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Document Title:	Volume 2 App 2 Project Description Appendices Part 1
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APPENDIX 2-A: DESIGN CRITERIA AND MAJOR EQUIPMENT SPECIFICATIONS

Design Basis

Corby Energy Center, LLC

Corby BESS
Project No. 163851

Revision B
5/3/2024

Design Basis

prepared for

Corby Energy Center, LLC
Corby BESS
Vacaville, CA

Project No. 163851

Revision B
5/3/2024

prepared by

Burns & McDonnell Western Enterprises, Inc.
Brea, CA

INDEX AND CERTIFICATION

Corby Energy Center, LLC

Design Basis
Project No. 163851

Report Index

Certification - Electrical

I hereby certify, as a Professional Engineer in the state of California, that the information in this document was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Corby Energy Center, LLC or others without specific verification or adaptation by the Engineer.

Revision History

Rev	Date	By	Checked	Revision Description
A	12/21/2023	Anthony Biondo	Adam Hinerman	Issued for Review (30%)
B	05/03/2024	Josephine Thomas	Drake Hudson	Issued for Review (60%)

INDEX AND CERTIFICATION

Corby Energy Center, LLC

Design Basis
Project No. 165747

Report Index

Certification – Instrumentation and Controls

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Revision History

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A	12/21/2023	Anthony Biondo	Derek Stuchlik	Issued for Review (30%)
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INDEX AND CERTIFICATION

Corby Energy Center, LLC

Design Basis
Project No. 165747

Report Index

Chapter Number	Chapter Title	Number of Pages
5.0	Civil	2

Certification – Civil

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Revision History

Rev	Date	By	Checked	Revision Description
A	12/21/2023	Dana Rosenblum	Emily Asnicar	Issued for Review (30%)
B	05/03/2024	Dana Rosenblum	John Tanner Dowell	Issued for Review (60%)

INDEX AND CERTIFICATION

Corby Energy Center, LLC

Design Basis
Project No. 165747

Report Index

Certification – Structural and Geotechnical

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Revision History

Rev	Date	By	Checked	Revision Description
A	12/21/2023	Jose Ramirez	Moses Pacheco	Issued for Review (30%)
B	05/03/2024	Jose Ramirez	Moses Pacheco	Issued for Review (60%)

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 General

Basis of Design (BOD) is defined as the documentation of codes, standards, principles, assumptions, rationale, criteria, and considerations that each engineering discipline will be using to develop the engineering drawings, specifications, and studies to meet the design requirements of the agreement.

1.2 General Project Information

Design Criteria	Value(s)	Note(s)
Client	Corby Energy Storage, LLC	
Site Address	6865 Byrnes Rd, Vacaville, CA 95687	
Site Access via	Byrnes Rd	
POI Type	AC	
POI Voltage	230kV	
POI Location	Vaca-Dixion PG&E Substation	
Project Type	Li-Ion Battery Storage (LFP)	
Battery Installation	Containerized	
Project Rated Power	300MW	
Project Rated Capacity	1200MWh	
BESS System Voltage (Max)	1500VDC	

1.3 Site Conditions

Design Criteria	Value(s)	Note(s)
Ambient Design Air Temp (Max)	40.0 °C	*ASHRAE, Extreme DB, n=20 is 45C. 40C design temperature was provided by Owner.
Ambient Design Air Temp (Min)	-6.6 °C	*ASHRAE, Extreme DB, n=20
Site Elevation	77’	DK Engineering Survery
Known Utilities/Obstructions	PG&E owned transmission gas pipeline at southwest corner of site	
Site Contamination	None known	

*ASHRAE: VACAVILLE NUT TREE, CA, USA (WMO: 724828)

1.4 Sparing Philosophy

Design Criteria	Value(s)	Note(s)
34.5kV Breakers	N/A	
Inverters and Step-Up Transformers	N/A	
480V Distribution Breakers	See Section 1.5	
120VAC Breakers	N/A	
120VAC UPS Feeders	N/A	
125VDC Breakers	N/A	
Bus Capacity	20%	At Beginning of Life
Transformer Capacity	20%	
UPS Battery Margin	N/A	
UPS Inverter Margin	N/A	
Duct Spares	N/A	
Tray Fill Margin	N/A	
Fiber Optic Cabling	Over 50% spare strands	

1.5 Future Expansion/Augmentation, Equipment Space

Design Criteria	Value(s)	Note(s)
34.5kV Breakers	N/A	Spare capacity on existing breakers planned for augmentation.
Inverters and Step-Up Transformers	AC Augmentation planned to meet facility nameplate rating for 20-year design life.	Space allocated for 40 future PCS skids.
480V Distribution Breakers	None planned.	Spare breakers provided at BOL (HOLD)
120VAC Breakers	N/A	
120VAC UPS Feeders	N/A	
125VDC Breakers	N/A	
Battery Augmentation Skids	AC Augmentation planned to meet facility nameplate rating for 20-year design life.	Space allocated for 160 future battery containers

1.6 Drawing Number Format

Design Criteria	Value(s)	Note(s)
Site Code	BCR	
Discipline	A – General C – Civil E – Electrical S – Structural T – Controls	
Sequence	XXX	
Drawing Number Format	Site Code-Discipline-Sequence	Ex. BCR-A-000

2.0 MAJOR EQUIPMENT

2.1 Battery Enclosures

Design Criteria	Value(s)	Note(s)
Quantity	(384) Three Hundred Eighty-Four	Beginning of Life Sizing and quantity provided by Owner
Manufacturer, Model	CATL, EnerC+ (C02306P05L01)	Owner Supplied
Rated Energy (BOL)	4073.47 kWh	
Discharge Duration	4 Hours	
Voltage Range	1040-1500 VDC	
Nominal Voltage	1331.2 VDC	
Auxiliary Power Requirements	37.5 kW, 480VAC, 3PH, 4W (HOLD)	Load Per Battery Enclosure
UPS Power Requirements	0.8 kW, 230V (HOLD)	

2.2 Power Conversion System Enclosures

Design Criteria	Value(s)	Note(s)
Quantity	(96) Ninety-six	Beginning of Life Sizing and quantity provided by Owner
Manufacturer, Model	Power Electronics FP4200M2	Owner Supplied
MV Transformer Rating	4207 kVA @ 40 °C	Most conservative nameplate @40 °C
MV Transformer Voltage	34.5 kV-660 V	
MV Transformer Configuration	Delta-Wye	HV-LV
MV Transformer Impedance	8.9 %	Impedance at 4207 kVA
Inverter Rating	4200 KVA @ 40 °C	
Inverter AC Output Voltage	660 VAC	
Inverter Battery Side Voltage Range	934-1500 VDC	

2.3 Auxiliary Power Transformer

Design Criteria	Value(s)	Note(s)
Quantity	17	
Manufacturer	Hitachi	Owner Supplied
Auxiliary Transformer Rating	1500 kVA @ 40 °C	
Auxiliary Transformer Voltage	34.5 kV-480V/277V	
Auxiliary Transformer Configuration	Delta-Wye Grounded	HV-LV
Transformer Impedance	5.65 +/- 7.5%	

2.4 Auxiliary Power Distribution

Design Criteria	Value(s)	Note(s)
Quantity	17	
Manufacturer	Lakeshore Electric	Owner Supplied
Switchboard Main	3P, 2000 AF/ 2000 AT	Trip setting dependent on string size
Switchboard Feeder	(32) 3P, 70A, 4-Wire (5) 2P, 10A	Typical for all

2.5 Equipment Clearances

Design Criteria	Value(s)	Note(s)
Battery Enclosures	Front – 10’ (11.5’ recommended) Rear – 11/16” Left Side – 10’ Right Side – 10’ Top – N/A	Rear clearance is for 2 containers back-to-back with reversed orientation, Minimum recommendations provided by OEM manuals
PCS Skid Enclosures	Front – 4.9’ Rear – 9.8’ Left Side – 6.5’ Right Side – 6.5’ Top – N/A	Minimum recommendations provided by OEM manuals
Aux. Distribution	Per NEC	

3.0 ELECTRICAL

3.1 Cable Requirements

3.1.1 General Requirements for all Cable

Design Criteria	Value(s)	Note(s)
Flame Tests	IEEE 1202/CSA FT-4 UL1685	
Other Compliance Standards/Listings	ICEA S-93-639 / NEMA WC 74 AEIC CS8 SUN RES UL44	
Other Requirements	Surface printing shall show manufacturer's name, insulation type, jacket	

3.1.2 35kV Power Cable Requirements

Design Criteria	Value(s)	Note(s)
Temperature Ratings	105 °C Continuous 140 °C Emergency 250°C Continuous	
NEC/BMCD Cable Type	MV105/TRN1	
Installation	Underground/Aboveground	
Conductor Material and Construction	Single Conductor Copper – Stranded (ASTM B800 and B801)	
Insulation/Jacket	TRXLPE/LLDPE	
Strand Shield	Extruded layer of semiconducting thermoset	
Conductor Shielding	None	
Insulation Shield	Extruded layer of semiconducting thermoset	
Metallic Shield	Helically applied, annealed, solid bare coper wires, 1/3 rated neutral.	

3.1.3 2000V Power Cable Requirements

Design Criteria	Value(s)	Note(s)
NEC/BMCD Cable Type	PV	
Installation	Underground/Aboveground	
Conductor Material and Construction	Single Conductor Copper – Stranded/Annealed (ASTM B496 and B8)	Subject to change
Insulation/Jacket	XLPE or EPR	
Strand Shield	N/A	
Conductor Shielding	N/A	
Insulation Shield	N/A	
Metallic Shield	N/A	

3.1.4 600V Power Cable Requirements

Design Criteria	Value(s)	Note(s)
NEC/BMCD Cable Type	XHHW-2, RHH, RHW-2, TC-ER/SEN4	
Installation	Underground/Aboveground	
Conductor Material and Construction	4-Conductor with Ground Copper – Stranded/Annealed (ASTM B8)	
Insulation/Jacket	XLPE/CPE	
Strand Shield	N/A	
Conductor Shielding	N/A	
Insulation Shield	N/A	
Metallic Shield	N/A	

Design Criteria	Value(s)	Note(s)
NEC/BMCD Cable Type	XHHW-2, RHH, RHW-2, USE-2/ SEN1G	
Installation	Underground/Aboveground	
Conductor Material and Construction	Single Conductor Copper – Stranded/Annealed (ASTM B8)	
Insulation/Jacket	XLPE	
Strand Shield	N/A	
Conductor Shielding	N/A	
Insulation Shield	N/A	
Metallic Shield	N/A	

3.2 Acceptable Conduit Construction

Design Criteria	Value(s)	Note(s)
PVC	Buried, Ducts, Embedded Concrete, Buried Road Crossings	Schedule 40
Fiberglass	Risers, Buried Riser Elbows	
RGS	Exposed, Risers	
Aluminum	Exposed	
EMT	Finished Areas	

3.3 Grounding Requirements

Design Criteria	Value(s)	Note(s)
Design Requirement	Modeled, step/touch per IEEE 80 requirements	
Conductors	Sized per CEC, Copper, minimum 4/0 AWG	
Rods	Copper-clad steel, minimum 10 ft. length, minimum 5/8” diameter	
Grid Burial Depth	Minimum 18”, determined by model	
Risers	Size per CEC. Copper, Minimum 4/0 AWG	
Rod Connections	Exothermic	
Conductor Connections	Exothermic	
Equipment Connections	Bolted	
Cable Tray Grounds	N/A	

4.0 INSTRUMENTATION & CONTROL

4.1 Preferred Manufacturer

Design Criteria	Value(s)	Note(s)
Managed Ethernet Switch	Cisco	
Unmanaged Ethernet Switch	RLH	
Fiber Patch Panel	Corning	
PLC	Modicon	
EMS	Orion	
Other controllers	None	

4.2 Communications Cables

Design Criteria	Value(s)	Note(s)
FIB1	Corning 006ESF-T4101D20	Fiber Optic – Loose Tube Indoor/Outdoor Nonconductive Riser Cable
FIB2	Corning 072EUF-T4101D20	Fiber Optic – Loose Tube Indoor/Outdoor Nonconductive Riser Cable

4.3 Networking Requirements

Design Criteria	Value(s)	Note(s)
Network Redundancy	Redundant corporate fiber cables	
Route Redundancy	Separate Ducts	
Quantity of Networks	2- control	
Cybersecurity	Inverter and BMS in separate fiber bundles and cassettes	
Termination and Splicing	Home-run bulk cables are directly spliced to field cables	

5.0 CIVIL/STRUCTURAL

5.1 Civil

5.1.1 Earthwork

Design Criteria	Value(s)	Note(s)
Cut/Fill	10693/35243 Cu. Yd.	
Drainage Features	Two (2) Retention Ponds	

Sitework Design Requirements

Description	Site Specific Depth (in)	Paved Width (ft)	Bottom Width (ft)	Minimum Drainage Slope %	Rock Thickness (in)	Asphalt Thickness (in)	Concrete Thickness (in)	Diameter (in)	Lining Material Type	Minimum Density %	Design Codes and Standards
Design Storm 25yr-24hr	5.28										NOAA Atlas 14
Soil Compaction @ Optimum Moisture Density										90	ASTM D1557
Asphalt Pavement	NA										AASHTO/ASTM
Concrete Pavement	NA										AASHTO/ASTM
Crushed Rock Roads	6" Caltrans over 12" properly prepared subgrade									95	Site Specific
Plant Road Width & Surfacing	6" Caltrans over 12" properly prepared subgrade	20'									Site Specific
Crushed Rock Surfacing	6"										Site Specific
Grass Topsoil Surfacing	4"										Site Specific
Overland Flow Storm Runoff				0.5%							Site Specific
Open Channel Ditches				0.5%							Site Specific
Culverts RCP				0.5%			Class III	24"			ACI
Concrete Manholes	NA										ACI

5.2 Geotechnical Information

5.2.1 Sources

- Draft Geotechnical Report, Corby BESS Project, Prepared by RRC. RRC Project No. GE23006031, January 31, 2024

5.2.2 Site Conditions Summary

Design Criteria	Value(s)	Note(s)
Expansive soils	Yes	See pg. 14 of Geotechnical Report
Potential Vertical Rise (PVR)	1 inch or less (with removal of clay materials to a minimum depth of 2 ft)	See pg. 14 of Geotechnical Report
Rock excavation	Not encountered	
Sheeting/shoring	Potential caving/sloughing of loose/soft and dry soils within narrow and shallow utility trenches may require sidewalls of trenches to be sloped in order to properly install underground utilities.	See pg. 15 of Geotechnical Report
Dewatering	Not expected from groundwater, excavation dewatering with conventional sumps and pumps is anticipated to suffice for conditions where rain causes perched groundwater conditions.	See pg. 27 of Geotechnical Report
Underground utilities/existing foundations	PG&E pipeline in southwest corner of site	
Settlement	Estimated to be about 1.5 to 2 inches under normal operating loading condition.	See pg. 11 of Geotechnical Report

