State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lt. Governor

Department of Administrative Services
KIMBERLY K. HOOD
Executive Director

Division of Facilities Construction and Management
P. JOSHUA HAINES
Director

Addendum No. 1

Date: July 1, 2014

To: Contractors

From: John Harrington – Project Manager, DFCM

Reference: Multiple Solar PV Facilities at Camp Williams, Draper HQ, West Jordan, Blanding, and St. George
Utah National Guard
DFCM Project No. 14261480

Subject: **Addendum No. 1**

Pages			
	Addendum Cover Sheet	1	page
	General Items	33	pages
	Total	34	pages

Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.

1.1 SCHEDULE CHANGES: There are no Project Schedule changes.

1.2 GENERAL ITEMS: Please see the attached documents.

Addendum No. 1

Date: July 1, 2014
To: Design/Build Teams
From: John Harrington - Project Manager
Reference: **MULTIPLE SOLAR PHOTOVOLTAIC FACILITIES**

Total Pages: 7 pages
Total No Download Documents including this Addendum: 13 documents

Questions and Answers as a result of Mandatory Site visits on June 24 and 25, 2014

Camp Williams

	Question	**Answer**
1	The new MV conduit and trenching from north to south will have manholes at 600 feet according to the briefing. Can you locate the relevant manholes on a map?	Drawings are included for download ("Camp Williams Infra Project.pdf")
2	Please verify the enclosed Jacobs Canal is under the gravel road?	The enclosed Jacobs Canal is under the gravel road.
3	If we can construct the system with minimal clearing, grubbing and grading, can we include this as part of our erosion and weed control solution? It is possible to minimize soil disturbance and minimize erosion in the out years.	For the purpose of the bidding, please assume that the specification for the ground underneath the array is as follows: Include a weed barrier that is to be pinned, with a minimum of 3" gravel (¾" crushed) covering the entire surface area. For the barrier, we request a 20 year (4.1 oz) woven polypropylene (or equal), needle punched landscape fabric. Clearing, grubbing and grading is the responsibility of the contractor.
4	Can we use gutters in lieu of other erosion control measures?	No. Gutters *may* be included but a weed barrier and gravel covering are still required.
5	Please verify work includes pulling approx. 2000' MV conductors from the PV Arrays to the electrical building and landing on existing switchgear	Work includes pulling approx. 2000' MV conductors from the PV Arrays to the electrical building and landing on existing switchgear.
6	Can the fencing for the South West and the Series 9000 ground mounts be combined?	Yes
7	Location of the manhole where we tie-in? Can a revised aerial site map be provided with the manhole and approx. distance to man hole from the South, West, 9000	Please refer to the included drawings (such as Camp Williams Infra Project.pdf).

	series arrays	
8	Where is the spec for the encasement of the pipe under the canal?	Please assume that electrical conduit will need to go underneath the canal encasement with a minimum distance of three feet or as applicable by Code. The boring under the canal will have to have a casement installed that contains the conduit. The system will need to be engineered, signed and stamped.
9	What size of pipe/conduit and how many are going to be furnished and approx. footages?	Please refer to the attached drawings (such as Camp Williams Infra Project.pdf) and estimates provided in the RFP document and use general Code compliant calculations for wire and conduit sizing.
10	Are the conduits going to be stubbed into the existing gear or into the building only?	The solar should run back at 12470 volt (dedicated new wire) to avoid large voltage drop, over a distance of approximately 2,000 feet, and intertie with the medium voltage breakers and SCADA intertie logic.
11	Are the remaining geo reports going to be conducted by the customer or the contractor	By the contractor
12	What is the set back from the Jacobs Canal center line?	Please use the following for your bid submittal: 1 rod to the west and 2 rods from the east
13	Is Camp Williams separately metered for each of the 4 sites or will they be metered together?	Separate meters are required (4# total).

Draper

1	What are the downwash wind requirements for the Draper carports?	For the purpose of the bid, please assume there is no downwash wind that affects the structural load calculations of the solar canopies.
2	Would a bridging type of canopy be acceptable as opposed to a T type cantilever?	Please assume T-type for the purpose of the bidding process.
3	Please verify that pavement repairs for trenching to the electrical point of connection will require the affected area to be re-oiled or sealed to make it aesthetically pleasing	The pavement repairs for trenching to the electrical point of connection will require the affected area to be re-oiled or sealed to make it aesthetically pleasing.
4	Is there an existing conduit for parking lot lights and is it suitable for pulling the conductors from the inverter to the electric disconnect?	Assume there is no existing conduit for lights or conductors from the inverter.
5	Once selected as contractor can we be timed to come in trench, lay lines in before paving occurs over warehouse parking lot?	Yes, depending on the specific timing of the paving project, it may be possible to make accommodations for trenching and conduit.
6	Once trenching is requested will Conduit be supplied as in the case of Camp Williams, if so what type and size of spec'd pipe would be supplied?	No, there is no budget allowance for conduit in the Draper paving project. Conduit at Draper is the contractor's responsibility.

West Jordan:

1	Can we build in the retention basin at this site? This was indicated in the RFQ but was not clear on the site walk.	Yes, the retention basin is a possible alternate.
2	The hangar has lightening terminals but the armory did not. Do either (or both) buildings require lightening protection on the PV system?	Please assume that no changes need to be made to the existing building lightning arresters (or lack there-of). The Solar system will need to comply with the applicable Code standards with respect to lightning protection.
3	Please verify the hangar roof is considered acceptable for a ballasted system?	The hangar roof is considered acceptable for a ballasted system. A structural opinion letter on this matter is included as an attachment ("Armory Letter of Recommendation.pdf").
4	Due to proximity to the airfield, are there additional helicopter downwash requirements for the hangar, armory or ground systems in the vicinity?	Please assume for the West Jordan PV systems, there are no additional helicopter downwash requirements for the hangar, armory or ground systems in the vicinity.
5	Please verify that a double cantilever carport is acceptable in the hangar parking	Please assume single cantilever for the purpose of bidding on this project.

	lot?	
6	Please verify the 85kW carport can be about 80 - 88 kW?	The 85kW carport can be about 80 - 88 kW.
7	Will UNG allow lawn & sprinkling to be removed for Ground array system, gravel road base added at completion?	Yes.
8	If DFCM roofing manager is sensitive to ballasted systems, can we get an opinion that YES it is needed, or a not required decision.	Ballasted, or hybrid ballasted / linked, low profile racking systems are acceptable.
9	Are roof warranty documents available?	See attached documents for download: hangar roof warranty.pdf west jordan armory roof warranty.pdf
10	What is the spec for ground treatment underneath ground mount?	Please include a weed barrier / blanket and gravel covering for underneath the array. The weed barrier is to be pinned and the gravel is to be ¾" crushed with a minimum of 3" of cover over the entire surface area.
11	Please address any flight path and or reflective surface issues	These were addressed and cleared and deemed not to be of influence on the bid.
12	Should safety walk pathways on the hangar be included?	Please include it as a line item of bid alternate if included in your proposal.
13	Are design plans and time line for the Armory building refurbishment available?	Not at this time
14	Can you identify which antennas will remain on the armory roof? There are several around the middle of the building.	All antennas will remain in place.

St George:

Please note, after careful deliberation, the battery emergency back-up requirement for St George no longer applies. For St George, we are now asking for a single bid comprising a 200 kW Ground Mount facility that is net metered, **without battery backup**.

Please note most of the questions below are no longer relevant.

1	Please verify that even though 1, 2 or 3 solutions will be accepted, one solution must include a 200kW PV system	We are now asking for one single solution, 200 kW PV system with grid connected inverter(s).
2	Please verify the "Storage Room" adjacent to the Electrical Room is the proposed	N/A

	space for locating the batteries	
3	It was mentioned the storage solution should be scalable to allow for more on-site storage or a later gen-set installation. However, it seems this requirement is for the Data Center building, which is not included in the storage solution. This sounds like a micro-grid, not just a glorified UPS. Is it your intent the design should have the capability to interact / connect to a future micro-grid solution?	N/A
4	Can we propose an alternate solution that assumes a single point of connection for the site, with a single site meter on the MV side of the transformers?	Yes, it is acceptable to propose an alternate solution that assumes a single point of connection for the site, with a single site meter on the MV side of the transformers.
5	Can we get the rate schedule for each meter? It is not on the provided utility bills	The utility bills included in the RFP, is all that is available at this time.
6	Does Dixie power allow net metering?	A special exception was made per a Dixie Escalante Board decision, which allow for a single occurrence of a 200 kW net metered PV facility at this particular site.
7	Are there USG security clearance requirements to work on or around or to see the building drawings for the Data Center? For example "Secret" clearance, not just the usual want and warrants checks.	No special clearance is required other than the usual criminal background checks as discussed during the site meeting.
8	Batteries are comparably very expensive therefore some specifications would help. Can you please provide battery specifications?	N/A
9	What is the spec for ground treatment underneath ground mount	Please include a weed barrier / blanket and gravel covering for underneath the array. The weed barrier is to be pinned and the gravel is to be ¾" crushed with a minimum of 3" of cover over the entire surface area.

General Questions

1	The minimum warranty is 5 years. Will a longer warranty, say 10 years, be regarded more favorably?	Yes. A 10 year workmanship warranty could be included as an alternate or an added line item.
2	If there are options the contractors see as cost savings to the UTNG, can they bid it that way?	Yes. In general, if not adhering to the spec as provided in the RFP document and appendices, please clearly mark additions or changes as either a bid alternate or a separate line item.
3	SCADA – can you provide the	For security reasons we are unable to post the

	specifications for the SCADA, either what we are to connect to, or the USACE specification that is required?	SCADA spec. Please make an allowance of $7,500 for each of the nine arrays to cover the cost of a meter, signal wiring, PLC modifications (if required) and SCADA programming changes.
4	Is network certification required for the monitoring and meters?	Yes
5	Do the inverters, SCADA and monitoring need to be interactive with other generators on sites in order to provide an off grid capability?	No
6	Page 5 of the RFQ says the modules and inverters need to be American Made. This has a very specific meaning with the USG (see the FTC site at http://business.ftc.gov/documents/bus03-complying-made-usa-standard). Can you specify a standard? Manufacturers know what is legal, so their labeling may be adequate for your needs.	The materials need not be 'ARRA' compliant or strictly adhere to the guidelines referenced on the Federal Trade Commission (FTC) website. There are no official 'country of origin' restrictions adhered to the funding source, however there is a strong preference that the modules and inverters are substantially domestically sourced and under warranty with a domestic company. Vendors are reminded that bid alternatives, or separate line items for alternate components or design proposals, are permitted.
7	Please verify aluminum conductors are not allowed	Aluminum conductors are not allowed.
8	Does the prime require a current Utah license to bid, or will it be acceptable to have a current license prior to award?	The prime requires a current Utah license to bid.
9	Are 6 foot fences acceptable? Do you require slats? Do you require triple strand barb wire or concertina on top?	The fencing needs to comply with the appropriate Electrical and other Code requirements. No other special specification will be imposed on the fencing.
10	Are hose bibs and water required to the arrays for washing?	Hose bibs should be included in the bid for the Blanding, St George and West Jordan locations, where it can be assumed that a water main intercept is less than 200 ft distance from the hose bib. A minimum 1" hose connection should be assumed. At Camp Williams, please assume that water supply will be included in the infra-structure project.
11	Will you contract under NEC 2011 or 2014 since the switch will occur prior to award?	Vendor is required to verify the applicable Code version at the time of permit submittal. There is no certainty that 2014 NEC will be approved by the legislature this year.
12	Does any (or all) PV systems require lightening protection?	All Solar PV systems will need to comply with the applicable Code standards with respect to lightning protection.
13	Do you require galvanized, powder coated or painted carport structures?	Powder coated.
16	Do the carports require 3 foot bollards around the posts?	The following spec for the car canopies is given for guidance:

		a) Posts to be bedded in sonotube/concrete bollards to 24" b) Minimum clearances - 9' leading edge, 13' elevated edge c) Wiring Treatments: no visible wires, all wires to be in conduit d) Metal to be Powder-Coated e) Coating Color Preference dark bronze in concurrence with outside building color trim f) Perimeter/Edge Trim Treatment – not required g) LED under lighting is required h) Snow/ice melt drip control/mitigation – not required i) Anti bird nesting, under sheeting, downspouts and gutters: not required
17	What is the minimum fire lane widths? Is there a setback requirement at Draper to allow for vehicle movement around the building?	Please use the existing parking spaces as guidance. Industry standards are to be applied with respect to vehicle movement, setback and fire lanes.
18	Please provide a single line for each site	See attached documents for download: Camp Williams one-line.pfd Draper One-line.pdf 1991_WJ_Armory_One_Line.pdf 1993-Blanding_One_Line.pdf 1994 Saint George Armory_One_Line.pdf
19	Can you please provide a formal solar module specification?	Please adhere to the specification as provided in the RFP document and its exhibits.
20	Where is the generator power connected into the service entrance for sites that have secondary systems? Are there subpanels? Please include one lines.	Please refer to the attached one-line diagrams, where available and appropriate.
21	Can you please provide utility corridor specifications for each site	The utility corridor document is not deemed suitable for the purpose of this bidding process. Please adhere to general applicable Electrical Code requirements.
22	Is there a prevailing wage standard on this project?	No
23	Are all permitting and submittal docs to go through DFCM?	Yes
24	Is there a page limit on response docs?	There is no prescribed page limit but vendors are advised to be economical with their Responses.
25	Who is responsible for the fencing?	The contractor

EQUIPMENT SCHEDULE

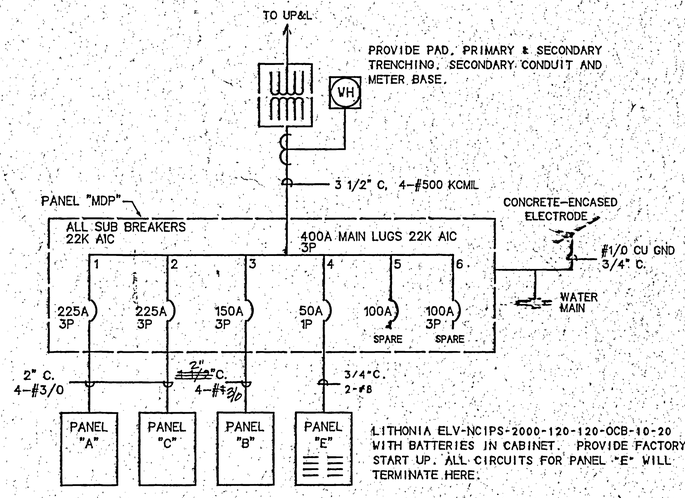
SYMBOL	DESCRIPTION	REQ'D	VOLTS	PHASE	BRKR.	DISC.	FUSE	FEEDER	STARTER	HP OR VA	FLA
EF 1	EXHAUST FAN	1	208	1	20A	2 POLE SWITCH		#12		3/4	7
EF 2	EXHAUST FAN	1	208	1	20A	2 POLE SWITCH		#12		1	8
EF 3	EXHAUST FAN	1	208	1	20A	2 POLE SWITCH		#12		1	8
EF 4	EXHAUST FAN	1	120	1	20A	SWITCH		#12		3/4	14
EF 5	EXHAUST FAN	1	208	1	20A	2 POLE SWITCH		#12		1	8
EF 6	EXHAUST FAN	1	120	1	20A	SWITCH		#12		1/6	4
EF 7	EXHAUST FAN	1	120	1	20A	SWITCH		#12		1/6	4
AHU 1	AIR HANDLING UNIT	1	208	3	50A	60A	45A	#8		5	30
AHU 2	AIR HANDLING UNIT	1	208	3	50A	60A	45A	#8		5	30
AHU 3	AIR HANDLING UNIT	1	208	3	50A	60A	45A	#8		5	30
AHU 4	AIR HANDLING UNIT	1	208	3	50A	60A	45A	#8		5	30
AHU 5	AIR HANDLING UNIT	1	208	3	70A	60A	60A	#8		7 1/2	42
AHU 6	AIR HANDLING UNIT	1	208	3	50A	60A	45A	#8		5	30
AHU 7	AIR HANDLING UNIT	1	208	3	30A	30A	25A	#10		3	19

KITCHEN EQUIPMENT SCHEDULE

SYMBOL	DESCRIPTION	CIRCUIT NO.	VOLTS	PHASE	BRKR	DISC.	FUSE	FEEDER	STARTER	HP OR VA	FLA
4	COFFEE MAKER	C-20	120	1	20A			#12		1800W	
10	DISH WASHING MACHINE	C-1,3,5	208	3	60A			#4		25KW	
11	GARBAGE DISPOSAL	C-2,4,6	208	3	40A			#10		5HP	
16	BOOSTER WATER HEATER	C-8,10,12	208	3	40A			#8		9KW	
17	HOT WATER HEATER	C-13,15,17	208	3	50A			#8		15KW	
18	COLD FOOD COUNTER	C-30	120	1	20A			#12		1KW	
19	HOT FOOD TABLE	C-19,21,23	208	3	30A			#10		6KW	
25	FOOD MIXER	C-22	120	1	20A			#12		1/2HP	
28	FROZEN FOOD CABINET	C-26	120	1	20A			#12		1/2 HP	
29	ICE MACHINE	C-18	120	1	20A			#12		1 HP	
31	REFRIGERATOR	C-25	120	1	20A			#12		1/4 HP	
32	REFRIGERATOR	C-24	120	1	20A			#12		3/4 HP	

FIXTURE SCHEDULE

SYMBOL	MANUFACTURER NAME	MANUFACTURER CATALOG NUMBER	FIXTURE VA	LAMP TYPE	MOUNTING	REMARKS
F1	LITHONIA	LB440-120-ES	140	4-F40SP35/WMP	SURFACE	
F2	LITHONIA	LB240A-120-ES	65	2-F40SP35/WMP	SURFACE	
F3	LITHONIA	2SPG440A12-120-ES	140	4-F40SP35/WMP	TROFFER	
F4	LITHONIA	TH5250MA16208WGA	280	1-250 MH	CEILING	
F5	LITHONIA	2SP-G240A12-120-ES	65	2-F40SP35/WMP	TROFFER	
F6	LITHONIA	2SP-G340A12-120-ES	108	2-F40SP35/WMP	TROFFER	
F7	HAZLUX	PDFB2T12-GGL-C2	33	1-F26DBXT4	CEILING	
F8	NOT USED					
F9	LITHONIA	L 240-120ES	75	2-F40SP35/WMP	SURFACE	
F10	LITHONIA	AFII26QT7AR	44	1-F26DBXT4	RECESSED	
F11	LITHONIA	DMW240-120ES	65	2-F40SP35/WMP	SURFACE	
F12	LITHONIA	CEW10100SAR	130	1-LU100	WALL @ 6'-8"	
F13	LITHONIA	TWH175M120PE	188	1-LU150	WALL @ 12'	COLOR TO MATCH WINDOW FRAMES
F14	LITHONIA	TWH70S120PE	84	1-LU70	WALL @ 12'	
X1	LITHONIA	F2ES1G120	13	2-F5BX	AS SHOWN ON DWGS	
X2	LITHONIA	F2ES2G120	13	2-F5BX	AS SHOWN ON DWGS	
PL-1	LITHONIA	KAS1250MRS 208 SP09		1-250MH	AS SHOWN ON DRWGS	POLE # SSS2046 COLOR MATCH WINDOWS



LITHONIA ELV-NCIPS-2000-120-120-OCB-10-20 WITH BATTERIES IN CABINET. PROVIDE FACTORY START UP. ALL CIRCUITS FOR PANEL "E" WILL TERMINATE HERE.

