into three-ring binders with identification on front and spine of each binder, and envelopes for folded drawings. Identify each binder on the front and spine with the printed title “OPERATION AND MAINTENANCE MANUAL”, Project title or name, year and subject matter covered. Indicate volume number for multiple volume sets of manuals. Include the following:

1. Manufacturer's operation and maintenance documentation.
2. Maintenance and service schedules.
3. Maintenance service contracts. Include name and telephone number of service agent.
4. Emergency instructions.
5. Spare parts list and local sources of maintenance materials.
6. Wiring diagrams.
7. Copies of warranties. Include procedures to follow and required notifications for warranty claims

2.3 RECORD DRAWINGS

A. Record Prints: Maintain a set of prints of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued. Mark to show actual installation where installation varies from that shown originally. Accurately record information in an acceptable drawing technique.

1. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings.

1. Format: Annotated PDF electronic file.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance.

1. Verify compatibility with and suitability of substrates.
2. Examine roughing-in for mechanical and electrical systems.
3. Examine walls, floors, and roofs for suitable conditions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Take field measurements as required to fit the Work properly. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

D. Verify space requirements and dimensions of items shown diagrammatically on Drawings.

3.2 CONSTRUCTION LAYOUT

A. Before proceeding to lay out the Work, verify layout information shown on Drawings.

3.3 INSTALLATION

A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Conceal wiring in finished areas unless otherwise indicated.
3. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations.

C. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

D. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.

E. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owner.

F. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

G. Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

A. Provide temporary support of work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

D. Cutting: Cut in-place construction using methods least likely to damage elements retained or adjoining construction.

1. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

E. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction in a manner that will minimize evidence of patching and refinishing.

2. Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance.
3. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

3.5 CLEANING

A. Clean Project site and work areas daily, including common areas. Dispose of materials lawfully.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
3. Remove debris from concealed spaces before enclosing the space.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:

1. Clean Project site and grounds, in areas disturbed by construction activities. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
3. Remove labels that are not permanent.
4. Clean transparent materials, including mirrors. Remove excess glazing compounds.
5. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Sweep concrete floors broom clean.
6. Vacuum carpeted surfaces.
7. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and foreign substances. Clean plumbing fixtures. Clean light fixtures, lamps, globes, and reflectors.

3.6 OPERATION AND MAINTENANCE MANUAL PREPARATION

A. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are unavailable and where the information is necessary for proper operation and maintenance of equipment or systems.

C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.

3.7 DEMONSTRATION AND TRAINING

A. Contractor to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system. Include a detailed review of the following:

1. Include instruction for basis of system design and operational requirements, review of documentation, emergency procedures, operations, adjustments, troubleshooting, maintenance, and repairs.

B. Contractor shall train Owner’s teaching faculty on the online monitoring functionality of new system.

END OF SECTION 01 7000

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SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL (Not Used)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Review locations established for recycling and disposal.

3.2 RECYCLING WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Sort and stack reusable members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
2. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
3. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Metals: Separate metals by type.

3.3 DISPOSAL OF WASTE

A. Except for items or materials to be recycled or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

B. Recycle recyclable materials off-site.

C. Do not burn waste materials.

END OF SECTION 01 7419

SECTION 22 1013

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Base Bid

1. Contractor: Work includes:

a. Pipes and fittings.
b. Piping specialties.
c. Piping joining materials.
d. Valves.
e. Pressure regulators.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

A. Natural-Gas System Pressure within Buildings: 2 lbs to building. See drawings for places to regulate down to 15 inches W.C.

1.5 SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
3. Pressure regulators. Indicate pressure ratings and capacities.
4. Dielectric fittings.

B. Operation and Maintenance Data: For gas pressure regulators and service meters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

1.8 COORDINATION

A. The Utility Company will furnish and install a gas service complete with regulator and meter as shown on drawings. Utility Company's regulator will regulate from utility pressure down to two psig WC. Utility Company shall provide, in writing, certification of gas pressure before firing any appliances.

B. Using Agency will pay all charges accessed by Utility Company for gas service and meter installation.

C. Connect to the gas service at meter outlet and furnish and install all pipe and fittings to all gas users.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

B. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.

2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
    b. Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering. Vent casing aboveground.
    c. Aboveground Portion: PE transition fitting.
    d. Outlet shall be threaded or suitable for welded connection.
    e. Tracer wire connection.
    f. Ultraviolet shield.
    g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

4. Transition Service-Line Risers: Factory fabricated and leak tested.

    a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
    b. Outlet shall be threaded or suitable for welded connection.
    c. Bridging sleeve over mechanical coupling.
    d. Factory-connected anode.
    e. Tracer wire connection.
    f. Ultraviolet shield.
    g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

2.2 JOINING MATERIALS

A. Joint Compound: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.3 MANUAL GAS SHUTOFF VALVES

A. See "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig.
2. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. 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:

   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.4 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Line Pressure Regulators: Comply with ANSI Z21.80.

1. 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:

   a. American Meter Company.
   b. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   c. Invensys.
   d. Maxitrol Company.
   e. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.

2.5 DIELECTRIC FITTINGS

A. Dielectric Unions:

1. 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:

    a. Capitol Manufacturing Company.
    b. Central Plastics Company.
    c. Hart Industries International, Inc.
    d. McDonald, A. Y. Mfg. Co.
    e. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
    f. Wilkins; Zurn Plumbing Products Group.

2. Minimum Operating-Pressure Rating: 150 psig.
3. Combination fitting of copper alloy and ferrous materials.
4. Insulating materials suitable for natural gas.
5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION (AFTER METER SETTING)

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Install fittings for changes in direction and branch connections.

C. Install pressure gage downstream from each service regulator.

3.4 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing. Install in strict accord with manufacturer's installation instructions.

3.5 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints (2" and smaller):

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints (2-1/2" and larger):

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

3.6 HANGER AND SUPPORT INSTALLATION

A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 3-1/2: Maximum span, 10 feet; minimum rod size, ½ inch.

3.7 CONNECTIONS

A. Install piping adjacent to appliances to allow service and maintenance of appliances.

B. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 24 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

C. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.8 LABELING AND IDENTIFYING

A. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment for piping and valve identification.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and authorities having jurisdiction.

C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 OUTDOOR PIPING SCHEDULE

A. Aboveground natural-gas piping after meter shall be one of the following:

1. NPS 2 and smaller; Steel pipe with malleable-iron fittings and threaded joints.
2. NPS 2-1/2 and larger; Steel pipe with wrought-steel fittings and welded joints.

3.11 MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves in branch piping for single appliance shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.

END OF SECTION 22 10 13

SECTION 26 0500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cable penetration.
3. Grout.
4. Common electrical installation requirements.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

A. Product Data: For sleeve seals.

1.5 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.2 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 INSPECTION OF BID DOCUMENTS AND PREMISES

A. Visit the premises, take measurements and verify all elevations shown on the drawings, inspect existing conditions and limitations, obtain first hand information necessary to submit a complete bid.

B. Thoroughly examine the complete set of contract documents including work required by other trades. Bidders are cautioned to acquaint themselves with requirements necessitating installation work of material or equipment furnished by other contractors or the Owner.

C. In the event of any conflict, discrepancy or inconsistency among the Contract Documents, interpretation shall be based on the following descending order or priority:

1. Specifications.
2. Drawings, and among the drawings, the following:

    a. as between figures given on drawings and scaled measurements, the figures shall govern;
    b. as between large scale drawings and small scale drawings, the large scale drawings shall govern.

3. In the event that Work is called for by the drawings but not by the specifications, or by the specifications but not by the drawings, the Contractor shall be responsible for such Work.

3.2 PERMITS AND FEES

A. Obtain and pay for all permits, and make all deposits necessary for the installation of the work under his contract.

B. Where inspections of the work are required by State or local authorities, obtain certificates of inspection of the work by such authorities, and these certificates (in triplicate) shall be submitted to the Architect / Engineer.

3.3 INTERRUPTION OF ELECTRICAL SYSTEMS AND SERVICES

A. Do not interrupt electric systems or 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 Engineer no fewer than seven days in advance of proposed interruption of electrical service. Indicate:

    a. The extent of the work to be done during the outage.
    b. Probable length of time required for the outage.
    c. Designed time at which the outage is to begin.