5.2.3 Soil Characteristic Summary

Design Criteria	Value(s)	Note(s)
Unit weight (lb/ft^3)	95-111, average of 105	See pg. 7 of Geotechnical Report
Water table depth	Ranges from 7.5 to 15 feet below grade	See pg. 9 of Geotechnical Report
Corrosivity	Steel – Moderate to High Concrete – Low, design in accordance with ACI 318 Exposure Class S0	See pg. 10 and 21 of Geotechnical Report

5.2.4 Slab, Mat, and Footing Design Parameters Summary

Design Criteria	Value(s)			Note(s)
Net allowable soil bearing capacity	Strip or Continuous Footings: 2,000 psf Mat Foundations: 2,500 psf			See pg. 20 of Geotechnical Report
Minimum embedment below grade	Bottom of foundation below frost penetration depth. Frost penetration depth is approximately 6 inches below ground surface.			See pg. 10 of Geotechnical Report
Modulus of subgrade reaction	50 pci for a 1'x1' plate			
Minimum stability factors of safety	Uplift	Overturning	Sliding	
	1.5	1.5	1.5	
Maximum settlement values	Total		Differential	
	1 inch		½ inch	
Minimum Width Dimensions	Continuous: 12 inches			

5.2.5 Pile Design Parameters Summary

Design Criteria	Value(s)		Note(s)
Type	Battery Enclosure: TBD PCS Skid: TBD		
Minimum embedment	Battery: TBD PCS Skid: TBD		
Minimum center-to-center spacing	3 x least horizontal dimension		
Axial capacity	Compression	Uplift	
	TBD	TBD	
End bearing or skin friction	TBD		
Lateral capacity	Pinned	Fixed	
	TBD	TBD	

5.3 Structural

5.3.1 Design Standards and Codes

- California Building Code, 2022
- ACI 318-19, Building Code Requirements for Structural Concrete, 2019
- American Welding Society Structural Welding Code – Steel (AWS D1.1)
- ANSI/AISC 341, Seismic Provisions for Structural Steel Buildings, 2016
- ANSI/AISC 360, Specification for Structural Steel Buildings, 2016
- ASCE 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures, 2016
- AISC Steel Construction Manual, 15th Edition

Design Criteria	Value(s)	Note(s)
Design Life	30 Years	

5.3.2 Structural and Miscellaneous Steel

Design Criteria	Value(s)	Note(s)
Wide flange (WF) shapes and tees cut from WF	ASTM A992, Grade 50 or ASTM A572, Grade 50	
Channels, angles, structural plate and bars	ASTM A36 or ASTM A572 Grade 50	
Pipe for structural uses	ASTM A53, Type E or S, Grade B or ASTM A106, Grade B	
Square and rectangular HSS	ASTM A500, Grade C (Fy = 50 ksi)	
Round HSS	ASTM A500 Grade C (Fy = 46 ksi)	
Anchor bolts (cast-in-place)	ASTM F1554, Grade 36, UNO (hot-dipped galvanized)	
Anchor bolts (post-installed)	Epoxy or adhesive type w/ galvanized materials, UNO	Design in accordance with manufacturer's printed instructions
Connection bolts	5/8" diameter ASTM F3125 Grade A325, UNO	
Grating	Main and cross bars – ASTM A1011 Depth – 1 1/4", UNO Serrated Finish - Galvanized	

BURNS McDONNELL

CREATE AMAZING.

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Corby Energy Storage System
Corby Energy Storage, LLC

Solano County, California
Project No. 163851

Major Equipment Specifications
5.5310

Rev. A

Issued for 60% Review

May 3, 2024

BURNS McDONNELL

DOCUMENT 00 01 07 – SEALS PAGE

CORBY ENERGY STORAGE, LLC
CORBY ENERGY STORAGE SYSTEM
5.5310 MAJOR ELECTRICAL EQUIPMENT
PROJECT NO. 163851

SPECIFICATION INDEX

CERTIFICATION(S)

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This item has been digitally sealed by Michael Stephen Roach on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Rev.	Date	By	Checked	Description
A	5/03/24	J. Thomas	D. Hudson	Issued for Review (60%)

Corby Energy Storage System
Technical Specification No. 5.5310 – Major Electrical Equipment
Burns & McDonnell Project No. 163851

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END TABLE OF CONTENTS

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 00 04 - GENERAL REQUIREMENTS

PART 1 - SUMMARY OF WORK – 01 11 04

1.01 TECHNICAL SPECIFICATION INFORMATION

A. Owner: Corby Energy Storage, LLC
   1. Technical Specification Identification: Corby Energy Storage System, Specification Number 5.5310.
   2. Corby Point of Delivery: 6865 Byrnes Rd. Vacaville California

B. Engineer: The Technical Specification Documents were prepared by Burns & McDonnell Western Enterprises, Inc., 140 S State College Blvd., Suite 100 Brea, California 92821.

1.02 PROJECT DESCRIPTION

A. The project consists of the addition of a 300MW, 1200MWH battery energy storage system at a new facility located in Solano County, California. The battery energy storage system (BESS) consists of battery modules installed in containers, power conversion system (PCS) skids, battery and energy management systems, and auxiliary power systems.

1.03 DEFINITIONS

A. “Contract” – when referring to the Contract for which the Specifications are written, or any derivatives such as:
   1. “Contract Agreement”
   2. “Contract Document”
   3. “Contract Drawings”
   4. “Contract Price”
   5. “Contract Times”

B. “Country of Origin” – defined as the production of the material into final product form.

C. "Day" - a calendar day of 24 hours measured from midnight to the next midnight shall constitute a day.

D. "Engineer" or "Engineer-Architect" – Burns & McDonnell Western Enterprises, or its duly authorized representatives.

E. "Equipment" - a product with operational or nonoperational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

F. “Equipment and Materials” – when referring to all equipment, materials, apparatus, devices, and parts thereof required as part of the Work.

G. “Furnish” – means secure, pay for and deliver to the site (or other location) ready for use or installation and in useable condition.

H. "Owner" - the public body or authority, corporation, association, partnership, or individual with whom the Supplier has entered into the Procurement Agreement and for whom the Work is to be provided.

I. “Point of Delivery” – when referring to the place designated in the Procurement or Subcontract Contract Documents where the Equipment and Materials are to be delivered.

J. “Project” – when referring to the Project of which the Work of the Contract is all or a part.

K. “Samples” – when referring to Submittals required for the Project.

L. "Scope Drawings" - drawings and other data designated as Scope Drawings prepared by Engineer for these Technical Specifications which show the character and scope of the Work to be performed and are referred to in the Technical Specifications.

M. “Shop Drawings” – when referring to Submittals required for the Project.

N. "Site" – when referring to lands or areas indicated in the Contract documents as being furnished by Owner upon which the Work is to be performed.
O. "Subcontractor" – when referring to an individual, firm, or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
P. "Submittals" - all Shop Drawings, product data, and Samples which are prepared by Supplier, a Subsupplier, or manufacturer, and submitted by Supplier to Engineer as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe proper installation, operation, and maintenance, or technical properties.
Q. "Substantial Completion" – when referring to the Work being substantially complete, or any derivatives such as:
    1. "Substantially Complete"
    2. "Substantially Completed"
R. "Subsupplier" - an individual, firm, or corporation having a direct contract with Supplier or with any other Subsupplier for the performance of a part of the Work.
S. "Supplier" – a manufacturer, fabricator, distributor, or vendor.
T. "Work" – when referring to the entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents.
U. Wherever used in these Technical Specifications, the intent of the following terms will be as described below:
    1. The words "as indicated" refer to the Drawings and "as specified" refer to the remaining Technical Specification Documents.
    2. The terms "responsible" or "responsibility" mean that the party to which the term applies shall assume all responsibilities thereto.
    3. When applied to Equipment and Materials, the words "furnish", "install", and "provide" shall mean the following:
        a. The word "provide" and "furnish" shall mean to secure and deliver all Equipment and Materials to the Point of Delivery.
        b. The word "install" shall mean to place apparatus, devices and parts of the Equipment and Materials in position, incorporate in the Work, adjust, clean, and make fit for use.

1.04 SCOPE

A. The Work of these Technical Specifications includes but is not limited to the following, see the detailed specifications for additional information:
    1. Manufacture and deliver the Equipment as defined in and in accordance with these specifications.
    2. Corby BESS Major Electrical Equipment
        a. Seventeen (17) 480 V, 2000 A Rated Switchboard.
        b. Seventeen (17) 34.5 kV – 480 V, 1500 kVA Rated Auxiliary Transformer
    3. Spare parts, special tools, lubricants, and consumables as specified in 1.5.
    4. The Equipment furnished By Owner under these Technical Specifications shall be designed for outdoor installation and outdoor storage.
    5. All Work shall be designed to meet the design data specified in Appendix 01 11 04-A General Design Parameters.
    6. Provide submittals and equipment data books.
B. Work by Others:
    1. Other Contracts
        a. Foundations for all Equipment will be provided by Others.

b. Receipt and installation of all Equipment will be provided by Others.

2. Work by Owner

a. Owner shall contract with Others for installation of Equipment.

C. Conflicting Requirements. In the event that requirements specified within the Technical Specification are found to be conflicting, Supplier shall notify Engineer before proceeding with the work. In general, the following order of precedence shall be applied by the Supplier:

1. Technical Specifications including all equipment data sheets
2. Other referenced industry codes/standards/specifications

1.05 SPARE PARTS, SPECIAL TOOLS, LUBRICANTS AND CONSUMABLES:

A. Spare parts, special tools, hardware, lubricants, and other consumables required for complete installation and commissioning shall be provided by Supplier. These shall be delivered to Site with the Equipment being provided under these Technical Specifications.

B. Supplier shall provide a list of manufacturer recommended spare parts for: 1) first two (2) years of operation; 2) installation and commissioning; 3) capital spares (spares not subject to wear).

1. These lists shall be included with Supplier's proposal and shall also be provided during execution as a formal submittal.
2. Supplier shall provide one consolidated, organized Excel spreadsheet that contains all the spare parts information for all Equipment provided.
3. Unit prices for spare parts shall be valid for purchase by Owner for two years after Substantial Completion.

C. Any spare parts, other than installation and commissioning spare parts, supplied by Supplier and used during erection and startup or during the warranty period shall be replaced within the warranty period at no charge to Owner. Supplier shall include warranty period in the bid package.

D. Special tools which are required to maintain, inspect, disassemble, or operate the Materials provided by the Supplier shall be provided by Supplier and will be turned over to Owner upon Substantial Completion.

PART 2 - SUBMITTALS – 01 33 04

2.01 LANGUAGE AND DIMENSIONS

A. All words and dimensional units shall be in the English language.
B. Metric dimensional unit equivalents may be stated in addition to the English units. However, English units of measurement shall prevail.
C. All words shall be in the English language.

2.02 QUALITY AND COMPLETENESS

A. Where standard drawings are furnished which cover a number of variations of the general class of Equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the Equipment being Furnished. Such annotation shall also include proper identification of the submittal permanently attached to the drawing.
B. Reproduction or copies of Scope Drawings or portions thereof will not be accepted as complete fabrication or erection drawings.

2.03 ENGINEER'S SUBMITTAL REVIEW AND ACTION STAMP

A. Engineer's review and approval will be only to determine if items of Equipment covered by the submittals are compatible with the design concept and conform to information given in the Technical Specification.
B. Such review and approval will not extend to design data reflected in submittals which is peculiarly within the special expertise of Supplier or Supplier's Subcontractors or Subsuppliers. Review and approval of a component item as such will not indicate approval of the assembly in which the item functions.
C. Engineer's review and approval of shop drawings, product data, or samples will not relieve Supplier of responsibility for any deviation from requirements of the Technical Specification unless Supplier has in writing called Engineer's attention to such deviation at the time of submission, and Engineer has given written concurrence in and approval of the specific deviation. Approval by Engineer shall not relieve Supplier from responsibility for errors or omissions in submittals.
D. Engineer's review action stamp, appropriately completed, will appear on all submittals of Supplier when returned by Engineer. Review status designations listed on Engineer's action stamp are defined as follows:
    1. A - SUBMITTAL APPROVED Signifies Equipment or Material represented by the submittal conforms to the design concept and complies with the intent of the Technical Specification documents and is approved for incorporation in the Work. Supplier is to proceed with fabrication or procurement of the items and with related Work. Copies of the submittal are to be transmitted to Engineer for final distribution.
    2. B - SUBMITTAL APPROVED AS NOTED (RESUBMIT) Signifies Equipment or Material represented by the submittal conforms to the design concept and complies with the intent of the Technical Specification and is approved for incorporation in the Work in accordance with Engineer's notations. Supplier is to proceed with fabrication or procurement of the items and with related Work in accordance with Engineer's notations and is to submit a revised submittal responsive to notations marked on the returned submittal or written in the letter of transmittal.
    3. C - SUBMITTAL NOT APPROVED (RESUBMIT) Signifies Equipment or Material represented by the submittal appears to conform with the design concept and comply with the intent of the Technical Specification documents but information is either insufficient in detail or contains discrepancies which prevent Engineer from completing its

review. Supplier is to resubmit revised information responsive to Engineer's annotations on the returned submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the submittal and related Work is not to proceed until the submittal is approved.

4. D - SUBMITTAL NOT APPROVED (SUBMIT ANEW) Signifies Equipment or Material represented by the submittal does not conform to the design concept or comply with the intent of the Technical Specification and is disapproved for use in the Work. Supplier is to provide submittals responsive to the Technical Specification.
5. F - NO APPROVAL REQUIRED (FOR REFERENCE) Signifies submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to Owner or Engineer in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Technical Specification. Engineer reviews such submittals for general content but not for basic details.

PART 3 - QUALITY CONTROL – 01 45 04

3.01 GENERAL

A. Supplier is responsible for meeting all requirements specified and/or referenced in the Technical Specification documents. This includes design, submittals, materials, fabrication, inspection, testing, quality control, and shipment.

3.02 QUALITY PROGRAM

A. Supplier shall have a Quality Control (QC) and Quality Assurance (QA) program that is documented in a written manual and/or procedures.

B. The Engineer may review the Suppliers QA/QC Program, procedures, work instructions, and quality records during source inspection shop visits.

3.03 NON-CONFORMANCE CONTROL

A. Suppliers shall issue non-conformance reports in accordance with their quality system procedures.

B. Supplier shall provide the Engineer with copies of all non-conformance reports at the time they are issued. The reports shall include technical justification for non-conformance dispositions. All dispositions which do not return an item to the conditions stated in an approved drawing or specification must be approved by Engineer prior to the shipment of the affected item.

3.04 DEVIATION / CONCESSION CONTROL:

A. Any technical deviations sought by the Supplier to the Technical Specification documents shall require written approval from Engineer prior to the deviation or change being implemented.

B. Any fabrication work to be performed by a Subsupplier that was not identified at the time of purchase may be considered a deviation and require written approval from the Engineer before fabrication work begins.