POWER ONE-LINE DIAGRAM

NO SCALE

ELECTRICAL SYMBOLS

- TELEPHONE/DATA OUTLET (COMPUTER)
- WH — WATT-HOUR METER
- QUAD RECEPTACLE
- DUPLEX RECEPTACLE
- GFCI RECEPTACLE
- S — SINGLE-POLE SWITCH
- S_2 — TWO-POLE SWITCH
- S_3 — THREE-WAY SWITCH
- S_4 — FOUR-WAY SWITCH
- J — JUNCTION BOX
- MOTOR OUTLET
- F — FUSED DISCONNECT
- WP — NEMA 3R RATING
- EXIT SIGN
- S — SMOKE DETECTOR
- H — FIRE ALARM HORN
- F — FIRE ALARM MANUAL PULL STATION
- T — THERMOSTAT
- P — PHOTOCELL
- DD — DUCT DETECTOR
- H — HEAT DETECTOR
- 3 PHASE RECEPTACLE
- PL — PARKING LIGHTING (POLE/LAMP)

0000STE4
Armory, Blanding - NG: 92-026
Electrical Plan - 24469

REGISTERED PROFESSIONAL ENGINEER — KEITH LOUIS GRIFFITHS — STATE OF UTAH

LYNN EDWARD ELLIOTT, AIA, PC
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A NEW NATIONAL GUARD ARMORY AT BLANDING UTAH

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

E 4

PANEL NOTES

1. MAIN BUSS BARS AND CONNECTING STRAPS SHALL BE COPPER THROUGHOUT
2. MINIMUM BREAKER INTERRUPTING AMPACITY RATING TO BE 10,000 AIC SYMMETRICAL, UNLESS OTHERWISE NOTED.
3. PROVIDE MOUNTING HARDWARE IN ALL "SPACE ONLY" DESIGNATIONS
4. ALL BRANCH PANELS TO HAVE CANS MINIMUM OF 5-3/4" DEEP x 20" WIDE.
5. ALL BRANCH FEEDERS TERMINATING IN PANELS TO TERMINATE WITH COPPER CONDUCTORS.

PANEL NO. LAIII VOLTAGE 120/208 4 WIRE X

SURFACE X FLUSH MOUNTED TYPE NQOD MAIN BREAKER

MAINS ONLY 225 A. FEED 4 # 4/0 THHN LOCATION

AREA SERVED	LOAD	CCT	BKR	A	B	C	BKR	CCT	LOAD	AREA SERVED
				SN						
				EG						
SPARE		85	20				20	86		SPARE
"		87	20				20	88		"
"		89	20				20	90		"
"		91	20				20	92		"
"		93	20				20	94		"
SPACE ONLY		95						96		SPACE ONLY
" "		97						98		" "
" "		99						100		" "
" "		101						102		" "
" "		103						104		" "
" "		105						106		" "
" "		107						108		" "
" "		109						110		" "
" "		111						112		" "
" "		113						114		" "
" "		115						116		" "
" "		117						118		" "
" "		119						120		" "
" "		121						122		" "
" "		123						124		" "
" "		125						126		" "

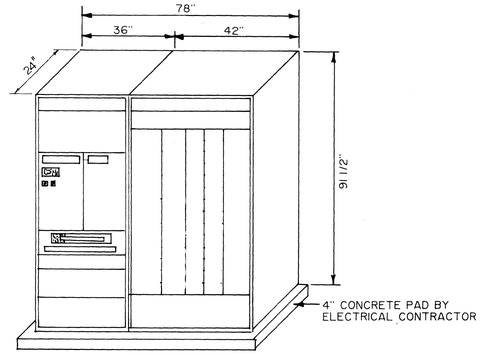
TOTAL CONNECTED LOAD

KW AMPS

A.I.C. 10,000

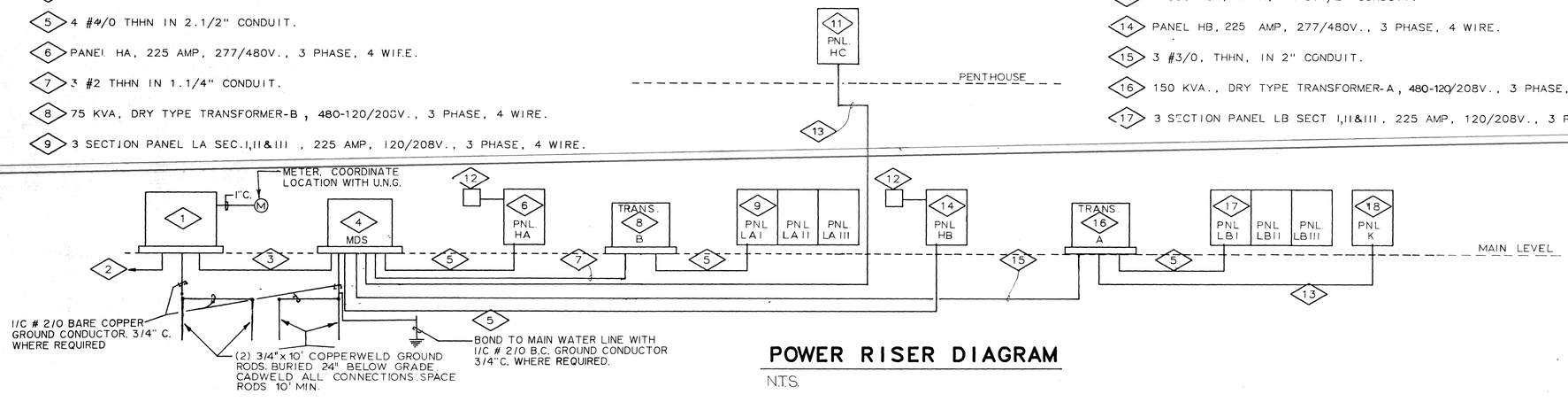
MAIN DISTRIBUTION SWITCHBOARD-(MDS)277/480V. 65,000 AIC.

SECT	BREAKER FRAME	AMPS.	POLE	AREA SERVED.	COMMENTS
(1)		800	3	BOLT LOC. SWITCH	CURRENT LIMITING FUSES
(2)	KA	250	3	TRANSFORMER-A	
(3)	KA	125	3	" B	
(4)	LA	400	3	PANEL-HC	
(5)	FA	100	3	" HA	
(6)	FA	100	3	" HB	



MAIN DISTRIBTION SWITCHBOARD-(MDS)

N.T.S.



POWER RISER DIAGRAM

N.T.S.

NOTE:

GROUND ELECTRICAL SYSTEM PER N.E.C. SECTION 250.

REGISTERED PROFESSIONAL ENGINEER
No. 2546
DOW W. RICHARDSON
STATE OF UTAH

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Salt Lake City, Utah 84111
Telephone 801 521-8600
Facsimile 801 521-7913

Architects
GILLIES STRANSKY BREMS SMITH

KEY ENGINEERING, INC.
1473 SOUTH 600 EAST
SALT LAKE CITY, UTAH
TELEPHONE: (801) 486-0775

KEYNOTE LIST

SPECIFICATION SECTION NUMBERS USED IN KEYNOTE REFERENCES ARE FOR QUICK REFERENCE ONLY, AND MAY NOT BE INCLUSIVE OF ALL ITEMS REQUIRED.

UTAH NATIONAL GUARD
WEST JORDAN ARMORY
WEST JORDAN, UTAH

PROJECT NO. 490003
DFCM PROJECT NO. NG 90-038

CONTRACT DOCUMENTS

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

4110 STATE OFFICE BLDG.
SALT LAKE CITY, UTAH
84117
(801) 533-5561

POWER RISER DIAGRAM

PROJECT NO. 90054
DATE 8/19/91
DRAWN KCH
CHECKED DWR
BINDING ORDER

E5.2

12/19/90 90054

PANELBOARD SCHEDULE

PANEL A — TYPE NEMA 1 — 120/208 VOLTS — 3 PHASE — 4 WIRE
MOUNTING ☐ FLUSH ☒ SURFACE — DIMENSIONS 20 W / 6 D / 49 H — LOCATION M103 — AMP MAINS ☒ LUGS ☐ BREAKER

BRANCH BREAKERS

ITEM	AMPS	POLE	WIRE SIZE	CIR. No.	LEFT PHASE LOAD A	LEFT PHASE LOAD B	LEFT PHASE LOAD C	RIGHT PHASE LOAD A	RIGHT PHASE LOAD B	RIGHT PHASE LOAD C	CIR. No.	AMPS	POLE	WIRE SIZE	ITEM
LTS. – M102,CORR	20	1		1	1500			800			2	20	1		REC. – M101,102
– M132				3		1800			1000		4				– N115
– N121				5			1200			800	6				– N115
– N120				7	1200			800			8				– N121
– N122				9		1600			1400		10				– N122
– N116,117				11			800			1000	12				– N120
– N118				13	1200			600			14				– N116,117
– N119				15		1200			800		16				– N118
– N115				17			1600			800	18				– N119
– N104,106				19	1400			800			20				– N107
– FOYER				21		900			1000		22				– N108
– N107				23			1200			800	24				– N107
– N108				25	1800			800			26				– N106
FUTURE FOUNTAIN				27		1000			800		28				– N105
LTS.– EXIT				29			1000			1000	30				– N104
– EXTERIOR				31	1400			800			32				– N104
– POST				33		400			400		34				– N107
LTS.– POLE	20	2		35			1000			400	36				– N107
–	–	–		37	1000			400			38				– N107
REC.– M132	20	1		39		1000			400		40				– N107
– M132				41			1000			1200	42				– EWC
					9500	7900	7900	5000	5800	6000					
					14500	13700	13700	TOTAL							
					121	114	114	AMPS. PHASE			TOTAL CONNECTED LOAD				42.0 KVA

FEEDER ☐ TOP ☐ BOTTOM
CONTRACTOR SHALL PROVIDE NEW INDEX
CONDUIT SIZE _____ WIRE SIZE _____ EQUIPMENT RATING 10,000 AMPS RMS SYM

PANELBOARD SCHEDULE

PANEL C — TYPE NEMA 1 — 120/208 VOLTS — 3 PHASE — 4 WIRE
MOUNTING ☐ FLUSH ☒ SURFACE — DIMENSIONS 20 W / 6 D / 49 H — LOCATION M121 — 225 AMP MAINS ☒ LUGS ☐ BREAKER

BRANCH BREAKERS

ITEM	AMPS	POLE	WIRE SIZE	CIR. No.	LEFT PHASE LOAD A	LEFT PHASE LOAD B	LEFT PHASE LOAD C	RIGHT PHASE LOAD A	RIGHT PHASE LOAD B	RIGHT PHASE LOAD C	CIR. No.	AMPS	POLE	WIRE SIZE	ITEM
LTS. – M121,CORR	20	1		1	400			1200			2	20	1		REC. – M121,135
– M135				3		1800			600		4				– M135
– M135				5			1500			800	6				– M135
– M135				7	1800			600			8				– M135
– M135				9		1800			800		10				– M138
– M135				11			1500			800	12				– M139
– M136,138				13	1800			800			14				– M136,137
– M141,143				15		1800			1000		16				SECURITY SYSTEM
– M139				17			800			800	18				REC. – M139
– M139				19	800			800			20				– M140
– M140				21		800			800		22				– M142,143
– M140				23			800			1000	24				SECURITY SYSTEM
FURNACE 1/3HP				25	830			800			26				REC. – M141
1/3HP				27		830			800		28				– M140
SPARE — COOLER PUMP 1/6HP				29			510			1000	30				FUTURE SCORE.
SPARE				31				1000			32				PAGING SYSTEM
MOTORIZED STD.				33		300					34				SPARE
				35			300				36				
MAU 10HP	60	3		37	3720						38				
–	–	–		39		3720			1000		40				REC. – ROOF
–	–	–		41			3720			1000	42				– ROOF
								9350	10750	8830	5200	5000	5400		
								14550	15750	14230	TOTAL				
								121	131	119	AMPS. PHASE			TOTAL CONNECTED LOAD	44.5 KVA

SPARE — TIME CLOCK, FLAG POLE, SIGN

FEEDER ☐ TOP ☐ BOTTOM
CONTRACTOR SHALL PROVIDE NEW INDEX
CONDUIT SIZE _____ WIRE SIZE _____ EQUIPMENT RATING 10,000 AMPS RMS SYM

PANELBOARD SCHEDULE

PANEL B — TYPE NEMA 1 — 120/208 VOLTS — 3 PHASE — 4 WIRE
MOUNTING ☐ FLUSH ☒ SURFACE — DIMENSIONS 20 W / 6 D / 49 H — LOCATION M103 — 225 AMP MAINS ☒ LUGS ☐ BREAKER

BRANCH BREAKERS

ITEM	AMPS	POLE	WIRE SIZE	CIR. No.	LEFT PHASE LOAD A	LEFT PHASE LOAD B	LEFT PHASE LOAD C	RIGHT PHASE LOAD A	RIGHT PHASE LOAD B	RIGHT PHASE LOAD C	CIR. No.	AMPS	POLE	WIRE SIZE	ITEM
LTS. – M103,CORR	20	1		1	1200			600			2	20	1		REC. – M103
– M127,131				3		1700			200		4				– TEL.EQ..
– M109,115				5			1400			800	6				– M126,127
– N133				7	1200			600			8				– M115,117
– N132				9		1200			800		10				– M116,133
– M104,106				11			800			1400	12				– M109
– N110				13	1200			1000			14				– M104,106
– N109				15		1800			1200		16				– N114
– N111,113				17			1400			600	18				– N132
– N114				19	1600			800			20				– N110
EXH.FAN 1/6HP				21		510			1000		22				– N109
CIRC PUMPS 1/12HP EA.				23			400			800	24				– N110
W.H. 1HP	30			25	1840			800			26				– N111
EXH.FAN 1/6HP	20			27		510			1400		28				– N113
MAU 1/2HP — ETH				29			1130			800	30				– N112
COOLER PUMP 1/6HP — MAU				31	510			400			32				– N110
EXH. FAN 1/6HP				33		510			400		34				– N110
UNIT HTR. 1/4HP				35			670			400	36				– N110
COOLER PUMP 1/6HP	20	3		37	510			400			38				– N110
EXH.FAN 1/3HP — MAU				39		830			1000		40				F.A. PANEL
LTS. FLAG				41			400			1200	42				REC. – EWC
					8060	7060	6200	4600	6000	6000					
					12660	13060	12200	TOTAL							
					106	109	102	AMPS. PHASE			TOTAL CONNECTED LOAD				37.9 KVA

FEEDER ☐ TOP ☐ BOTTOM
CONTRACTOR SHALL PROVIDE NEW INDEX
CONDUIT SIZE _____ WIRE SIZE _____ EQUIPMENT RATING 10,000 AMPS RMS SYM

PANELBOARD SCHEDULE

PANEL K — TYPE NEMA 1 — 120/208 VOLTS — 3 PHASE — 4 WIRE
MOUNTING ☒ FLUSH ☐ SURFACE — DIMENSIONS 20 W / 6 D / 49 H — LOCATION M122 — 400 AMP MAINS ☒ LUGS ☐ BREAKER

BRANCH BREAKERS

ITEM	AMPS	POLE	WIRE SIZE	CIR. No.	LEFT PHASE LOAD A	LEFT PHASE LOAD B	LEFT PHASE LOAD C	RIGHT PHASE LOAD A	RIGHT PHASE LOAD B	RIGHT PHASE LOAD C	CIR. No.	AMPS	POLE	WIRE SIZE	ITEM
ICE MAKER 1HP	20	2		1	920			2000			2	30	2		OVEN BLOWER
SPARE — –	–	–		3		920			2000		4	–	–		– — SPARE
SPARE	50	2		5							6	50	2		SPARE
–	–	–		7							8	–	–		–
SPARE	50	2		9							10	50	2		SPARE
SPARE	50	2		11							12	–	–		–
–	–	–		13							14	50	2		SPARE
DISPOSAL	30	3		15							16	–	–		–
DISHWASHER	–	–		17			2000			480	18	30	3		DISPOSAL 5 HP
–	–	–		19	2000			480			20	–	–		–
DISHWASHER	60	3		21		2000			480		22	–	–		–
BOOSTER WATER HEATER	–	–		23			5000			3000	24	40	3		BOOSTER HTR 9KW — SANITIZER
SPARE — DISPOSAL	20	3		25	5000			3000			26	–	–		–
SPARE — –	–	–		27		5000			3000		28	–	–		–
TOASTER	20	2		29			480			5000	30	60	3		H.W. HEATER
COFFEE MAKER	20	1		31	480			5000			32	–	–		– — SPARE
REFRIG. 1HP	30			33		480			5000		34	–	–		–
COOLER 1/4HP	20			35			1800			4000	36	50	1		COOKING — SPARE
COLD FOOD TBL.	30			37	1840			3170			38	40	3		HOT FOOD TBL.
				39		670			3170		40	–	–		–
				41			2100			3170	42	–	–		–
					19000	19000	15000	12480	12480	8480					
					31480	31480	23480	TOTAL							
					262	262	196	AMPS. PHASE			TOTAL CONNECTED LOAD				86.4 KVA

FEEDER ☐ TOP ☐ BOTTOM
CONTRACTOR SHALL PROVIDE NEW INDEX
CONDUIT SIZE _____ WIRE SIZE _____ EQUIPMENT RATING 10,000 AMPS RMS SYM

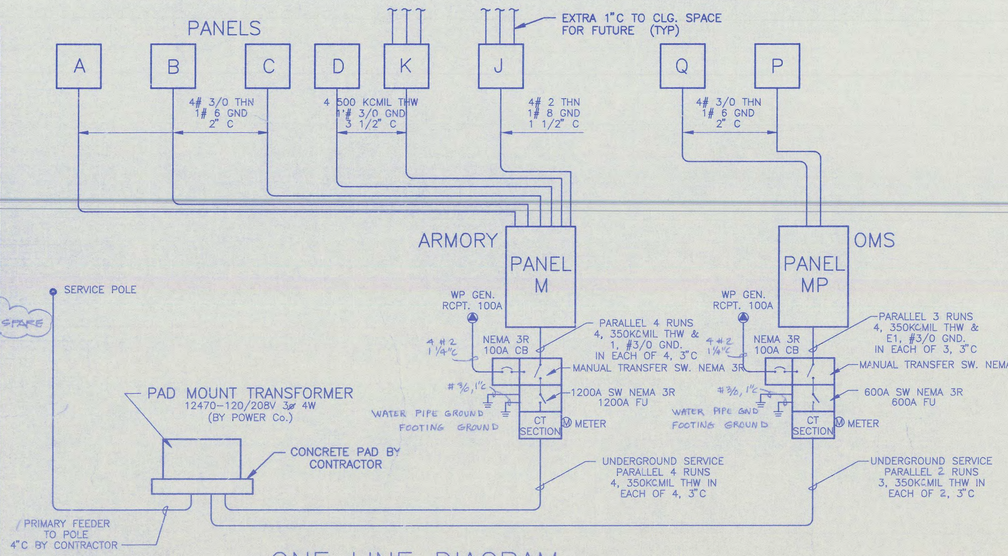
PANELBOARD SCHEDULE

PANEL J — TYPE NEMA 1 — 120/208 VOLTS — 3 PHASE — 4 WIRE
MOUNTING ☒ FLUSH ☒ SURFACE — DIMENSIONS 20 W / 6 D / 49 H — LOCATION M122 — 100 AMP MAINS ✱ LUGS ☐ BREAKER