2. Schedule work to minimize the number and length of time of the outage(s) or interruption(s) of the various systems and services.

3.4 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Space Preference:

1. Carefully verify and coordinate the location and level of all lines. Run preliminary levels and check with all other contractors so that conflict in location may be avoided.
2. If conflicts occur, the following preference schedule shall be followed:

    a. Recessed electric fixtures.
    b. High pressure ductwork.
    c. Sanitary drainage.
    d. Steam condensate, hot and chilled water.
    e. Low pressure ductwork.
    f. Domestic water storm and vent lines.
    g. Electric conduits.

3. No other work shall have preference over plumbing lines below fixtures.
4. No other work shall have preference over conduit above or below electric switchgear and above or below panels.
5. No piping conveying fluids shall be provided directly over electrical or elevator equipment.

F. Lines and Levels: Determine all grades, maintain necessary lines and levels throughout the progress of the work and assume full responsibility for their correctness. Where levels are indicated on the drawings, work shall be installed at those levels unless prior written approval to change is obtained from the Architect / Engineer.

G. Location of Equipment: The approximate location of all equipment is shown on the drawings. The Architect / Engineer reserves the right to change the location of all equipment 5' in any direction

without these changes being made the subject of an extra charge provided such changes are made before final installation.

3.5 ELECTRICAL DEMOLITION

A. Disconnect and remove electrical systems, equipment and components indicated to be removed.

1. Electrical Equipment to be Removed: Remove electrical equipment indicated to be removed along with associated supports, fittings, raceways and conductors.
2. Feeders and Branch Circuits to be Removed: Remove feeders and branch circuits indicated to be removed along with associated supports, fittings, raceway and conductors.

B. All removed electrical equipment, devices, raceways, conductors and associated items, except as noted below, shall become property of the Contractor and shall be properly disposed of by the Contractor.

1. Turn over to the Owner and deliver to a place of storage as directed the following:

a. Existing manual transfer switch.

C. Removal of existing electrical devices shall be such that all existing remaining electrical devices are kept in continuous service.

D. Existing circuit conductors connected to other fixtures, devices or other electrical equipment that are not to be removed or disconnected and are passing through outlet boxes, fixtures and conduit that are being removed; shall be rerouted from remaining existing device to next remaining device as necessary to keep remaining devices in service and existing circuit conductors continuous.

E. Where connections of existing devices cannot be made continuous with existing conduit, boxes and conductors; new raceways and conductors shall be installed from existing remaining device to next remaining device.

F. For each item disconnected and removed, disconnect and remove defunct circuit wiring back to next active remaining device or to panel or switchboard from which the circuit originates.

G. For each item disconnected and removed, disconnect and remove abandoned, exposed conduits, and / or conduits made exposed by demolition, back to next active remaining device or to panel or switchboard from which the circuit originates.

H. All conditions shall be carefully field determined and verified.

I. Provide all abandoned ceiling outlets, switch boxes and outlet boxes with blank coverplates.

3.6 OPENINGS IN EXISTING CONSTRUCTION

A. In existing construction, perform all cutting and patching where required in connection with the work. Match patching to existing adjacent surfaces.

B. All cutting in existing structural elements of building shall be accomplished with hole saws. Air hammers and cutting torches are not permitted.

C. Reinforced concrete slabs, steel joists, concrete floors and footings, or other structural work shall not be cut or disturbed in any way, unless as approved by the Architect / Engineer. The Electrical Contractor shall be held responsible for and correct all damage that he may cause.

D. Openings between conduit and floors or walls through fire or smoke barriers shall be closed with fire stop material to maintain fire or smoke barrier rating.

E. Fire stop material shall be Dow Corning 3-6548 Silicone RTV Foam, Chase Technology Corp. CTC PR-855 fire-resistant foam sealant, 3M CP-25 Series Caulk Fire Barrier, T & B S-101 Fire Barrier or Nelson Flameseal.

3.7 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

   a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth and location of joint. Comply with requirements in Section 07 92 00 “Joint Sealants”.
   b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

3.8 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly.

3.9 FIELD CORRECTIONS AND CHANGES

A. Carefully and accurately record on field set of drawings, any deviations or changes in locations of conduit, wiring and/or equipment made in the field and shall keep the Architect / Engineer informed on all deviations and changes.

B. At the completion of the job, furnish the Architect / Engineer three (3) complete sets (not the field set) of drawings indicating these deviations or changes. Extra sets of drawings will be provided to the contractor for this purpose. Any changes in the exterior work shall be recorded by dimension.

3.10 OPERATION AND MAINTENANCE INSTRUCTIONS

A. Before final acceptance of the electrical installation, provide to the Architect / Engineer three (3) bound copies of a complete set of operating and maintenance instructions and procedures for all electrical systems and equipment furnished under this contract.

B. Prepare a complete file of maintenance and operating instructions which covers all electrical systems and equipment listed in the section entitled "Submittals".

C. Data shall be placed in an 8-1/2" x 11" slide hinge, heavy duty, three-post type, stiff cover binder. Each completed binder shall not exceed 3-1/2" in thickness. Label binder as follows:

ELECTRICAL SYSTEMS
MAINTENANCE AND OPERATING INSTRUCTIONS
Brookens Administrative Center IT Generator
Urbana, Illinois

D. Data shall include a complete table of contents, tabs, final approved shop drawings, wiring diagrams, manufacturer's operating and maintenance instructions, catalog brochure information, replacement parts lists, name, address and telephone number of nearest stocking supply house.

E. Drawings shall be neatly folded to approximately 8-1/2" x 11" size and inserted individually into 8-1/2" x 11" sheet protectors which shall be properly punched and inserted into the binder.

F. All material relative to the equipment for one system (i.e.; lighting fixtures, panelboards, motor starting equipment, etc.) shall be filed behind a clearly labeled filing tab. The following information shall be typed on the filing tab page: Item, Manufacturer, Contractor's Order Number, Supplier's Order Number, Manufacturer's Order Number.

G. Three completed files shall be submitted for review prior to job completion. Final payments will not be certified until the maintenance manuals have been received and reviewed.

H. Authorized manufacturer's personnel shall instruct (to the Owner's satisfaction) all personnel designated by the Owner in the use of equipment and systems as listed in the section entitled "Submittals".

I. Provide a minimum of one man day in one trip to the job before the job is accepted for the instruction and training of the Owner's representative in the operation and maintenance of the complete electrical system.

J. The above does not relieve the contractor of his responsibility of making service calls due to any defect which may develop with systems or equipment during the guarantee period nor shall these service calls be included as part of instruction time. Specific requirements in specifications for factor service representatives is also in addition to above requirements.

3.11 CLEANING UP

A. Before work can be considered complete, clean all surfaces of all paint, plaster, mortar, labels and other stains and remove all lumps of cement. Take care not to scratch, mar, or damaged surfaces in cleaning.

B. In case of dispute, the Owner / User may remove the rubbish and charge the cost to the one or more contractors as the Architect / Engineer may determine to be just.

3.12 TOUCH-UP PAINTING

A. Comply with requirements in Division 9 Painting Sections for cleaning and touch-up painting.

B. All factory applied paint finishes on all electrical items, equipment, panelboards, switchboards, fire alarm devices, etc., that is scratched or damaged shall be touched up with rust inhibitive paint to match factory applied paint.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

D. Multi-Conductor Cable: Comply with NEMA WC70 for type SO with ground wire.

2.2 CONNECTORS AND SPLICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.

B. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

C. Minimum wire size shall be No. 12 except for internal fixture wire which shall be minimum size of No. 14 type SF, SFF, PF, PFF or TFN, 600 volt.

D. All branch circuit wiring and feeder cables for circuits over 20 amps shall be sized as noted on the drawings. If size is not specifically noted, size all branch circuit wiring and feeder cables in accordance with the National Electrical Code.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.6 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:

1. Ground rods.
2. Grounding arrangements and connections for separately derived systems.
3. Grounding for sensitive electronic equipment.

C. Qualification Data: For testing agency and testing agency's field supervisor.

D. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel, 3/4 inch by10 feet in diameter.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

1. Bury at least 24 inches below grade.
2. Duct-Bank Grounding Conductor: Bury 12 inches above duct bank when indicated as part of duct-bank installation.