PART 4 - MATERIALS AND FABRICATION – 01 60 04

4.01 MATERIALS AND COMPONENTS

A. Any deviations require written approval from Engineer prior to starting fabrication. Acceptance of deviations requests for Country of Origin may include requiring supplemental testing by an independent agency at the cost of the Supplier. Failure to notify Engineer prior to the start of fabrication can result in rejection and replacement of the Material in question. It is the responsibility of the Supplier to verify that all Materials used meet these criteria.

B. Supplier shall provide Engineer with copies of Material Test Reports (MTR) for all materials and consumables when required per applicable codes, standards, and specifications.

C. It is the responsibility of the Supplier to verify that all Materials, components, and sub-components are in accordance with the requirements specified in this section and all other referenced technical sections. The Supplier shall promptly replace any non-compliant or "suspect" Materials, as acceptable to the Engineer, so as to not adversely impact schedule.

D. In the event that the Engineer identifies Materials that are non-compliant, suspect, or counterfeit, the Supplier shall be required to replace the Material and the Supplier may turn such items over to the appropriate regulatory agencies for further evaluation.

E. Use of Standard Products and Continued Availability:

1. Where they are available and comply with specifications, provide standard products of types that have been produced and used successfully in similar situations on other projects.

F. Where, because of the nature of its application, Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the manufacturer has published assurances that the products and its parts are likely to be available to Owner at a later date.

4.02 FABRICATION AND TESTING

A. Supplier shall conduct all tests as required by applicable codes and standards and as required by this Technical Specification.

4.03 NAMEPLATES:

A. Along with required labels and operating data, manufacturer or producer's nameplates, imprints, or trademarks may be placed on surfaces exposed to view.

B. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.

C. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated Equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall be fabricated as specified per Division 26 00 02.

D. Tagging: Supplier shall provide project specific tagging to identify Equipment supplied by the tag number as identified on the Scope Drawings. At a minimum, tags will include tag number and item description. This is a separate requirement from Manufacturer nameplates such as transformer ANSI/IEEE standard nameplates.

1. Engraved laminated plastic nameplates shall be as follows:
    a. Fabricated from laminated matte finish white plastic with black core.
    b. 1-1/2 inches high and 6 inches long for "Master" nameplates, with 3/8-inch letters.
    c. 1 inch high and 2- to 3-inch nominal length for individual device nameplates with 3/16-inch letters.
    d. Engrave designations as required later by the Engineer.

e. Attach nameplates by permanent adhesive or screws. Double sided tape is not acceptable.
f. Nameplates shall be manufacturer's standard.

4.04 TRANSPORTATION AND HANDLING:

A. Supplier shall prepare Equipment and Materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage. Provisions for protection shall include the following:
1. Crates or other suitable packaging materials.
2. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt.
3. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel.
4. Grease packing or oil lubrication in all bearings and similar items.

PART 5 - APPENDICES

A. 01 11 04 A – General Design Parameters

END OF SECTION 01 00 04

5.1 – APPENDIX A

SECTION 01 00 04 A – GENERAL DESIGN PARAMETERS

PART 1 - FUNCTION:

A. The Supplier shall use the criteria described in this section to develop the parameters and the detailed design necessary to specify, purchase, and supply Equipment in accordance with the Technical Specifications included herein.
B. These criteria set the minimum standards acceptable. They are not intended to limit the Supplier to a single design approach. The Technical Specifications set the standards of quality for equipment and materials included in the Supplier's design.
C. The anticipated life that is required for Equipment and Materials furnished is 20 years. Continuous operation will be required for its anticipated life with minimum scheduled downtime for inspections and maintenance.
D. The materials specified in the Technical Specifications are the minimum requirements. Supplier shall provide higher grade materials where required to provide service life consistent with the life expectancy utility power plant equipment and structures.
E. General design criteria are specified in this SECTION. Design criteria specific to Equipment and systems are specified in the subsequent Technical Specifications.

PART 2 - APPLICABLE CODES AND STANDARDS:

A. All Work in accordance with the following codes as required:
    1. International (IBC) – 2018 Edition with local amendments
    2. California Electrical Code – 2022 Edition

PART 3 - DESIGN PARAMETERS:

A. This article includes the basic Site/Project information and certain design criteria applicable to the Project. This information is general in nature and may be additionally defined within the Technical Specifications. When additionally defined or specified within the Technical Specifications, the Technical Specification criteria shall control. In the event that additional specific information regarding the Project Site is required, Supplier shall contact Purchaser.
B. Corby Site Conditions:

HVAC Design Conditions (2021 ASHRAE Fundamentals Handbook)						
Location	Vacaville Nut Tree, California		ASHRAE Weather Station #			724828
Ambient Design Conditions						
Summer (F)		Winter (F)		20 Year Extreme Conditions (F)		
0.4%, DB/MCWB	1%, DB/MCWB	99.6%, DB	99%, DB	Min, DB	Max, DB	Max, WB
101.8/68.7	99.1/67.8	30.6	33.8	20.1	113	77.9
HVAC Design Parameters						
		Indoor Design Temperatures		Outdoor Design Conditions		System Type
Building/Room Type		Summer, F	Winter, F	Summer	Winter	
Air-Conditioned Equipment Areas or Occupied Areas						
		72.0	68.0	20 Year Extreme	20 Year Extreme	HVAC

1. Plant Elevation: 77 ft msl
2. Precipitation: Average annual precipitation is 14.9 inches.
3. Risk Category II
4. Wind Design shall be in accordance with CBC 2022 & IBC 2021 / ASCE 7-2016 and the following:
   a. Basic Wind Speed, V = 93 mph
   b. Allowable Design Wind Speed, V_{asd} = 72 mph
   c. Exposure Category C
5. Seismic Design shall be in accordance with CBC 2022 & IBC 2021 / ASCE 7-2016 and the following:
   a. Soil Site Class: D
   b. Short period Site coefficient, F_a = 1.024
   c. Long period Site coefficient, F_v = 1.872
   d. Mapped Spectral Accelerations for Short Periods, S_s (0.2) = 1.190g
   e. Mapped Spectral Accelerations for 1-Sec Period, S_1 (1.0) = 0.428g
   f. Design Spectral Acceleration for Short Period, S_{DS} = 0.812g
   g. Design Spectral Acceleration for 1-Sec Period, S_{D1} = 0.534g
   h. Seismic Importance Factor, I_e = 1.0
   i. Component Importance Factor, I_p: 1.0 or 1.5 (as appropriate for design function)
   j. Seismic Design Category D
   k. Seismic Site Modified Peak Ground Acceleration, PGA_m = 0.547g
6. Snow Loading shall be in accordance with CBC 2022 & IBC 2021 / ASCE 7-2016 and the following:
   a. Ground Snow Load, p_g = 0 psf
   b. Snow Importance Factor, I_s = 1.0
   c. Exposure Factor, C_e = 0.9 (Terrain Category C, Fully Exposed)
   d. Thermal Factor, C_t = 1.2 (Unheated and Open-Air Structures, Confirm Ct for specific structure)
   e. Plant site frost depth: 6 inches below grade.

C. All Equipment shall be shop assembled to the fullest extent possible.

D. Supplier is responsible for final design. Specified temperatures shall be used for determining material properties (pipe, steel, etc.).
E. All materials for the Project shall comply with the OSHA Regulations and Standards 29CFR1910. All Work performed on Site shall comply with OSHA Regulations and Standards 29CFR1926 and 29CFR1926 Subpart R.
F. All Work and materials shall be in compliance with local, county, state, federal regulations, codes, standards, laws, and ordinances.
G. Equipment Sound Level Requirements:
    1. Near Field: The maximum A-weighted sound level for Equipment furnished under these Technical Specifications shall not exceed 85 dBA free field measured 3 feet horizontally from the base of the Equipment and 5 feet above floor level or any personnel platforms under any operating condition. In addition, provide sound level for all octave bands for each Equipment furnished.
H. Asbestos material is strictly prohibited in the Equipment furnished under this Purchase Order.
I. Coating/Painting:
    1. Unless specified more explicitly in the technical specifications, all Equipment shall be factory finish painted with system suitable for the intended final service conditions and environment at this Project Site without any additional field painting for a reasonable design and operating service life of no less than 20 years. All equipment provided shall include manufacturer's surface preparation and salt spray corrosion resistant coating system.
    2. Submit all factory finish painting information (surface preparation, number of coats, thickness of each coat, general type and manufacturer's product name/number of each coat, topcoat color name/number, and other applicable information) for consideration, evaluation, and Owner's future use.
J. Standards of Design and Workmanship:
    1. The finished Work and/or product shall be complete in all respects. All hardware shall be manufactured, fabricated, assembled, finished, and documented with the workmanship of the highest quality throughout, and all of the components shall be new.
    2. The Work shall be carried out in accordance with best recognized practices and customary industry quality unless otherwise specified within the technical specification Sections.

END OF SECTION 01 00 04 A

DIVISION 26 - ELECTRICAL

SECTION 26 00 02 – ELECTRICAL EQUIPMENT - GENERAL TECHNICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY:

A. The electrical equipment supplied under these Technical Specifications will be used in conjunction with Owner's new Battery Energy Storage System.

B. Furnish new Equipment with all auxiliary items except those specified as furnished by Owner, required for complete Equipment systems as specified. This shall include all materials required for complete field assembly, installation, and operation.

C. Furnish to coordinate completely in physical arrangement, and physical and electrical connections to Equipment and structures furnished by Owner.

1.02 RELATED REQUIREMENTS:

A. The requirements of this Section supplement the Specifications in Sections 26 12 19 and 26 24 00.

1.03 REFERENCE STANDARDS:

A. Publication Dates: Comply with standards in effect as of date of the Technical Specifications unless otherwise indicated.

B. Applicable Codes and Standards:

1. American Society for Testing and Materials (ASTM):
    a. A6 - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
    b. A36 - Standard Specification for Carbon Structural Steel.
    c. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
    d. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
    e. A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
    f. A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
    g. B187 - Standard Specification for Copper, Bus Bar, Rod, and Shapes and General Purpose Rod, Bar, and Shapes
    h. B236 - Standard Specification for Aluminum Bars for Electrical Purposes (Bus Bars).
    i. B317 - Standard Specification for Aluminum-Alloy Extruded Bar, Rod, Tube, Pipe, Structural Profiles, and Profiles for Electrical Purposes (Bus Conductor).

1.04 DELIVERY:

A. Ship Equipment as completely assembled as possible, within construction limitations at Owner's Site. Factory install all component Equipment specified. Ship Equipment assemblies with all components completely installed, other than normal drawout-type components such as removable breaker elements.

B. Tag and package all maintenance equipment, spare parts, and special tools separately. Identify on Bill of Lading as "Owner's Spare Parts."

1.05 EQUIPMENT QUALIFICATION:

A. All Equipment and Material designs furnished shall be identical to equipment and material designs having an acceptable history of domestic service for a period of not less than three years at comparable temperature, voltage, and design stress levels.

B. Equipment and Material designs with less than three years of actual service will be considered from established manufacturers but shall be furnished only if accepted by Engineer and Owner prior to award.

C. All major Equipment furnished shall be manufactured at Supplier's own plants, unless otherwise approved by Engineer. Minor auxiliary items not manufactured by Supplier shall be supplied by manufacturers approved by Engineer.

1.06 JOB CONDITIONS:

A. As defined in Division 1.

B. Furnish Equipment and Materials which will be capable of meeting the specified ratings and performance under the altitude and ambient temperature conditions specified. Nameplate data shall be for the conditions specified.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS:

A. Furnish Equipment of dead front construction.

B. Furnish Materials suitable for their application, and for the mechanical and electrical stresses to which they will be subjected.

C. Furnish all current carrying parts of high conductivity copper unless specified otherwise.

D. Silverplate or tinplate all primary current connections and joints. Plating shall be done after all drilling and cutting operations are completed.

E. Provide space, cutouts, drilling, and blank plates for future equipment and for equipment installed by others where specifically indicated.

F. Engraved laminated plastic nameplates shall be as follows:

1. Fabricated from laminated matte finish white plastic with black core. Size of nameplates:
   a. 1-1/2 inches high and 6 inches long for "Master" nameplates, with 3/8-inch letters.
   b. 1 inch high and 2- to 3-inch nominal length for individual device nameplates with 3/16-inch letters.
2. Engrave designations as required later by the Engineer.
3. Attach nameplates by permanent adhesive or screws. Double sided tape is not acceptable.
4. Nameplates shall be manufacturer’s standard.

G. Wiring:

1. Furnish all wiring integral to all Equipment, including wiring across shipping splits, wiring for future equipment, and for equipment installed by others. Factory install all wiring integral to each shipping group, one end of all wiring across shipping splits, and one end of all wiring for future equipment and for equipment installed by others.
2. Make all internal wiring connections at Equipment terminals or terminal blocks; splices in wiring will not be acceptable.
3. Terminate all points requiring external wiring connections, all points requiring field connection to wiring leads from other shipping sections, and all spare contacts on control switches, auxiliary switches, and lockout relays at numbered points on terminal blocks located in the Equipment control compartments.

4. Connect all wiring as indicated on approved Supplier's and Engineer's schematic and connection drawings.
5. Group terminal blocks for external connection to conveniently receive the Owner's cables. Locate terminal blocks for connections across shipping splits adjacent to the split. Terminal blocks for external connection on drawout breakers shall be fully accessible with the removable breaker element in either the "connected" or "test" position.
6. Terminate all current transformer secondary leads individually on short circuiting type terminal blocks located in the control compartment. Connect the current transformer in wye or delta, as required, on the external connection side of this terminal block. Where a current transformer secondary circuit is connected to devices internal and external to the equipment, furnish a second short circuiting type terminal block for external wiring connections.
7. No more than two wires shall be terminated at any one terminal block stud or screw.
8. Use stranded, tinned copper switchboard wire, insulated for 600Vac, 90ºC copper temperature, Type SIS, as follows (does not include wiring between equipment):

Type of Circuit	Minimum Wire Size
Indicating light or annunciator	16 AWG
Transducer outputs	16 AWG (shielded)
Circuit breaker close or trip	14 AWG
Current transformer secondary and power supply branch circuit	10 AWG
Main ac power supply and main ac control buses	10 AWG
Main dc power supply and main dc control buses	8 AWG

* SW1 (SIS) Wire Specifications at the end of this Section.

9. Install internal wiring in horizontal and vertical wiring troughs or neatly dressed wire bundles for easy accessibility to interior wiring.
10. Label all wires at equipment studs and terminal blocks with slip-on wire sleeves stamped or printed to indicate wire number or destination terminal number as indicated on approved Supplier’s connection drawings.
11. Connect all internal grounds to the Equipment internal ground bus.
12. Terminate all internal wiring individually with preinsulated ring-tongue-type compression terminals on stud or screw type terminals.
13. Terminate all potential transformer secondaries on a set of terminal blocks, located to provide convenient access.