BRANCH BREAKERS

ITEM	AMPS	POLE	WIRE SIZE	CIR. No.	LEFT PHASE LOAD A	LEFT PHASE LOAD B	LEFT PHASE LOAD C	RIGHT PHASE LOAD A	RIGHT PHASE LOAD B	RIGHT PHASE LOAD C	CIR. No.	AMPS	POLE	WIRE SIZE	ITEM
LTS. – M117,122	20	1		1	700			1000			2	20	1		REC. – M118,125
– M123,125				3		1300			1000		4	20	1		– COFFEE
EXH.FAN 1/3HP				5			830			1000	6	–	–		– COFFEE
SPARE — COOLER PUMP 1/6HP				7	510			800			8	20	1		– N124
SPARE				9					1000		10				– N123
				11						830	12				– COOLER
				13				830			14				– COOLER
				15					830		16				REC 128
				17						830	18				SPARE 124
HOOD FIRE PRT.				19	200			830			20				122
HOOD LIGHTS — REC. MOD FURN.				21		400					22				SPARE
SMOKE DAMPERS				23			200				24				ICE MAKER
SPACE				25				400			26				REC. MOD FURN. — SPARE
				27					400		28				SPARE
				29						400	30				
CLNG SPRINKLER	20			31	200			400			32				
HEATER	20	2		33		1250			1250		34	20	2		HEATER
–	–	–		35			1250			1250	36	–	–		–
EXH.FAN 2HP	20	3		37	910			910			38	20	3		MAU 2HP
–	–	–		39		910			910		40	–	–		–
–	–	–		41			910			910	42	–	–		–
					2120	2210	1740	4370	3740	3570					
					6490	5950	5310	TOTAL							
					54	50	44	AMPS. PHASE			TOTAL CONNECTED LOAD				17.9 KVA

FEEDER ☐ TOP ☐ BOTTOM
CONTRACTOR SHALL PROVIDE NEW INDEX
CONDUIT SIZE _____ WIRE SIZE _____ EQUIPMENT RATING 10,000 AMPS RMS SYM



ONE LINE DIAGRAM
NO SCALE

AS-BUILT FROM CONTRACTORS RECORD DRAWINGS
DEC 01 1994

REGISTERED PROFESSIONAL ENGINEER — No. 4659 — DEAN PAUL LEVORSEN — STATE OF UTAH

SORENSEN / MACKEY ASSOCIATES, INC.
ARCHITECTS / PLANNERS
FIFTH STREET PLAZA
3690 SOUTH 500 WEST SUITE 102
SALT LAKE CITY, UTAH 84115
(800) 262-9393 FAX (800) 262-9407

UTAH NATIONAL GUARD

ARMORY

ST. GEORGE, UTAH

DFCM PROJECT NO. NF : 92-182

DRAWING TITLE:
PANEL SCHEDULES & ONE-LINE DIAGRAM

JOB NO.: UNG 9216	SHEET NUMBER
DATE:	E200
DRAWN BY:	
CHECKED BY:	
APPROVED:	

structural

June 3, 2014

Maud de Bel
BacGen
4015 Beach Drive SW
Seattle, WA 98116

Ref: Utah National Guard; West Jordan, Utah
Subject: Solar Panel Roof Evaluation

Ms. de Bel,

In response to your request, BHB Consulting Engineers has performed a structural evaluation of the roof of the Utah National Guard armory building for the addition of the proposed solar panel units.

We performed a site visit and walked the roof to get a good idea of the types of loads are currently being imposed on the roof structure. We were also able to obtain a joist tag from the building, which enabled us to get the original shop drawings and associated calculations for the original construction of the roof. These allowed us to corroborate our assumptions of expected loads.

From our observations of the building, we were able to calculate the actual dead load of waterproofing membrane, metal roof deck, joists/girders, and mechanical equipment to be 12 psf. With an allowance of 3 psf for miscellaneous items and the 31 psf snow load, this gives an actual total load of 46 psf.

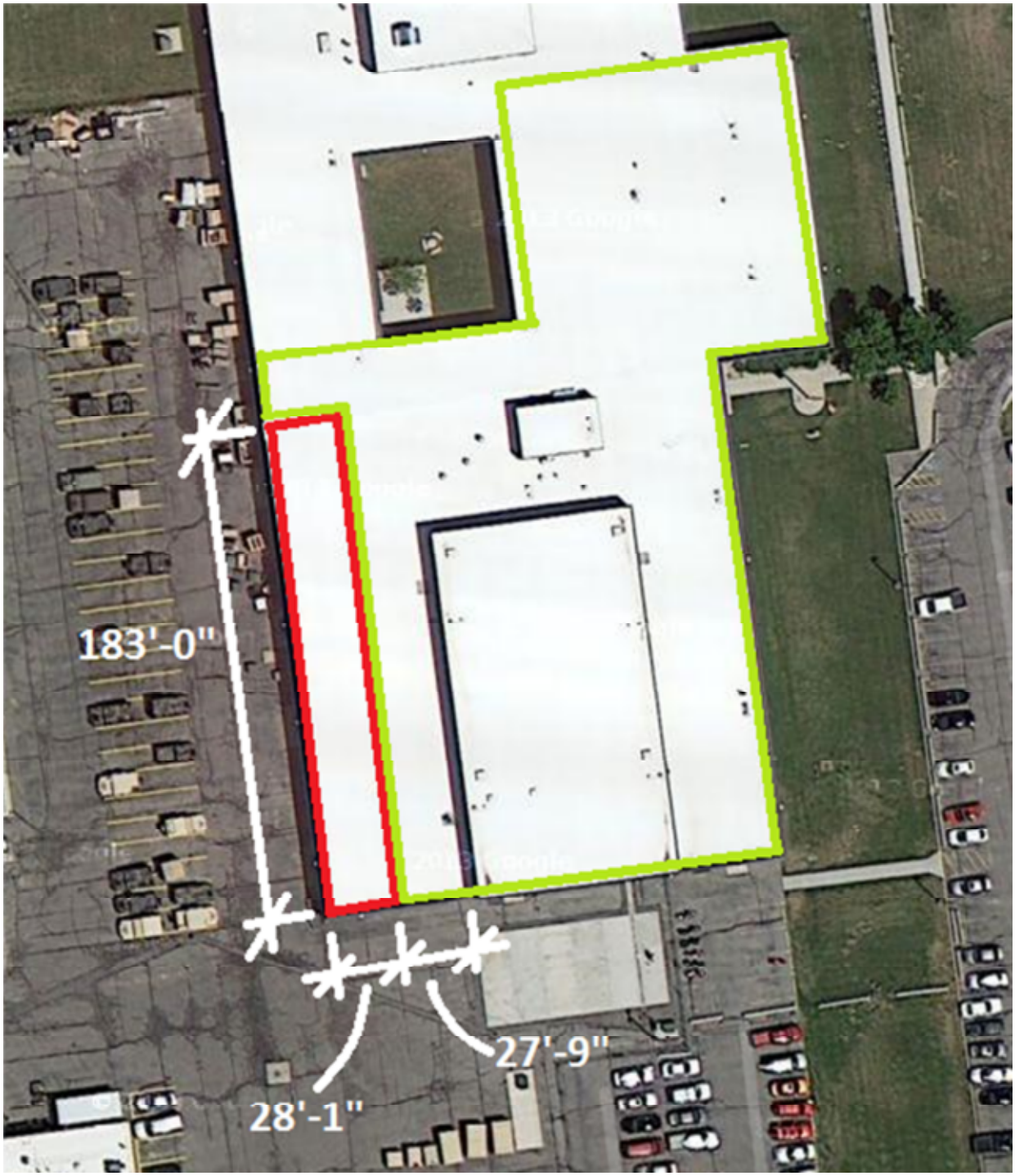
All of the proposed locations for the solar panels, with the exception of one bay, have ample available capacity based on these loads. The westernmost bay on the south end of the building (a 183'-0" x 28'-1" rectangular area) is the area that doesn't have capacity to support the approximately 5 psf of added weight for the solar panels. The location of this bay can be seen in the aerial image attached, which outlines the acceptable locations in green and outlines the unacceptable areas in red.

The calculations of the loads and capacity of the roof are attached, and copies of the drawings can be provided if necessary.

Sincerely,

Gerald Mckenzie, SE
BHB Consulting Engineers, P.C.

2766 South Main Street - SLC, Utah 84115 - Phone: 801.355.5656 - Fax: 801.355.5950
www.bhbengineers.com



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"Engineering Results"
BHB Consulting Engineers
A Professional Corporation

Project: Utah National Guard Armory Roof Evaluation

2766 South Main Street • Salt Lake City • Utah 84115
Phone: 801.355.5656 • Fax 801.355.5950

Sheet:

Job#: 14428

Date: 5/30/14

By: DLH

High Roof

Joists: 14K1: G.F. 284 plf TL, 197 plf LL (span = 20'-0")

Joist spacing = 4'-9"

$\Rightarrow TL = \frac{(284\ plf)}{4.75\ ft} = 59.8\ psf$

$LL = \frac{197\ plf}{4.75\ ft} = 41.5\ psf$

Actual Loads

SL = 31 psf

Dead Loads: (assumed from observations on site visit)

Waterproofing Membrane: 3psf
Metal Roof Deck: 3 psf
Joists/Girders: 3 psf
Mechanical: 3psf
Misc: 3 psf

$\Sigma = 15\ psf$

$\Rightarrow LL = SL = 31\ psf$

$DL = 15\ psf$

$TL = 46\ psf$

$\Rightarrow$ TL capacity = 59.8 psf − 46 psf = 13.8 psf

LL capacity = 41.5 psf − 31 psf = 10.5 psf

Using DL of 5 psf for solar panels, Ok

Girders designed for 6k point loads

Actual point load = (46 psf)(4.75 ft)(20 ft) = 4.37 k

With solar panels = 4.37k + (5psf)(4.75ft)(20ft) = 4.8 k Ok

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Project: Utah National Guard Armory Roof Evaluation

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Sheet:

Job#: 14428

Date: 6/3/14

By: DLH

Low Roof

East Side:

Joists: 24k10, span: 34'-2" (worst case)

G.F. 502 plf TL, 337 plf LL

⇒ @ Joist spacing = 6 ft

$L = \frac{502\ plf}{6\ ft} = 84\ psf$

$LL = \frac{337\ plf}{6\ ft} = 56\ psf$

Actual Loads Expected Same as above

⇒ TL capacity = 84 psf - 46 psf = 38 psf

LL capacity = 56 psf - 31 psf = 25 psf

For DL of 5 psf for solar panels, Ok

West Side:

West Bay:

Joists: 20K3, span: 28'-1"

G.F. 281 plf TL, 211 plf LL

Joist spacing = 6'-0"

⇒ $TL = \frac{281\ plf}{6\ ft} = 46.8\ psf$

$LL = \frac{211\ plf}{6\ ft} = 35.2\ psf$

From calcs obtained from Vulcraft, design loads are:

$TL = \frac{254.4\ plf}{6\ ft} = 42.4\ psf$

$LL = \frac{181.5\ plf}{6\ ft} = 30.25\ psf$

TL capacity = 46.8 psf - 42.4 psf = 4.4 psf

Not enough capacity to accomodate 5 psf for solar panels.

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Sheet:

Job#: 14428

Date: 6/3/14

By: DLH

Low Roof, West Side, East Bay:

Joists: 20K9, span = 27'-9"

G.F. 517 plf TL, 353 plf LL

Joist spacing = 6'-0"

$\Rightarrow TL = \frac{517\ plf}{6\ ft} = 86\ psf$

$LL = \frac{353\ plf}{6\ ft} = 58.8\ psf$

Expected actual loads same as for high roof

TL capacity = 86 psf − 46 psf = 40 psf

LL capacity = 58.8 psf − 31 psf = 27.8 psf

For 5 psf load of solar panels, Ok

Girder designed for 10k point loads

Actual point load = (46 psf)(6 ft)(14 ft + 13.9 ft) = 7.7 k

With solar panels = 7.7k + (5 psf)(6 ft)(17.9 ft) = 8.1k

Solar panels can be added to this bay

East of Atrium:

Worst case Joists: 20K5, span = 27'-5"

Joist spacing = 6'-0"

G.F. 355 plf TL, 248 plf LL

$\Rightarrow TL = \frac{355\ plf}{6\ ft} = 59.2\ psf$

$LL = \frac{248\ plf}{6\ ft} = 41.3\ psf$

Same expected loads

$\Rightarrow$ TL capacity = 59.2 psf − 46 psf = 13.2 psf

LL capacity = 41.3 psf − 31 psf = 10.3 psf

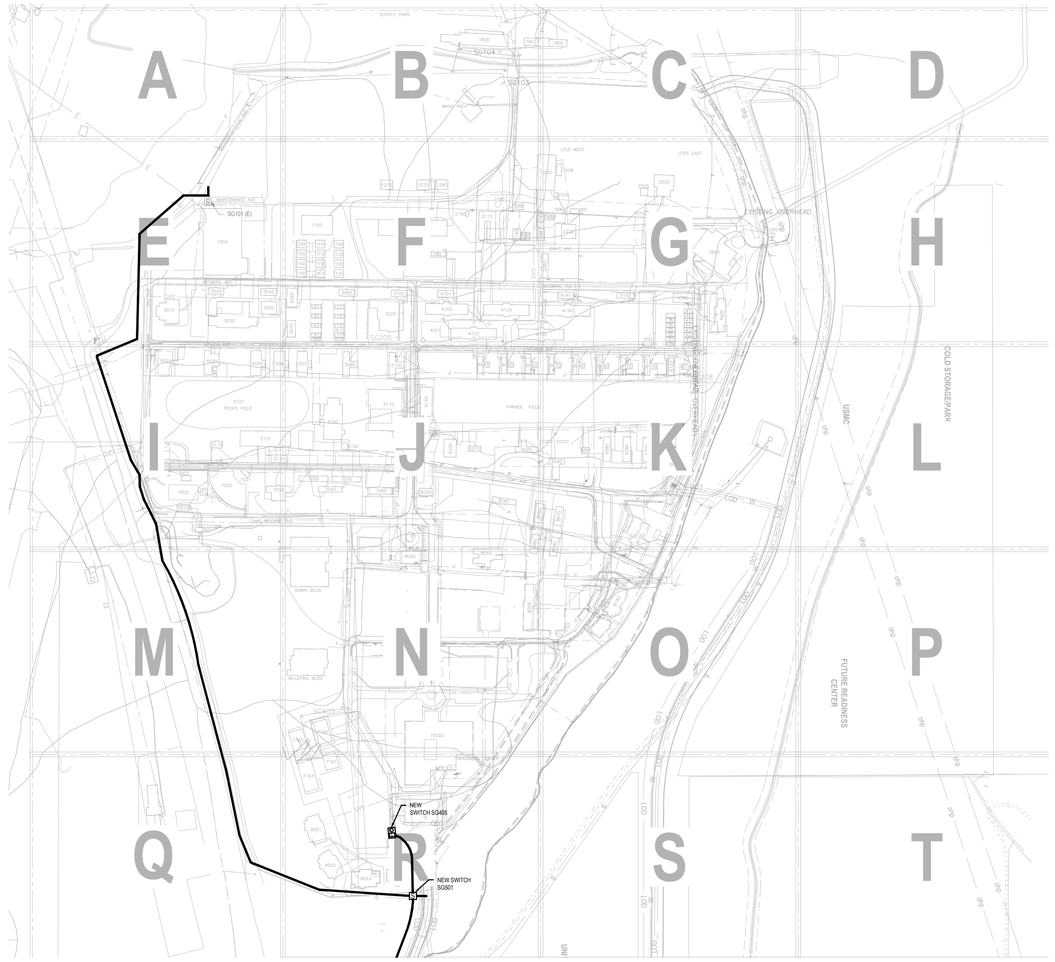
Ok for 5 psf from solar panels

Girders designed for 9.3k point loads

Actual point load = (46 psf)(6 ft)(27.5 ft) = 7.6k

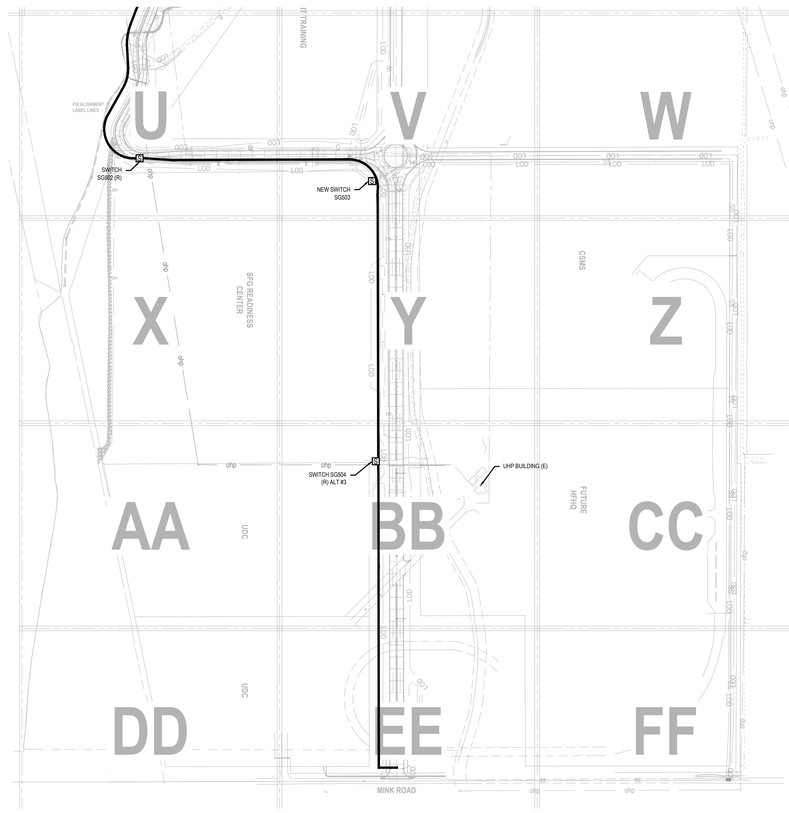
With solar panels = 7.6k + (5 psf)(6 ft)(27.5 ft) = 8.4k

Ok



1 ES101 UPPER GARRISON ELECTRICAL SITE PLAN

SCALE: 1" = 300'-0"



2 ES101 LOWER GARRISON ELECTRICAL SITE PLAN

SCALE: 1" = 300'-0"

EFT ARCHITECTS
265 EAST 100 SOUTH SUITE 250
SALT LAKE CITY, UTAH 84111-1604
801.521.8564 WWW.EFTARCH.COM

PROFESSIONAL STAMP

LICENSED PROFESSIONAL ENGINEER
No. 221888
KENNETH D. GARNER
06-02-14
STATE OF UTAH

DFCM
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UTAH 84114
PHONE: 801.538.3018

CODE OFFICIAL STAMP

DRAWINGS ARE IN COMPLIANCE WITH DFCM STANDARDS

CAMP WILLIAMS

PHASE II SOUTH GARRISON INFRASTRUCTURE
17800 SOUTH CAMP WILLIAMS ROAD
RIVERTON, UTAH

ISSUE DESCRIPTION	DATE
.	.