C. Conductor Terminations and Connections:

1. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits. Separate grounding conductors are not shown on the drawings but shall be included in all raceways as set forth on the drawings.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70. Separate grounding conductors are not shown on the drawings but shall be included in all raceways as set forth on the drawings:

1. Feeders.
2. Single-phase motor and appliance branch circuits.
3. Three-phase motor and appliance branch circuits.
4. Flexible raceway runs.
5. Armored and metal-clad cable runs.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

B. Report measured ground resistances that exceed the following values:

1. Pad-Mounted Equipment: 5 ohms.

C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.

1.6 QUALITY ASSURANCE

A. Comply with NFPA 70.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Anchors using explosive charges to drive inserts into concrete shall not be used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Cooper B-Line, Inc.; a division of Cooper Industries.
2) Empire Tool and Manufacturing Co., Inc.
3) Hilti Inc.
4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 5 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Concrete: Bolt to concrete inserts.
2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
3. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or metal framing channel welded to structure.
4. To Light Steel: Sheet metal screws.
5. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

E. Repair fireproofing damaged as a result of installing clamps or supports to structural steel.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 5 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

END OF SECTION

SECTION 26 0533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Metal conduits tubing and fittings.
2. Nonmetal conduits, tubing and fittings.
3. Surface raceways
4. Boxes, enclosures and cabinets.
5. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections and attachment details.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control test reports.

PART 2 - PRODUCTS

2.1 METAL CONDUIT, TUBING AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.; Anaconda Metal Hose.

4. Electri-Flex Co.
5. O-Z Gedney; a brand of EGS Electrical Group.
6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

C. EMT: Comply with ANSI C80.3 and UL 797.

D. FMC: Zinc-coated steel.

E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.

2. Fittings for EMT:

a. Material: Steel.
b. Type: Compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed and including flexible external bonding jumper.

2.2 NONMETALLIC CONDUITS, TUBING AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.; Anaconda Metal Hose.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corp.
6. Condux International, Inc.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions; Carlon Electrical Products.
10. Niedax-Kleinhuis USA, Inc.
11. RACO; a Hubbell Company.
12. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. Fittings for ENT and RNC: Comply with NEMA TC 3; solvent welding type, match to conduit or tubing type and material.

E. Fittings for LFNC: UL 514B.

F. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers".

2.3 SURFACE RACEWAYS

A. Listing and Labeling: Surface raceways and tele-power poles shall be listed and labeled as defined in NFPA 70, by a qualified testing agency and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Mono-Systems, Inc.
    b. Panduit Corp.
    c. Wiremold / Legrand.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a Pentair Company.
7. Hubbell Incorporated; Killark Division.
8. Kraloy.
9. Milbank Manufacturing Co.
10. Mono-Systems, Inc.
11. O-Z/Gedney; a brand of EGS Electrical Group.
12. RACO; a Hubbell Company.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Stahlin Non-Metallic Enclosures; a division of Robroy Industrities.
16. Thomas & Betts Corporation.
17. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures and Cabinets: Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

G. Gangable boxes are allowed.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: IMC.
2. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Boxes and Enclosures: NEMA 250, Type 1.

C. Minimum Raceway Size: 3/4-inch trade size.

D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. EMT: Use compression fittings. Comply with NEMA FB 2.10.
2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this Article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Conduits and raceways shall not be supported from plumbing lines, ductwork or supports for equipment provided by other trades.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

G. Support conduit within 12 inches of enclosures to which attached.

H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

I. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

J. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

K. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

M. Surface Raceways:

1. Install raceways with a minimum 2-inch radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

N. Flexible Conduit Connections: Comply with NEMA RV 3. Use maximum of 72 inches of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.
2. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

O. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 FIRESTOPPING

A. Install firestopping at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 07 84 13"Penetration Firestopping."

3.4 PROTECTION

A. Protect coatings, finishes and cabinets are without damage or deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

B. Protect work from injury by keeping all conduit and boxes capped and plugged or otherwise protected. This includes damage by freezing and / or stoppage from building materials, sand, dirt or concrete.

END OF SECTION

SECTION 26 0553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Identification for conductors.
2. Equipment identification labels.
3. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.2 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 50 lb, minimum.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

B. Paint: Paint materials and application requirements are specified in Division 09 painting Sections.

C. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

A. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- high letters on 1-1/2-inch- high label; where 2 lines of text are required, use labels 2 inches high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Attach labels with screws and not adhesives.

2. Equipment to Be Labeled:

    a. Panelboards, electrical cabinets, and enclosures.
    b. Generator.
    c. Transfer switch.
    d. Generator annunciator panel.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Attach signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

E. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
2. Colors for 208/120-V Circuits:

    a. Phase A: Black.
    b. Phase B: Red.
    c. Phase C: Blue.
    d. Neutral: White.
    e. Ground: Green.

3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

END OF SECTION

SECTION 26 2416

PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. RFI: Radio-frequency interference.

D. RMS: Root mean square.

E. SPDT: Single pole, double throw.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:

a. Enclosure types and details for types other than NEMA 250, Type 1.
b. Bus configuration, current, and voltage ratings.
c. Short-circuit current rating of panelboards and overcurrent protective devices.
d. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

2. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports including the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panelboard Schedules: For installation in panelboards.

E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section " 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.

1.5 QUALITY ASSURANCE

A. Source Limitations:

1. Obtain panelboards, overcurrent protective devices, components and accessories through one source from a single manufacturer.
2. Obtain panelboards, overcurrent protective devices, components and accessories from the same manufacturer as:

a. Fusible and non-fusible switches.
b. Molded case circuit breakers.
c. Enclosed controllers.
d. Switchboards.
e. Low voltage transformers.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:

1. Ambient Temperature: Not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.7 COORDINATION

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, and encumbrances to workspace clearance requirements.

B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Panelboards, Overcurrent Protective Devices, Controllers, Contactors, and Accessories:

a. Eaton Corporation; Cutler-Hammer Products.
b. General Electric Co.; Electrical Distribution & Protection Div.
c. Siemens Energy & Automation, Inc.
d. Square D.

2.2 MANUFACTURED UNITS

A. Enclosures: Flush and surface-mounted cabinets. NEMA PB 1, Type 1.

1. Rated for environmental conditions at installed location.
2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
3. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
4. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.

B. Phase and Ground Buses:

1. Material: Hard-drawn copper, 98 percent conductivity.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
3. Split Bus: Vertical buses divided into individual vertical sections.

C. Conductor Connectors: Suitable for use with conductor material.

1. Main and Neutral Lugs: Mechanical type.
2. Ground Lugs and Bus Configured Terminators: Compression type.

D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches.

2.3 PANELBOARD SHORT-CIRCUIT RATING

A. Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.4 OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker: UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. GFCI Circuit Breakers: Single- and two-pole configurations with 30-mA trip sensitivity.

B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.

1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
3. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards and accessories according to NEMA PB 1.1.

B. Mount top of trim 74 inches above finished floor, unless otherwise indicated.

C. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.

D. Install overcurrent protective devices and controllers.

E. Install filler plates in unused spaces.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Perform the following field tests and inspections and prepare test reports:

1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches and Section 7.6 for molded-case circuit breakers. 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.

3.5 CLEANING

A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION

SECTION 26 3213

PACKAGED ENGINE GENERATOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes packaged engine-generator sets for standby power supply with the following features:

1. Gas engine.
2. Unit-mounted cooling system.
3. Remote-mounting control and monitoring.
4. Performance requirements for sensitive loads.
5. Outdoor enclosure.

B. Related Sections include the following:

1. Division 26 Section "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine-generator sets.

1.3 DEFINITIONS

A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

1.4 SUBMITTALS

A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:

1. Thermal damage curve for generator.
2. Time-current characteristic curves for generator protective device.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
2. Wiring Diagrams: Power, signal, and control wiring.

C. Source quality-control test reports.

1. Certified summary of prototype-unit test report.
2. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.

3. Certified Summary of Performance Tests: Certify compliance with specified requirement to meet performance criteria for sensitive loads.
4. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
5. Report of sound generation.
6. Report of exhaust emissions showing compliance with applicable regulations.
7. Certified Torsional Vibration Compatibility: Comply with NFPA 110.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1. Maintenance Proximity: Not more than four hours' normal travel time from Installer's place of business to Project site.