H. Terminal Blocks:
1. All terminal blocks shall be heavy duty, rated not less than 20 amperes, 600V.
2. Terminal blocks for current transformer circuits shall be short-circuiting type. Furnish with sufficient shorting screws for each terminal.
3. Identify each terminal on each block with a permanent designation.
4. Mount terminal blocks vertically in rows with provisions for supporting external control cables entering from the top or bottom.

I. Finish:
   1. Apply finish to all steel surfaces of Equipment.
   2. Clean and treat surfaces with phosphatizing process or equal and apply all necessary filler before application of finish.
   3. Apply a corrosion-resistant prime coat of paint and at least two finish coats of standard, No. 61 light gray paint for indoor Equipment and salt-spray corrosion resistant No. 70 sky gray paint for outdoor Equipment.
   4. Hot-dip galvanize all steel supporting structures and hardware in accordance with ASTM A123 and A153.

PART 3 - EXECUTION

3.01 FACTORY TESTING:

A. Factory testing shall be performed prior to shipment of the Equipment.
B. The Owner shall be allowed to witness the factory testing and shall be given a two-week notice before the testing is to begin.
C. Factory testing is defined in applicable specification sections.
D. The Equipment shall be fully assembled prior to the beginning of testing.
E. Manufacturer shall provide all equipment and factory personnel required to allow Owner to witness the testing.

END OF SECTION 26 00 02

Burns & McDonnell Western Enterprises, Inc. Engineers - Architects - Consultants Brea, California	WIRE AND CABLE SPECIFICATION SHEET	
	SW1 **B&McD TYPE:**	**SIS** **CEC TYPE:**

600 VOLT - SINGLE CONDUCTOR - POWER CABLE

GENERAL REQUIREMENTS:

CONDUCTOR:	Class B stranded annealed copper per ASTM B8.
INSULATION:	Ethylene-propylene “EP” (UL44); or cross-linked polyethylene “XLPE” (UL44).
IDENTIFICATION:	Surface printing on the cable shall show manufacturer’s name, insulation type (SIS), VW-1, conductor size, conductor type, voltage rating, and Underwriters Laboratories label (UL).

SPECIFIC REQUIREMENTS:

TEMP. RATING:	Cable shall be suitable for operation under the following maximum conductor temperatures: 90°C --- Continuous, dry locations only
INSULATION THICKNESS:	Insulation thickness shall be in accordance with UL 44.
FACTORY TESTS:	All cable shall be tested in accordance with requirements of UL44 including the flame test VW-1.
CERTIFICATION:	Cables shall be certified to be in conformance with all applicable requirements of UL44.

SECTION 26 12 19 – AUXILARY TRANSFORMER

PART 1 - GENERAL

1.01 SUMMARY:

A. The Equipment specified in this Division shall also conform to the General Technical Requirements of Section 26 00 02 and Division 1.

B. Work in this Section includes furnishing the following:

1. Seventeen (17) outdoor pad-mount type Auxiliary Transformer with ratings as follows:
   a. Auxiliary Transformers: 1500 kVA, 34.5 kV-480/277 V.
2. Maintenance equipment and spare parts as specified.

C. Furnish Equipment suitable for operation on a solidly grounded neutral, low-voltage system rated 480 V line to line, 3-phase/4 wire.

1.02 REFERENCE STANDARDS:

A. Publication Dates: Comply with the standards in effect as of date of the Technical Specifications unless otherwise indicated.

B. Applicable Codes and Standards:

1. Design, construct, assemble and test all equipment furnished to conform with, but not limited to, the following:
   a. Institute of Electrical and Electronics Engineers (IEEE):
      (1) IEEE C57.12.00 - Liquid-Immersed Distribution, Power, and Regulating Transformers.
      (2) IEEE Std C57.12.28 – Pad-Mounted Equipment - Enclosure Integrity
      (3) IEEE C57.12.34 - Requirements for Pad-Mounted, Compartmental-type, Self-cooled, Three-Phase Distribution Transformers, 5 MVA and Smaller; High Voltage, 34.5 kV Nominal System Voltage and Below; Low Voltage, 15 kV Nominal System Voltage and Below.
      (4) IEEE C57.12.70 - Terminal Markings and Connections for Distribution and Power Transformers.
      (5) IEEE C57.12.80 - Terminology for Power and Distribution Transformers.
      (6) IEEE C57.12.90 - Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers.
      (7) IEEE C57.13 - Requirements for Instrument Transformers.
      (8) IEEE 386 – Standard for Separable Insulated Connector Systems for Power Distribution Systems Rated 2.5kV through 35kV.
      (9) IEEE C62.11 - Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV).
      (10) IEEE C62.22 - Application of Metal-Oxide Surge Arresters for Alternating Current Systems.
   b. National Electrical Manufacturer's Association (NEMA):
      (1) NEMA CC1 - Electric Power Connection for Substations.
      (2) NEMA TR1 - Standards for Transformers, Regulators, and Reactors.

1.03 SUBMITTALS:

A. The following documentation shall be provided.

B. Includes, but not limited to, the following:

1. Outline drawings.
2. Nameplate drawings.
3. Wiring diagrams.
4. Schematic diagrams.
5. Instrument transformer performance curves and data.

6. Instruction books.

1.04 QUALITY ASSURANCE:

A. Factory Tests: Transformer shall be tested in accordance with applicable standards.

PART 2 - PRODUCTS

2.01 AUXILARY TRANSFORMERS:

A. Ratings:
   1. 1500 kVA, KNAN (55°C rise).
   2. Impedance: 5.75% ± 7.5%.
   3. High Voltage: 34,500 V, 150 kV BIL, delta-connected.
   4. Low Voltage: 480 V, 45 kV BIL, wye-connected.
   5. No Load Taps: Full-capacity taps in high-voltage winding:
      a. Two 2-1/2% above rated voltage.
      b. Two 2-1/2% below rated voltage.
   6. Noise Level: Per NEMA Standards.
   7. Three Phase.
   8. Frequency: 60 hertz.
   9. Angular Displacement: DY1, HV leading LV by 30 degrees.

B. Type and Design:
   1. Outdoor pad-mount type.
   2. NEMA 3R – Raintight for outdoor locations.
   3. Winding Material: Aluminum.
   4. Liquid filled with R-Temp, Envirotemp FR3, or approved equal.
   5. Maximum oil volume shall be less than 700 gallons.
   6. High-voltage winding wired to bushings in a dead-front, full-height compartment (with hinged doors) containing 600A dead-break primary one-piece bushings externally removable, integral design. Provide two complete sets of copper bushings for separate terminations of an incoming and an outgoing feed to create a loop-fed configuration. The compartment shall be sized to provide sufficient depth for up to two elbow connectors to be stacked and terminated on each bushing.
   7. The high voltage compartment shall include provisions for bottom entrance of single-conductor high-voltage, insulated, shielded, aluminum power cable in PVC or fiberglass conduit. Terminations with stress relief devices will be provided by others.
   8. Low-voltage winding, including neutral, wired to bushings in a live-front, full-height compartment with sufficient silver-plated or tin-plated NEMA 2-hole pads and provisions for bottom entrance of multiple insulated copper power cable in PVC or fiberglass conduit.
   9. Provide means of supporting cables so that cable will not place excessive loads on bushings.
   10. Steel barrier between high-voltage and low-voltage compartments.
   11. Core laminations to be "nonaging" cold-rolled, grain-oriented, highly permeable, silicon alloy steel.
   12. External load break switch operable without exposure to any live circuits. Switch handle shall be protected by a hinged cover with padlock provisions.
   13. Transformers shall be suitable for installation on concrete pad.
   14. Apply undercoating to all surfaces in contact with concrete.

15. Transformers shall be provided with high voltage overcurrent protection in the form of an externally removable loadbreak expulsion or cartridge fuse assembly in series with under-oil partial-range current-limiting back-up fuses with an interrupting rating of 50 kA or better.
16. Provide engraved laminated plastic nameplates for each transformer.
17. Include accessories as follows:
    a. Externally operated no load tap changer.
    b. Lower drain valve and liquid sampling device.
    c. Dial-type thermometer with alarm contact for high-temperature.
    d. Magnetic liquid level gauge with alarm contact for low level.
    e. Pressure vacuum gauge.
    f. Lifting lugs and jacking pads.
    g. Pressure relief device.
    h. Two ground pads, one in each compartment.

2.02 MAINTENANCE EQUIPMENT AND SPARE PARTS:

A. As recommended by Manufacturer. Provide list of recommended commissioning spare parts included as part of the bid.

PART 3 - EXECUTION - NOT APPLICABLE.

END OF SECTION 26 12 19

SECTION 26 24 00 – SWITCHBOARDS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes switchboards for low-voltage power and lighting systems applications.
B. The Equipment specified in this Division shall also conform to the General Technical Requirements of Section 26 00 02 and Division 01.
C. Work in this Section includes furnishing the following:
   1. Seventeen (17) outdoor 480/277 V switchboards.
D. Furnish Equipment suitable for operation on a solidly grounded neutral, low-voltage system rated 480 V line to line, 3-phase/4wire.

1.02 REFERENCE STANDARDS:

A. The Institute of Electrical and Electronics Engineers, Inc. (IEEE):
   1. IEEE C37.20.1 – Metal-Enclosed Low-Voltage (1000 Vac and below, 3200 Vdc and below) Power Circuit Breaker Switchgear.
B. California Electrical Code (CEC).
C. National Electrical Manufacturers Association (NEMA):
   1. NEMA ICS 1 – Industrial Control and Systems General Requirements.
   2. NEMA ICS 2 – Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts.
   3. NEMA ICS 4 – Application Guideline for Terminal Blocks.
   4. NEMA PB 1 – Panelboards.
   5. NEMA PB 2 – Deadfront Distribution Switchboards.
   6. NEMA 250 – Enclosures for Electrical Equipment (1,000V Maximum).
D. Underwriters' Laboratories, Inc. (UL):
   1. UL 50 – UL Standard for Safety Enclosures for Electrical Equipment, Non-Environmental Considerations.
   2. UL 67 – Panelboards.
   3. UL 489 – UL Standard for Safety Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.
   4. UL 508 – UL Standard for Industrial Control Equipment.
   5. UL 891 – UL Standard for Safety Switchboards.

1.03 SUBMITTALS:

A. The following documentation shall be provided.
B. Includes, but not limited to, the following:
   1. General arrangement and outline information.
   2. Schematic power diagrams.
   3. Wiring diagrams.
   4. Bills of Material.
   5. Nameplate information.
   6. Protective device coordination curves.

PART 2 - PRODUCTS

2.01 SWITCHBOARDS:

A. General:

1. Heavy-duty type with voltage and ampere ratings as indicated below in Section 2.01.B.5.
2. Enclosures of the following types:
   a. NEMA 3R - Raintight for outdoor locations.
3. Switchboards constructed of sheet steel for floor mounting and finished with a rust inhibiting primer and No. 70 sky grey paint.
4. Hinged door with lock and catch combination in the front trim of all panelboards.
5. Phenolic nameplate on front of panel engraved with the panelboard or switchboard designation, and above each breaker operating handle on switchboards. Refer to Section 26 00 02 for nameplate specifications.
6. Breakers with trip rating and number of poles as specified below in Section 2.01.B.5.g.
7. Future breaker space for the number of poles as specified below in Section 2.01.B.5.g.
8. Main buses of the capacity as specified below in Section 2.01.B.5.
9. The short-circuit current rating of the assembled switchboard as specified below in Section 2.01.B.3. and Section 2.01.B.4.

B. 480Vac Switchboards:
   1. Rated 600Vac, 3 phase, 4 wire, solid neutral, with main breaker as specified.
   2. Suitable for operation on a 480V solidly grounded system.
   3. Main breaker shall have a minimum interrupting capacity of 65,000 rms amperes symmetrical at 480V.
   4. Branch breakers shall have a minimum interrupting capacity of 65,000 rms amperes symmetrical at 480V.
   5. Switchboard Ratings:
      a. 2000A main power bus.
      b. (1) – 2000A frame electrically operated main breaker equipped with an adjustable trip setting rated for 100% continuous load.
         (1) Control shall be 24 VDC.
         (2) Unit shall be equipped with one (1) 480/120V control power transformer.
         (3) Provide 120VAC control circuits. The 120VAC control circuit will be used to provide auxiliary power for switchboard meters.
         (4) Main breaker shall be equipped with three (3) metering class CTs, rated 2000/5 with accuracy 0.3B1.8 or approved alternative.
         (5) All control and auxiliary devices shall be rated for operation in the temperature range -20°C to 70°C.
         (6) Provide one (1) UPS module to maintain power to the switchboard control devices during a control power throwover. The UPS module shall be a Weidmuller UPS or Engineer approved equivalent, and shall be rated to receive a 120VAC input and provide a 24 VDC output with a 30 minute backup. The rated power of the UPS shall be 750VA or greater.
         (7) The UPS module shall be powered from the switchboard control power transformer.
         (8) Main breaker shall be equipped with one (1) SHARK 200 power meter, part number SHARK200-60-10-V3-D-INP100S-X-FPL, or engineering approved equal.
            (a) Each meter shall be two-element, designed for operation with the furnished instrument transformers.
            (b) Each meter shall be designed for application with an external auxiliary power supply so that control power throwovers will not result in a loss of data.

(c) Each meter's auxiliary power supply shall be sourced from the UPS 24VDC source.

(9) Provide one (1) RS232 serial to single mode fiber media converter, Modbus TCP-IP capable. Rated for use with provided UPS power supply.

(10) Provide one (1) 100Base-t Ethernet to single mode fiber media converter, Modbus TCP-IP capable. Rated for use with provided UPS power supply.

(11) All necessary fusing to protect provided control devices and meters per manufacturer's installation instructions.

(12) Accommodations for a minimum of five (5) 1000kcmil CU conductors per phase and neutral, and five (5) 1/0 AWG ground conductors for main breaker feed.

c. Switchboards shall be equipped with Cam-Lok receptacles for connections to accommodate a backup generator.

d. Switchboards shall be equipped with accommodations for a backup generator connection via NEMA 2-hole pattern connections to the 480V phase buses and ground bus in a separate compartment.

e. Switchboards shall be equipped with a KIRK Key Interlock that requires the main breaker to be in the open position prior to the backup compartment being unlocked to make connections for the backup feed.

f. Switchboards shall be equipped with one (1) pistol-grip style control switch.
   (1) 2 position, maintained in both positions.
   (2) Nameplate engraved with CLOSE TRIP.

g. Switchboard bus shall be equipped with one (1) – 480/120V PTs, wired open delta, connected to the bus, with accuracy classification of 0.3 W, X, Y, Z.

h. Feeder breakers:
   (1) AUXSWB-XXXX shall be equipped with the following:
      (a) (32) – 3 pole, 70A breakers
      (b) Spare capacity for (8) – 3 pole, 70A breakers
      (c) (1) – 3 pole, TBD A breaker

i. Wireway sized to accommodate routing and landing cables sized per CEC on each feeder breaker.

j. Switchboard shall be bottom entry only.

k. Switchboard shall be able to accommodate (5) 5" SCH 40 PVC conduits for the main disconnect section.

l. Switchboard shall be able to accommodate (32) 2.5" SCH 40 PVC conduit entries for the feeder breaker section.