ISSUED DATE	PLOTTED DATE
06.19.14	6.19.2014
EFT PROJECT NO.	DFCM PROJECT NO.
13013	13240480
DRAWN BY	CHECKED BY
SW	LW

SHEET TITLE

UPPER AND LOWER ELECTRICAL SITE PLAN

SHEET NUMBER

ES101

Ken Garner Engineering, Inc.
ELECTRICAL CONSULTING ENGINEERS
420 East South Temple, Suite 370
Salt Lake City, Utah 84101
Telephone: 801.328.8800
Fax: 801.328.8802
Contact: LEWIS WONG
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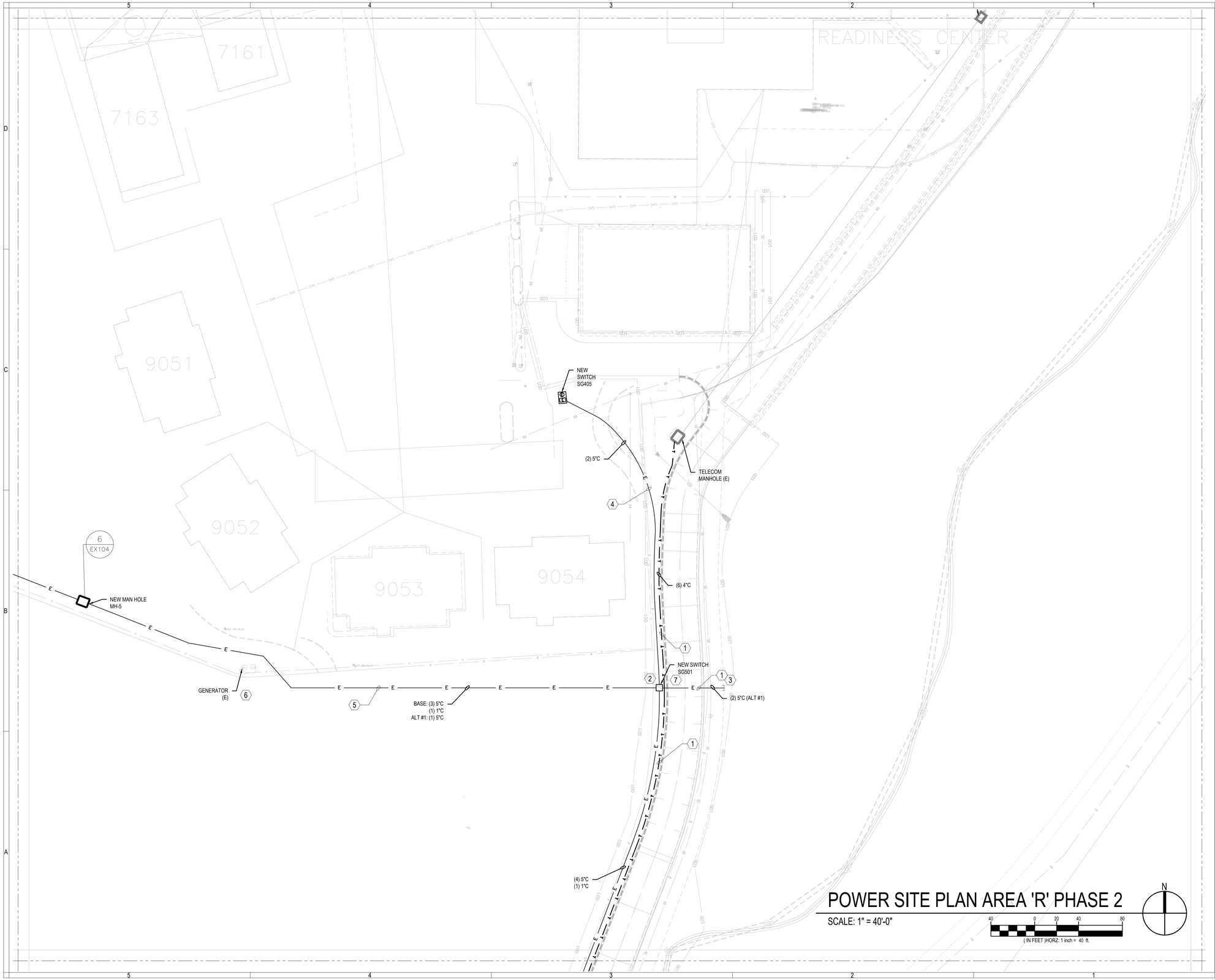
Project #: 2013-082.00



KEYED NOTES

1. RUN CONDUITS AND PROVIDE PULL ROPE. CONDUCTORS TO BE PROVIDED IN FUTURE.
2. PLACE BOLLARDS TO PROTECT EQUIPMENT FROM DAMAGE IN HIGH TRAFFIC AREAS. SEE DETAILS 6, 7, AND 8 ON SHEET EX303.1 FOR INSTALLATION AND PLACEMENT.
3. STUB UP SPARE CONDUITS 4" ABOVE GRADE. PROVIDE PULL ROPE AND CAP.
4. RUN CONDUITS AND PROVIDE PULL ROPE IN BASE BID. CONDUCTORS TO BE PROVIDED IN ALTERNATE #2.
5. PROVIDE AN ADDITIONAL 5"C IN DUCTBANK FOR FUTURE SOLAR AS PART OF ALTERNATE #1, FOR A TOTAL OF (4)5"C +(1) 1"C IN THE DUCTBANK.
6. LOCATE AND AVOID GENERATOR FEEDER AND AUXILLIARY CONTROLS, AND CIRCUITS.
7. COORDINATE EXACT LOCATION OF SWITCH WITH GATE ACCESS AND FUTURE SOLAR ARRAY.

GENERAL NOTES

A. CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS, MATERIALS, FINISHES, AND DIMENSIONS BEFORE AND AFTER DEMOLITION
B. CONTRACTOR TO ENSURE THAT ALL SIDEWALKS AND ROADS OUTSIDE OF CONSTRUCTION AREA ARE KEPT CLEAN AND CLEAR OF DEBRIS AND OBSTRUCTIONS AT ALL TIMES.
C. PROTECT ALL ITEMS TO REMAIN FROM DAMAGE.
D. COORDINATE ALL PLANNED POWER OUTAGES WITH BASE OPERATIONS PRIOR TO DISCONNECTING.
E. COORDINATE DEMOLITION OF OVERHEAD LINES AND CONSTRUCTION OF UNDERGROUND SYSTEM TO MINIMIZE DOWN TIME.
F. ALL PRIMARY VOLTAGE CONDUIT TO BE ENCASED IN CONCRETE AT A MINIMUM OF 36 IN. BELOW GRADE WITH MAGNETIC RIBBON AT 12" BELOW GRADE. RUN DEEPER THAN 36" IN THE EVENT OF A CONFLICTING CROSSING.
G. ALL SECONDARY VOLTAGE CONDUIT TO BE ENCASED IN CONCRETE AT A MINIMUM OF 24 IN. BELOW GRADE UNLESS RUNNING PARALLEL WITH THE PRIMARY VOLTAGE CONDUIT, THEN RUN THE SECONDARY VOLTAGE CONDUIT IN THE SAME CONCRETE DUCTBANK AS THE PRIMARY. SEE ELECTRICAL DETAILS.

POWER SITE PLAN AREA 'R' PHASE 2

SCALE: 1" = 40'-0"

(IN FEET)HORZ: 1 inch = 40 ft.

N

A	B	C	D
E	F	G	H
I	J	K	L
M	N	O	P
Q	R	S	T
	U	V	W
	X	Y	Z
	AA	BB	CC
	DD	EE	FF

KEYPLAN

SCALE: NTS

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Project #: 2013-082.00

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CODE OFFICIAL STAMP

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CAMP WILLIAMS

UTAH NATIONAL GUARD

PHASE II SOUTH GARRISON INFRASTRUCTURE
17800 SOUTH CAMP WILLIAMS ROAD
RIVERTON, UTAH

ISSUE DESCRIPTION	DATE
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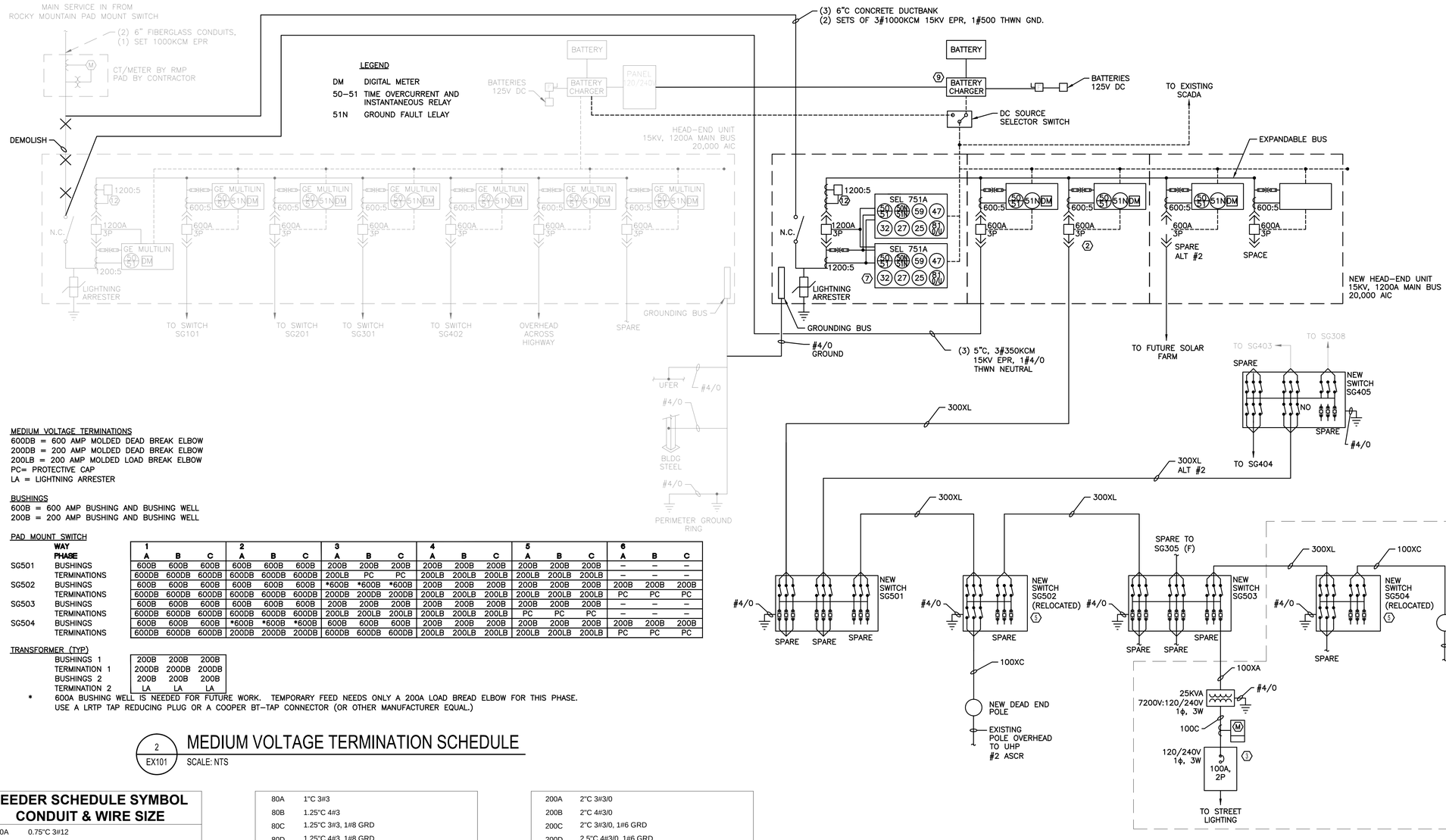
SW	LW

SHEET TITLE

POWER SITE PLAN AREA 'R' PHASE 2

SHEET NUMBER

EP101-R



KEYED NOTES - SHEET EX101

1. (2)10' LONG, 5/8 INCH DIAMETER COPPER ROD BENEATH PANEL BURIED 24 INCH BELOW GRADE TO TOP OF ROD. CADWELD CONNECTION TO CONDUCTOR LEAVING 6' SLACK IN CONDUCTOR BETWEEN RODS.
2. PROVIDE ENGRAVED LABEL STATING WHAT EACH BREAKER CONTROLS.
3. PROVIDE PANEL WITH INTEGRAL TVSS
4. PROVIDE NEMA 3R ENCLOSURE FOR TVSS
5. USE OLD 4-WAY SWITCH SG405 FOR NEW SWITCH SHOWN.
6. DO NOT BOND THE NEUTRAL AND GROUND BUS AT THIS PANEL/DISCONNECT.
7. MULTI FUNCTION METER AND RELAY. SEE SPECIFICATIONS FOR MORE DETAIL.
8. PROVIDE (1) 5/8" X 10' GROUND ROD BURIED 24" BELOW GRADE FOR DISCONNECT.
9. CONNECT BATTERY CHARGER TO THE EQUIPMENT BUILDING 120/240V PANEL. VERIFY BREAKER AND FEEDER SIZE PRIOR TO ORDERING.

MEDIUM VOLTAGE TERMINATIONS
600DB = 600 AMP MOLDED DEAD BREAK ELBOW
200DB = 200 AMP MOLDED DEAD BREAK ELBOW
200LB = 200 AMP MOLDED LOAD BREAK ELBOW
PC= PROTECTIVE CAP
LA = LIGHTNING ARRESTER

BUSHINGS
600B = 600 AMP BUSHING AND BUSHING WELL
200B = 200 AMP BUSHING AND BUSHING WELL

PAD MOUNT SWITCH

	WAY	1			2			3			4			5			6		
	PHASE	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
SG501	BUSHINGS	600B	600B	600B	600B	600B	600B	200B	200B	200B	200B	200B	200B	200B	200B	200B	–	–	–
	TERMINATIONS	600DB	600DB	600DB	600DB	600DB	600DB	200LB	PC	PC	200LB	200LB	200LB	200LB	200LB	200LB	–	–	–
SG502	BUSHINGS	600B	600B	600B	600B	600B	600B	*600B	*600B	*600B	200B	200B	200B	200B	200B	200B	200B	200B	200B
	TERMINATIONS	600DB	600DB	600DB	600DB	600DB	600DB	200DB	200DB	200DB	200LB	200LB	200LB	200LB	200LB	200LB	PC	PC	PC
SG503	BUSHINGS	600B	600B	600B	600B	600B	600B	200B	200B	200B	200B	200B	200B	200B	200B	200B	–	–	–
	TERMINATIONS	600DB	600DB	600DB	600DB	600DB	600DB	200LB	200LB	200LB	200LB	200LB	200LB	PC	PC	PC	–	–	–
SG504	BUSHINGS	600B	600B	600B	*600B	*600B	*600B	600B	600B	600B	200B	200B	200B	200B	200B	200B	200B	200B	200B
	TERMINATIONS	600DB	600DB	600DB	200DB	200DB	200DB	600DB	600DB	600DB	200LB	200LB	200LB	200LB	200LB	200LB	PC	PC	PC

TRANSFORMER (TYP)

BUSHINGS 1	200B	200B	200B
TERMINATION 1	200DB	200DB	200DB
BUSHINGS 2	200B	200B	200B
TERMINATION 2	LA	LA	LA

* 600A BUSHING WELL IS NEEDED FOR FUTURE WORK. TEMPORARY FEED NEEDS ONLY A 200A LOAD BREAD ELBOW FOR THIS PHASE. USE A LRTP TAP REDUCING PLUG OR A COOPER BT-TAP CONNECTOR (OR OTHER MANUFACTURER EQUAL.)

2 EX101 MEDIUM VOLTAGE TERMINATION SCHEDULE
SCALE: NTS

FEEDER SCHEDULE SYMBOL CONDUIT & WIRE SIZE

20A	0.75"C 3#12
20B	0.75"C 4#12
20C	0.75"C 3#12, 1#12 GRD
20D	0.75"C 4#12, 1#12 GRD
20E	0.75"C 4#12, 1#12 GRD, 1#12 ISOLATED GRD
30A	0.75"C 3#10
30B	0.75"C 4#10
30C	0.75"C 3#10, 1#10 GRD
30D	0.75"C 4#10, 1#10 GRD
30E	0.75"C 4#10, 1#10 GRD, 1#10 ISOLATED GRD
40A	0.75"C 3#8
40B	0.75"C 4#8
40C	0.75"C 3#8, 1#10 GRD
40D	0.75"C 4#8, 1#10 GRD
40E	0.75"C 4#8, 1#10 GRD, 1#10 ISOLATED GRD
60A	0.75"C 3#6
60B	0.75"C 4#6
60C	0.75"C 3#6, 1#10 GRD
60D	1"C 4#6, 1#10 GRD
60E	1"C 4#6, 1#10 GRD, 1#10 ISOLATED GRD
70A	1"C 3#4
70B	1"C 4#4
70C	1"C 3#4, 1#8 GRD
70D	1.25"C 4#4, 1#8 GRD
70E	1.25"C 4#4, 1#8 GRD, 1#8 ISOLATED GRD

80A	1"C 3#3
80B	1.25"C 4#3
80C	1.25"C 3#3, 1#8 GRD
80D	1.25"C 4#3, 1#8 GRD
80E	1.25"C 4#3, 1#8 GRD, 1#8 ISOLATED GRD
100A	1"C 3#2
100B	1.25"C 4#2
100C	1.25"C 3#2, 1#8 GRD
100D	1.25"C 4#2, 1#8 GRD
100E	1.25"C 4#2, 1#8 GRD, 1#8 ISOLATED GRD
100XA	2"C 1#2 15KV EPR AL, 1#2 CU THWN NEUTRAL
100XC	3"C 3#2 15KV EPR AL, 1#2 CU THWN NEUTRAL
125A	1.25"C 3#1
125B	1.5"C 4#1
125C	1.5"C 3#1, 1#6 GRD
125D	2"C 4#1, 1#6 GRD
125E	2"C 4#1, 1#6 GRD, 1#6 ISOLATED GRD
150A	1.5C" 3#1/0
150B	2"C 4#1/0
150C	2"C 3#1/0, 1#6 GRD
150D	2"C 4#1/0, 1#6 GRD
150E	2"C 4#1/0, 1#6 GRD, 1#6 ISOLATED GRD
175A	1.5"C 3#2/0
175B	2"C 4#2/0
175C	2"C 3#2/0, 1#6 GRD
175D	2"C 4#2/0, 1#6 GRD
175E	2"C 4#2/0, 1#6 GRD, 1#6 ISOLATED GRD

200A	2"C 3#3/0
200B	2"C 4#3/0
200C	2"C 3#3/0, 1#6 GRD
200D	2.5"C 4#3/0, 1#6 GRD
200E	2.5"C 4#3/0, 1#6 GRD, 1#6 ISOLATED GRD
225A	2"C 3#4/0
225B	2.5"C 4#4/0
225C	2.5"C 3#4/0, 1#4 GRD
225D	2.5"C 4#4/0, 1#4 GRD
225E	2.5"C 4#4/0, 1#4 GRD, 1#4 ISOLATED GRD
250A	2.5"C 3#250KCM
250B	2.5"C 4#250KCM
250C	2.5"C 3#250KCM, 1#4 GRD
250D	3"C 4#250KCM, 1#4 GRD
250E	3"C 4#250KCM, 1#4 GRD, 1#4 ISOLATED GRD
300XL	5"C 3#350KCM 15 KV EPR AL, 1#4/0 CU THWN NEUTRAL

