

Addendum #1

Project Name: Hastings City Auditorium – Interior Renovation
Hastings, Nebraska
Project No.: AUD-2015-15011C
Issued: November 25, 2015
Bid Date: 10:00am, Thursday, December 10, 2015
Bid Opening: Sinclair Hille Architects
Location: Lincoln, NE 68508

This Addendum is issued to all known bidders before receipt of proposals. This Addendum is to authorize the use of the following information in preparing proposals for the above named project. The bidder **must** enter the number of this Addendum on the **Proposal Sheet**.

GENERAL INFORMATION

- ADD 1-1.** A list of attendees from the pre-bid walkthrough on November 24th, 2015 is included for reference at the end of this document.
- ADD 1-2.** It is assumed by Heartland Testing and Consulting that the insulation in between the brick and steel in the base of the boiler is asbestos containing. Boiler removal is needed to gain access to this material. Abatement to be completed by others; coordinate with Owner.

MODIFICATIONS TO THE DRAWINGS

ADD 1-3. Ramp/Stair Conversion

Referencing attached Architectural Sketches ADD1-3 a & b, and Structural Plan, stairs at existing ramps have been modified to accommodate critical, field verified clearances.

ADD 1-4. Ticket Window Wall

Referencing attached Architectural Sketch ADD 1-4, Ticket Window Wall is to be furred out to provide flush finish with adjacent furred-out wall construction. Provide new countertop and roller shade at existing window.

ADD 1-5. Door Schedule

Referencing attached door schedule, please make the following changes:

- Door 108 to receive Hardware Set 14 (TA2714 4-1/2"x4-1/2" Hinges, 10U15LP passage set, 281 closer)
- Door 110B is a pair of 4'-0" panels.
- Door 112 to receive Hardware Set 15 (Similar to Set 3.0, but for single door)

- Doors 111A, 111B, 111C, 111D, 201B, 201C, to maintain existing rated frames.

ADD 1-6. Electrical

Referencing attached Sheet E301 please note the following modifications:

- One-line diagram shows removal of Blower and a panel being connected to the existing 100A fused switch.

MODIFICATIONS TO THE SPECIFICATIONS

ADD 1-7. Refer to Advertisement for Bids. Note, the bid date has been changed to Thursday, December 10th, 2015. Time and location to remain the same.

ADD 1-8. Refer to Section 013100, Paragraph 1.8.A.1, regarding Submittal Exchange. Modify to read as follows:

The cost of this service will be paid for by the **General Contractor**

ADD 1-9. The following Specification Sections have been added to the Project Manual:

- **263213 – Engine Generators**
- **263600 – Transfer Switches**

ARCHITECTURAL PRIOR APPROVALS / SUBSTITUTIONS

ADD 1-10. The manufacturers listed herein will be considered approved for bidding. However, the proposed substitution must meet the intent of the specifications and will be subject to shop submittal approval during construction. Burden of Proof is on Proposer. Bidders shall bear all responsibility for coordinating and performing related changes in the Work necessitated by such substitution and include such costs in the Bid:

<u>Specification Section</u>	<u>Manufacturer / Proposed Product</u>
a. 075323 – EPDM Roofing	90 mil, non -fabric-backed product
b. 079200 – Joint Sealants	Silka
c. 085113 – Aluminum Windows	Manko 800 Series Provide comparable panning system as noted on drawings
d. 095113 – Acoustical Panel Ceilings	Gordon Incorporated
e. 095113 – Acoustical Panel Ceilings	CertainTeed / Performa

Hastings City Auditorium – Interior Renovation

- | | |
|---------------------------------------|--------------------------------|
| f. 097200 – Wall Coverings | QTS – Quiet Technology Systems |
| g. 099500 – Broadcast Flooring System | Florock Polymer Flooring |

ATTACHMENTS

- List of Attendees at the Pre-Bid Meeting (2 pages).
- ADD 1-3 Stair Modifications, plans, sections (3 pages)
- ADD 1-4 Ticket Window Modifications (1 page)
- ADD 1-5 Door Schedule (1 page)
- E301 Re-issued Electrical One-Line Diagram/Panel Schedules (1 – D size Sheet)
- Specifications Sections 263213- Engine Generators & 263600- Transfer Switches(21 pages, including updated T.O.C.)

End of Addendum #1

Pre-Bid Construction Sign-In

Project No.

AUD 2015 - 15011-C

Hastings, Nebraska

November 23, 2015

1:00 p.m.

NAME	AFFILIATION	PHONE NO.	EMAIL ADDRESS
1. David Wacker	City Eng	402 461 2330	dwacker@cityofhastings.org
2. John L. Burgoon	Ideal Fl.	402.463.4776	le67232@windstream.net
3. Dan Smith	K-T Heating & Air Conditioning	482-463-1794	dan@ktheatingandwindstream.net
4. Steve Beau	Central Contracting	308 234-2421	sbeau@centralcontracting.net
5. Dave HAMBURGER	CARINAEAL CONST	402-463-1353	doh@carinaealconstruction.com
6. Greg Sup	Kidwell	844-733-5114	gsup@kidwell-us.com
7. DAVID AUTSKY	MEININGER FIRE PROT.	402.446.2616	DAVID@MFP-INC.COM
8. RICH SCHEMIES	BAMFORDS INC	308.237.2157	RICH@SCHEMIES@BAMFORDSINC.COM
9. Jeff Henderson	Park & Rec	(402) 461-2325	Jhenderson@cityofhastings.org
10. Harold Smeber	Smeber Milk	(402) 476-7331	msmeber@smebermilk.com
11. Lewis Seberg	City of	469 9689	LSeberg@Cityofhastings.org
12. Jahn Hedges	Olson Associates	(402) 458-8650	jhedges@olsonassociates.com
13. Zach Adams	ATE Elec	(402) 984-3400	Zadams-012345@hotmail.com
14. Regg Ruff	Ruffs Heating & AC	402-463-4853	rruff@ruffsh Heating.com