PART 3 - EXECUTION – NOT USED

END OF SECTION 26 24 00

SECTION 26 33 53 – UNINTERRUPTIBLE POWER SYSTEM

PART 1 - GENERAL

1.01 SUMMARY:

A. Work in this Section includes the following:
   1. Seventeen [17] integrated UPS(s) including, but not limited to the following subcomponents.
      a. Battery charger(s).
      b. Static inverter(s).
      c. Static transfer switch(es).
      d. Manual bypass switch(es).
      e. AC distribution panelboard(s).
      f. Input transformer.
      g. Thermal management system as needed to maintain the battery health and equipment ratings.

B. The Uninterruptable Power System (UPS) system shall provide reliable AC electric power to support BESS Container ventilation fan(s).

C. System shall be coordinated to provide a fully selective protection scheme between the inverter, alternate source, static switch, and AC distribution panel.

D. A manual bypass switch shall be provided to supply power to the load for maintenance purposes.

1.02 REFERENCE STANDARDS:

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

B. Applicable Codes and Standards: Design, fabricate, assemble, and test all Equipment furnished to conform with, but not limited to, the following:
   1. Institute of Electrical and Electronics Engineers (IEEE):
      a. 485 - Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications.
      b. 946 - Recommended Practice for the Design of DC Auxiliary Power Systems for Generating Stations.
      c. 1184 - Guide for Batteries for Uninterruptible Power Supply Systems.
      d. 1187 - Recommended Practice for Installation Design and Installation of Valve-Regulated Lead-Acid Storage Batteries for Stationary Applications.
      e. 1188 - Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications.
      f. 1189 - Guide for Selection of Valve-Regulated Lead-Acid (VRLA) Batteries for Stationary Applications.
      g. 1375 - Guide for the Protection of Stationary Battery Systems.
      h. C2 - National Electric Safety Code (NESC).
   2. National Electrical Manufacturer's Association (NEMA):
      a. CC1 - Electric Power Connection for Substations.
      b. TR1 - Transformers, Step Voltage Regulators, and Reactors.
      c. ICS 1 - Industrial Control and Systems General Requirements.
   3. Underwriters' Laboratories (UL):
      a. 67 – Standard for Safety Panelboards.

b. 506 – UL Standard for Safety Specialty Transformers.
c. 508 - UL Standard for Safety Industrial Control Equipment.
d. 1778 - UL Standard for Safety Uninterruptible Power Systems.

4. California Electrical Code (CEC).

1.03 SUBMITTALS:

A. The following documentation shall be provided.
B. Includes, but not limited to, the following:
   1. Arrangement and outline drawings.
   2. Installation drawings.
   3. External connection diagrams.
   4. Schematic diagrams.
   5. Bills of Material.
   6. Battery Sizing Calculations.
   7. One-line diagrams.
   8. Instruction books and manuals.
   9. Protective device coordination curves.
   10. Test reports.
   11. Battery Storage Requirements.
   12. Nameplate Schedule.
   13. Transformer nameplate drawings with impedance and windings configuration.

1.04 QUALITY ASSURANCE:

A. Factory Tests:
   1. Perform manufacturer's standard factory tests.
   2. Test shall ensure operation at all input voltages, frequencies, power factor, and ambient temperature of 45ºC.
   3. The test load for the inverter test should have a power factor of 1.0. Verification of operation at a power factor of 0.8 shall also be performed. Test loads shall be switched on and off at various inverter load conditions including no load. Several 100% step loads shall be applied to the inverter. The output of the inverter shall be monitored and recorded during the switching operations.
   4. A log of the test, including all input and output variations and all ambient air temperatures inside and outside the equipment, shall be kept.
   5. Test report and certified statement of compliance with this Specification shall be submitted in triplicate at the time of delivery.

1.05 JOB CONDITIONS:

A. Specified in Section 01 11 04.
B. Furnish Equipment which will be capable of meeting the specified ratings and performance under the altitude and ambient temperature conditions specified.
C. Furnish Equipment that can reach a 25-year design life.

PART 2 - PROJECTS

2.01 GENERAL REQUIREMENTS:

A. Equipment:
   1. All Equipment and Material furnished shall have an acceptable history of satisfactory reliable service for a period of at least three years at comparable temperature, voltage, and design stress levels.
   2. Ship equipment as completely assembled as possible, consistent with shipping facilities and construction requirements at Owner's Site. Optimize shop fabricated assemblies to reduce overall costs.
   3. Factory wire all panels and install control devices in panels wherever possible.
   4. Furnish with all necessary auxiliary items required for a complete workable electrical system conforming with the intent of these Specifications.
   5. Furnish complete, coordinating the physical arrangement and electrical connection with other equipment and structures furnished by others.
   6. Use manufacturer's standard design as far as is consistent with the intent of these Specifications.
   7. Furnish with all necessary Material as required for complete field assembly and installation.
   8. Furnish Equipment of dead front construction and designed for heavy-duty power plant operation.
   9. Design for outdoor service, rated for NEMA 3R.
   10. Provide engraved laminated plastic nameplates, white with black lettering, for each major piece of Equipment and each instrument or control device mounted on the Equipment. Size and engraving as approved by Engineer.
   11. Bolted-type lugs and connectors for connection of all external power cables and buses will be furnished by others.
   12. Factory install all component equipment specified. No equipment assembly shall be shipped incomplete without specific approval by Engineer.
   13. Equipment requiring forced ventilation shall be complete with all necessary wiring and controls. An alarm shall be furnished to indicate fan failure.
   14. Heaters shall be supplied to prevent condensation inside the enclosures and to maintain optimum battery temperature.

B. Materials:
   1. Use new, unused, and first-quality Materials, free of defects.
   2. Use Materials suitable for their application, and for the mechanical and electrical stresses to which they will be subjected.
   3. Furnish as required for complete installation ready for operation, except such material as specified to be furnished by Owner.

C. Control Wiring:
   1. Complete installation of all internal control wiring at the factory.
   2. Terminate all points requiring external wiring connections at numbered points on terminal blocks conveniently grouped to receive Owner's cables.
   3. Connect to agree with manufacturer's schematic and connection drawings that have been approved by Engineer.
   4. Provide all wiring necessary for all Equipment specified, and for wiring for future equipment where such wiring is specified.
   5. Install all internal wiring without splices.

6. Provide extra flexible hinge wire in areas subject to flexing, such as on hinged brackets or swing racks, if used.

D. Finish:
   1. Clean and treat surfaces with phosphatizing process or equal and apply all necessary filler before application of finish.
   2. Apply at least two coats of manufacturer's standard finish suitable for service intended to all surfaces of Equipment.

2.02 FUNCTIONAL OPERATION:

A. The system will supply power to emergency ventilation systems (fans) of containerized battery storage systems.
B. The inverter input will be connected to the battery bus, with the battery charger normally supplying dc power to the inverter, while at the same time maintaining a full charge on the battery.
C. The battery will normally be "floating" on the supply to the inverter.
D. In the event of failure of the charger output, the battery shall assume supply to inverter, without power interruption and without variation of inverter output voltage and frequency beyond the limits specified.
E. The static transfer switch shall be connected to normally conduct power from the inverter output to the ac load.
F. In the event of failure of the inverter output, the static transfer switch shall automatically transfer to an alternate ac source, and retransfer automatically upon sustained restoration of the inverter output.
G. The alternate ac source shall include an isolation transformer and voltage regulator which will provide a noise free and regulated source of ac for the system.
H. The manual bypass switch shall facilitate testing or maintenance of the system without power interruption.

2.03 UPS BATTERY:

A. Battery voltage range and capacity shall be per needs of the load and inverter input range.
B. Duty Cycle.
   1. Battery shall be sized to deliver 1.2 kVA to the inverter load for a 2-hour duration.
C. Type and Design:
   1. Batteries shall be mounted in a self-contained enclosure.
   2. Maintenance free, lead-acid type with a service life at design conditions not less than 25 years. Alternative battery types may be proposed.
   3. Number of terminal posts per cell as determined by battery manufacturer.
   4. Provide vent caps to prevent acid spray. Shall include explosion preventing filters.
   5. Furnish all necessary intercell and interstep connections. Connections shall be lead coated copper with stainless-steel bolts.
   6. Clear sediment space of at least 1 inch, with enough electrolyte supplied for a normal level of at least 3 inches above the top of the plates.
   7. Furnish battery monitoring system with the following features:
      a. Cell and inter-cell impedance monitoring.
      b. System voltage monitoring.
      c. Float, charge, and discharge current monitoring.
      d. Ambient temperature monitoring.
      e. Cell temperature monitoring.
      f. Battery Discharge Data Logging.

g. RS-232/RS-485/Ethernet. A fiber optic interface shall be provided with an **HOLD** interface provided.
h. User configurable dry contact alarms.

8. Furnish manual disconnecting means to disconnect the battery from the main DC distribution panel. The disconnect shall be a properly rated molded case manual breaker (no trip elements) or a standard non-fusible disconnect switch. Battery disconnect switches shall be contained in a NEMA 3R enclosure or integrated into the UPS enclosure.
9. Furnish batteries charged and wet, ready for use.

2.04 INPUT TRANSFORMER

A. Ratings:
1. Input voltage: 480V +/- 10%, 3 phase, 4 wire, 60 Hertz, solidly grounded system.
2. Output voltage: 230V+/- 10%, 1 phase, 3 wire, 60 Hertz, solidly grounded system.
3. Ratings: As required to support load and thermal management system and/or internal UPS loads.

B. Transformer shall be cabinet mounted and provided with suitable overcurrent protection in accordance with the NEC.

2.05 AC DISTRIBUTION PANEL

A. The UPS shall be furnished with an AC Distribution Panelboard to service the loads. Note that the UPS capacity will be less than the connected load as the connected load will not be continuous and the connected load capabilities will not all be powered simultaneously.
B. Breaker quantities:
1. Twenty-four [24] AC breakers
a. 10A, 230V+/- 10%, 1 phase, 2 pole, 60 Hertz
2. Distribution panel to include accommodations for twelve [12] 2 pole breakers.

2.06 BATTERY CHARGER:

A. Ratings:
1. Input voltage: 230V +/- 10%, 1 phase, 60 Hertz, solidly grounded system.
2. Output voltage: As per Battery OEM datasheet.
3. Output current: Battery chargers shall be sized to fully recharge batteries from a fully discharged state in 12 hours while supplying normal continuous DC load.
4. Output voltage regulated to within +1% from no load to full load with input voltage variations of +10%, frequency variations of +5%, and maximum harmonic distortion of 5%.

B. Type and Design:
1. Automatic, self-regulating, constant voltage, full-wave rectifier type with electronically controlled power elements.
2. Automatically vary the charging rate in accordance with the requirements of the station battery.
3. Forced air or convection cooled, depending on size and operating temperature.
4. Furnish charger in free-standing, floor-mounted, NEMA 3R ventilated steel cabinet with hinged front door on which controls and instruments are mounted.
5. Chargers shall be suitable for parallel operation if parallel operation is required.
6. Include the following features and equipment:
a. Pilot light.
b. Output DC voltmeter and ammeter, accurate within 2%.

c. Output DC circuit breaker or fuse.
d. Input AC circuit breaker.
e. Zero to 72-hour adjustable equalizing timer to provide automatic return from equalizing charge rate.
f. Input AC failure relay contacts to close on AC failure.
g. DC low-voltage alarm relay with contacts to close on low dc voltage condition.
h. DC charge failure relay with contacts to close on loss of charger voltage output.
i. Ground detection.
j. Surge suppression devices for protection against system transient voltages.
k. Current limiting protection, to protect battery and to limit current even on short circuit directly on output terminals as required to protect the equipment and not operate output overload protection. Current sensing devices for each charger to be located in switchboard or battery disconnect for monitoring of the battery charging current.
l. Communications between chargers as necessary to coordinate operation and output current.

7. Charger/eliminators shall be capable of supplying rated output with battery disconnected, with not more than 2% ripple.

2.07 INVERTER:

A. Ratings:
1. Input voltage: As per battery.
2. Output voltage: 230Vac, 1 phase, 60 Hertz.
3. Output capacity: 1.2 kVA continuous at 0.8 power factor lagging.
4. Voltage regulated to within +2% from no load to full load at unity power factor, with input voltage variation from the battery.
5. Frequency regulated to within +0.5 Hertz with synchronizing line disconnected.
6. Maximum slew rate 1 Hertz/second.
7. Harmonics not exceeding 5%.
8. Overload capability of 120% continuous (ferroresonant), 125% for 10 minutes (PWM) , 500% for one cycle (ferroresonant), 200% for 50 ms (PWM).

B. Type and Design:
1. IGBT type with voltage regulator, oscillator for frequency control, filters, and automatic phase and frequency synchronizing to normal station ac.
2. The inverter load will be ventilation fan motors with associated inrush current demands. The inverter shall be designed to operate as specified in all respects with this type of load.
3. Inverter shall be synchronized to station ac as long as the station ac is within the frequency range of 59.5 60.5 Hertz (ferroresonant), 59-61 Hertz (PWM). For variations beyond this, the inverter shall control its own frequency to within the limits specified.
4. Furnish inverter in free-standing, floor-mounted, steel cabinet with hinged front door. Frame shall be 12-gage steel minimum, door panels shall be 14-gage minimum and side panels shall be 18-gage minimum. Cabinet shall be rated for NEMA 3R.
5. Include the following features and equipment:
a. Output AC voltmeter, accurate to within 2%.
b. Output AC ammeter, accurate to within 2%.
c. Output frequency meter, accurate to within 1%.
d. Input DC circuit breaker.
e. Output AC circuit breaker.

f. Necessary surge suppression devices for protection against system transient voltages.
g. Test points to permit testing of internal circuitry.
h. Low voltage alarm, connected to inverter input.
i. Overtemperature alarm.
j. Low voltage alarm connected to inverter output.
k. Bypass source input circuit breaker.
l. Bypass source failure light.
m. Battery supplying load light.
n. Fan failure light.
o. Static switch transfer light.

2.08 STATIC TRANSFER SWITCH:

A. Ratings:
1. 230Vac, 1 phase, 60 Hertz.
2. Rated for continuous operation at 125% of full rated load.
3. Overload capability:
a. 1000% for one cycle.
4. Transfer time not more than 1/4 cycle, on a 60-Hertz basis.

B. Type and Design:
1. Solid-state type, using silicon controlled rectifier components.
2. Single pole, double throw.
3. After transfer to alternate ac source, switch shall retransfer to inverter only after restoration of inverter output for thirty seconds (factory adjustable from 1-999 sec.).
4. Switch shall transfer to alternate source only if normal voltage is available from that source.
5. Switch shall be mounted in the inverter cabinet.
6. Include the following features and equipment:
a. Power factor correction capacitors, if required.
b. Auxiliary alarm relay and indicating lamps to indicate position of switch.
c. Means for initiating transfer and retransfer manually for test.
d. Test points to permit testing of internal circuitry.