1 EX101 ONE-LINE DIAGRAM PHASE 2
SCALE: NTS

Relay Setting Table

Circuit	Model	CT Ratio	51P PHASE 0.4 TO 12 (by 0.1)	51P PH. TIME DELAY 1 TO 10 (by 0.1)	50P PH. IOC 0.5 TO 40 (by .1x)	50P IOC TIME DEL 1 TO 10 (by 0.1)	CURVE
FEEDER FROM RMP	SEL 751A	1200:5	–	–	–	–	extreme inverse
FEEDER FROM RMP	SEL 751A	1200:5	–	–	–	–	extreme inverse
FEEDER TO EXISTING MAIN	SEL 351A	1200:5	–	–	–	–	extreme inverse
FEEDER TO LOWER GARRISON	SEL 351A	600:5	–	–	–	–	extreme inverse
SPARE CIRCUIT BREAKER	SEL 351A	600:5	–	–	–	–	extreme inverse

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CODE OFFICIAL STAMP

DRAWINGS ARE IN COMPLIANCE WITH DFCM STANDARDS

CAMP WILLIAMS

UTAH NATIONAL GUARD

PHASE II SOUTH GARRISON INFRASTRUCTURE
17800 SOUTH CAMP WILLIAMS ROAD
RIVERTON, UTAH

ISSUE DESCRIPTION	DATE
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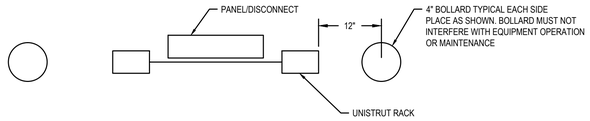
ISSUED DATE	PLOTTED DATE
06.19.14	6.19.2014
EFT PROJECT NO. 13013	DFCM PROJECT NO. 13240480
DRAWN BY SW	CHECKED BY LW

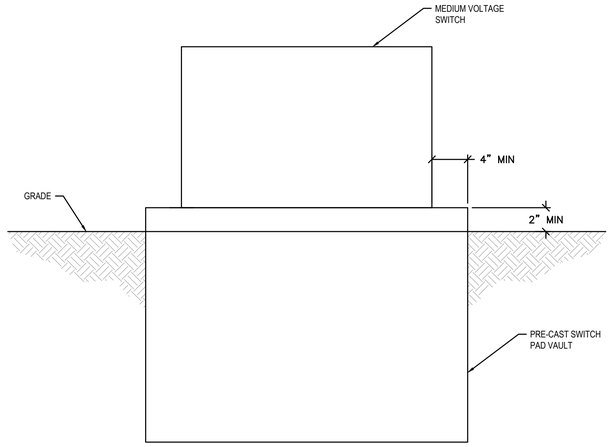
SHEET TITLE
NEW ONE-LINE DIAGRAM PHASE 2

SHEET NUMBER
EX101



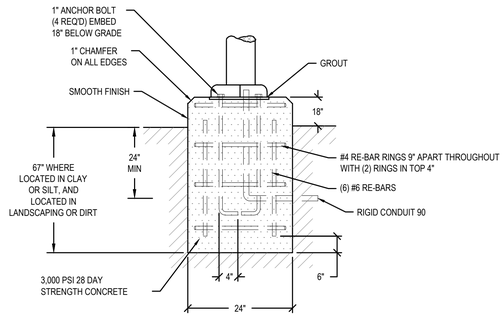
1 EX103 **RACK PROTECTION**

SCALE: NTS



2 EX103 **MEDIUM VOLTAGE PAD MOUNT SWITCH PAD VAULT**

SCALE: NTS



NOTES:
1. ANCHOR BOLTS SUPPLIED WITH POLE. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
2. BOND GROUND CONDUCTOR TO POLE.
3. SEAL CONDUIT TO PREVENT WATER INFILTRATION.
4. PROVIDE SPARE CONDUIT 36" BEYOND LAST POLE ON CIRCUIT AND CAP FOR FUTURE EXTENSION.

3 EX103 **POLE BASE DETAIL UNCONSTRAINED (LANDSCAPING SURROUNDING BASE)**

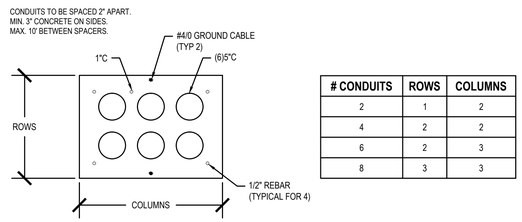
SCALE: NTS

LUMINAIRE SCHEDULE

TYPE		DESCRIPTION	LAMP(S) AND BALLASTS	INPUT (VA)	VOLTAGE (V)	MANUFACTURER(S)	CATALOG #
SL2	DESCRIPTION:	2-HEAD POLE MOUNTED FIXTURE, TYPE II DIST.	LED	404	240	USA LTG	(2) VRS LED-II-120LED-525MA-NW-120-1-RPA-SCBA/STS 30-11/4-FBA
	SIZE:	24"L X 16"W 8"H	13,500 LUMENS/HEAD				(2) CSX1 LED 700 40K T2M MVOLT SPA PER DDBXD/ STS 30 6-4B DM28 DDB/BANNER ARMS DDB
	MOUNTING:	POLE MOUNTED WITH STRAIGHT ARM					
	HOUSING:	DIE-CAST ALUMINUM W MATCHING DOOR	4100K			LITHONIA	
	REFLECTOR:	INJECTION - MOULDED ARCYLIC - TYPE 3 WITH SPILL LIGHT CONTROL				BEGALED	
	LENS:	FLAT TEMPERED GLASS					
	FINISH:	DARK BRONZE POLYESTER POWDER					
	OTHER:	FUSED, PHOTOCELL					
	NOTE:	30' SQUARE TAPERED STEEL DARK BRONZE POLE W/ 180 DEG FIXED BANNER					
		ARMS, TOP & BOTTOM FOR 4' TALL BANNERS. PROVIDE POLE BASE AS SHOWN ON THE DRAWINGS. MADE IN USA.					
SL1	DESCRIPTION:	SINGLE HEAD POLE MOUNTED FIXTURE, TYPE III DIST.	LED	202	240	USA LTG	VRS LED-III-120LED-525MA-NW-120-1-RPA-SCBA
	SIZE:	24"L X 16"W 8"H	13,500 LUMENS				CSX1 LED 700 40K T3M MVOLT SPA PER DDBXD/ STS 30 6-4B DM19 DDB
	MOUNTING:	POLE MOUNTED WITH STRAIGHT ARM				LITHONIA	
	HOUSING:	DIE-CAST ALUMINUM W MATCHING DOOR	4100K			BEGALED	
	REFLECTOR:	INJECTION - MOULDED ARCYLIC - TYPE 3 WITH SPILL LIGHT CONTROL					
	LENS:	FLAT TEMPERED GLASS					
	FINISH:	DARK BRONZE POLYESTER POWDER					
	OTHER:	FUSED, PHOTOCELL					
	NOTE:	30' SQUARE TAPERED STEEL DARK BRONZE POLE,					
		PROVIDE POLE BASE AS SHOWN ON THE DRAWINGS. MADE IN USA					

NOTES:

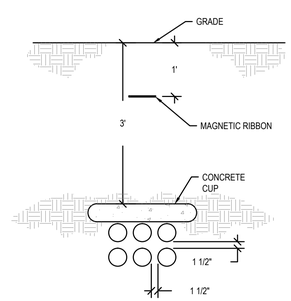
1	ALL LIGHT FIXTURES SHALL HAVE A MINIMUM 5 YEAR WARRANTY.
2	ALL LED LIGHT FIXTURES SHALL HAVE REPLACEABLE AND UPGRADABLE LED MODULES, LM79 AND LM80 LISTED, WITH 50,000 HR MIN. L70 RATING.
3	LIGHT FIXTURE DESCRIPTION TAKES PRECEDENCE OVER CATALOG NUMBER. LIGHT FIXTURES SHALL MEET DESCRIPTION REQUIREMENTS.



# CONDUITS	ROWS	COLUMNS
2	1	2
4	2	2
6	2	3
8	3	3

4 EX103 **SECTION THROUGH POWER DUCT BANK**

SCALE: NTS

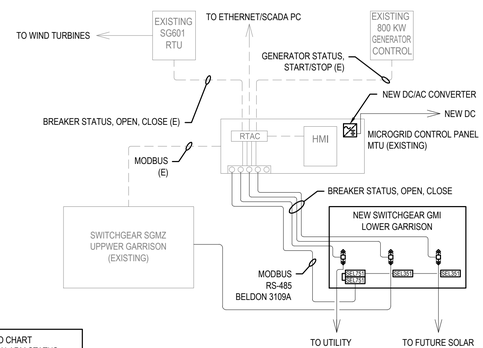


6 EX103 **TELECOM DUCT BANK DETAIL**

SCALE: NTS

5 EX103 **BONDING AT SERVICE CONDUCTOR RACEWAY**

SCALE: NTS



MOBUS I/O CHART
- RELAY ALARM STATUS
- BREAKER SLOSED STATUS
- BREAKER TRIPPED STATUS
- VOLTAGE VALUE
- CURRENT VALUE

BREAKER OPEN OUTPUT
BREAKER CLOSED OUTPUT

SEQUENCE OF OPERATION
1. PLC CONTROLS - MONITORS, INCOMING WIND, GENERATOR, UTILITY AND SOLAR POWER.
2. LOAD ADD OR LOAD SHED TO MAINTAIN RELIABLE POWER.
3. CAMP WILL PURSUE FUTURE NET METERING AGREEMENT AS PART OF SOLAR PROJECT.

NOTE: ORIGINAL CONTACT FOR MICROGRID CONTROL PANEL IS ICTECK IGOR KOVALENKO, 801-571-6740

7 EX103 **SCADA BLOCK DIAGRAM**

SCALE: NTS

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CAMP WILLIAMS

UTAH NATIONAL GUARD

PHASE II SOUTH GARRISON INFRASTRUCTURE
17800 SOUTH CAMP WILLIAMS ROAD
RIVERTON, UTAH

ISSUE DESCRIPTION	DATE
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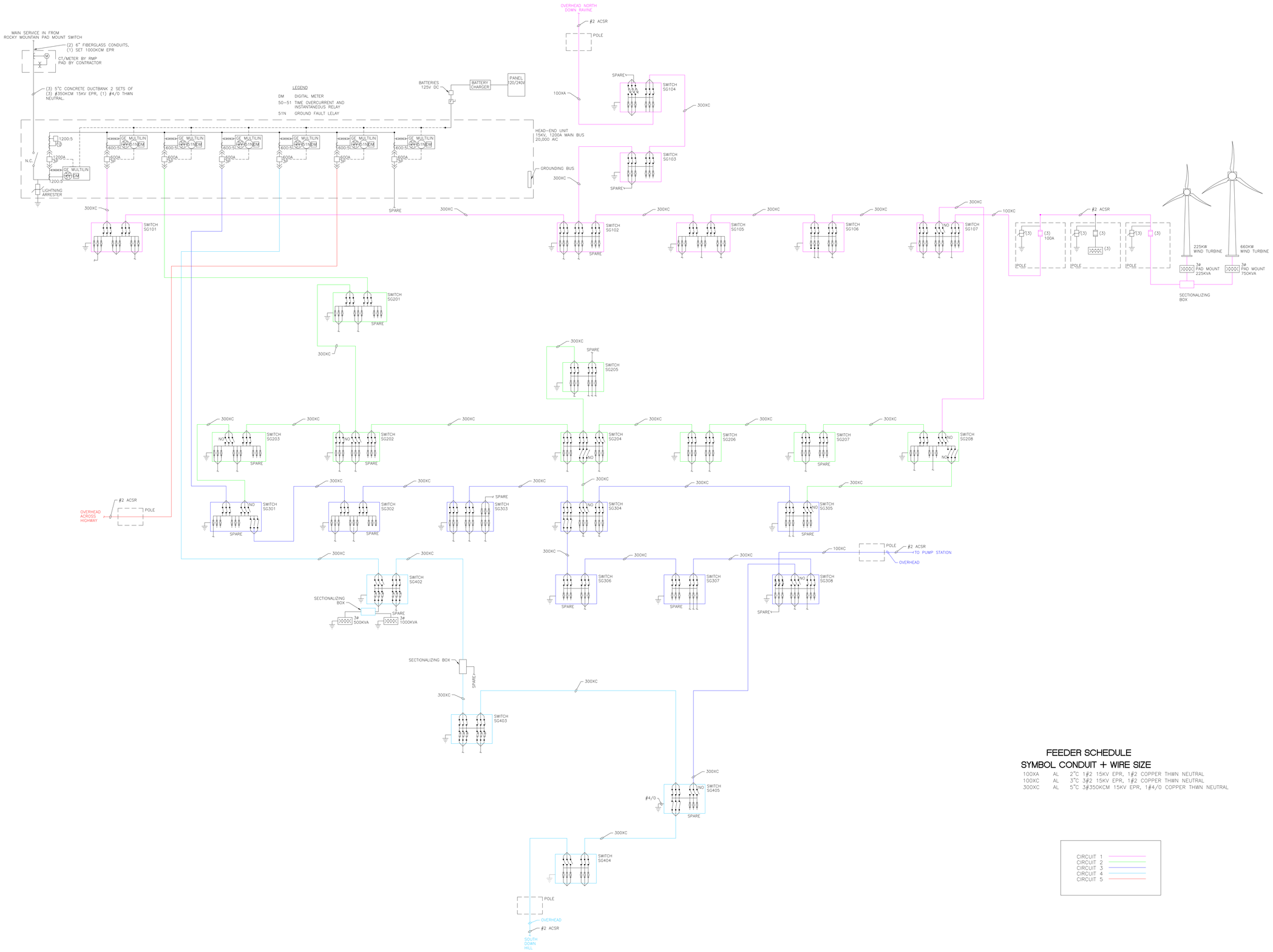
ISSUED DATE	PLOTTED DATE
06.19.14	6.19.2014
EFT PROJECT NO.	DFCM PROJECT NO.
13013	13240480
DRAWN BY	CHECKED BY
SW	LW

SHEET TITLE

ELECTRICAL DETAILS
PHASE 2

SHEET NUMBER

EX103



FEEDER SCHEDULE

SYMBOL CONDUIT + WIRE SIZE

100XA	AL	2"C 1#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
100XC	AL	3"C 3#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
300XC	AL	5"C 3#350KCM 15KV EPR, 1#4/0 COPPER THWN NEUTRAL

CIRCUIT 1
CIRCUIT 2
CIRCUIT 3
CIRCUIT 4
CIRCUIT 5

AS REPORTED AS-BUILTS

RECORD DRAWINGS AS REPORTED

Documents have been revised based solely on Record Working Drawings supplied by the Contractor and the Contractor Documents. They do not necessarily show all existing conditions and may not be accurate at all locations. Field verify existing and/or hidden conditions prior to commencement of new work.

1 EX201 COMBINED ONE-LINE DIAGRAM

SCALE: NTS

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Project #: 57050.00

5353 SOUTH 960 EAST
SUITE 220
SALT LAKE C

CAMP WILLIAMS ELECTRICAL POWER DISTRIBUTION UPGRADE

UTAH NATIONAL GUARD - CAMP WILLIAMS
17800 SOUTH CAMP WILLIAMS RD
RIVERTON, UT 84065

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NO.	DATE	
1	06/03/09	CONSTRUCTION DOCUMENTS

REVISIONS:

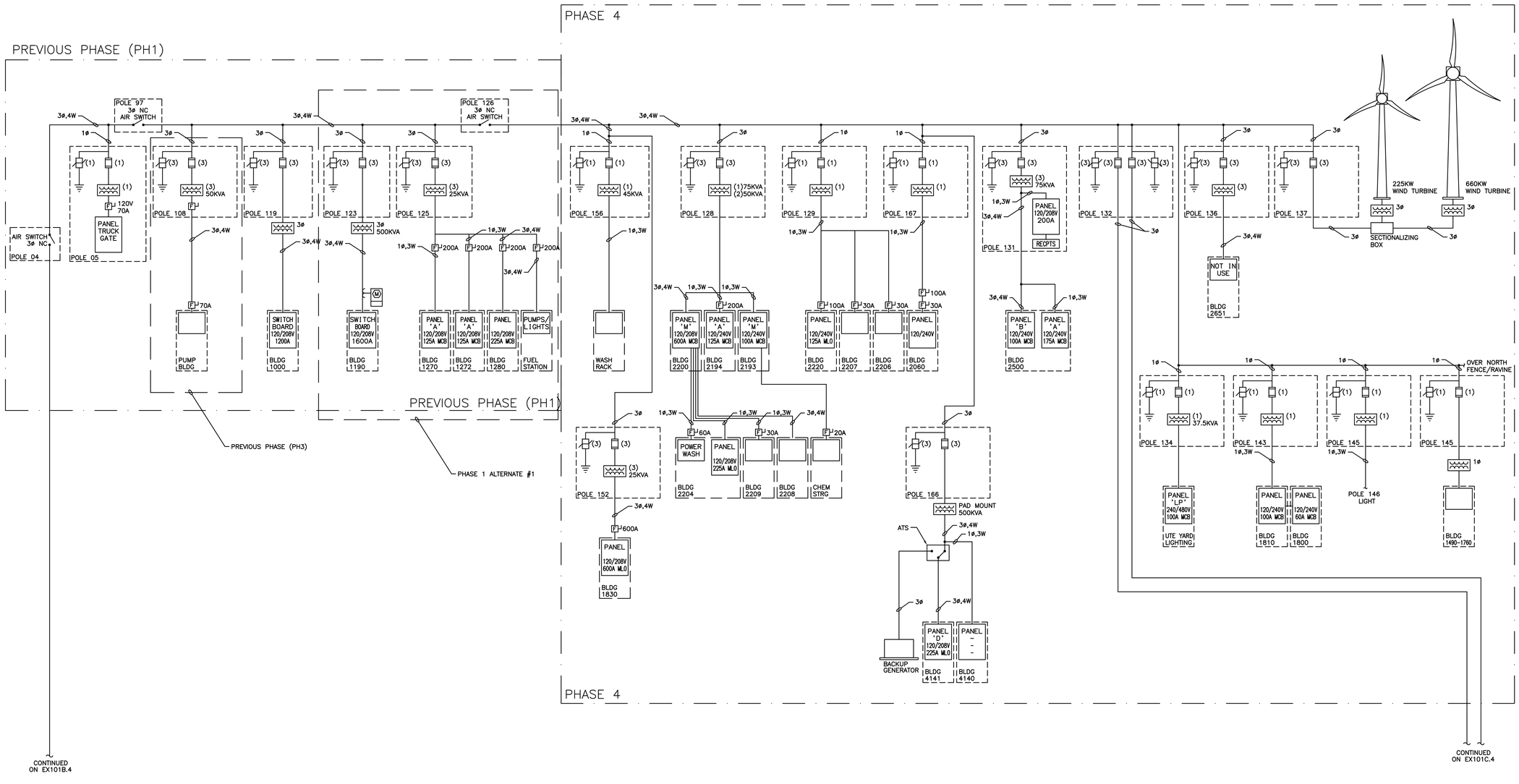
NO.	DATE	

SHEET TITLE:

COMBINED ONE-LINE DIAGRAM

SHEET NUMBER:

EX201



1 EX101A.4 EXISTING ONE-LINE DIAGRAM SHEET 'A' PHASE 4

SCALE: NTS

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CAMP WILLIAMS ELECTRICAL POWER DISTRIBUTION UPGRADE DFCM PROJECT NO. - 07161480

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NO.	DATE	
1	06/03/09	CONSTRUCTION DOCUMENTS

REVISIONS:

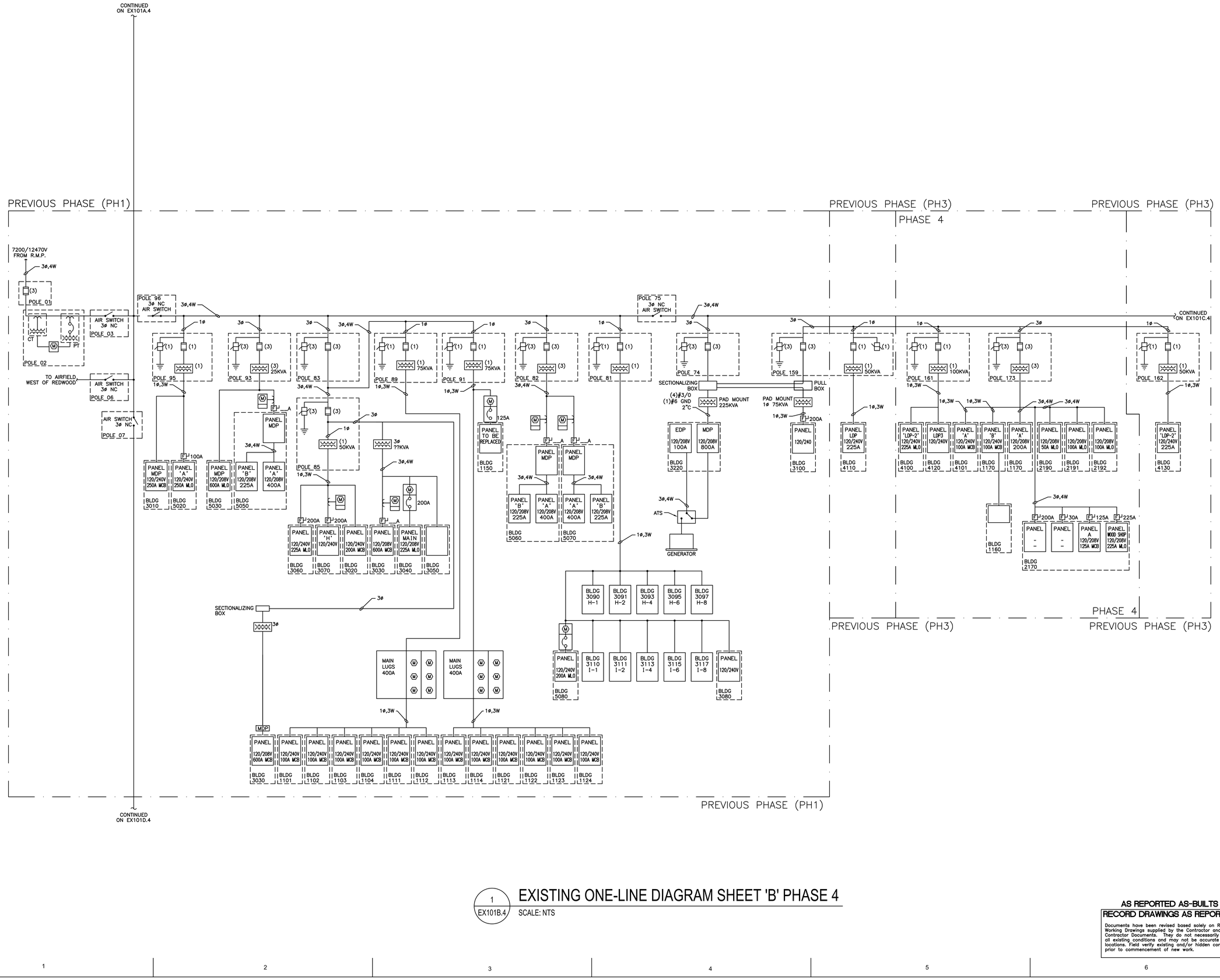
NO.	DATE	

SHEET TITLE:

EXISTING ONE-LINE DIAGRAM SHEET 'A' PHASE 4

SHEET NUMBER:

EX101A.4



1 EX101B.4 EXISTING ONE-LINE DIAGRAM SHEET 'B' PHASE 4

SCALE: NTS

AS REPORTED AS-BUILTS

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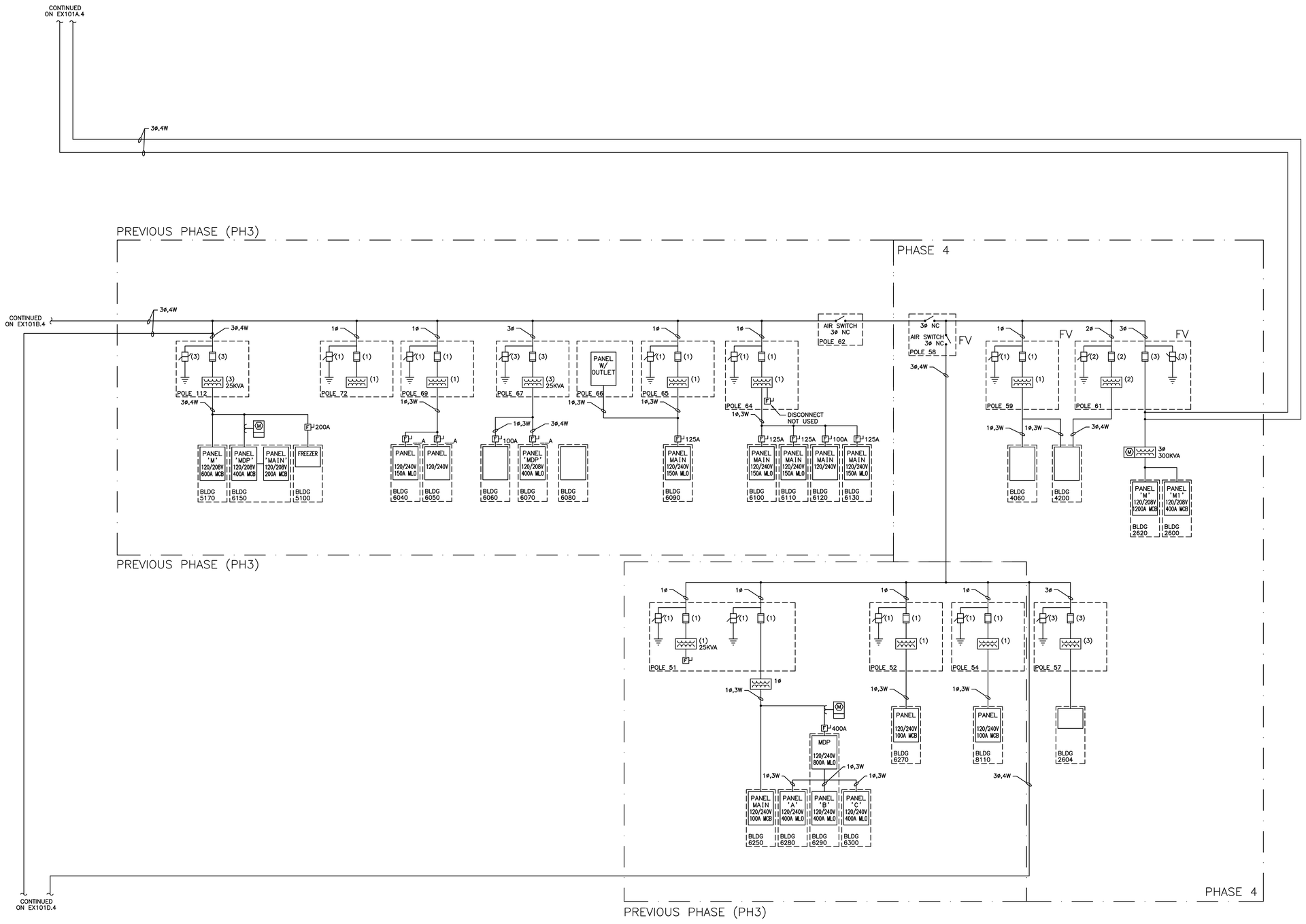
REVISIONS:	
NO.	DATE

SHEET TITLE:

EXISTING ONE-LINE DIAGRAM SHEET 'B' PHASE 4

SHEET NUMBER:

EX101B.4



1 EX101C.4 — EXISTING ONE-LINE DIAGRAM SHEET 'C' PHASE 4

SCALE: NTS

AS REPORTED AS-BUILTS

RECORD DRAWINGS AS REPORTED

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CAMP WILLIAMS ELECTRICAL POWER DISTRIBUTION UPGRADE DFCM PROJECT NO. - 07161480

UTAH NATIONAL GUARD - CAMP WILLIAMS
17800 SOUTH CAMP WILLIAMS RD
RIVERTON, UT 84065

ISSUED:

NO.	DATE	
1	06/03/09	CONSTRUCTION DOCUMENTS

REVISIONS:

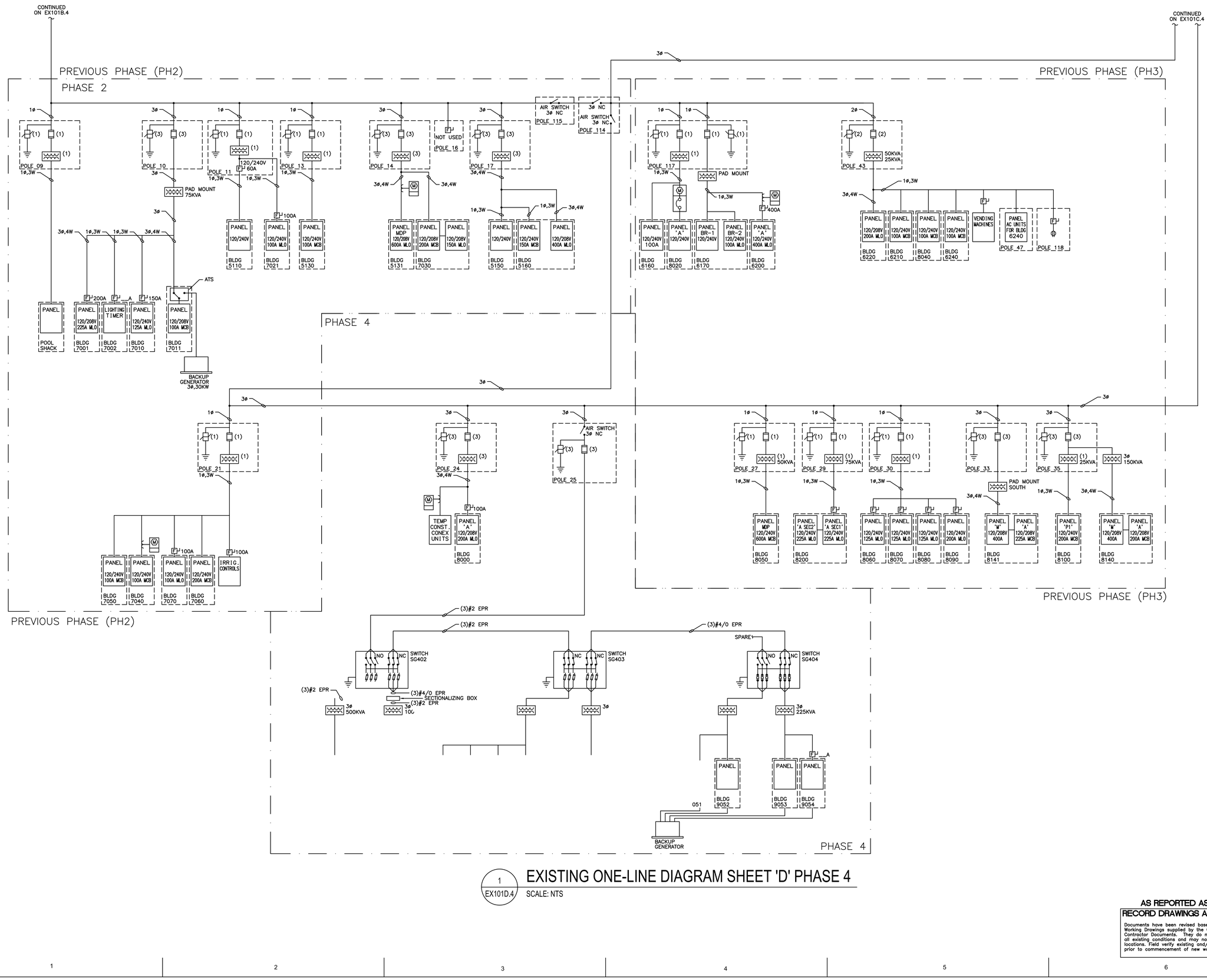
NO.	DATE	

SHEET TITLE:

EXISTING ONE-LINE DIAGRAM SHEET 'C' PHASE 4

SHEET NUMBER:

EX101C.4



1 EX101D.4 EXISTING ONE-LINE DIAGRAM SHEET 'D' PHASE 4

SCALE: NTS

AS REPORTED AS-BUILTS

RECORD DRAWINGS AS REPORTED

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State of Utah
Department of Administrative Services
Division of Facilities Construction & Management
4110 State Office Building
Salt Lake City, Utah 84114
Phone: (801) 538 - 3018
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Internet: http://dfcm.utah.gov

Ken Garner Engineering, Inc.
ELECTRICAL CONSULTING ENGINEERS
102 West 500 South, Suite 225
Salt Lake City, Utah 84101
Telephone: 801.328.8800
Fax: 801.328.8802
Contact: Ken Garner
Project #: 57050.00

Stanley Consultants INC.
5353 SOUTH 960 EAST
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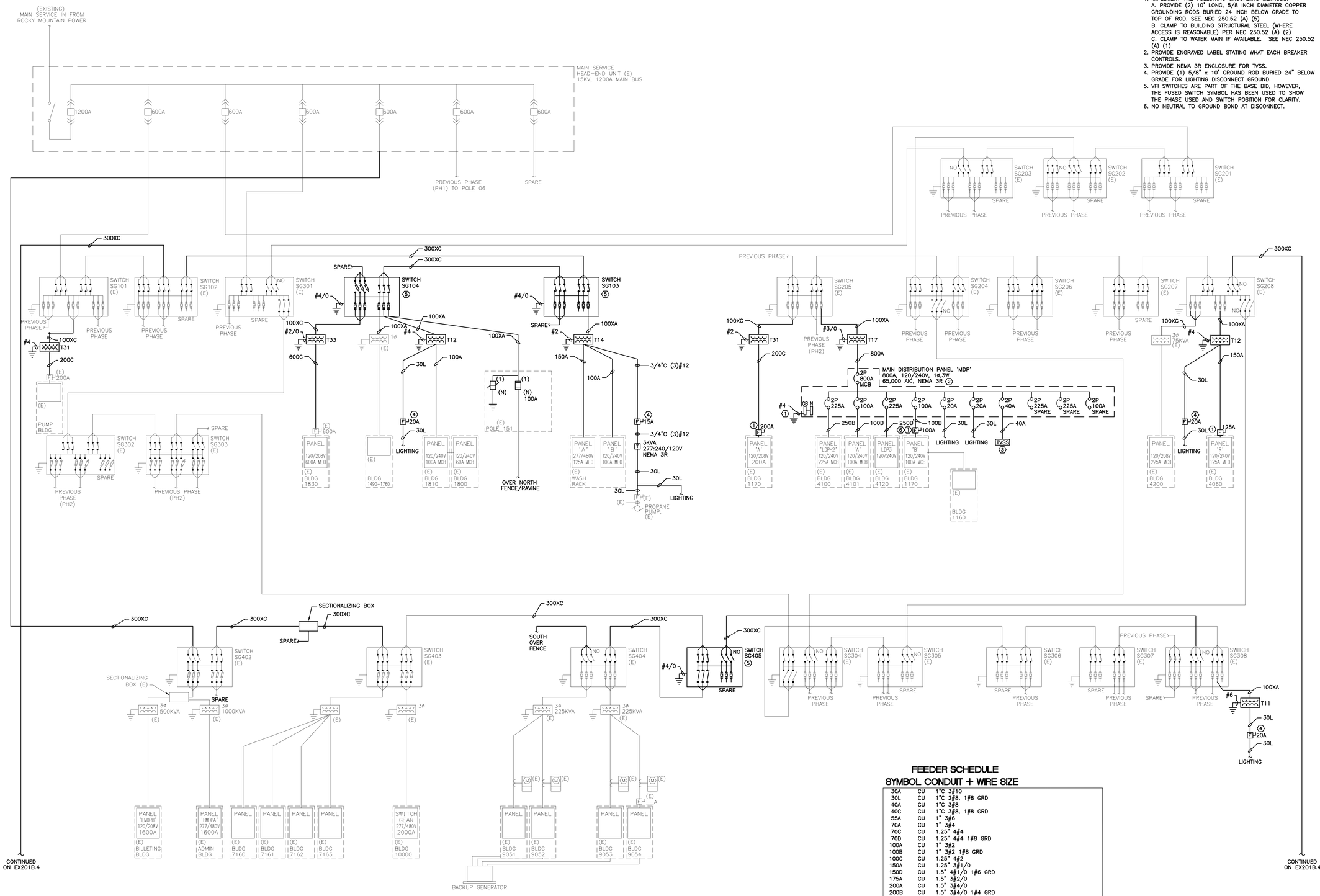
NO.	DATE	

SHEET TITLE:

EXISTING ONE-LINE DIAGRAM SHEET 'D' PHASE 4

SHEET NUMBER:

EX101D.4



KEYED NOTES - SHEET EX201A.4

1. IMPLEMENT THE FOLLOWING GROUNDING METHODS:
   A. PROVIDE (2) 10' LONG, 5/8 INCH DIAMETER COPPER GROUNDING RODS BURIED 24 INCH BELOW GRADE TO TOP OF ROD. SEE NEC 250.52 (A) (5)
   B. CLAMP TO BUILDING STRUCTURAL STEEL (WHERE ACCESS IS REASONABLE) PER NEC 250.52 (A) (2)
   C. CLAMP TO WATER MAIN IF AVAILABLE. SEE NEC 250.52 (A) (1)
2. PROVIDE ENGRAVED LABEL STATING WHAT EACH BREAKER CONTROLS.
3. PROVIDE NEMA 3R ENCLOSURE FOR TVSS.
4. PROVIDE (1) 5/8" x 10' GROUND ROD BURIED 24" BELOW GRADE FOR LIGHTING DISCONNECT GROUND.
5. VFI SWITCHES ARE PART OF THE BASE BID, HOWEVER, THE FUSED SWITCH SYMBOL HAS BEEN USED TO SHOW THE PHASE USED AND SWITCH POSITION FOR CLARITY.
6. NO NEUTRAL TO GROUND BOND AT DISCONNECT.