Pre-Bid Construction Sign-In

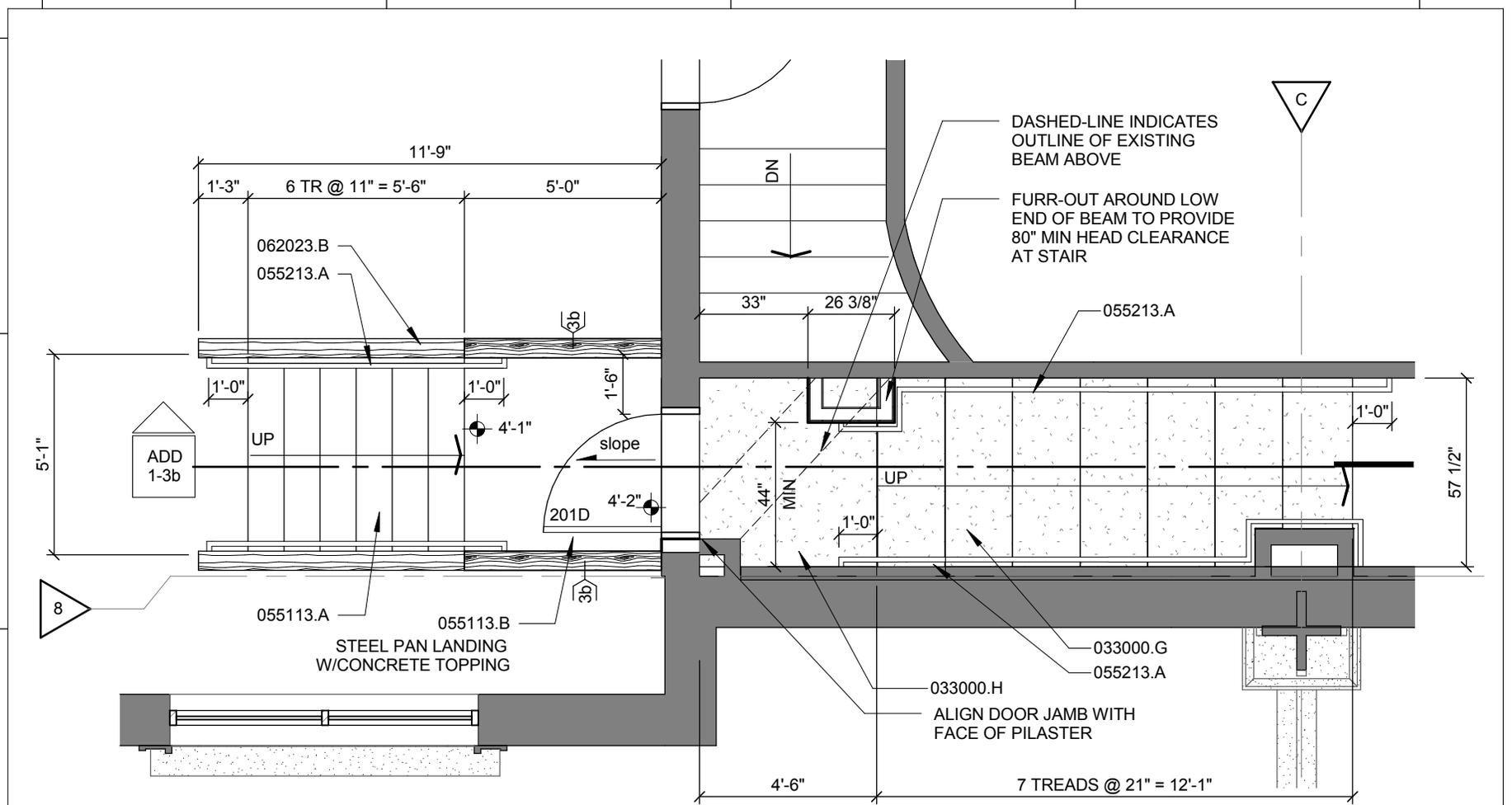
Project No.

AUD 2015 - 15011-C

Hastings, Nebraska

November 23, 2015
1:00 p.m.

NAME	AFFILIATION	PHONE NO.	EMAIL ADDRESS
15. Jacob Swoboda	Commonwealth Electric	308-234-6950 308-233-2368	jacob.swoboda@commonwealthelectric.com
16. Mike Mailander	Famil's Construction	402-462-8732	mailander_fmisco@windstream.net
17. Mark Evans	City of Hastings	402-461-2301	mevans@cityofhastings.org
18. Merle Gifford	Hampton Constr.	308-224-5517	mgifford@hampton1.com
19. GREG STENNETT	HAMPTON	402-890-5643	gstennett@hampton1.com
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			



Ramp / Stair Plan

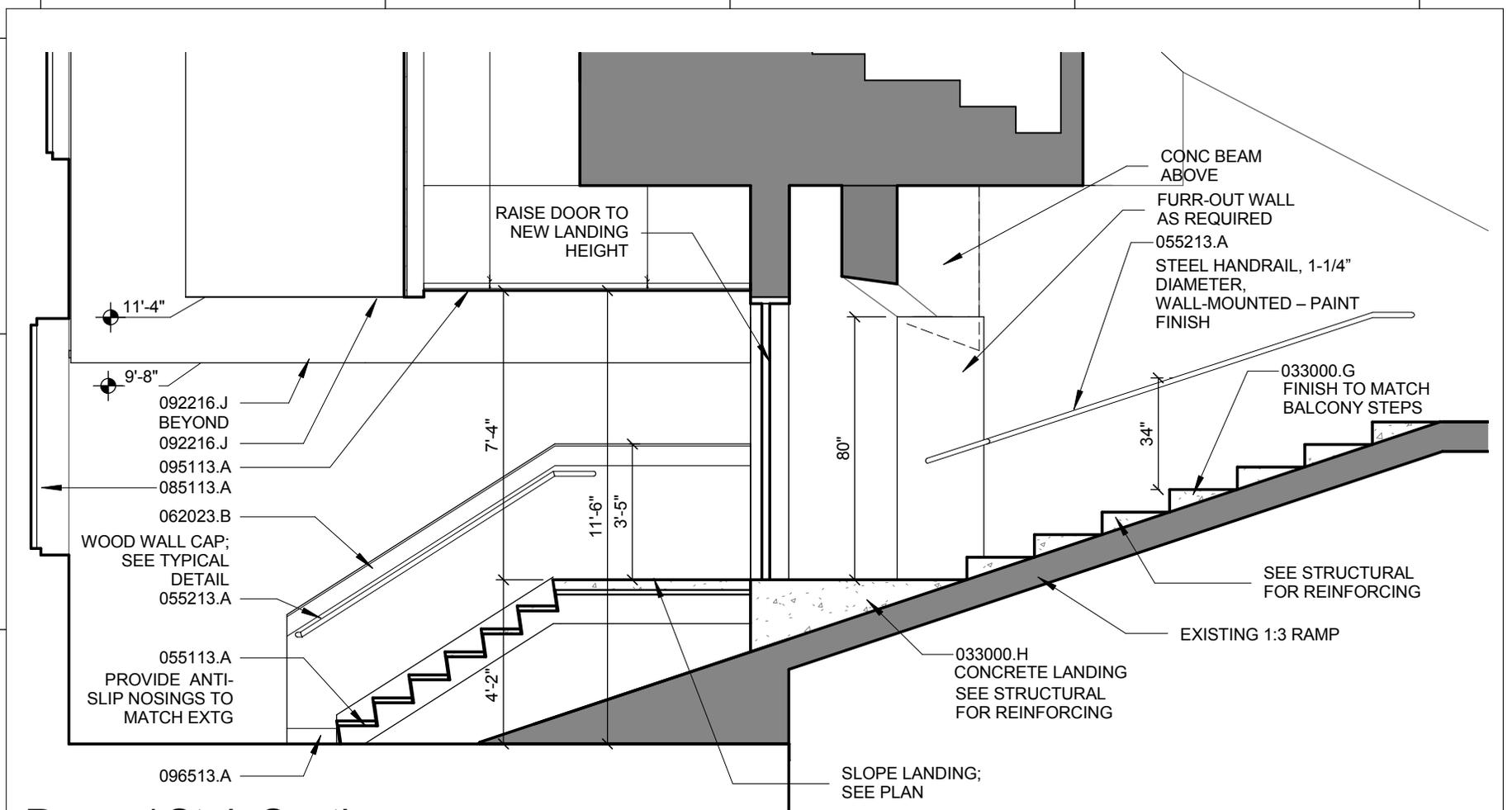
SCALE: 1/4" = 1'-0"