B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.

C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Comply with ASME B15.1.

F. Comply with NFPA 37.

G. Comply with NFPA 70.

H. Comply with NFPA 110 requirements for Level 1 emergency power supply system.

I. Comply with UL 2200.

J. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.6 PROJECT CONDITIONS

A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

1. Ambient Temperature: Minus 15 to plus 40 deg C.

2. Relative Humidity: 0 to 95 percent.
3. Altitude: Sea level to 1,000 feet.

1.7 COORDINATION

A. Coordinate size and location of concrete bases for package engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Industrial Power (Basis of Design).
2. Caterpillar; Engine Div.
3. Kohler Co.; Generator Division.
4. Onan/Cummins Power Generation; Industrial Business Group.

2.2 ENGINE-GENERATOR SET

A. Factory-assembled and -tested, engine-generator set.

B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.

C. Capacities and Characteristics:

1. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
2. Output Connections: Three-phase, four wire.
3. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

D. Generator-Set Performance:

1. Provide 60 KW, 6.8 L generator minimum.

2.3 ENGINE

A. Fuel: Natural gas.

B. Rated Engine Speed: 1800 rpm.

C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.

D. Lubrication System: The following items are mounted on engine or skid:

1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System:

1. Natural Gas System:

a. Carburetor.
b. Secondary Gas Regulators: One for each fuel type.
c. Fuel-Shutoff Solenoid Valves: One for each fuel source.
d. Flexible Fuel Connectors: One for each fuel source.

F. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.

G. Governor: Adjustable isochronous, with speed sensing.

H. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.

1. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
2. Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
3. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
4. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.

a. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.
b. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

I. Air-Intake Filter: Heavy-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

J. Starting System: 12-V electric, with negative ground.

1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
2. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
3. Cranking Cycle: As required by NFPA 110 for system level specified.
4. Battery: Adequate capacity within ambient temperature range specified in Part 1 "Project Conditions" Article to provide specified cranking cycle at least three times without recharging.
5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
6. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10

deg C regardless of external ambient temperature within range specified in Part 1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.

7. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
8. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:

    a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
    c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

2.4 CONTROL AND MONITORING

A. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down generator set.

B. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.

C. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:

    1. AC voltmeter.
    2. AC ammeter.
    3. AC frequency meter.
    4. DC voltmeter (alternator battery charging).
    5. Engine-coolant temperature gage.
    6. Engine lubricating-oil pressure gage.
    7. Running-time meter.
    8. Ammeter-voltmeter, phase-selector switch(es).
    9. Generator-voltage adjusting rheostat.
    10. Generator overload.

D. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.

E. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.

1. Overcrank shutdown.
2. Coolant low-temperature alarm.
3. Control switch not in auto position.
4. Battery-charger malfunction alarm.
5. Battery low-voltage alarm.
6. Engine high-temperature shutdown.
7. Lube-oil, low-pressure shutdown.
8. Overspeed shutdown.
9. Remote emergency-stop shutdown.
10. Engine high-temperature prealarm.
11. Lube-oil, low-pressure prealarm.
12. Fuel tank, low-fuel level.
13. Low coolant level.

F. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

2.5 GENERATOR OVERCURRENT AND FAULT PROTECTION

A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 80 percent rated; complying with NEMA AB 1 and UL 489.

1. Tripping Characteristic: Designed specifically for generator protection.
2. Trip Rating: Matched to generator rating.
3. Mounting: Adjacent to or integrated with control and monitoring panel.

2.6 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

A. Comply with NEMA MG 1.

B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

C. Electrical Insulation: Class H or Class F.

D. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

F. Enclosure: Dripproof.

G. Instrument Transformers: Mounted within generator enclosure.

H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.

2.7 OUTDOOR GENERATOR-SET ENCLOSURE

A. Description: Vandal-resistant, weatherproof steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance.

Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

B. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 10 seconds with ambient temperature at top of range specified in system service conditions.

C. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.

D. Lighting: Provide weather resistant fluorescent lighting with 30 footcandles average maintained.

2.8 FINISHES

A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

2.9 SOURCE QUALITY CONTROL

A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

1. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:

1. Test components and accessories furnished with installed unit that are not identical to those on tested prototype to demonstrate compatibility and reliability.
2. Full load run.
3. Maximum power.
4. Voltage regulation.
5. Transient and steady-state governing.
6. Single-step load pickup.
7. Safety shutdown.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.

B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.

B. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

C. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.3 CONNECTIONS

A. Connect engine exhaust pipe to engine with flexible connector.

B. Connect fuel piping to engines with a gate valve and union and flexible connector.

C. Ground equipment according to Division 16 Section "Grounding and Bonding."

D. Connect wiring according to Division 16 Section "Conductors and Cables."

3.4 IDENTIFICATION

A. Identify system components according to Division 15 Section "Mechanical Identification" and Division 16 Section "Electrical Identification."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

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.

B. Tests and Inspections:

1. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

    a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
    b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
    c. Verify acceptance of charge for each element of the battery after discharge.
    d. Verify that measurements are within manufacturer's specifications.

2. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
3. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.

C. Coordinate tests with tests for transfer switches and run them concurrently.

D. Test instruments shall have been calibrated within the last 12 months, traceable to standards of NIST, and adequate for making positive observation of test results. Make calibration records available for examination on request.

E. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

F. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

H. Remove and replace malfunctioning units and retest as specified above.

I. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.

J. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators. Refer to Division 1 Section "Demonstration and Training."

END OF SECTION

SECTION 26 3600

TRANSFER SWITCH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes transfer switches rated 600 V and less, including the following:

1. Automatic transfer switches.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:

1. Features and operating sequences, both automatic and manual.
2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NEMA ICS 1.

D. Comply with NFPA 70.

E. Comply with NFPA 110.

F. Comply with UL 1008 unless requirements of these Specifications are stricter.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Contactor Transfer Switches:

a. Generac Industrial Power (Basis of Design).
b. Caterpillar; Engine Div.
c. Emerson; ASCO Power Technologies, LP.
d. Kohler Power Systems; Generator Division.
e. Onan/Cummins Power Generation; Industrial Business Group.
f. Russelectric, Inc.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
2. Switch Action: Double throw; mechanically held in both directions.
3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

G. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 Section "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

H. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.3 AUTOMATIC TRANSFER SWITCHES

A. Comply with Level 1 equipment according to NFPA 110.

B. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.

C. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

D. Automatic Transfer-Switch Features:

1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 90 to 95 percent of nominal, and dropout voltage is adjustable from 70 to 90 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
2. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to ten seconds, and factory set for one second.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be 90 percent of nominal. Pickup frequency shall be 90 percent of nominal.
4. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is not available.

2.4 SOURCE QUALITY CONTROL

A. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Identify components according to Division 26 Section "Identification for Electrical Systems."

B. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.2 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
2. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

    a. Check for electrical continuity of circuits and for short circuits.
    b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
    c. Verify that manual transfer warnings are properly placed.
    d. Perform manual transfer operation.

4. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.

    a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
    b. Simulate loss of phase-to-ground voltage for each phase of normal source.
    c. Verify time-delay settings.
    d. Verify pickup and dropout voltages by data readout or inspection of control settings.

B. Coordinate tests with tests of generator and run them concurrently.

C. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

D. Remove and replace malfunctioning units and retest as specified above.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01 Section "Demonstration and Training."