TRANSFORMER SCHEDULE

CALLOUT	KVA RATING	PRIMARY/SECONDARY	VFI OVERCURRENT SETTING
T11	15	7200V:120/240V	(1) 6A
T12	25	7200V:120/240V	(1) 10A
T13	37.5	7200V:120/240V	(1) 15A
T14	50	7200V:120/240V	(1) 21A
T15	75	7200V:120/240V	(1) 31A
T16	100	7200V:120/240V	(1) 42A
T17	167	7200V:120/240V	(1) 70A
T21	37.5	7200V:240/480V	(1) 15A
T31	75	12470V:120/208V	(3) 10A
T32	112.5	12470V:120/208V	(3) 16A
T33	150	12470V:120/208V	(3) 21A
T34	225	12470V:120/208V	(3) 31A
T35	300	12470V:120/208V	(3)42A
T36	500	12470V:120/208V	(3) 70A

*TRANSFORMERS SHOWN ARE NOT IN EVERY PHASE

FEEDER SCHEDULE

SYMBOL	CONDUIT + WIRE SIZE
30A	CU 1"C 3#10
30L	CU 1"C 2#8, 1#8 GRD
40A	CU 1"C 3#8
40C	CU 1"C 3#8, 1#8 GRD
55A	CU 1" 3#6
70A	CU 1" 3#4
70C	CU 1.25" 4#4
70D	CU 1.25" 4#4 1#8 GRD
100A	CU 1" 3#2
100B	CU 1" 3#2 1#8 GRD
100C	CU 1.25" 4#2
150A	CU 1.25" 3#1/0
150D	CU 1.5" 4#1/0 1#6 GRD
175A	CU 1.5" 3#2/0
200A	CU 1.5" 3#4/0
200B	CU 1.5" 3#4/0 1#4 GRD
200C	CU 2.5" 4#4/0
200D	CU 2.5" 4#4/0 1#4 GRD
250A	CU 2.5" 3#250KCM
250B	CU 2.5" 3#250KCM 1#4 GRD
250C	CU 2.5" 4#250KCM
250D	CU 3" 4#250KCM 1#4 GRD
300A	CU 2.5" 3#350KCM
300C	CU 3" 4#400KCM
400A	CU (2) SETS 200A
400C	CU (2) SETS 200C
600A	CU (2) SETS 300A
600C	CU (2) SETS 300C
800A	CU (4) SETS 200A
800C	CU (4) SETS 200C
100XA	AL 2"C 1#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
100XC	AL 3"C 3#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
300XC	AL 5"C 3#350KCM 15KV EPR, 1#4/0 COPPER THWN NEUTRAL

ADD SPARE CONDUITS AS INDICATED ON SITE PLAN

1 EX201A.4

NEW ONE-LINE DIAGRAM SHEET 'A' PHASE 4

SCALE: NTS

AS REPORTED AS-BUILTS

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DFCM PROJECT NO. - 07161480

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NO.	DATE	
1	06/03/09	CONSTRUCTION DOCUMENTS

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NO.	DATE	

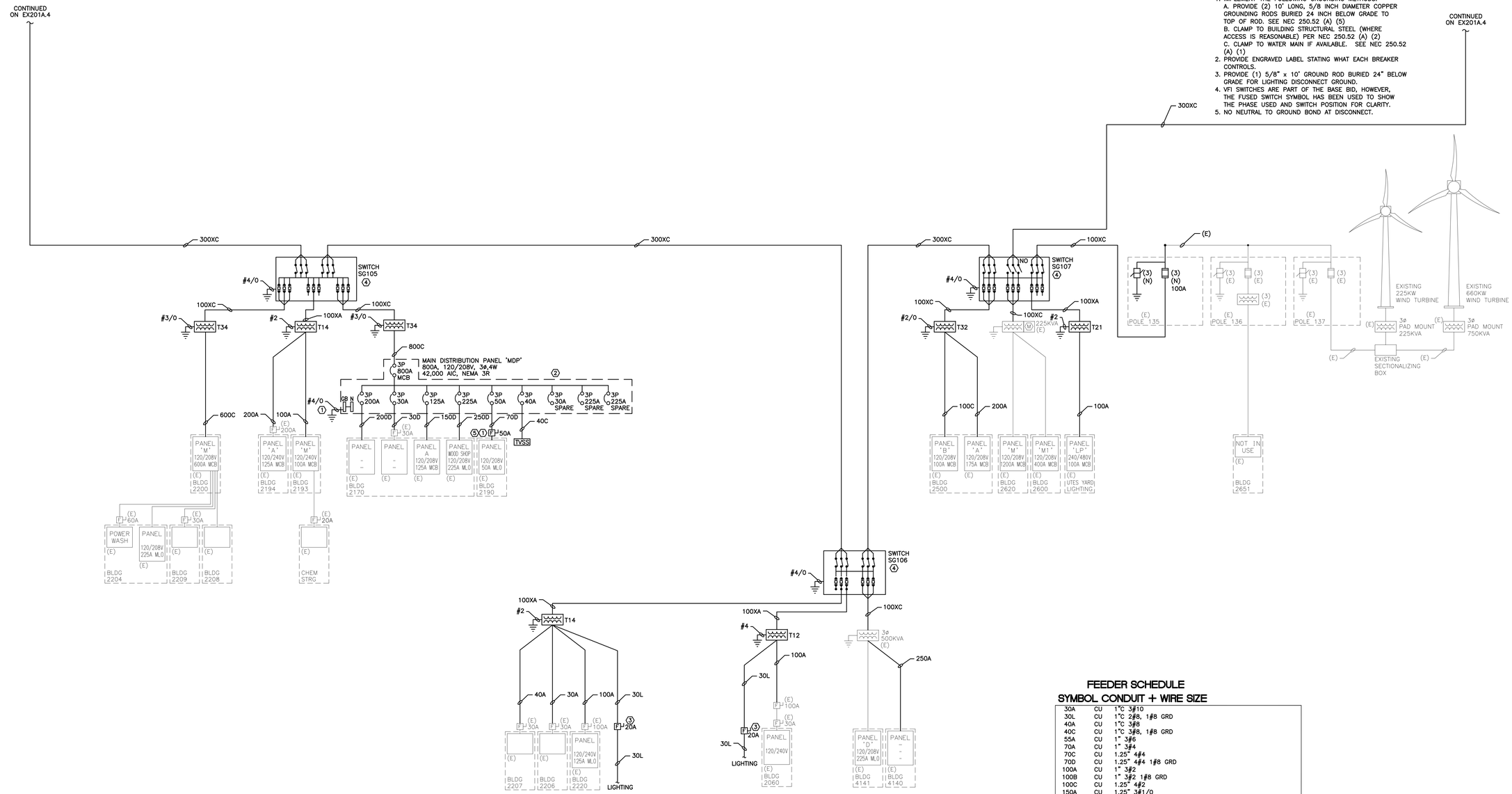
SHEET TITLE:

NEW ONE-LINE DIAGRAM SHEET 'A' PHASE 4

SHEET NUMBER:

EX201A.4

By: Hilary, Dec 15, 2010 - 8:04pm
N:\2007\57050 Camp Williams Electrical Power Distribution Upgrade\Cad\AS-BUILTS\PHASE 4\EX201A.dwg



KEYED NOTES - SHEET EX201B.4

1. IMPLEMENT THE FOLLOWING GROUNDING METHODS:
   A. PROVIDE (2) 10' LONG, 5/8 INCH DIAMETER COPPER GROUNDING RODS BURIED 24 INCH BELOW GRADE TO TOP OF ROD. SEE NEC 250.52 (A) (5)
   B. CLAMP TO BUILDING STRUCTURAL STEEL (WHERE ACCESS IS REASONABLE) PER NEC 250.52 (A) (2)
   C. CLAMP TO WATER MAIN IF AVAILABLE. SEE NEC 250.52 (A) (1)
2. PROVIDE ENGRAVED LABEL STATING WHAT EACH BREAKER CONTROLS.
3. PROVIDE (1) 5/8" x 10' GROUND ROD BURIED 24" BELOW GRADE FOR LIGHTING DISCONNECT GROUND.
4. VFI SWITCHES ARE PART OF THE BASE BID, HOWEVER, THE FUSED SWITCH SYMBOL HAS BEEN USED TO SHOW THE PHASE USED AND SWITCH POSITION FOR CLARITY.
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FEEDER SCHEDULE

SYMBOL CONDUIT + WIRE SIZE

30A	CU	1"C 3#10
30L	CU	1"C 2#8, 1#8 GRD
40A	CU	1"C 3#8
40C	CU	1"C 3#8, 1#8 GRD
55A	CU	1" 3#6
70A	CU	1" 3#4
70C	CU	1.25" 4#4
70D	CU	1.25" 4#4 1#8 GRD
100A	CU	1" 3#2
100B	CU	1" 3#2 1#8 GRD
100C	CU	1.25" 4#2
150A	CU	1.25" 3#1/0
150D	CU	1.5" 4#1/0 1#6 GRD
175A	CU	1.5" 3#2/0
200A	CU	1.5" 3#4/0
200B	CU	1.5" 3#4/0 1#4 GRD
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250C	CU	2.5" 4#250KCM
250D	CU	3" 4#250KCM 1#4 GRD
300A	CU	2.5" 3#350KCM
300C	CU	3" 4#400KCM
400A	CU	(2) SETS 200A
400C	CU	(2) SETS 200C
600A	CU	(2) SETS 300A
600C	CU	(2) SETS 300C
800A	CU	(4) SETS 200A
800C	CU	(4) SETS 200C
100XA	AL	2"C 1#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
100XC	AL	3"C 3#2 15KV EPR, 1#2 COPPER THWN NEUTRAL
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ADD SPARE CONDUITS AS INDICATED ON SITE PLAN

TRANSFORMER SCHEDULE

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T31	75	12470V:120/208V	(3) 10A
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T34	225	12470V:120/208V	(3) 31A
T35	300	12470V:120/208V	(3)42A
T36	500	12470V:120/208V	(3) 70A

*TRANSFORMERS SHOWN ARE NOT IN EVERY PHASE

1 / EX201B.4

NEW ONE-LINE DIAGRAM SHEET 'B' PHASE 4

SCALE: NTS

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SHEET TITLE:

NEW ONE-LINE DIAGRAM SHEET 'B' PHASE 4

SHEET NUMBER:

EX201B.4

Camp Williams Cantonment Map

17800 South Camp Williams Road, Bluffdale Utah

Prepared: 3/12/2014

111°55'50"W 111°55'40"W 111°55'30"W 111°55'20"W 111°55'10"W

40°26'20"N 40°26'10"N 40°26'0"N 40°25'50"N 40°25'40"N

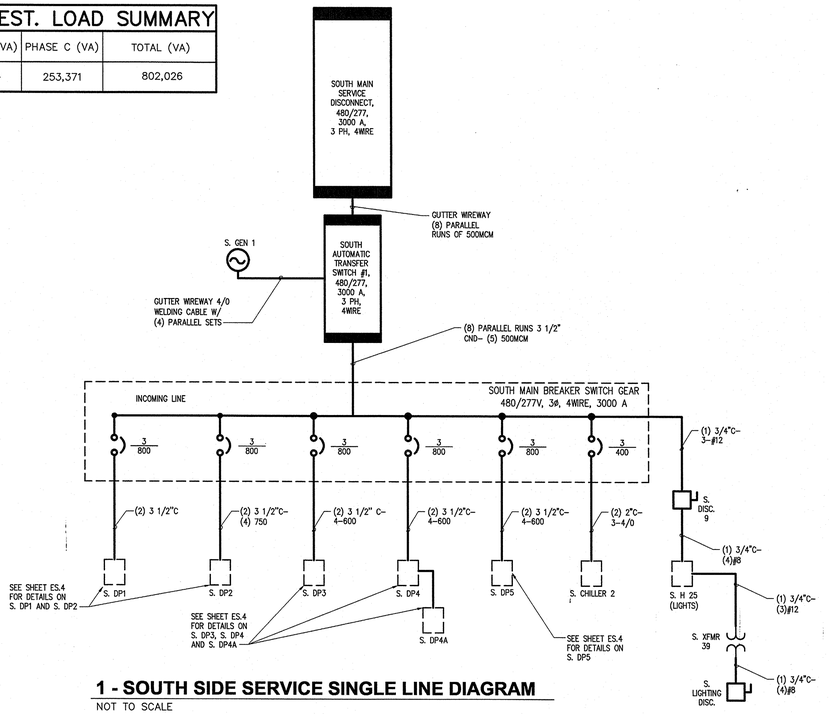
VETERANS MEMORIAL
PERIMETER TRAIL
EXERCISE TRAIL
SUPPLY STREET
TRANSPORTATION AVENUE
POWER AVENUE
MAINTENANCE AVENUE
LOGISTIC STREET
FACILITY STREET
UTES STREET
IDAHO AVENUE
WYOMING AVENUE
NEVADA AVE
UTAH AVENUE
CAMP WILLIAMS AVENUE
OREGON AVENUE
READINESS AVENUE
READINESS WAY
ACADEMY STREET
OFFICER STREET
1ST ST
2ND ST
3RD ST
WATTS ROAD
CAMP WILLIAMS ROAD (Redwood Road)
REVEILLE TRAIL
CANAL ROAD
PERIMETER TRAIL
(Road under construction)
68
To Ranges
Truck Gate
Main Entrance
TARBET FIELD
Track
Theater
Pool
Volleyball
RV Parking
1000 TISA
1001
1150
1190 Engineering
1210
1230 HRF
1250 Heat Trainer
1270
1272 1280
1302
1500
1800
1810
1830
2200 West Utes
2208
2500 East UTES
2540
2204
2209
2206 2207
2520 2510 2530
2160 2170
2190 2191 2192 2193
2210
2194
2220 Firehouse
2600
2620
1160 1180
1170
2060
1094 1104 1114 1124
1093 1103 1113 1123
1092 1102 1112 1122
1091 1101 1111 1121
3010
3020
3030
3040
3050
3060
3070
3080 Latrine/Sho
3100
3220 144th
4101 Latrine/Shower
4100
4120 Barracks
4110
4130
4141
4140
4200 Service Club
5020
5030 Dining
5050
5060
5070
5080
5100
5110
5131 Range Control
5130
5160
5170
5150
6040 6050 6060 6070 Laundry 6080 6090 6100 6110 6120 PT 6130
6150 Instruction
6160 Chapel
6170
6200 PX
6220
6240
6250 Latrine/Showers
6280 6290 Barracks 6300
6270
7009 Entrance
7020
7030 Dining
7040
7050
7070
7060 Billet/Mail
7001
7010
7012 Guard
7150 RTI Admin
RTI Education (under construction)
7155 RTI Barracks
7160
7161
7142
8000
8032 RTI Billets (under construction)
8300 BEQ (under construction)
8301
8110
8100 Officers Club
8101
8200 BOQ
8400 PT
8140A DVQ
8140B DVQ
8160 Sunrise Hall (under construction)
9000 Readiness Center
9056 (under construction)
9055
9051
9052
9053
9054
10
11
12
20 FEMA
21 FEMA
22

1000 Series
2000 Series
3000 Series
4000 Series
5000 Series
6000 Series
7000 Series
8000 Series
9000 Series

SCALE 1:4,000 at 22x34 | NAD83 | GRS80 | Imagery: April 3 2013
0 50 100 150 200 Meters
0 200 400 600 800 Feet

CFMO | Nathan Bradshaw | \\Cantonment_Map.pdf
DRAFT The information on this map is for planning purposes only. This information is not adequate for legal boundary definition. No warranty is made by the StateNational Guard Bureau as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

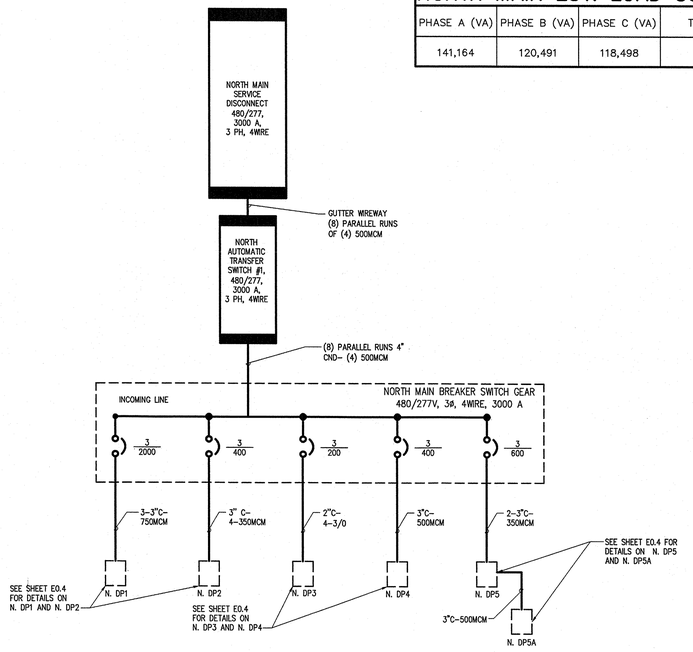
SOUTH MAIN EST. LOAD SUMMARY			
PHASE A (VA)	PHASE B (VA)	PHASE C (VA)	TOTAL (VA)
284,961	263,694	253,371	802,026



1 - SOUTH SIDE SERVICE SINGLE LINE DIAGRAM

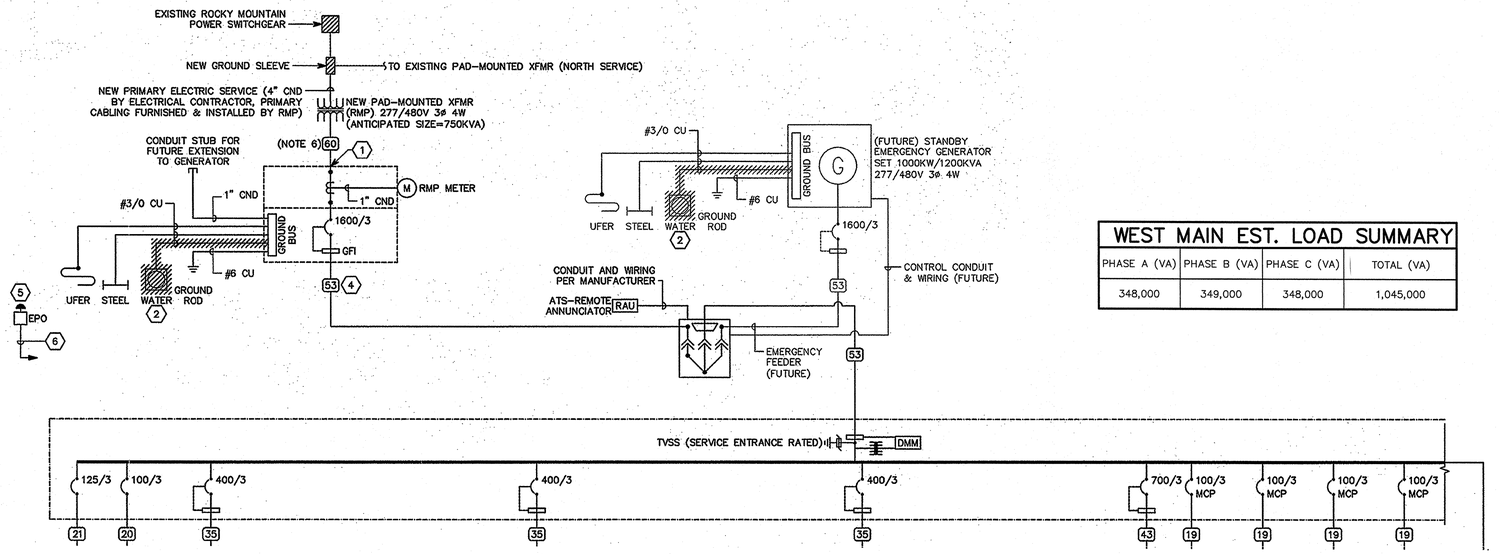
NOT TO SCALE

NORTH MAIN EST. LOAD SUMMARY			
PHASE A (VA)	PHASE B (VA)	PHASE C (VA)	TOTAL (VA)
141,164	120,491	118,498	380,153



2 - NORTH SIDE SERVICE SINGLE LINE DIAGRAM

NOT TO SCALE



3 - WEST SIDE SERVICE SINGLE LINE DIAGRAM

NOT TO SCALE

WEST MAIN EST. LOAD SUMMARY			
PHASE A (VA)	PHASE B (VA)	PHASE C (VA)	TOTAL (VA)
348,000	349,000	348,000	1,045,000

THESE DRAWINGS WERE PREPARED BY MCBH ENGINEERS, PLLC (MCBH), WILMINGTON, NC, FOR POSITIVE POWER, LLC (POSITIVE POWER), OGDEN, UTAH, TO PROVIDE "RECORD DRAWINGS" FROM BASE FLOOR PLANS PROVIDED TO POSITIVE POWER BY THE OWNER AND SITE INVESTIGATION INFORMATION GATHERED BY AND PROVIDED TO MCBH BY POSITIVE POWER. MCBH ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THESE RECORD DRAWINGS OR FOR ANY ERRORS OR OMMISSIONS THAT MAY HAVE BEEN INCORPORATED INTO THEM AS A RESULT OF INCORRECT INFORMATION PROVIDED TO MCBH. THOSE RELYING ON THESE RECORD DOCUMENTS ARE ADVISED TO OBTAIN INDEPENDANT VERIFICATION OF THEIR ACCURACY. WEST SIDE SERVICE DRAWINGS ("EW" SERIES MCBH DRAWINGS AND "3-WEST SIDE SERVICE SINGLE LINE DIAGRAM" ON MCBH SHEET E0.1) WERE ORIGINALLY PRODUCED BY SPECTRUM ENGINEERS, SALT LAKE CITY, UTAH, AND DATED 11/20/2006, AND ARE REPRODUCED IN THIS SET OF DRAWINGS FOR REFERENCE ONLY. MCBH MAKES NO REPRESENTATION THE ORIGINAL DRAWINGS ARE ACCURATE AND MAKES NO CLAIM OF OWNERSHIP OF THE ORIGINAL DRAWINGS.