NOTE: NORTH STAIR/RAMP IS SIMILAR

Attachment to: Addendum #1
 Date: 11/25/15
 Project Name: Hastings City Auditorium Interior Renovation
 Project Number: 15011

ADD 1-3a

SINCLAIR **hille**
architects



Ramp / Stair Section

SCALE: 1/4" = 1'-0"

Attachment to: Addendum #1

Date: 11/25/15

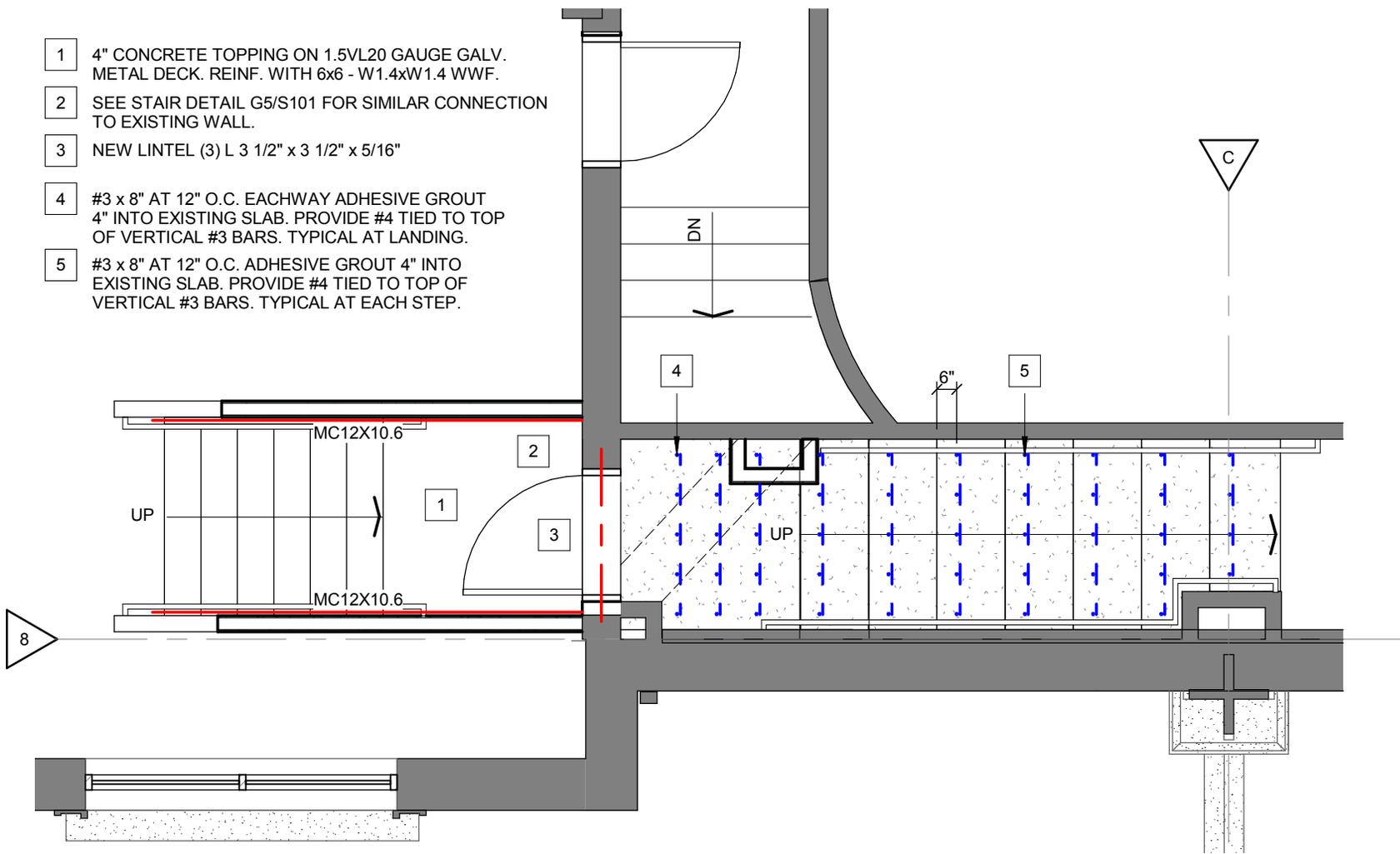
Project Name: Hastings City Auditorium Interior Renovation

Project Number: 15011

ADD 1-3b

SINCLAIR **hille**
architects

- 1 4" CONCRETE TOPPING ON 1.5VL20 GAUGE GALV. METAL DECK. REINF. WITH 6x6 - W1.4xW1.4 WWF.
- 2 SEE STAIR DETAIL G5/S101 FOR SIMILAR CONNECTION TO EXISTING WALL.
- 3 NEW LINTEL (3) L 3 1/2" x 3 1/2" x 5/16"
- 4 #3 x 8" AT 12" O.C. EACHWAY ADHESIVE GROUT 4" INTO EXISTING SLAB. PROVIDE #4 TIED TO TOP OF VERTICAL #3 BARS. TYPICAL AT LANDING.
- 5 #3 x 8" AT 12" O.C. ADHESIVE GROUT 4" INTO EXISTING SLAB. PROVIDE #4 TIED TO TOP OF VERTICAL #3 BARS. TYPICAL AT EACH STEP.

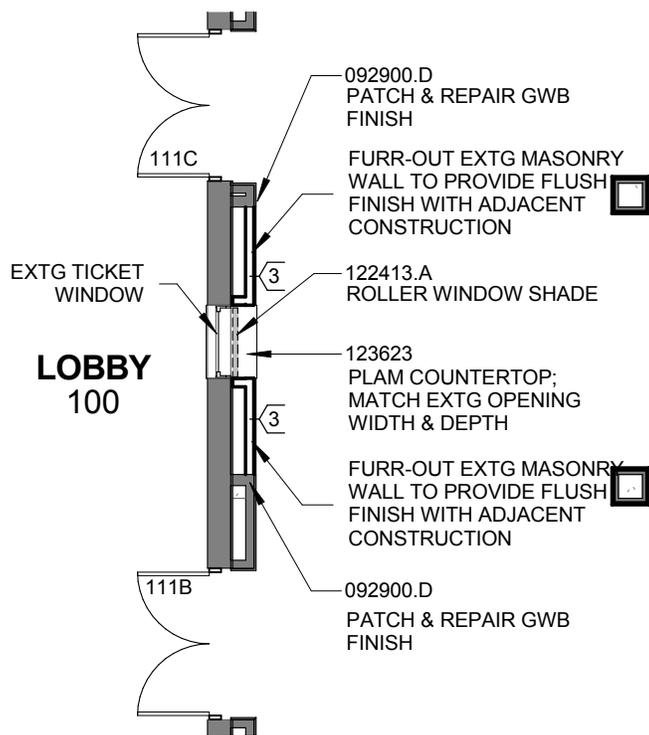


Structural Plan at South Existing Ramp - North Ramp Similar	
Scale: 1/4" = 1'-0"	
Date	11/25/15
Project Name	Addendum #1 Hastings City Auditorium Interior Renovation