2.09 MANUAL BYPASS SWITCH:

A. Ratings:
1. 230Vac, 1 phase, 60 hertz.
2. Rated for continuous operation at 125% of full rated load.

B. Type and Design:
1. 1-pole, 2-position with overlapping contacts. Termination bus for continuous neutral connections.
2. Switch shall be lockable in both positions.
3. Switch shall provide the following power supply arrangements, without load interruption during switching.
a. Load supplied through static switch, normally from inverter source.
b. Load supplied directly from the alternate source, bypassing the charger, inverter, and the static switch.
4. Manual bypass switch shall permit the inverter or static switch to be completely maintainable even to the extent of complete removal for factory repair, without disturbing

the connections to the manual bypass switch. Furnish switch in NEMA 3R enclosure with external indication of switch position.

5. Manual bypass switch shall be interlocked against any sequence of operation that could damage the inverter or static switch.

2.10 MAINTENANCE EQUIPMENT AND SPARE PARTS:

A. One portable hydrometer syringe.
B. One [1] vent plug thermometer if applicable to proposed battery type.
C. One [1] set of connector bolt wrenches.
D. One [1] set of cell numbers for mounting on rack.
E. Anti-corrosion compound for battery connections.
F. Two [2] spare fuses of each type and rating used in each piece of equipment.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Unload, store, install, adjust, and test in strict accordance with the manufacturer's instructions and as directed by the manufacturer's field service representative.
B. Install all interconnecting wiring between batteries, chargers, inverters, transfer/bypass switches, panelboards, or other components specified in this Section. Installation of other field wiring will be by others unless specified in other sections.
C. Install a temporary feed to the battery chargers to permit charging of batteries as quickly as possible after installation.

3.02 FIELD INSPECTIONS AND TESTS:

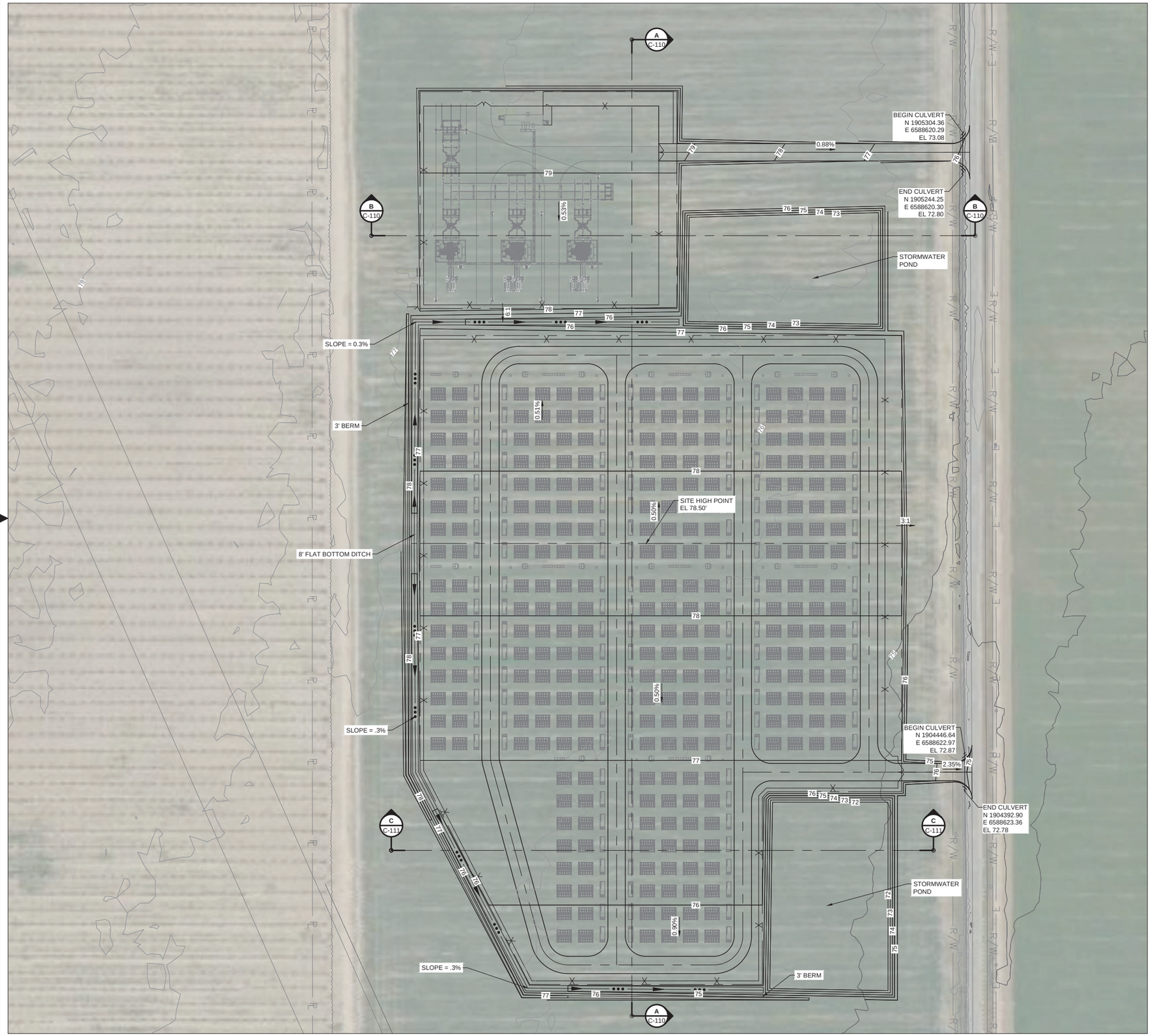
A. All field inspections and tests shall be performed under the direction of the manufacturer's field service representative.
B. Furnish all equipment necessary to perform field tests, including:
   1. Volt ohm meter.
   2. High speed chart recorder.
C. After sufficient field wiring has been installed to load the inverter, perform the following tests:
   1. All tests recommended by the manufacturer.
   2. With the chart recorder connected to the inverter load bus, conduct electrically initiated and manual transfers between inverter and alternate ac source to verify that transfer interruptions do not exceed specified time.
   3. Check quality of inverter and voltage regulator output waveforms at load levels from no load to at least 75% of rated full load.
D. At completion of successful field tests, Supplier shall submit three copies of an inspection and test report (including charts from recorder) to the Owner.
E. Field service representative shall provide operating and maintenance instructions for Owner's personnel.

END OF SECTION 26 33 53

Burns & McDonnell Western Enterprises, Inc
140 S State College Blvd., Suite 100
Brea, CA 92821
Phone: 816-333-9400
Fax: 816-333-3690
www.burnsmcd.com

Burns & McDonnell: Making our clients successful for more than 100 years

APPENDIX 2-B: PRELIMINARY GRADING PLAN



CUT/FILL	
CUT	FILL
CY	CY
10,693	35,243

REV	DATE	BY	CKD	DESCRIPTION
A	12/21/23	DCR	ERA	ISSUED FOR 30% REVIEW
B	05/03/24	DCR	JTD	ISSUED FOR 60% REVIEW

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL

BURNS & McDONNELL WESTERN ENTERPRISES, INC.
140 S STATE COLLEGE BLVD., SUITE 100
BREA, CA 92821

date 05/03/2024	detailed J. DOLL
designed D. ROSENBLUM	checked J.T. DOWELL

CORBY ENERGY STORAGE, LLC
700 UNIVERSE BLVD.
JUNO BEACH, FL 33408

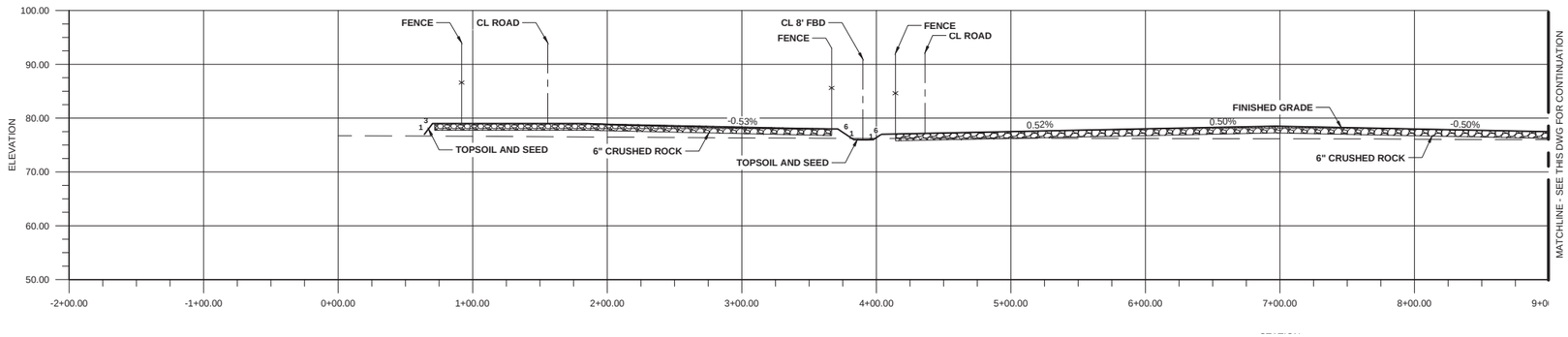
CORBY BESS PROJECT
6865 BYRNES ROAD
VACAVILLE, CALIFORNIA 95687

CORBY BESS
GRADING PLAN

project 163851	contract 8410
drawing **BCR-C-100**	rev. **B**
sheet	of sheets

file 163851BCR-C-100.dwg

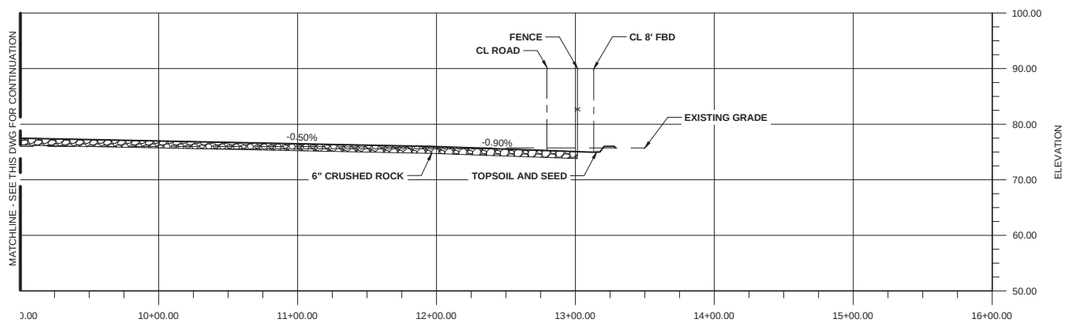
Scale For Microfilming
Millimeters
Inches



SECTION A C-100

HORIZ: 0 20' 40' 80' SCALE IN FEET

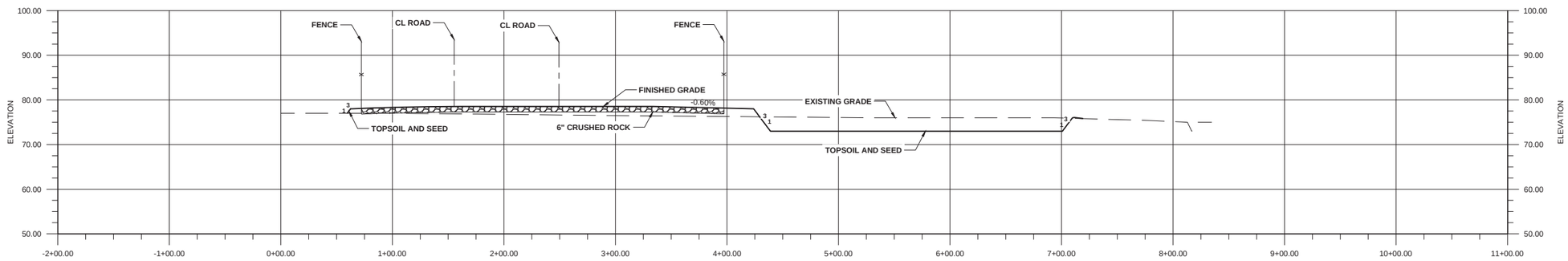
VERT: 0 10' 20' SCALE IN FEET



SECTION A C-100

HORIZ: 0 20' 40' 80' SCALE IN FEET

VERT: 0 10' 20' SCALE IN FEET



SECTION B C-100

HORIZ: 0 20' 40' 80' SCALE IN FEET

VERT: 0 10' 20' SCALE IN FEET

REV	DATE	BY	CKD	DESCRIPTION
A	05/03/24	DCR	JTD	ISSUED FOR 60% REVIEW

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL

BURNS & McDONNELL WESTERN ENTERPRISES, INC.
140 S STATE COLLEGE BLVD., SUITE 100
BREA, CA 92821

date	detailed
05/03/2024	J. DOLL
designed	checked
D. ROSENBLUM	J.T. DOWELL

CORBY ENERGY STORAGE, LLC
700 UNIVERSE BLVD.
JUNO BEACH, FL 33408

CORBY BESS PROJECT
6865 BYRNES ROAD
VACAVILLE, CALIFORNIA 95687

CORBY BESS
GRADING SECTIONS

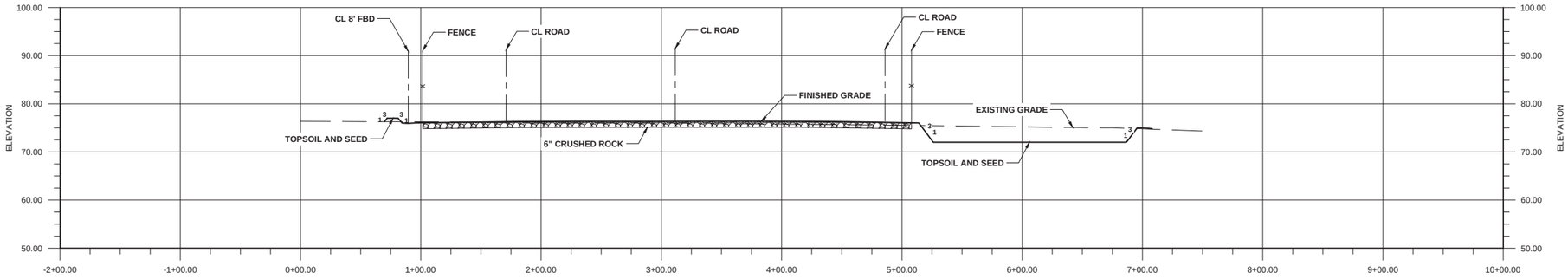
project	contract
163851	8410

drawing **BCR-C-110** rev. **A**

sheet of sheets

file 163851BCR-C-110.dwg

Millimeters
Scale For Microfilming
Inches



SECTION C / C-100

HORIZ: 0 20' 40' 80' SCALE IN FEET

VERT: 0 10' 20' SCALE IN FEET

Millimeters

Scale For Microfilming

Inches

REV	DATE	BY	CKD	DESCRIPTION
A	05/03/24	DCR	JTD	ISSUED FOR 60% REVIEW

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS & McDONNELL WESTERN ENTERPRISES, INC.
140 S STATE COLLEGE BLVD., SUITE 100
BREA, CA 92821

date	detailed
05/03/2024	J. DOLL
designed	checked
D. ROSENBLUM	J.T. DOWELL

CORBY ENERGY STORAGE, LLC
700 UNIVERSE BLVD.
JUNO BEACH, FL 33408

CORBY BESS PROJECT
6865 BYRNES ROAD
VACAVILLE, CALIFORNIA 95687

CORBY BESS
GRADING SECTIONS

project	contract
163851	8410

drawing BCR-C-111 — rev. A

sheet of sheets

file 163851BCR-C-110.dwg

APPENDIX 2-C: SID CONSTRUCTOIN WATER CORRESPONDENCE

From: Benson, Michael p
To: Dietzjohn Baldos
Subject: RE: Construction Water Application - NextEra Energy
Attachments: image001.png

Good morning Dietzjohn,

Wondering if it's possible to get a will-serve letter with the contingency thrown in?