Revision No.	Description	Date
0	RECORD DRAWINGS	06.02.08

REVISIONS

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3808 Park Avenue
Wilmington, NC 28403
Phone : 910.791.4000
Fax : 910.791.5266
Web Site: mcbheng.com
Engineers, PLLC
McFadyen • Cribb • Benson • Hahn

STATE OF UTAH PROFESSIONAL ENGINEER JOSEPH B. NEWMAN /SEAL 6368934-2202 6-12-08

Utah National Guard Headquarters
Electrical Record Drawings
Salt Lake City, Utah

Electrical
Single Line Diagrams (North, South and West)

Job No.:	07380
Drawn:	JBN
Designed:	JBN
Checked:	RDM

Scale: AS SHOWN

Drawing No: E0.1 1 of 7

Revision: 0

structural

May 30, 2014

Maud de Bel
BacGen
4015 Beach Drive SW
Seattle, WA 98116

Ref: Utah National Guard; West Jordan, Utah
Subject: Solar Panel Roof Evaluation

Ms. de Bel,

In response to your request, BHB Consulting Engineers has performed a structural evaluation of the roof of the army aviation support facility for the addition of the proposed solar panel units.

We were provided access to the as-built drawings of the structure by the managers of the facility and allowed to physically visit the building and observe that the as built structure appeared to be consistent with the drawings. We were also able to obtain the roof shop drawings from Vulcraft by obtaining a joist tag from the project. From these two sets of drawings and our observations, we were able to determine that the roof was initially designed for total load of 60 psf and a snow load of 31 psf.

From our observations of the building, we were able to calculate the actual dead load of waterproofing membrane, metal roof deck, joists/girders, and mechanical equipment including fans and the fire suppression system to be 20 psf. With an allowance of 3 psf for miscellaneous items and the 31 psf snow load, this gives an actual total load of 51 psf, which leaves a capacity of 9 psf.

The calculations of the loads and capacity of the roof are attached, and copies of the drawings can be provided if necessary.

From the information provided to us that the proposed solar panel systems averages approximately 5 psf, the roof of this building is structurally adequate to carry the added loads of the proposed solar panels. The proposed locations can be seen in the attached aerial image.

Sincerely,

Gerald Mckenzie, SE
BHB Consulting Engineers, P.C.

LICENSED PROFESSIONAL STRUCTURAL ENGINEER
GERALD R. McKENZIE
323922-2203
STATE OF UTAH
5/30/2014

2766 South Main Street - SLC, Utah 84115 - Phone: 801.355.5656 - Fax: 801.355.5950
www.bhbengineers.com

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"Engineering Results"
BHB Consulting Engineers
A Professional Corporation

Project: Utah National Guard Hangar Roof Evaluation

2766 South Main Street • Salt Lake City • Utah 84115
Phone: 801.355.5656 • Fax 801.355.5950

Sheet:

Job#: 14428

Date: 5/30/14

By: DLH

Joists: 16 K2 w/ span = 20'-0"

G.F. 368 plf TL, 297 plf LL

Joist Spacing = 6'-2"

$\Rightarrow TL = \frac{(368\ plf)}{6.17\ ft} = 60\ psf$

$LL = \frac{297\ plf}{6.17\ ft} = 48\ psf$

Dead Loads: (assumed from site observations)

Waterproofing Membrane: 3 psf

Metal Roof Deck: 3 psf

Joists/Girders: 5 psf

Mechanical, including fans, fire supression system, etc: 6 psf

Misc: 3 psf

$\Sigma = 20\ psf$

$LL = SL = 31\ psf$

$DL = 20\ psf$

$\Rightarrow TL = 51\ psf$

TL capacity = 60 psf - 51 psf = 9 psf

LL capacity = 48 psf - 31 psf = 17 psf

Using DL of 5 psf for solar panels, Ok

Girders: Designed for 7.2k point loads @ each joist

Load applied w/ solar panels: $TL = (51\ psf)(20\ ft)(6.17\ ft) = 6.3k$ Ok

07539

VERSICO TOTAL ROOFING SYSTEM WARRANTY

VSW-1
Rev 4/11

Versico, a division of Carlisle Construction Materials Incorporated (Versico), warrants to the Building Owner (Owner) of the building described below, that subject to the terms, conditions, and limitations stated in this warranty, Versico will repair any leak in the Versico Total Roofing System (Versico Roofing System) installed by a Versico Authorized Roofing Contractor for a period of 20 years commencing with the date of Versico's acceptance of the Versico Roofing System installation. However, in no event shall Versico's obligations extend beyond 20.5 years subsequent to the date of substantial completion of the Versico Roofing System. See below for exact date of warranty expiration.

The Versico Roofing System is defined as the following Versico Materials: Membrane, Flashings, Adhesives and Sealants, Fastener Assemblies, Metal Edging, Insulation and any other Versico brand products utilized in this installation.

TERMS, CONDITIONS, LIMITATIONS

1. Owner shall provide Versico with written notice to the address printed below within thirty (30) days of the discovery of any leaks in the Roofing System. By so notifying Versico, the Owner authorizes Versico to investigate the cause of the leak. Should the investigation reveal the cause of the leak to be outside the scope of this warranty, investigation and repair costs for this service shall be paid by the Owner.

2. If, upon inspection, Versico determines that the leak is caused by defects in the Versico Roofing System's material or workmanship of the Versico Authorized Roofing Contractor in installing the same, Owner's remedies and Versico's liability shall be limited to Versico's repair of the leak.

3. This Warranty shall not be applicable if Versico determines that any of the following has occurred:

(a) The Versico Roofing System is damaged by natural disasters, including, but not limited to, lightning, insects, winds in excess of 90 mph measured at roof level, earthquakes, fire, tornado, and hail; or

(b) The Versico Roofing System is damaged by any acts of negligence, accidents, or misuse, including but not limited to, excessive traffic, recreational activities, storage of materials on the roof, vandalism, or civil disobedience; or

(c) The Versico Roofing System is damaged by infiltration of moisture in, through, or around walls, skylights, vents, copings, HVAC units, building structures, or underlying or surrounding areas; or

(d) The Versico Roofing System is damaged by the building structure failing to have adequate strength to support all live and dead loads, including water and snow loads, or by any other structural defects or failures; or

(e) The Versico Roofing System is damaged by settlement, distortion, cracking, movement or failure of the roof substrate, coping, walls, structural members or components adjacent to the roof or foundation of said building; or

(f) The Versico Roofing System is damaged as a result of attack by roof top contaminants such as solvents, petroleum, oil products, acids, or other harmful chemicals; or

(g) The Versico Roofing System encounters leaks or is otherwise damaged by condensation resulting from any condition within the building that may generate moisture.

4. This Warranty shall be null and void if Versico determines that any of the following has occurred:

(a) If, after installation of the Versico Roofing System by a Versico Authorized Roofing Contractor, there are any alterations, test cuts, or repairs made on or through the roof, or objects such as, but not limited to, structures, fixtures, or utilities are placed upon or attached to the roof without first obtaining written authorization from Versico, or

(b) Failure by the Owner to use reasonable care in maintaining the roof, including, but not limited to, periodic cleaning of drains and removal of harmful debris from the roof, or

(c) Owner fails to comply with every term and/or condition stated herein.

5. During the term of this Warranty, Versico shall have free access to the roof during regular business hours.

6. Versico shall have no obligation under this Warranty while any bills for installation, supplies, services, and warranty charges have not been paid in full to the Versico Authorized Roofing Contractor, Versico, or material suppliers.

7. Versico's failure at any time to enforce any of the terms or conditions stated herein shall not be construed to be a waiver of such provision.

8. This warranty is not assignable by operation of law or otherwise. Application may be made by a new building owner for reissuance of the warranty during the original warranty period. Certain procedures, including an inspection of the Versico Roofing System by a Versico representative, and fees will apply to any reissuance. Versico reserves the right, in its sole discretion, to refuse to reissue this warranty.

9. Only Versico brand insulations are covered by this warranty. Versico specifically disclaims liability, under any theory of law, for damages sustained by or caused by non-Versico brand insulation products.

10. Versico shall not be responsible for the cleanliness or discoloration of the Versico Roofing System caused by environmental conditions including, but not limited to, dirt pollutants or biological agents.

11. Versico shall have no liability under any theory of law for any claims, repairs, restoration, or other damages including, but not limited to, consequential or incidental damages, relating, directly or indirectly, to the presence of any irritants, contaminants, vapors, fumes, molds, fungi, bacteria, spores, mycotoxins, or the like in the building or in the air, land, or water serving the building.

VERSICO DOES NOT WARRANT PRODUCTS UTILIZED IN THIS INSTALLATION WHICH IT HAS NOT FURNISHED; AND SPECIFICALLY DISCLAIMS LIABILITY, UNDER ANY THEORY OF LAW, ARISING OUT OF THE INSTALLATION AND PERFORMANCE OF, OR DAMAGES SUSTAINED BY OR CAUSED BY, PRODUCTS NOT FURNISHED BY VERSICO.

THE REMEDIES STATED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES FOR FAILURE OF THE ROOFING SYSTEM OR ITS COMPONENTS. THERE ARE NO WARRANTIES EITHER EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, WHICH EXTEND BEYOND THE FACE HEREOF. VERSICO SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR OTHER DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGE TO THE BUILDING OR ITS CONTENTS UNDER ANY THEORY OF LAW.

OWNER: UTAH NATIONAL GUARD
BUILDING: UTAH NATIONAL GUARD - FIELD MAINTENANCE SHOP
7602 SOUTH AIRPORT ROAD
WEST JORDAN, UT

ROOFER: UTAH CORRECTIONAL INDUSTRIES
P.O. BOX 850
DRAPER, UT 84020

DATE INSTALLATION COMPLETED: 10/05/2011
DATE OF ACCEPTANCE BY VERSICO: 12/20/2011
WARRANTY EXPIRATION DATE: 12/19/2031

WARRANTY NUMBER: [redacted]10075435

VERSICO, a division of Carlisle Construction Materials Incorporated

BY [redacted]

VERSICO ROOFING SYSTEMS
P.O. Box 1289 Carlisle, PA 17013
(800) 992-7663 (717) 960-4035 FAX

00236

No. G2007-00007129

GAF MATERIALS CORPORATION

EVERGUARD® DIAMOND PLEDGE™ ROOF GUARANTEE

Diamond Pledge

TYPE OF GUARANTEE: EVERGUARD DIAMOND PLEDGE PERIOD OF COVERAGE: 20 YEARS

OWNER: STATE OF UTAH - DFCM PROJECT #07014470, SALT LAKE CITY, UT 84114

NAME AND TYPE OF BUILDING: UTAH NATIONAL GUARD ARMORY

ADDRESS OF BUILDING: 7680 SOUTH AIRPORT ROAD, WEST JORDAN, UT 84084

SPECIFICATION: TMATI60 AREA OF ROOF: 870.00 SQUARES

APPLIED BY: COLLINS ROOFING INC. / BLUFFDALE, UT

DATE OF COMPLETION: 11/21/2007 EXPIRATION DATE: 11/21/2027

THE GUARANTEE

GAF MATERIALS CORPORATION ("GAFMC") guarantees to you, the original owner of the building described above, that GAFMC will repair leaks through the EverGuard roofing membrane, base flashing, insulation, expansion joint covers, preflashed accessories and coated edge metal (the "EverGuard Roofing Materials") resulting from the causes listed below while this guarantee is in effect.

Scope Of Coverage - Leaks Caused by:

1. Natural deterioration of the EverGuard Roofing Materials
2. Splits not caused by structural failure or movement of or cracks in substrate roof base or non-GAFMC insulation over which the EverGuard Roofing Materials are applied
3. Ridges
4. Buckles and wrinkles
5. Workmanship in applying the EverGuard Roofing Materials

There is no dollar limit on covered repairs. Leaks caused by any materials other than those listed above, such as the roof deck, insulation, or any other materials used in the construction of the roof system, are not covered.

GUARANTEE PERIOD

This guarantee ends as of the date listed above. Note: Some systems require the use of specialized accessories in the roofing system. Where Mcurbs or Lexsuco® flashings are used, they are covered by this guarantee **only** for the first ten years.

OWNER'S RESPONSIBILITIES

In the event of a leak through the EverGuard Roofing Materials, you must notify the GAFMC Guarantee Services Group, 1361 Alps Road, Bldg. 11, Wayne, New Jersey 07470 in writing about the leak within 30 days after its discovery or GAFMC will have no responsibility for any repairs. NOTE: the roofing contractor is NOT an agent of GAFMC; notice to the roofing contractor is NOT notice to GAFMC.

By notifying GAFMC, you authorize GAFMC to investigate the cause of the leak. If the investigation reveals that the leak is not covered by this Guarantee, you agree to pay an investigation cost of $500. This Guarantee will be cancelled if you fail to pay this cost within 30 days of receipt of an invoice for it.

You must perform regular inspections and maintenance and keep records of this work. Any equipment or material that impedes any inspection must be removed at your expense so that GAFMC can perform inspections. You must make repairs to the building or roof components not covered under the guarantee that are identified by GAFMC during an inspection as necessary to preserve the integrity of the EverGuard Roofing Materials. This guarantee will be cancelled if you fail to do so in a timely manner.

You may make temporary repairs to minimize damage to the building or its contents in an emergency, at your sole expense. These repairs will not result in cancellation of the guarantee as long as they are reasonable and customary and do not result in permanent damage to the EverGuard Roofing Materials.

EXCLUSIONS FROM COVERAGE

This Guarantee does NOT cover leaks or defects or deficiencies in the Roof Deck or Roof System caused by:

1. Lack of roof maintenance.
2. Unusual weather conditions or natural disasters including, but not limited to, windstorms, hail, floods, hurricanes, lightning, tornados, and earthquakes.
3. Damage to the roof constructed of the EverGuard Roofing Materials due to: (a) movement or cracking of the roof deck or building; (b) improper installation or failure of any non-GAFMC insulation or materials including, but not limited to, nailers; (c) infiltration or condensation of moisture through or around the walls, copings, building structure or surrounding materials; or (d) chemical attack on the membrane, including, but not limited to, exposure to grease or oil.
4. Traffic of any nature on the roof.
5. Changes in the use of the building unless approved in writing in advance by GAFMC.
6. Any repairs, modifications or additions to the EverGuard Roofing Materials after the roof is completed, unless approved by GAFMC in writing in advance.
7. Any condition (e.g., base flashing height or lack of counter-flashing) that is not in accordance with GAFMC's EverGuard Application and Specifications Manual unless specifically accepted by GAFMC in writing.

No representative, employee or agent of GAFMC has the authority to assume any additional liability or responsibility for GAFMC unless approved in writing by an authorized Guarantee Services Manager. GAFMC shall not be responsible for or liable for any change or amendment to the EverGuard roof specifications in regard to the construction of the roof described above unless the change and/or amendment to the specifications is approved in writing by an authorized GAFMC Guarantee Services Manager. NOTE: Any inspections made by GAFMC are limited to a surface inspection only, are for GAFMC's sole benefit, and do not constitute a waiver of any of the terms and conditions of this guarantee.

ASSIGNABILITY

You may assign this guarantee to a subsequent owner of this building for the remaining term only if: 1) the request is in writing within 30 days after ownership transfer; 2) you make any repairs to the EverGuard Roofing Materials or other roofing or building components that are identified by GAFMC after an inspection as necessary to preserve the integrity of the EverGuard Roofing Materials; and 3) you pay an assignment fee of $500. This Guarantee is NOT otherwise assignable, directly or indirectly.

LIMITATION OF DAMAGES; MEDIATION; JURISDICTION; CHOICE OF LAW

THIS GUARANTEE IS EXPRESSLY IN LIEU OF ANY OTHER GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, and of any other obligations or liability of GAFMC, whether any claim against it is based upon negligence, breach of warranty or any other theory. In NO event shall GAFMC be liable for any CONSEQUENTIAL OR INCIDENTAL DAMAGES of any kind, including, but not limited to interior or exterior damages and/or mold growth.

The parties agree that, as a condition precedent to litigation, any controversy or claim relating to this Guarantee shall be first submitted to mediation before a mutually acceptable mediator. In the event that mediation is unsuccessful, the parties agree that neither one will commence or prosecute any lawsuit or proceeding other than before the appropriate state or federal court in the State of New Jersey. This Guarantee shall be governed by the laws of the State of New Jersey, without regard to principles of conflicts of laws. Each party irrevocably consents to the jurisdiction and venue of the above identified courts.

NOTE: This Guarantee becomes effective only when all bills for installation and supplies have been paid in full to the roofing contractor and materials suppliers, and the Guarantee charge has been paid to GAF Materials Corporation.

GAF MATERIALS CORPORATION
1361 ALPS ROAD
WAYNE, NJ 07470

By: Dina M Delfini 12/13/2007

Authorized Signature Date

COMTS700A