VOSS & ASSOCIATES Inc.
STRUCTURAL ENGINEERS

SHEET

1 of 1



Plan Detail @ Ticket Window

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

Attachment to:	Addendum #1	C1/A101	ADD 1-4
Date:	11/25/15		
Project Name:	Hastings City Auditorium Interior Renovation	SINCLAIR	hille architects
Project Number:	15011		

DOOR SCHEDULE Addendum 1

Door No.	Door Size	F.R.	DOOR			FRAME			Hdwr. Set	NOTES	Door No.
			Elev.	Mat'l	Fin.	Type	Mat'l	Fin.			
001	3'-0" x 7'-0" EXTG		-	-	-	-	-	8	1	001	
002	3'-0" x 7'-0" EXTG		-	-	-	-	-	8	1	002	
101	3'-0" x 7'-0"	60 MIN	F	WD	STN	HM-1	HM	PNT	9	101	
102	3'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	102	
103	3'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	103	
104	3'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	104	
105	PAIR 3'-0" x 7'-0" EXTG		-	-	-	-	-	5	1	105	
106	PAIR 3'-0" x 7'-0"	45 MIN	F	WD	STN	HM-1	HM	PNT	3	106	
108	3'-0" x 7'-0"		F	WD	STN	HM 1	HM	PNT	14	108	
109	PAIR 3'-0" x 7'-0" EXTG		-	-	-	-	-	5	1	109	
110	3'-0" x 7'-0"		-	-	-	-	-	(none)	2	110	
110B	PAIR 4'-0" x 7'-0" EXTG		-	-	-	-	-	5	1	110B	
111A	PAIR 3'-0" x 7'-0"	60 MIN	V	WD	STN	-	HM	PNT	4	111A	
111B	PAIR 3'-0" x 7'-0"	60 MIN	V	WD	STN	-	HM	PNT	4	111B	
111C	PAIR 3'-0" x 7'-0"	60 MIN	V	WD	STN	-	HM	PNT	4	111C	
111D	PAIR 3'-0" x 7'-0"	60 MIN	V	WD	STN	-	HM	PNT	4	111D	
111E	PAIR 3'-0" x 7'-0" EXTG		-	-	-	-	-	2	1	111E	
111F	PAIR 3'-0" x 7'-0" EXTG		-	-	-	-	-	5	1	111F	
111G	PAIR 3'-0" x 7'-0" EXTG		-	-	-	-	-	2	1	111G	
112	3'-0" x 7'-0"	45 MIN	F	WD	STN	HM 1	HM	PNT	15	112	
114	PAIR 2'-6" x 7'-0" EXTG		-	-	-	-	-	5	1	114	
115	3'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	115	
116	2'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	116	
117	3'-0" x 7'-0"	60 MIN	F	WD	STN	HM-1	HM	PNT	9	117	
118	3'-0" x 7'-0" EXTG		-	-	-	-	-	1	1	118	
121	3'-0" x 7'-0" EXTG		-	-	-	-	-	11	1	121	
122	3'-0" x 7'-0" EXTG		-	-	-	-	-	10	1	122	
123	3'-0" x 7'-0" EXTG		-	-	-	-	-	12	1	123	
125	2'-0" x 7'-0" EXTG		-	-	-	-	-	12	1	125	
201A	3'-0" x 7'-0"	60 MIN	F	WD	STN	HM-1	HM	PNT	6	201A	
201B	PAIR 3'-0" x 7'-0"	60 MIN	V	WD	STN	-	HM	PNT	7	201B	
201C	3'-0" x 7'-0"	60 MIN	F	WD	STN	-	HM	PNT	1	201C	
201D	3'-0" x 7'-0"	60 MIN	F	WD	STN	HM-1	HM	PNT	6	201D	
304	3'-0" x 7'-0" EXTG		-	-	-	-	-	13	1	304	
305	3'-0" x 7'-0" EXTG		-	-	-	-	-	13	1	305	
306	3'-0" x 7'-0" EXTG		-	-	-	-	-	12	1	306	
307	3'-0" x 7'-0" EXTG		-	-	-	-	-	12	1	307	
400	3'-0" x 7'-0" EXTG		-	-	-	-	-	8	1	400	
401	3'-0" x 7'-0" EXTG		-	-	-	-	-	(none)		401	

DOOR SCHEDULE NOTES

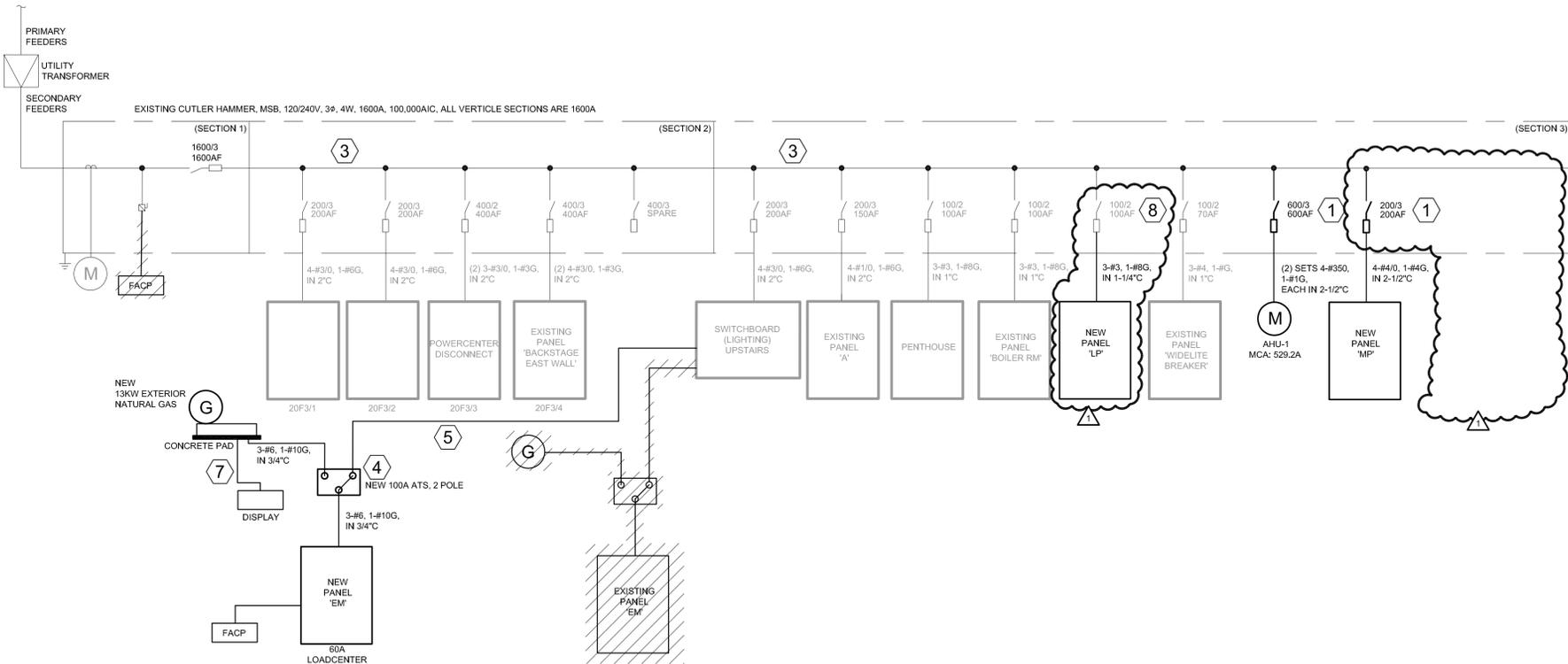
- 1 EXISTING DOOR TO REMAIN; TOUCH-UP PAINT AND STAIN FINISH AS REQUIRED TO ACHIEVE A CONSISTANT LEVEL OF FINISH
- 2 DOORHARDWARE PROVIDED BY MOVABLE WALL MANUFACTURER
- 3 NEW DOOR PANEL IN EXISTING HM FRAME