B. Coordinate this training with that for generator equipment.

END OF SECTION

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN, ILLINOIS
1776 E. WASHINGTON, URBANA, ILLINOIS 61802
AUGUST 2014

ENGINEER:

Engineers and Associates, Inc.
Mechanical & Electrical Consulting Engineers
1615 South Neil Street
Champaign, Illinois 61820
Tel: (217)356-0536 Fax: (217)356-1092

OWNER:

DRAWING LIST	
SHEET NUMBER	SHEET NAME
C1	COVER SHEET
E1	FIRST FLOOR PLAN - SOUTH - POWER
E2	FIRST FLOOR PLAN - NORTH - POWER
E3	SECOND FLOOR PLAN - POWER
E4	ELECTRICAL ONE-LINE DIAGRAM
E5	ELECTRICAL DETAILS
E6	PANEL SCHEDULES
E7	PANEL SCHEDULES
E8	PANEL SCHEDULES
P1	GAS PIPING PLAN

Revision | No. | Date

Project No. 6833
Designed LEM | Approved JNG
Drawn JNG | Approved JNG
Checked JNG

Sheet Title: COVER SHEET
BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
1776 E. WASHINGTON, URBANA, ILLINOIS 61802

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1615 South Neil Street
Champaign, Illinois 61820
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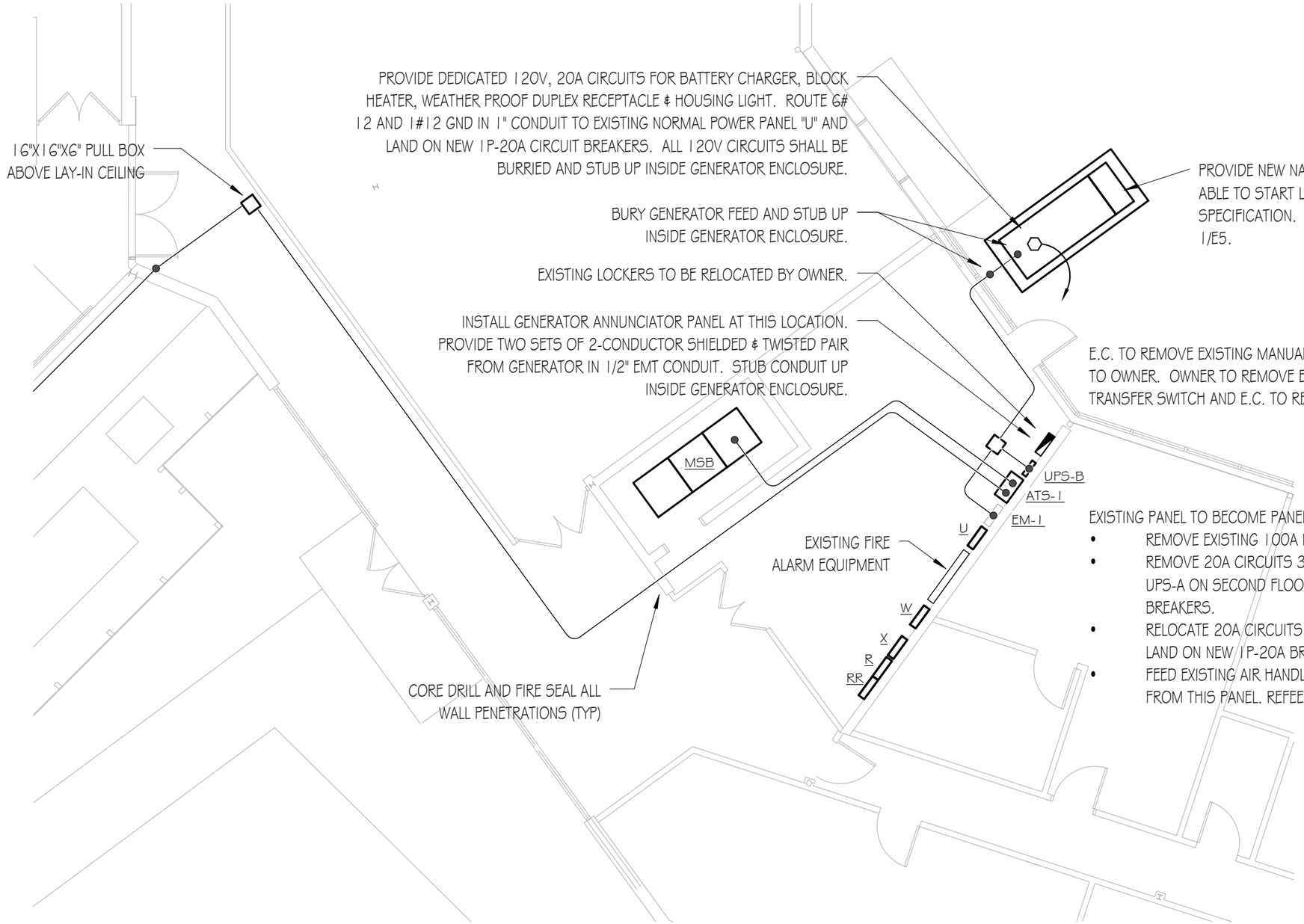
Date 8/5/2014

Sheet C1



EXISTING PANEL TO BECOME PANEL "EM-1":

- REMOVE EXISTING 100A MCB AND CONFIGURE AS MLO.
- REMOVE 20A CIRCUITS 3, 5 & 7. CIRCUITS TO BE REFED FROM PANEL UPS-A ON SECOND FLOOR. SEE SHEET E3. LAND ON NEW 1P-20A BREAKERS.
- RELOCATE 20A CIRCUITS 1,10,11,12,13,14,15 & 17 TO PANEL UPS-B. LAND ON NEW 1P-20A BREAKERS.
- FEED EXISTING AIR HANDLER SERVING I.T. SPACE ON SECOND FLOOR FROM THIS PANEL. REFEED AS SHOWN ON SHEET E3.

FIRST FLOOR PLAN - NORTH - POWER

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

0 4 8 16 32

No.	Revision	Date

Designed	Project No.
LEM	6833
Drawn	Approved
LEM	JNG
Checked	Approved
JNG	JNG

Sheet Title: FIRST FLOOR PLAN - SOUTH - POWER

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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1515 South Neil Street
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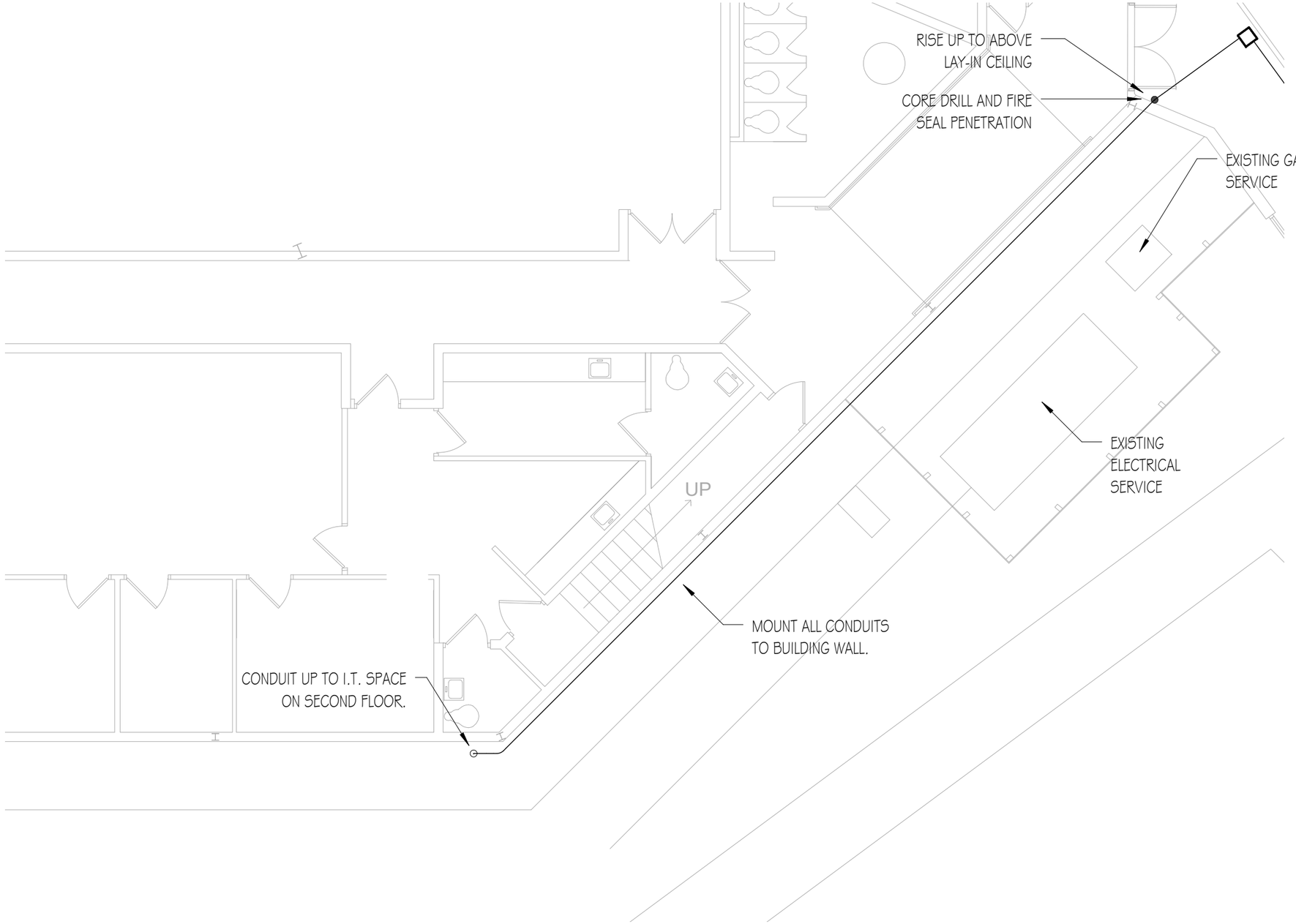
Date: 8/5/2014