Something along the lines of "SID will provide water for construction if there is unallocated water at the time of need" – I understand this may not be typical.

Best,

Michael Benson
Early Stage Project Management | E&C Energy Storage
Working on behalf of NextEra Energy
Cell: [redacted]

From: Dietzjohn Baldos <DBaldos@sidwater.org>
Sent: Wednesday, July 24, 2024 4:27 PM
To: Benson, Michael p <Michaelp.Benson@nexteraenergy.com>
Subject: Re: Construction Water Application - NextEra Energy

Good afternoon Michael,

SID does not provide will-serve letters for construction water. And also, every year our board approves a water budget and there is no guarantee that SID would have construction water available in 2026.

Best regards,

Dietzjohn Baldos | Engineering Technician

Solano Irrigation District

Mail: dbaldos@sidwater.org

Cell: [redacted]

From: Benson, Michael p <Michaelp.Benson@nexteraenergy.com>
Sent: Tuesday, July 16, 2024 6:45 AM
To: Dietzjohn Baldos <DBaldos@sidwater.org>

Subject: RE: Construction Water Application - NextEra Energy

Good morning Dietzjohn,

Thank you for following up. You're reading that correctly – construction slated to begin in 2026.

Understood on the fluctuation in water rates between now and 2026, but the AHJ requires a will-serve letter for construction water up-front for permitting.
Is that something your team would be able to provide?

Best,

Michael Benson
Early Stage Project Management | E&C Energy Storage
Working on behalf of NextEra Energy
Cell: [redacted]

From: Dietzjohn Baldos <DBaldos@sidwater.org>
Sent: Friday, July 12, 2024 10:18 AM
To: Benson, Michael p <Michaelp.Benson@nexteraenergy.com>
Subject: Re: Construction Water Application - NextEra Energy

Good morning Michael,

I hope you're doing well. I apologize for the late response. I just want to make sure the date for this construction project is correct. Is it for the year 2026? If it is, we cannot proceed with the application as it is too early to apply for a construction permit. It would be best to resubmit another form at a date, probably about two to three months, before the start of the project. The reason behind this is the water rates changes year-by-year.

Let me know if you have any questions. Thank you!

Best regards,

Dietzjohn Baldos | Engineering Technician

Solano Irrigation District

Mail: dbaldos@sidwater.org

Cell: [redacted]

From: Benson, Michael p <Michaelp.Benson@nexteraenergy.com>
Sent: Monday, July 8, 2024 6:21 PM
To: Dietzjohn Baldos <DBaldos@sidwater.org>
Subject: Construction Water Application - NextEra Energy

Dietzjohn,

Hope all is well – I'm reaching out with a construction water application form for a project slotted for construction to begin in 2026.

We'd be expecting this to be used for dust control during the grading phase, but I don't expect the full ~30 acre-feet will be needed as the site is mostly flat.

Happy to provide any further information about the project and where it's at in the permitting process – feel free to reach out via cell or email.

Thanks,

Michael Benson
Early Stage Project Management | E&C Energy Storage
Working on behalf of NextEra Energy
Cell: [redacted]

APPENDIX 2-D: REPRESENTATIVE FIRE PROTECTION SYSTEM SCHEMATIC

FIRE PROTECTION SYSTEM

ONE CONTROL PANEL FOR FOUR CONTAINERS

DRAWING INDEX	
DRAWING NO.	DESCRIPTION
D01	COVER SHEET,LEGEND, NOTES, MATRIX
D02	RISER DIAGRAME
D03	ARRANGEMENT OF CONTAINER
D04	DETAILS
D05	A#CONTROL CONTAINER AND POINT TO POINT TERMINAL 1
D06	A#CONTROL CONTAINER AND POINT TO POINT TERMINAL 2
D07	B/C/D#CONTROL CONTAINER AND POINT TO POINT TERMINAL 1
D08	B/C/D#CONTROL CONTAINER AND POINT TO POINT TERMINAL 2
D09	FCP BATTERY CALCULATIONS
D10	CONTAINER TERMINAL DETAIL
D11	SUGGESTION OF CONNECTION BETWEEN CONTAINERS

6

BILL OF MATERIALS				
QTY.	DESCRIPTION	PN NO.	MANUFACTURER	PRODUCT MODEL NUMBER
1	FIRE CONTROL PANEL	400340-00172	POTTER	ARC-100
12	SMOKE DETECTOR	400340-00096	POTTER	PAD200-PD
8	HEAT DETECTOR	400340-00095	POTTER	PAD100-HD
20	DETECTOR BASE	400340-00098	POTTER	PAD100-4DB
8	GAS DETECTOR(H2)		HONEYWELL	SPLCF6BARCXNZZ
4	PULL STATION		POTTER	RMS-1T-WP-LP
4	ABORT SWITCH	400340-00112	POTTER	ABORT
4	HORN & STROBE	400340-00111	POTTER	HS-24WR-WP
4	DISABLE SWITCH		POTTER	RCDS-1
16	TWO RELAY TWO INPUT MODULE		POTTER	PAD100-TRTI
8	NAC MODULE	400340-00099	POTTER	PAD100-NAC
8	SURGE PROTECTOR		DITEX	DTK-2MHLP24BWB
8	EXPLOSION-PROOF VENTILATION LOUVER		HEBEN	
4	EXPLOSION-PROOF EXHAUST FAN		HEBEN	
4	FAN EMERGENCY SWITCH		HEBEN	SSB01

NO.	Enclosure Design and Installation Requirements	YES/NO
1	Fire Extinguishing System(Aerosol Canister system)	NO
2	Explosion Prevention System	YES
3	Fire Detection	YES
4	Gas Detection	YES
5	Detector Alarm Notification	YES

6

Notes:Cause and effect matrix please refer detail information attached.

南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT	
				SUBPROJECT	Fire Protection System
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	COVER SHEET,LEGEND, NOTES, MATRIX
DISCIP.	Fire Protection	PHASE	Schematic		
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059 DWG NO. D01

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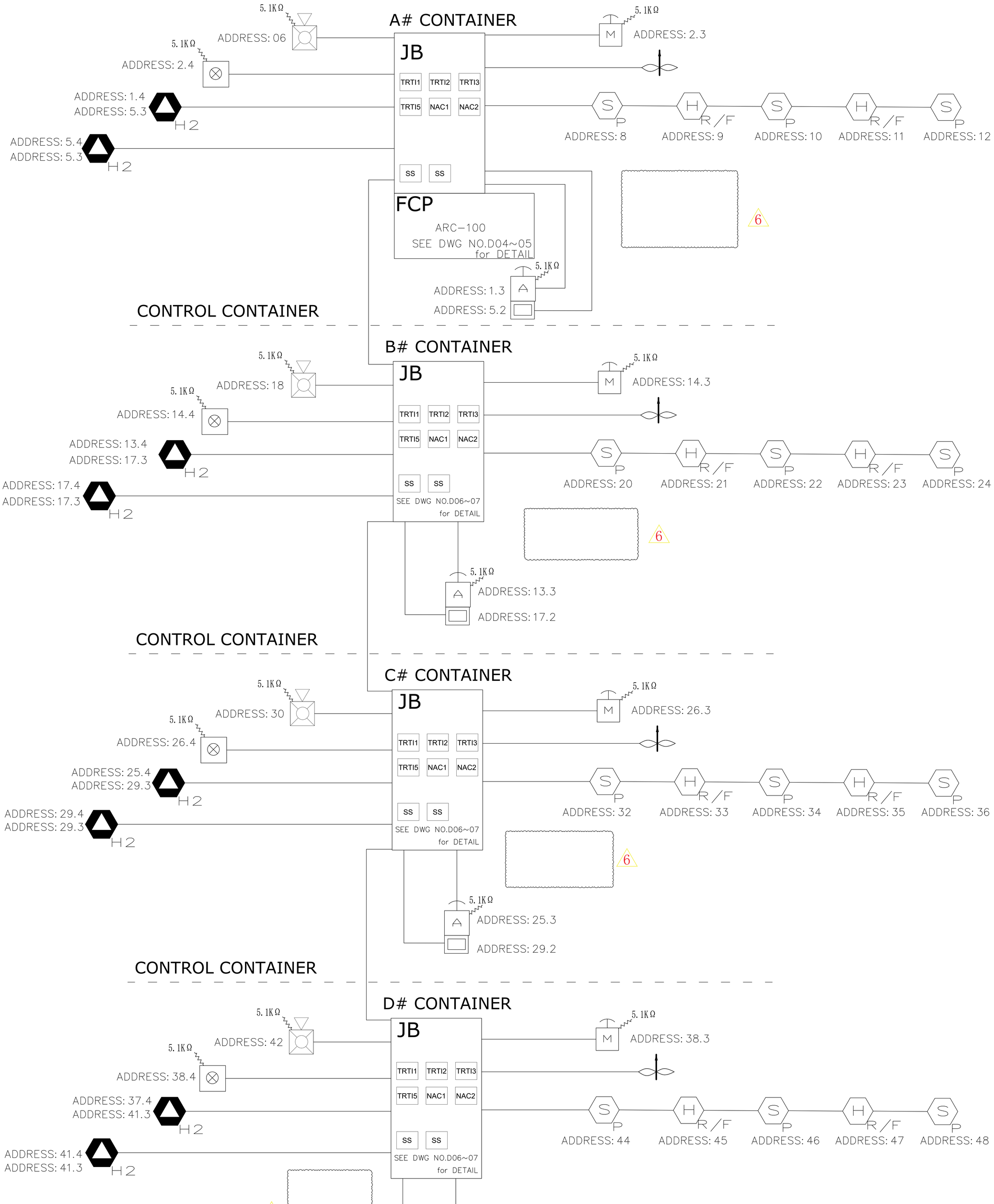


SLC DATA LOOP ADDRESS SCHEDULE

ADDRESS XX — ADDRESS

example:1

LEGEND

SYM	DESCRIPTION
FCP	FIRE CONTROL PANEL
JB	JUNCTION BOX
S P	SMOKE DETECTOR
H R/F	HEAT DETECTOR
H2	GAS DETECTOR(H2)
	HORN & STROBE
M	PULL STATION
A	ABORT SWITCH
	DISABLEMENT SWITCH
AOM	NAC MODULE
AIO 2	TWO RELAY TWO INPUT MODULE
	ELECTRIC EXHAUST LOUVER
	EXPLOSION-PROOF EXHAUST FAN
	FAN EMERGENCY SWITCH

NOTE:

See next page for detail about Cause and Effect Matrix Fire Protection System

EQUIPMENT	ADDRESS	EQUIPMENT	ADDRESS	EQUIPMENT	ADDRESS
A#PAD100-TRTI(1)	1	B#PAD100-TRTI(3)	15	C#SMOKE DETECTOR(3)	32
A#ABORT SWITCH	1.3	B#PAD100-TRTI(5)	17	C#HEAT DETECTOR(1)	33
A#GAS DETECTOR 1 (H2)	1.4	B#GAS DETECTOR TROUBLE	17.3	C#SMOKE DETECTOR(1)	34
A#PAD100-TRTI(2)	2	B#GAS DETECTOR 2 (H2)	17.4	C#HEAT DETECTOR(2)	35
A#PULL STATION	2.3	B#PAD100-NAC(1) HORN & STROBE	18	C#SMOKE DETECTOR(2)	36
A#DISABLE SWITCH	2.4	B#PAD100-NAC(2) 6	19	D#PAD100-TRTI(1)	37
A#PAD100-TRTI(3)	3	B#SMOKE DETECTOR(3)	20	D#ABORT SWITCH	37.3
A#PAD100-TRTI(5)	5	B#HEAT DETECTOR(1)	21	D#GAS DETECTOR 1 (H2)	37.4
A#GAS DETECTOR TROUBLE	5.3	B#SMOKE DETECTOR(1)	22	D#PAD100-TRTI(2)	38
A#GAS DETECTOR 2 (H2)	5.4	B#HEAT DETECTOR(2)	23	D#PULL STATION	38.3
A#PAD100-NAC(1) HORN & STROBE	6	B#SMOKE DETECTOR(2)	24	D#DISABLE SWITCH	38.4
A#PAD100-NAC(2) 6	7	C#PAD100-TRTI(1)	25	D#PAD100-TRTI(3)	39
A#SMOKE DETECTOR(3)	8	C#ABORT SWITCH	25.3	D#PAD100-TRTI(5)	41
A#HEAT DETECTOR(1)	9	C#GAS DETECTOR 1 (H2)	25.4	D#GAS DETECTOR TROUBLE	41.3
A#SMOKE DETECTOR(1)	10	C#PAD100-TRTI(2)	26	D#GAS DETECTOR 2 (H2)	41.4
A#HEAT DETECTOR(2)	11	C#PULL STATION	26.3	D#PAD100-NAC(1) HORN & STROBE	42
A#SMOKE DETECTOR(2)	12	C#DISABLE SWITCH	26.4	D#PAD100-NAC(2) 6	43
B#PAD100-TRTI(1)	13	C#PAD100-TRTI(3)	27	D#SMOKE DETECTOR(3)	44
B#ABORT SWITCH	13.3	C#PAD100-TRTI(5)	29	D#HEAT DETECTOR(1)	45
B#GAS DETECTOR 1 (H2)	13.4	C#GAS DETECTOR TROUBLE	29.3	D#SMOKE DETECTOR(1)	46
B#PAD100-TRTI(2)	14	C#GAS DETECTOR 2 (H2)	29.4	D#HEAT DETECTOR(2)	47
B#PULL STATION	14.3	C#PAD100-NAC(1) HORN & STROBE	30	D#SMOKE DETECTOR(2)	48
B#DISABLE SWITCH	14.4	C#PAD100-NAC(2) 6	31		