DOOR SCHEDULE

SCALE:

Attachment to: Addendum #1
 Date: 11/25/15
 J1/A501 ADD 1-5

Project Name: Hastings City Auditorium Interior Renovation
 Project Number: 15011
 SINCLAIR hille architects



PANEL NO.	EM	TYPE	LIGHTING & APPLIANCE
SERVICE VOLTAGE	120/240-10	PHASE BUS RATING	60A
MAIN BREAKER SIZE	50A	NEUTRAL BUS RATING	60A
		SHORT CIRCUIT RATING	10kAIC

DESCRIPTION	C/B		CT.	C/B		DESCRIPTION
	AMP	AMPS		AMP	AMPS	
AUDITORIUM EM LIGHTING	20/1	1077	1	2	840	FIRE ALARM CONTROL PANEL
LOBBY EM LIGHTING	20/1		3	4	0	SPARE
GENERAL AND EXTERIOR EM LIGHTING	20/1	131	5	6	0	SPARE
SPARE	20/1		7	8	0	SPARE
SPARE	20/1	0	9	10	0	SPARE
SPARE	20/1	0	11	12	0	SPARE
SPARE	---	0	13	14	0	SPARE
SPARE	---	0	15	16	0	SPARE
SPARE	---	0	17	18	0	SPARE
SPARE	---	0	19	20	0	SPARE
SPARE	---	0	21	22	0	SPARE
SPARE	---	0	23	24	0	SPARE
SPARE	---	0	25	26	0	SPARE
SPARE	---	0	27	28	0	SPARE
SPARE	---	0	29	30	0	SPARE

TOTAL PHASE A:	21.3 AMPS	2.6 KVA	TOTAL CONNECTED LOADS:	2.4 KVA
TOTAL PHASE B:	3.2 AMPS	0.4 KVA	TOTAL CONNECTED LOADS PLUS SPARES:	2.9 KVA
			ESTIMATED DEMAND LOADS:	3.0 KVA

PANEL NO.	MP	TYPE	NEW
SERVICE VOLTAGE	120/240 3ø	PHASE BUS RATING	225A
MAIN BREAKER SIZE	MLD	NEUTRAL BUS RATING	225A
		SHORT CIRCUIT RATING	45kAIC

DESCRIPTION	C/B			CT.	CT.	VOLT AMPS			C/B	DESCRIPTION
	AMP	A	B			A	B	C		
M - UH-1	15/2	1000		1	2	7751		70/3	M - HP-1	
---	---		1000	3	4		7751	---	---	
M - UH-2	15/2			5	6		7751	70/3	M - HP-2	
---	---	1000		7	8	7751		---	---	
M - BC-1	20/2		960	9	10		7751	---	---	
---	---		960	11	12		7751	---	---	
M - BC-2	20/2	960		13	14	1920		20/2	M - HP-3	
---	---		960	15	16		1920	---	---	
M - AC-1	15/2		42	17	18		1200	20/1	D - EXTERIOR SIGNAGE	
---	---	42		19	20	0		20/1	SPARE	
WILD LEG	---		0	21	22		0	---	WILD LEG	
R - HVAC RECEPT	20/1		900	23	24		0	20/1	SPARE	
SPARE	20/1	0		25	26	0		20/1	SPARE	
WILD LEG	---		0	27	28		0	---	WILD LEG	
SPARE	20/1	0		29	30		0	20/1	SPARE	
SPARE	20/1	0		31	32	0		20/1	SPARE	
WILD LEG	---		0	33	34		0	---	WILD LEG	
SPARE	20/1	0		35	36		0	20/1	SPARE	
SPARE	20/1	0		37	38		0	20/1	SPARE	
WILD LEG	---		0	39	40		0	---	WILD LEG	
SPARE	20/1		0	41	42		0	20/1	SPARE	

TOTAL PHASE A:	147.4 AMPS	20.4 KVA	TOTAL CONNECTED LOADS:	60.4 KVA
TOTAL PHASE B:	146.8 AMPS	20.3 KVA	TOTAL CONNECTED LOADS PLUS SPARES:	12.4 KVA
TOTAL PHASE C:	141.5 AMPS	19.6 KVA	ESTIMATED DEMAND LOADS:	66.2 KVA

L - LIGHTING
R - RECEPTACLE
M - MOTOR
O - OTHER

PANEL NO.	A	TYPE	EXISTING PANEL
SERVICE VOLTAGE	120/240-10	PHASE BUS RATING	60A
MAIN BREAKER SIZE	MLD	NEUTRAL BUS RATING	60A
		SHORT CIRCUIT RATING	10kAIC

DESCRIPTION	C/B		CT.	CT.	VOLT AMPS		C/B	DESCRIPTION
	AMP	AMPS			AMP	AMPS		
UNDER BALCONY (SOUTH)	20/1	0	1	2	0	0	20/1	UNDER BALCONY (NORTH)
UNDER BALCONY (SOUTH)	20/1	0	3	4	0	0	20/1	UNDER BALCONY (NORTH)
EXHAUST FAN (MEN)	20/1	0	5	6	0	0	---	SPACE
EXHAUST FAN (WOMEN)	20/1	0	7	8	0	0	---	SPACE
WATERCOOLERS (2)	20/1	960	9	10	0	0	20/1	PANEL LIGHT-HEAT (MENS)
HEAT (WOMEN)	20/1	0	11	12	0	0	20/1	STORAGE ROOM (CENTER)
L - LOBBY	20/1	1321	13	14	0	0	20/1	LOBBY (HEAT)
SPARE	---	0	15	16	0	0	20/1	HAND DRYER SOUTH (MENS)
SPARE	---	0	17	18	0	0	20/1	HAND DRYER NORTH (MENS)
MARQUEE TIME CLOCK	20/1	0	19	20	0	0	20/1	HAND DRYER NORTH (WOMENS)
SPARE	---	0	21	22	0	0	20/1	HAND DRYER SOUTH (WOMENS)
KITCHEN ICE MACHINE	20/1	0	23	24	0	0	60/2	SUB PANEL
HOT WATER HEATER (KITCHEN)	30/2	0	25	26	0	0	---	---
---	---	0	27	28	0	0	---	SPACE
EMERGENCY LIGHTS	15/1	0	29	30	0	0	15/1	RELAYS