Sheet: E1



FIRST FLOOR PLAN - SOUTH - POWER

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

0 4 8 16 32

No.	Revision	Date

Project No. 6233			
Designed Designer	Approved Approver	Drawn Author	Approved Approver
Checked Checker			

Sheet Title: FIRST FLOOR PLAN - NORTH - POWER

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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1511 South Mattis Ave.
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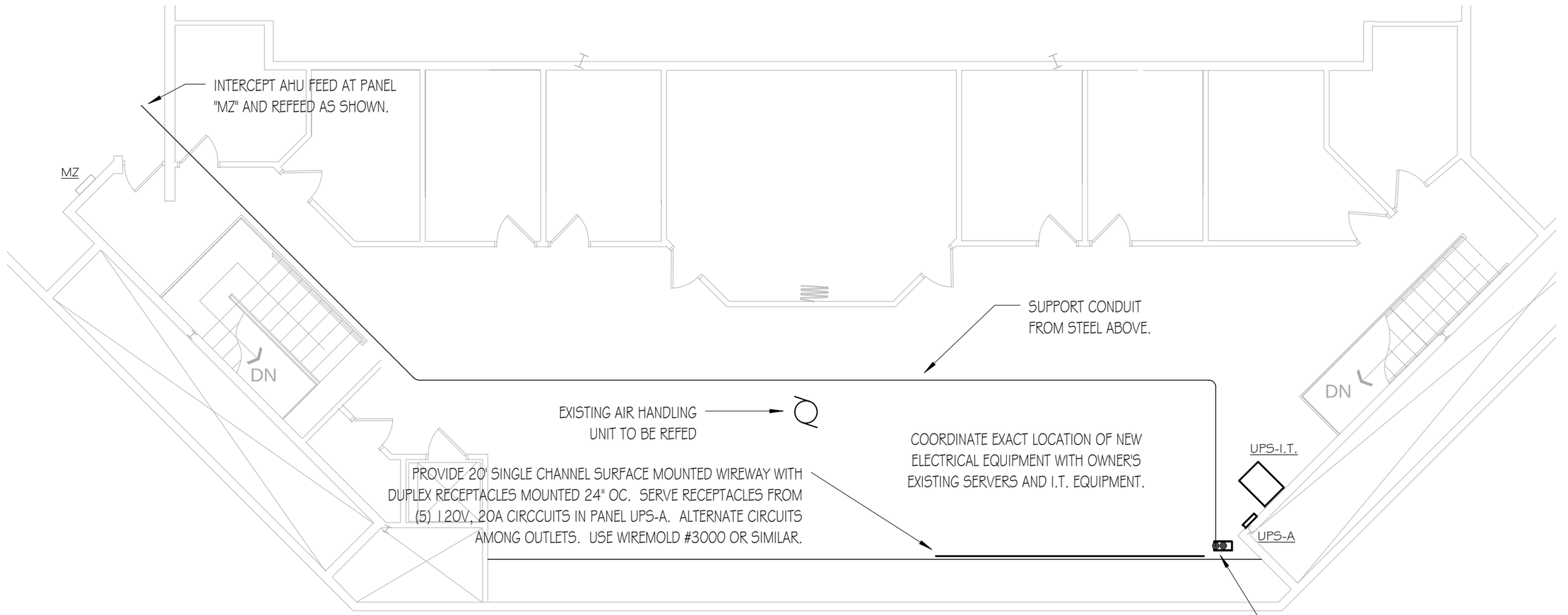
Date: 8/5/2014

Sheet: E2



SECOND FLOOR PLAN - POWER

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

0 4 8 16 32

Date	No.	Revision

Project No. 6833	Approved JNG
Designed LEM	Approved JNG
Drawn LEM	
Checked JNG	

Sheet Title: SECOND FLOOR PLAN - POWER

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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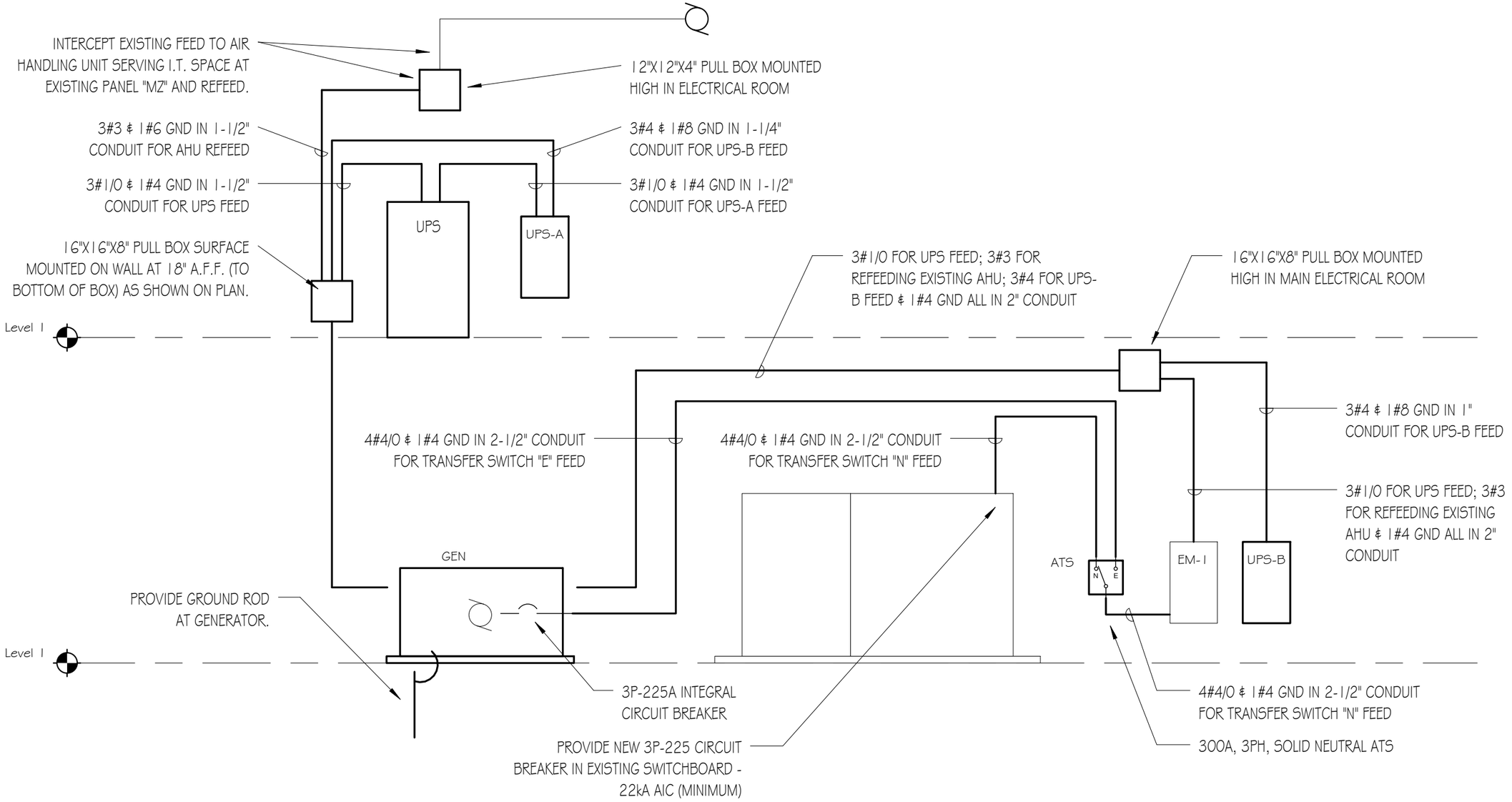
Date: 8/5/2014