TOTAL PHASE A:	21.8 AMPS	2.6 KVA	TOTAL CONNECTED LOADS:	2.3 KVA
TOTAL PHASE B:	0.0 AMPS	0.0 KVA	TOTAL CONNECTED LOADS PLUS SPARES:	2.6 KVA
			ESTIMATED DEMAND LOADS:	2.7 KVA

PANEL NO.	LP	TYPE	LIGHTING & APPLIANCE
SERVICE VOLTAGE	120/240-10	PHASE BUS RATING	100A
MAIN BREAKER SIZE	MLD	NEUTRAL BUS RATING	100A
		SHORT CIRCUIT RATING	45kAIC

DESCRIPTION	C/B			CT.	CT.	VOLT AMPS			C/B	DESCRIPTION
	AMP	A	B			A	B	C		
L - STORAGE ROOM 108, ALCOVE	20/1	346		1	2	0	0	20/1	SPARE	
R - REFRIG.	20/1		800	3	4		0	20/1	SPARE	
L - FIRST FLOOR COLUMN	20/1	800		5	6	1384		20/1	L - AUDITORIUM ACCENT	
L - FIRST FLOOR AUDITORIUM	20/1		1277	7	8		1408	20/1	L - AUDITORIUM PERIMETER	
R - BAR/STORAGE	20/1	540		9	10		0	20/1	SPARE	
L - KITCHEN	20/1		288	11	12		1080	20/1	L - AUDITORIUM CENTRAL	
L - STORAGE 106	20/1	216		13	14	1512		20/1	L - AUDITORIUM CENTRAL	
L - EXTERIOR EGRESS	20/1		50	15	16		0	20/1	SPARE	
L-S. MEETING ROOM/STORAGE	20/1	399		17	18		0	20/1	SPARE	
SPARE	20/1	0		19	20		0	20/1	SPARE	
R - SERVICE RECEPTACLE	20/1	180		21	22		0	20/1	SPARE	
SPARE	20/1	0		23	24		0	20/1	SPARE	
SPARE	20/1	0		25	26		0	20/1	SPARE	
SPARE	20/1	0		27	28		0	20/1	SPARE	
SPARE	20/1	0		29	30		0	20/1	SPARE	
SPARE	---	0		31	32		0	---	SPACE	
SPARE	---	0		33	34		0	---	SPACE	
SPARE	---	0		35	36		0	---	SPACE	
SPARE	---	0		37	38		0	---	SPACE	
SPARE	---	0		39	40		0	---	SPACE	
SPARE	---	0		41	42		0	---	SPACE	

TOTAL PHASE A:	53.7 AMPS	6.4 KVA	TOTAL CONNECTED LOADS:	10.3 KVA
TOTAL PHASE B:	49.4 AMPS	5.9 KVA	TOTAL CONNECTED LOADS PLUS SPARES:	12.4 KVA
			ESTIMATED DEMAND LOADS:	12.4 KVA

L - LIGHTING
R - RECEPTACLE
M - MOTOR
O - OTHER

- SHEET NOTES:**
- PROVIDE NEW FUSIBLE SWITCH IN AVAILABLE SPACE.
 - PROVIDE NEW GFCI CIRCUIT BREAKER IN EXISTING LOAD CENTER.
 - LABEL EXISTING SWITCHES WITH WHAT LOAD IS SERVED.
 - REPLACE EXISTING ATS WITH NEW ATS IN EXISTING LOCATION. PROVIDE 100A, 2 POLE 120/240V ATS. CUMMINS ONAN RST 1004954.
 - REUSE EXISTING CONDUIT AND WIRE.
 - PROVIDE NEW 13KW EXTERIOR NATURAL GAS GENERATOR IN WEATHER RATED ENCLOSED, CUMMINS RS13A-13GSBA-6711B-A443X821, WITH 60/2 CIRCUIT BREAKER.
 - PROVIDE 1-1/2" CONDUIT FROM GENERATOR TO GENERATOR DISPLAY. PROVIDE GENERATOR/DISPLAY CONTROL UMBILICAL CORD IN CONDUIT.
 - CONNECT THE NEW PANEL TO THE SWITCH PREVIOUSLY SERVING THE BLOWER MOTOR. VERIFY THERE ARE EXISTING 100A FUSES IN PLACE. REPLACE WITH 100A FUSES IF 100A FUSES DON'T ALREADY EXIST.



PROJECT CONSULTANTS
STRUCTURAL ENGINEER
201 North 75 Street, Suite 200
Lincoln, NE 68508
402-733-0000
402-733-0001
MECHANICAL/ELECTRICAL ENGINEERS
603 P Street, Suite 200
Lincoln, NE 68508
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City of Hastings
Hastings City Auditorium Interior Renovation

SINCLAIR hille architects
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Lincoln, NE 68508
T: 402-476-7331 F: 402-476-6341

Electrical One-line Diagram and Panel Schedules

SHA PROJECT NO. 15011

E301

Division	Section Title	Pages
SPECIFICATIONS GROUP		
<i>Facility Services Subgroup</i>		
DIVISION 26 - ELECTRICAL		
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES	4
260526	GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS	4
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	4
260533	RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS	8
260144	SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLES	4
260553	IDENTIFICATION FOR ELECTRICAL SYSTEMS	8
262413	SWITCHBOARDS	4
262416	PANELBOARDS	8
262726	WIRING DEVICES	6
262813	FUSES	4
262816	ENCLOSED SWITCHES	6
262913	ENCLOSED CONTROLLERS	8
263213	ENGINE GENERATORS	14
263600	TRANSFER SWITCHES	6
271100	COMMUNICATIONS EQUIPMENT ROOM FITTINGS	4
271500	COMMUNICATIONS HORIZONTAL CABLING	8
283111	DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEMS	14

END OF TABLE OF CONTENTS

SECTION 263213 – ENGINE GENERATORS

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 packaged natural gas-engine generator sets with the following features and accessories:
 - 1. Battery charger.
 - 2. Engine-generator set.
 - 3. Muffler.
 - 4. Outdoor enclosure.
 - 5. Remote display.
 - 6. Remote stop switch.
 - 7. Starting battery.
- 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.
- B. Steady-State Voltage Modulation: The uniform cyclical variation of voltage within the operational bandwidth, expressed in Hertz or cycles per second.

1.4 SUBMITTALS

- A. 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.
 - 3. Data on features, components, accessories ratings, and performance.
 - 4. Thermal damage curve for generator.
 - 5. Time-current characteristic curves for generator protective device.
 - 6. Certified summary of prototype-unit test report.
 - 7. Remote display.

8. Battery charger.
 9. Battery compartment.
 10. Battery compartment heater.
- B. Qualification Data: For Installer.
- C. Certified summary of prototype-unit test report.
- D. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
- E. Certified Summary of Performance Tests: Demonstrate compliance with specified requirement to meet performance criteria for sensitive loads.
- F. Test Reports:
1. Report of factory test on units to be shipped for this Project, showing evidence of compliance with specified requirements.
 2. Report of sound generation.
 3. Report of exhaust emissions showing compliance with applicable regulations.
 4. Field quality-control test reports.
- G. Certification of Torsional Vibration Compatibility: Comply with NFPA 110.
- H. Operation and Maintenance Data: For packaged engine generators 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. List of tools and replacement items recommended to be stored at the Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.
- I. 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 (160 km) 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 supplier.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of packaged generator sets and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- E. 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.

- F. Comply with NFPA 37.
- G. Comply with NFPA 70.
- H. Generator shall be UL 2200 listed.
- I. Comply with NFPA 110 requirements for Level 2 emergency power supply system.
- J. Engine Exhaust Emissions: Comply with applicable state and local government requirements.
- K. 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 COORDINATION

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

1.7 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: Five years from date of Substantial Completion. Warranty includes parts, labor, travel, meals, and lodging. Warranty shall not have any deductibles or reduction of coverage.

1.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include semiannual exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Maintenance agreements shall include parts and supplies as used in manufacture and installation of original equipment. Provide lube oil and complete filter replacement 6 months after Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design is Cummin RS13a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Caterpillar; Engine Div.
 2. Generac Power Systems, Inc.
 3. Kohler Co; Generator Division.
 4. Onan Corp./Cummins Power Generation; Industrial Business Group.

2.2 ENGINE-GENERATOR SET

- A. Packaged engine-generator set shall be a coordinated assembly of compatible components.
- B. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
- C. Output Connections: Single phase, three wire.
- D. Safety Standard: Comply with ASME B15.1.
- E. Nameplates: Each major system component shall be equipped with a nameplate to identify manufacturer's name and address, and model and serial number of component.
- F. Mounting Frame: Adequate strength and rigidity to maintain alignment of mounted components without depending on concrete foundation. Mounting frame shall be free from sharp edges and corners and shall have lifting attachments arranged for lifting with slings without damaging components.
1. Rigging Diagram: Inscribed on metal or vinyl plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

2.3 GENERATOR-SET PERFORMANCE

- A. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
1. Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
- B. Steady-State Voltage Operational Bandwidth: 2 percent of rated output voltage from no load to full load.
- C. Steady-State Voltage Modulation Frequency: Less than 1 Hz.
- D. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 1.2 seconds.

- E. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
- F. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
- G. Transient Frequency Performance: Less than 3.8 percent variation for a 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within two seconds.
- H. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, the system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
- I. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
- J. Start Time: Comply with NFPA 110, Type 10, system requirements.

2.4 SERVICE 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. Altitude: Sea level to 1500 feet (450 m).
- B. Unusual Service Conditions: Engine-generator equipment and installation are required to operate under the following conditions:

2.5 ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: 3600 rpm for spark ignited 45 kW through 60 kW.
- C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm (11.4 m/s).
- 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. Dual Natural Gas (Vapor-Withdrawal) System:

- a. Carburetor.
 - b. Secondary Gas Regulators.
 - c. Fuel-Shutoff Solenoid Valves.
 - d. Flexible Fuel Connectors.
- F. Coolant Jacket Heater: Electric-circulating type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity. Rated for 208 volt single phase.
- G. Governor: Adjustable isochronous, with speed sensing.

2.6 ENGINE COOLING SYSTEM

- A. Description: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
- B. Radiator: Rated for specified coolant.
- 1. Fan: Driven by multiple belts from engine shaft.
- C. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
- D. Expansion Tank: Rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with low water level sensor.
- E. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- F. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
- 1. Rating: 20-psig (345-kPa) maximum working pressure with coolant at 180 deg F (82 deg C), and noncollapsible under vacuum.

2.7 FUEL SUPPLY SYSTEM

- A. Comply with NFPA 30.

2.8 ENGINE EXHAUST SYSTEM

- A. Muffler: Critical type, sized as recommended by engine manufacturer; sound level measured at a distance of 10 feet (3 m) from exhaust discharge shall be 86 dBA or less.
- B. Condensate Drain for Muffler: Schedule 40, black steel pipe connected to muffler drain outlet through a petcock.
- C. Connection from Engine to Exhaust System: Flexible section of corrugated stainless-steel pipe.
- D. Exhaust Rain Cap: Stainless steel, installed.

2.9 COMBUSTION-AIR INTAKE

- A. Description: Standard-duty, single element engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

2.10 STARTING SYSTEM

- A. Description: 12-V electric, with negative ground and including the following items:
1. Components: Sized so they will not be damaged during a full engine-cranking cycle.
 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: Lead acid. Adequate capacity within ambient temperature range specified in "Environmental Conditions" Paragraph in "Service Conditions" Article to provide specified cranking cycle at least twice without recharging.
 5. Battery Cable: Size as recommended by engine manufacturer for cable length required. Include required interconnecting conductors and connection accessories.
 6. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
 7. 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.

2.11 CONTROL AND MONITORING

- A. Functional Description: 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 the generator set. When mode-selector switch is switched to the on position, the generator set starts. The off position of the same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down the generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down the 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 shall include those required by NFPA 110 for a Level 2 system, and the following:
1. AC voltmeter. Voltage line to line, and line to neutral.
 2. AC ammeter. Current by phase.
 3. AC frequency meter.
 4. DC voltmeter (alternator battery charging).
 5. Engine-coolant temperature.
 6. Engine lubricating-oil pressure.
 7. Engine lubricating-oil temperature.
 8. Engine RPM.
 9. Running-time meter.
 10. Generator-voltage adjusting.
 11. Generator overload.
- D. Protective controls that will shut-down the generator, and display on the controller, shall include the following:
1. Customer programmed digital auxiliary input. A minimum of four customer auxiliary inputs shall be provided.
 2. Emergency stop.
 3. High coolant temperature.
 4. High oil temperature.
 5. Locked rotor - fail to rotate.
 6. Low coolant level.
 7. Low oil pressure.
 8. Overcrank.
 9. Overspeed with user adjustable level, range 65-70 Hz on 60 Hz systems.
 10. Generator set overvoltage with user adjustable level, range 105% to 135%.
 11. Generator set undervoltage with user adjustable level, range 70% to 95%.
 12. Overfrequency with user adjustable level, range 102% to 140%.
 13. Underfrequency with user adjustable level, range 80% to 90%.
- E. Warning functions to include:
1. Low oil pressure.
 2. High engine temperature.
 3. Low engine temperature.
 4. Oil pressure sender failure.
 5. Engine temperature sender failure.
 6. Alternator over current.
 7. Engine overload, with three (3) load shed contacts.
 8. Low battery voltage.
 9. High battery voltage.
 10. Weak battery.
 11. Four (4) customer inputs.
 12. Low fuel level or pressure.
- F. 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.
- G. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 2 systems. Include necessary contacts and terminals in control and monitoring panel.