Sheet: E3



ELECTRICAL ONELINE DIAGRAM

SCALE: NO SCALE

No.	Date	Revision

Designed	Project No.	Approved
LEM	6233	JNG
Drawn		Approved
LEM		JNG
Checked		
JNG		

Sheet Title: ELECTRICAL ONE-LINE DIAGRAM

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
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1776 E. WASHINGTON, URBANA, ILLINOIS 61802

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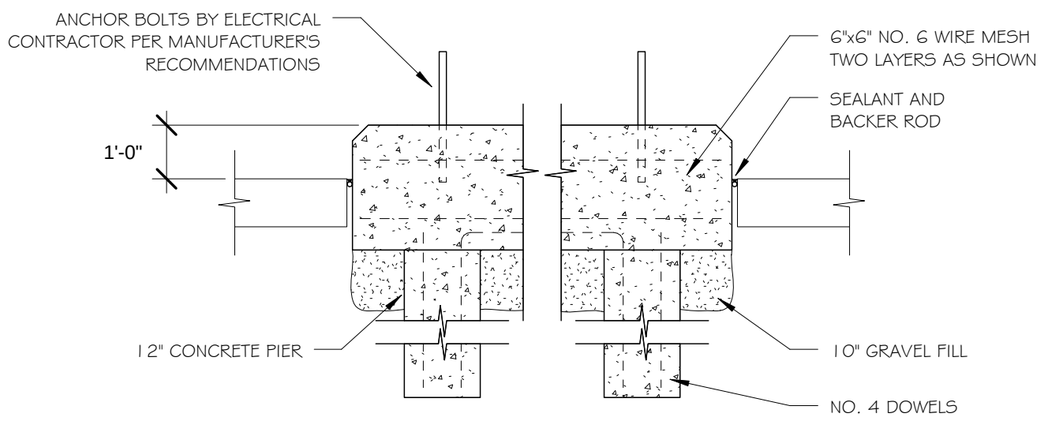
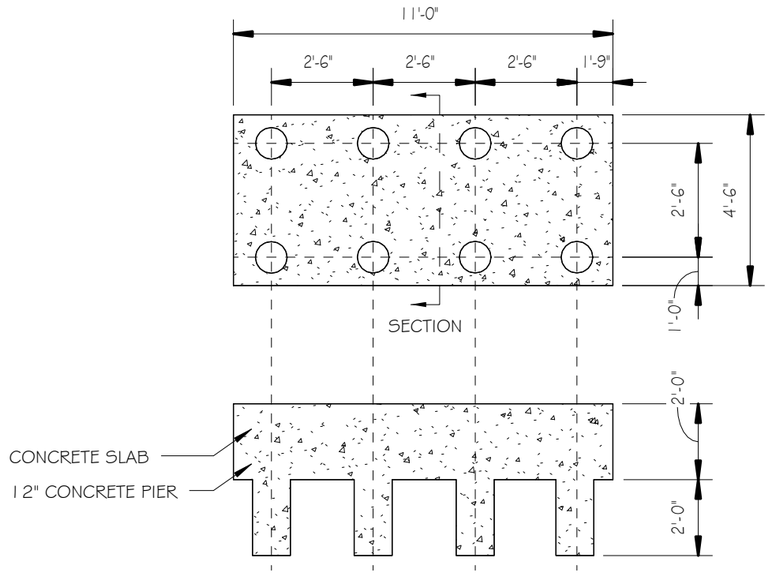
Date: 8/5/2014

Sheet: E4



SECTION



1 / E5 GENERATOR PAD DETAIL

SCALE: NO SCALE

Date	No.	Revision

Designed	Project No.	Approved
LEM	6833	JNG
Drawn		Approved
LEM		JNG
Checked		
JNG		

Sheet Title: ELECTRICAL DETAILS

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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155 S. Gregory Street
Champaign, Illinois 61820
Tel: (217)356-0536 Fax: (217)356-1092

Date: 8/5/2014

Sheet: E5

BRANCH PANEL: EM-1

LOCATION:
SUPPLY FROM:
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 120/208 Wye
PHASES: 3
WIRES: 4

A.I.C. RATING: 18 kA
MAINS TYPE: MLO
MAINS RATING: 225 A
MCB RATING: -

NOTES:
PANEL IS EXISTING - PROVIDE NEW PANEL LABEL AND DIRECTORY.

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		C		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	EXISTING BREAKER MARKED AS SPARE	20 A	1	0 VA	198 VA					2	20 A	I.T. ROOM A318A FCU	2
3	EXISTING BREAKER MARKED AS SPARE	20 A	1			0 VA	198 VA						4
5	EXISTING BREAKER MARKED AS SPARE	20 A	1					0 VA	894 VA	2	20 A	I.T. ROOM A318A ACCU	6
7	EXISTING BREAKER MARKED AS SPARE	20 A	1	0 VA	894 VA								8
9	EXISTING BREAKER MARKED AS SPARE	20 A	1			0 VA	0 VA			1	20 A	EXISTING BREAKER MARKED AS SPARE	10
11	EXISTING BREAKER MARKED AS SPARE	20 A	1					0 VA	0 VA	1	20 A	EXISTING BREAKER MARKED AS SPARE	12
13	EXISTING BREAKER MARKED AS SPARE	20 A	1	0 VA	0 VA					1	20 A	EXISTING BREAKER MARKED AS SPARE	14
15	EXISTING BREAKER MARKED AS SPARE	20 A	1			0 VA	0 VA			1	20 A	EXISTING BREAKER MARKED AS SPARE	16
17	EXISTING BREAKER MARKED AS SPARE	20 A	1					0 VA	0 VA	--	--	SPACE W/ BUS	18
19	POD 400 RTU	80 A	3	8348 VA	0 VA					--	--	SPACE W/ BUS	20
21						8348 VA	0 VA			--	--	SPACE W/ BUS	22
23								8348 VA	0 VA	--	--	SPACE W/ BUS	24
25	UPS-I.T.	120 A	2	6557 VA	0 VA					--	--	SPACE W/ BUS	26
27						5177 VA	0 VA			--	--	SPACE W/ BUS	28
29	SPACE W/ BUS	--	--					0 VA	0 VA	--	--	SPACE W/ BUS	30
31	SPACE W/ BUS	--	--	0 VA	0 VA					--	--	SPACE W/ BUS	32
33	SPACE W/ BUS	--	--			0 VA	0 VA			--	--	SPACE W/ BUS	34
35	SPACE W/ BUS	--	--					0 VA	0 VA	--	--	SPACE W/ BUS	36
37	SPACE W/ BUS	--	--	0 VA	0 VA					--	--	SPACE W/ BUS	38
39	SPACE W/ BUS	--	--			0 VA	0 VA			--	--	SPACE W/ BUS	40
41	SPACE W/ BUS	--	--					0 VA	0 VA	--	--	SPACE W/ BUS	42
		TOTAL LAOD:		15997 VA		13723 VA		9243 VA					
		TOTAL AMPS:		139 A		120 A		77 A					

LEGEND:

LOADCLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Equipment	11734 VA	100.00%	11734 VA		
HVAC	27229 VA	125.00%	34036 VA	TOTAL CONN. LOAD:	38962 VA
				TOTAL EST. DEMAND:	45770 VA
				TOTAL CONN. CURRENT:	108 A
				TOTAL EST. DEMAND CURRENT:	127 A

NOTES:

No.	Revision	Date

Designed	Project No.	Approved
LEM	6233	JNG
Drawn		Approved
LEM		JNG
Checked		
JNG		

Sheet Title: PANEL SCHEDULES

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
1776 E. WASHINGTON, URBANA, ILLINOIS 61802

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Mechanical & Electrical Consulting Engineers
1512 South First Street
Champaign, Illinois 61820
Tel: (217)356-0536 Fax: (217)356-1092

Date: 8/5/2014

Sheet: E6

BRANCH PANEL: UPS-A

LOCATION:
SUPPLY FROM: UPS-I.T.
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 120/208 Single
PHASES: 1
WIRES: 3