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

2.12 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 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. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4. Mounting: Adjacent to or integrated with control and monitoring panel.
- B. Generator Protector: Microprocessor-based unit that continuously monitors current level in each phase of generator output, integrates generator heating effect over time, and predicts when thermal damage of the alternator will occur. When signaled by the protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from the load circuits. Protector shall perform the following functions:
 - 1. Initiates a generator overload alarm when the generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 - 2. Under single or three-phase fault conditions, regulates the generator to 300 percent of rated full-load current for up to 10 seconds.
 - 3. As the overcurrent heating effect on the generator approaches the thermal damage point of the unit, the protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.

2.13 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1 and specified performance requirements.
- 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. Excitation shall use no slip or collector rings, or brushes, and shall be arranged to sustain generator output under short-circuit conditions as specified.
- G. Enclosure: Dripproof.
- H. Instrument Transformers: Mounted within generator enclosure.
- I. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.

1. Adjustment on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
- J. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- K. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- L. Broad range reconnectible 12-lead generator.
- M. Alternator temperature rise of 125 degrees C over 40 degree C ambient.
- N. PMG (Permanent Magnet Generator) regulator for SCR loads, provides increased motor starting ability. Sustains main field excitation for short circuit current fault discrimination and coordination. Provides increased immunity from non-linear loads, installed.

2.14 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, sound attenuating weather aluminum housing. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be hinged to access interior, with locking provisions. Hinges shall be stainless steel. Instruments and control shall be mounted within enclosure.
 1. Vertical air inlet and outlet hoods with 90 degree angles to redirect air and reduce noise, if hoods are required to meet the sound requirements.
 2. Acoustic insulation that meets UL94 HF1 flame resistance standards, 2 inches thick minimum.
 3. Sound attenuated enclosure with a maximum 86 dB(A) at 23 ft. (7 m.)
- 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 2 hours with ambient temperature at top of range specified in system service conditions.
 1. Louvers: Fixed-engine cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.

2.15 FINISHES

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

2.16 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 in Paragraphs 3.2.1, 3.2.1.1, and 3.2.1.2.
 2. Generator Tests: Comply with IEEE 115.
 3. Components and Accessories: Items furnished with installed unit that are not identical to those on tested prototype shall have been factory tested to demonstrate compatibility and reliability.

- 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. Full load run.
 - 2. Maximum power.
 - 3. Voltage regulation.
 - 4. Transient and steady-state governing.
 - 5. Single-step load pickup.
 - 6. Safety shutdown.
- C. Report factory test results within 10 days of completion of test.

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 CONCRETE BASES

- A. Coordinate size and location of concrete bases with generator manufacturer.

3.3 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generators level on concrete base.
 - 1. Engine-generator mounted on skid base.
- C. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
- D. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in Division 22 Sections. Drawings indicate general arrangement of piping and specialties. The following are specific connection requirements:

1. Connect fuel piping to engines with a gate valve and union.
 - a. Natural-gas piping, valves, and specialties for gas distribution are specified in Division 23 Section "Facility Natural-Gas Piping."
- B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- C. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors and Cables."
- D. 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.

3.5 IDENTIFICATION

- A. Identify system components according to Division 23 Section "Identification for HVAC Piping and Equipment" and Division 26 Section "Identification for Electrical Identification."

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- 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, Sections 7.15.2.1 and 7.22.1 (except for vibration baseline test). Certify compliance with test parameters.
 2. Perform tests recommended by manufacturer.
 3. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, the following:
 - a. Single-step full-load pickup test.
 4. 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.
 5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 6. 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.
 7. Exhaust Emissions Test: Comply with applicable government test criteria.

8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 - 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 the National Institute for Standards and Technology, 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.

3.7 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
- C. Complete installation and startup checks according to manufacturer's written instructions.

3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.
 1. Coordinate this training with that for transfer switches.

END OF SECTION 263213

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SECTION 263600 - TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions 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.
 - 2. Remote display.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Dimensioned plans, sections, and elevations showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
- C. Qualification Data: For manufacturer.
- 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 01 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. Source Limitations: Obtain automatic transfer switches, bypass/isolation switches, nonautomatic transfer switches, remote annunciators, and remote annunciator and control panels through one source from a single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for emergency service under UL 1008, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA ICS 1.

- E. Comply with NFPA 70.
- F. Comply with NFPA 110.
- G. 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. Caterpillar; Engine Div.
 - b. Emerson; ASCO Power Technologies, LP.
 - c. Generac Power Systems, Inc.
 - d. Kohler Co.; Generator Division.
 - e. Onan Corp./Cummins Power Generation; Industrial Business Group.
- B. Basis of Design is Cummins/Onan: RST 100A

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. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels have communication capability matched with remote device.
- D. Solid-State Controls: Repetitive accuracy of all settings is plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.
- E. 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.
- F. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
- G. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.
- H. 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.

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.
- I. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
- J. 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.

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. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
- E. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

2.4 AUTOMATIC TRANSFER-SWITCH FEATURES

- A. Undervoltage Sensing for Each Phase of Normal Source: Senses low phase-to-ground voltage on each phase. Pickup voltage is adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
- B. Time delay for override of normal-source voltage sensing delays transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
- C. Voltage/Frequency Lockout Relay: Prevents premature transfer to generator. Pickup voltage is adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency is adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
- D. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes. Provides automatic defeat of delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

- E. Test Switch: Simulates normal-source failure.
- F. Switch-Position Pilot Lights: Indicate source to which load is connected.
- G. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - 1. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - 2. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
- H. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
- I. 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.
- J. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 2 A at 30-V dc 250-V ac minimum.
- K. 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.
- L. 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:

- 1. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
- 2. Push-button programming control with digital display of settings.
- 3. Integral battery operation of time switch when normal control power is not available.

2.5 REMOTE ANNUNCIATOR SYSTEM

- A. Functional Description: Remote annunciator panel annunciates conditions for indicated transfer switches. Annunciation includes the following:
 - 1. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - 2. Switch position.
 - 3. Switch in test mode.
 - 4. Failure of communication link.

2.6 FINISHES

- A. Enclosures: Manufacturer's standard enamel over corrosion-resistant pretreatment and primer.

2.7 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. Wall-Mounted Switch: Anchor to wall by bolting per manufactures specifications.
- B. Annunciator and Control Panel Mounting: Surface mounted, unless otherwise indicated.
- C. Identify components according to Division 26 Section "Identification for Electrical Systems."

3.2 WIRING TO REMOTE COMPONENTS

- A. Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

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."
- C. 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.
- D. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.

2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.22.3. Certify compliance with test parameters.
 3. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. 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.
 - e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
 - f. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
- C. Coordinate tests with tests of generator and run them concurrently.
- D. 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.
- E. Remove and replace malfunctioning units and retest as specified above.
- 3.5 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.
1. Coordinate this training with that for generator equipment.

END OF SECTION 263600