A.I.C. RATING: 18 kA
MAINS TYPE: MLO
MAINS RATING: 100 A
MCB RATING: -

NOTES:

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	UPS-B	60 A	2	2369 VA	1459 VA			1	20 A	WIREWAY RECEPTACLE CIRCUIT	2
3						2578 VA	1140 VA	1	20 A	WIREWAY RECEPTACLE CIRCUIT	4
5	WIREWAY RECEPTACLE CIRCUIT	20 A	1	1270 VA	1459 VA			1	20 A	WIREWAY RECEPTACLE CIRCUIT	6
7	WIREWAY RECEPTACLE CIRCUIT	20 A	1			1459 VA	0 VA	1	20 A	SPARE	8
9	SPARE	20 A	1	0 VA	0 VA			1	20 A	SPARE	10
11	SPARE	20 A	1			0 VA	0 VA	--	--	SPACE W/ BUS	12
13	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	14
15	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	16
17	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	18
19	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	20
21	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	22
23	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	24
25	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	26
27	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	28
29	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	30
			TOTAL LAOD:	6557 VA		5177 VA					
			TOTAL AMPS:	61 A		50 A					

LEGEND:

LOADCLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Equipment	11734 VA	100.00%	11734 VA		
				TOTAL CONN. LOAD:	11734 VA
				TOTAL EST. DEMAND:	11734 VA
				TOTAL CONN. CURRENT:	56 A
				TOTAL EST. DEMAND CURRENT:	56 A

NOTES:

No.	Revision	Date

Designed	Approved	Project No.
LEM	JNG	6833
Drawn	Approved	
LEM	JNG	
Checked		
JNG		

Sheet Title: PANEL SCHEDULES

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
1776 E. WASHINGTON, URBANA, ILLINOIS 61802

Engineers and Associates, Inc.
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Date: 8/5/2014

Sheet: E7

BRANCH PANEL: UPS-B

LOCATION:
SUPPLY FROM: UPS-A
MOUNTING: SURFACE
ENCLOSURE: NEMA 1

VOLTS: 120/208 Single
PHASES: 1
WIRES: 3

A.I.C. RATING: 18 kA
MAINS TYPE: MLO
MAINS RATING: 60 A
MCB RATING: -

NOTES:

CKT	CIRCUIT DESCRIPTION	TRIP	POLE	A		B		POLE	TRIP	CIRCUIT DESCRIPTION	CKT
1	EX. CKT. TO BE RELOCATED	20 A	1	840 VA	550 VA			1	20 A	EX. CKT. TO BE RELOCATED	2
3	EX. CKT. TO BE RELOCATED	20 A	1			720 VA	499 VA	1	20 A	EX. CKT. TO BE RELOCATED	4
5	EX. CKT. TO BE RELOCATED	20 A	1	379 VA	600 VA			1	20 A	EX. CKT. TO BE RELOCATED	6
7	EX. CKT. TO BE RELOCATED	20 A	1			859 VA	499 VA	1	20 A	EX. CKT. TO BE RELOCATED	8
9	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	10
11	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	12
13	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	14
15	SPACE W/ BUS	--	--			0 VA	0 VA	--	--	SPACE W/ BUS	16
17	SPACE W/ BUS	--	--	0 VA	0 VA			--	--	SPACE W/ BUS	18
			TOTAL LAOD:	2369 VA		2578 VA					
			TOTAL AMPS:	23 A		25 A					

LEGEND:

LOADCLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Equipment	4946 VA	100.00%	4946 VA		
				TOTAL CONN. LOAD:	4946 VA
				TOTAL EST. DEMAND:	4946 VA
				TOTAL CONN. CURRENT:	24 A
				TOTAL EST. DEMAND CURRENT:	24 A

NOTES:

No.	Date	Revision

Designed	Drawn	Checked
LEM	LEM	JNG

Project No.	Approved	Approved
6833	JNG	JNG

Sheet Title: PANEL SCHEDULES

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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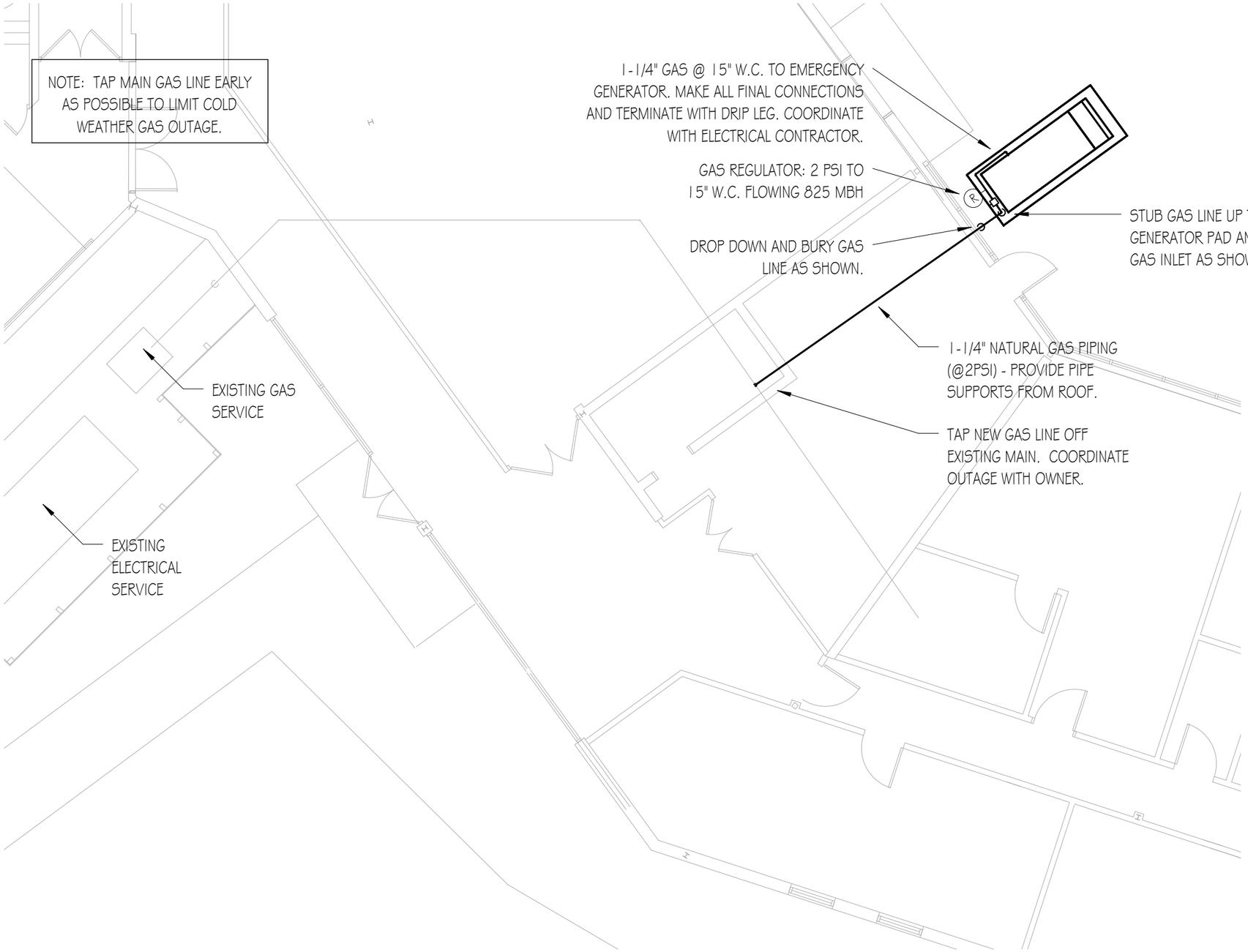
Date: 8/5/2014

Sheet: E8



FIRST FLOOR PLAN - PLUMBING

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

0 4 8 16 32

No.	Revision	Date

Project No. 6833	Approved JNG	Designed LEM	
		Drawn LEM	Approved JNG
		Checked JNG	

Sheet Title: GAS PIPING PLAN

BROOKENS ADMINISTRATIVE CENTER I.T. GENERATOR
COUNTY OF CHAMPAIGN ILLINOIS
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Date: 8/5/2014

Sheet: P1