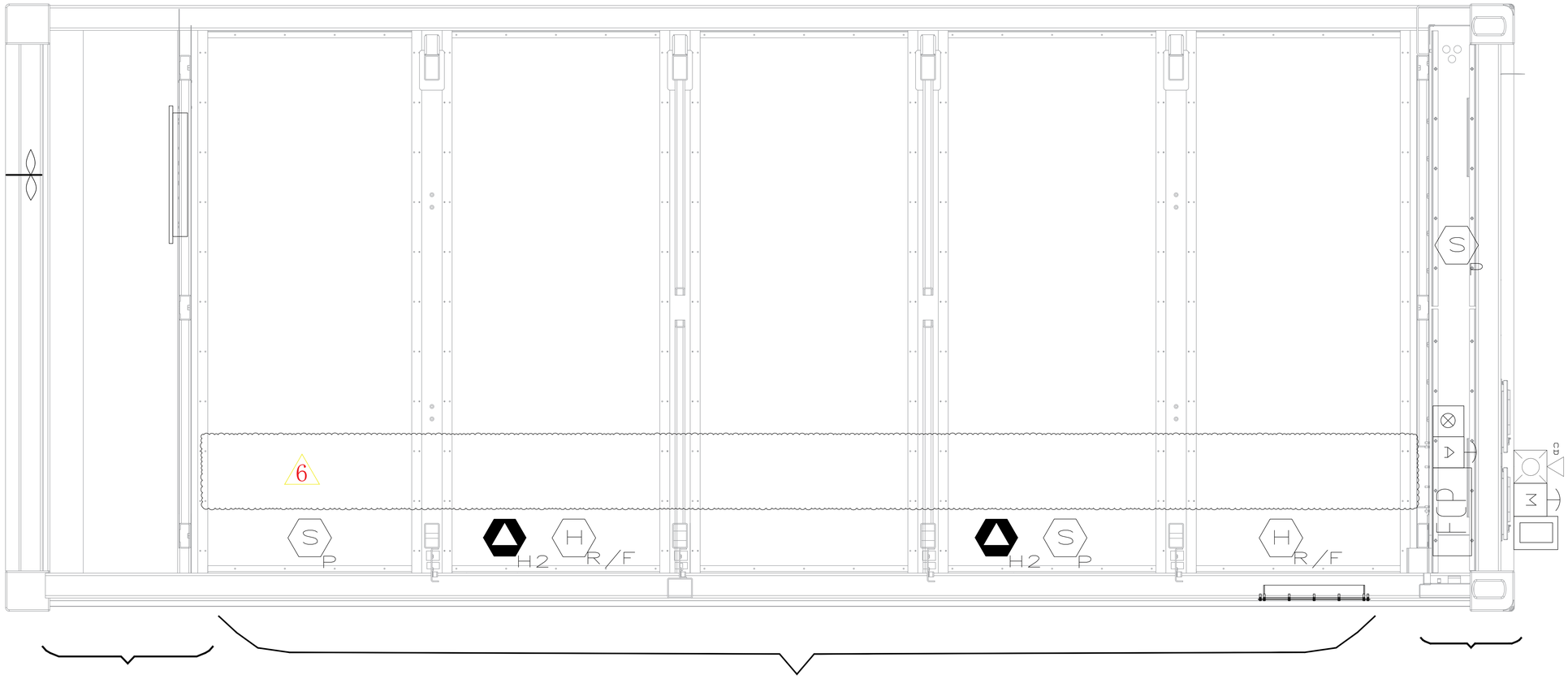
南京和本机电设备科技有限公司
Nanjing Heben M&E Equipment Technology Co., Ltd.

PROJECT	
SUBPROJECT	Fire Protection System
DWG TITLE	RISER DIAGRAME
JOB NO.	HBME-FPS-2023-059
DWG NO.	D02
SHEET	OF
PHASE	Schematic
CERT. NO.	D232453295
DISCIP.	Fire Protection
GRADE OF QUAL.	GRADE B
SCALE	

EnerC+(USA)

CAUSE AND EFFECT MATRIX
FIRE PROTECTION SYSTEM

INITIATING DEVICE				FSCP	FSCP	JB01	JB01	Fan	JB01	TRTI	NAC	NAC	Fan	Fan	Fan	
				Fire control panel status display (indicator light on and displays alarm information)	The fire control panel beeps	The fire control panel 1st-stage fire alarm signal to BMS	The fire control panel 2nd-stage fire alarm signal to BMS	Fan stop	Trouble output	Horn & strobe alarm	/	/	Fan trouble to BMS	Fan start signal output to BMS	Fan start	
No.	Name	Position	Function	1	2	3	4	5	6	7	8	9	10	11	12	Description
1	Smoke detector 1	Battery compartment	Only battery compartment smoke detector 1 fire alarm.	X	X	X				X						1 If any heat detector，smoke detector or gas detector alarm, the horn & strobe will be triggered and output 1st-stage alarm signal to BMS. 2 Any gas detector alarm (10%LEL), the horn & strobe will be triggered and activate the fan，When the gas sensing concentration is lower than the alarm value, the fan will not stop. 3 Any one of the smoke and heat detector or two heat detectors alarm at the same time in battery compartment, the 2nd-stage alarm signal will be sent to BMS. 4 When the pull station is triggered,2nd-stage alarm signal will be sent to BMS.The horn & strobe alarm will be triggered. 5 Emergency start-up switch "on" to start the fan.The horn & strobe alarm acts and outputs fan start signal. 6 Emergency stop switch "on" to stop the fan. 7 The disablement switch is in the disable state, and The fire control panel output trouble signal. At this time, if the fire extinguishing conditions are met, the aerosol will not be released（Optional）. 8 Any line break, terminal resistance fall off, probe fall off, gas trouble, control panel main power failure or backup battery trouble, the fire control panel outputs trouble signal. Notes Any container output first-stage alarm/second-stage alarm/trouble signal to BMS,the other containers will also output first-stage alarm/second-stage alarm/trouble signal simultaneously. The independent horn/strobe activation per the activated BESS container.For example,while horn/strobe of container A be triggered,the horn/strobe of the other containers will not be triggered.
2			Smoke detector 1 circuit is short.	X	X				X							
3			The circuit of smoke detector 1 is open, or terminal resistance is off, or detector do not connect.	X	X				X							
4	Smoke detector 2	Battery compartment	only battery compartment smoke detector 2 fire alarm.	X	X	X				X						
5			The circuit of smoke detector 2 is short.	X	X				X							
6			The circuit of smoke detector 2 is open, or detector do not connect.	X	X				X							
7	Smoke detector 3	Electrical compartment	Only electrical compartment smoke detector 3 fire alarm.	X	X	X				X						
8			The circuit of smoke detector 3 is short.	X	X				X							
9			The circuit of smoke detector 3 is open, or detector do not connect.	X	X				X							
10	Heat detector 1	Battery compartment	Only battery compartment heat detector 1 fire alarm.(85℃)	X	X	X				X						
11			The circuit of heat detector 1 is short.	X	X				X							
12			The circuit of heat detector 1 is open, or detector do not connect.	X	X				X							
13	Heat detector 2	Battery compartment	Only battery compartment heat detector 2 fire alarm.(85℃)	X	X	X				X						
14			The circuit of heat detector 2 is short.	X	X				X							
15			The circuit of heat detector 2 detector is open, or detector do not connect.	X	X				X							
16	Gas detector 1	Battery compartment	Only gas detector 1 alarm(10%LEL)	X	X	X				X				X	X	
17			Gas detector 1 alarm(10%LEL) , the fan emergency stop switch is “on” .	X	X	X		X		X						
18			Gas detector 1 alarm circuit is open.	X	X				X							
19			Gas detector 1 is trouble.	X	X				X							
20	Gas detector 2	Battery compartment	Only gas detector 2 alarm(10%LEL)	X	X	X				X				X	X	
21			Gas detector 2 alarm(10%LEL) , the fan emergency stop switch is “on” .	X	X	X		X		X						
22			Gas detector 2 alarm circuit is open.	X	X				X							
23			Gas detector 2 body is trouble.	X	X				X							
24	Fan emergency start-up switch	/	fan emergency start-up switch is on	X	X					X				X	X	
25	Smoke detector 1 & Heat detector 1	/	Smoke detector 1 fire alarm and heat detector 1 fire alarm, the abort switch button is not pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
26	Smoke detector 1 & Heat detector 2	/	Smoke detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
27	Smoke detector 2 & Heat detector 1	/	Smoke detector 2 fire alarm and heat detector 1 fire alarm, the abort switch button is not pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
28	Smoke detector 2 & Heat detector 2	/	Smoke detector 2 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
29	Heat detector 1 & Heat detector 2	/	Heat detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
30	Smoke detector 1 & Heat detector 1	/	Smoke detector 1 fire alarm and heat detector 1 fire alarm, the abort switch button is pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
31	Smoke detector 1 & Heat detector 2	/	Smoke detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
32	Smoke detector 2 & Heat detector 1	/	Smoke detector 2 fire alarm and heat detector 1 fire alarm, the abort switch button is pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
33	Smoke detector 2 & Heat detector 2	/	Smoke detector 2 fire alarm and heat detector 2 fire alarm, the abort switch button is pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
34	Heat detector 1 & Heat detector 2	/	Heat detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is pressed, the disablement switch is in the allowed state.	X	X	X	X			X						
35	Smoke detector 1 & Heat detector 1	/	Smoke detector 1 fire alarm and heat detector 1 fire alarm, the abort switch button is not pressed, the disablement switch is in the disable state.	X	X	X	X		X	X						
36	Smoke detector 1 & Heat detector 2	/	Smoke detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the disable state.	X	X	X	X		X	X						
37	Smoke detector 2 & Heat detector 1	/	Smoke detector 2 fire alarm and heat detector 1 fire alarm, the abort switch button is not pressed, the disablement switch is in the disable state.	X	X	X	X		X	X						
38	Smoke detector 2 & Heat detector 2	/	Smoke detector 2 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the disable state.	X	X	X	X		X	X						
39	Heat detector 1 & Heat detector 2	/	Heat detector 1 fire alarm and heat detector 2 fire alarm, the abort switch button is not pressed, the disablement switch is in the disable state.	X	X	X	X		X	X						
40	Pull station	Man Release	The pull station button is pressed ,the abort switch button is not pressed, and the disblement switch is in the allowed state.	X	X		X			X						
41			The pull station button is pressed ,the abort switch button is pressed, and the disblement switch is in the allowed state.	X	X		X			X						
42			The pull station button is pressed ,the abort switch button is not pressed, and the disblement switch is in the disable state.	X	X		X		X	X						
43			The pull station switch circuit is open, or the terminal resistance is off.	X	X				X							
44	Fan trouble signal	/	Fan body trouble (the fan or louvers cannot operate when the fan is opened)	X	X				X				X			
45	Fan condition signal	/	After the fan starts, feedback the start signal to the fire control panel.	X	X					X				X		
46	Disablement switch	/	The disablement switch is in disable stage.	X	X				X							
47		/	The circuit is short or open.	X	X				X							
48	Abort switch	ABORT	The abort switch circuit is open, or the terminal resistance is off.	X	X				X							
49	Horn & strobe alarm	NAC1	The horn & strobe alarm circuit is short.	X	X				X							
50			The horn & strobe alarm circuit is open, or the terminal resistance is off.	X	X				X							



LEGEND	
SYM	DESCRIPTION
FCP	FIRE CONTROL PANEL
JB	JUNCTION BOX
S P	SMOKE DETECTOR
H R/F	HEAT DETECTOR
H2	GAS DETECTOR(H2)
	HORN & STROBE
M	PULL STATION
A	ABORT SWITCH
	DISABLEMENT SWITCH
AOM	NAC MODULE
AIO 2	TWO RELAY TWO INPUT MODULE
	ELECTRIC EXHAUST LOUVER
	EXPLOSION-PROOF EXHAUST FAN
	FAN EMERGENCY SWITCH

南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT			
				SUBPROJECT	Fire Protection System		
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	ARRANGEMENT OF CONTAINER		
DISCIP.	Fire Protection	PHASE	Schematic				
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO.	D03

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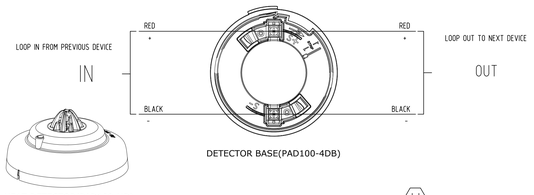
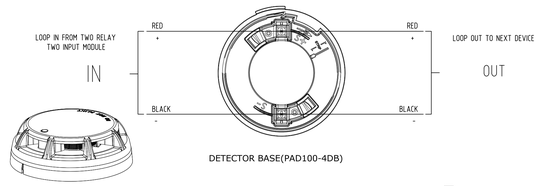


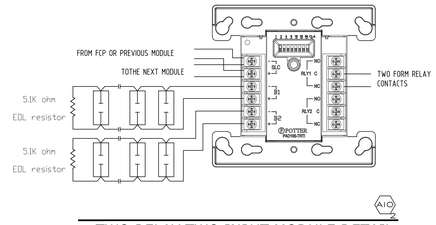
HEAT DETECTOR DETAIL

SCALE:NTS P/N: PAD100-HD+PAD100-4DB



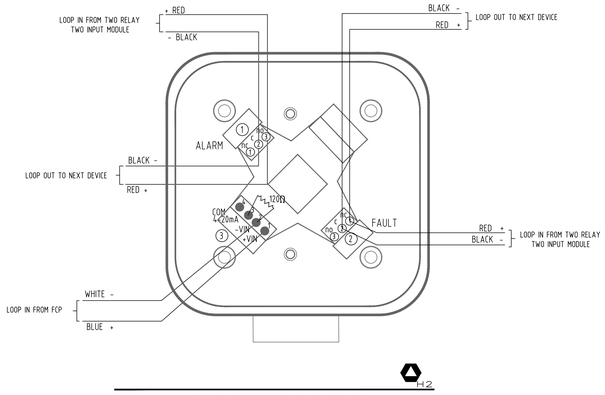
SMOKE DETECTOR DETAIL

SCALE:NTS P/N: PAD200-PD+PAD100-4DB



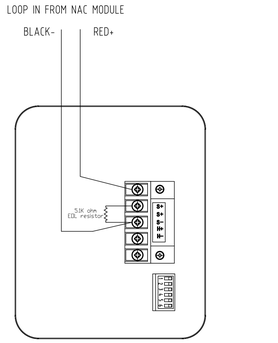
TWO RELAY TWO INPUT MODULE DETAIL

SCALE:NTS P/N: PAD100-TRTI



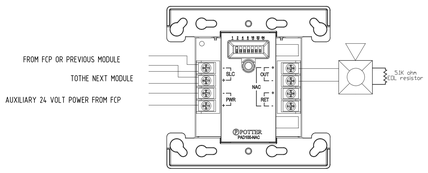
GAS DETECTOR DETAIL

SCALE:NTS P/N: XCL



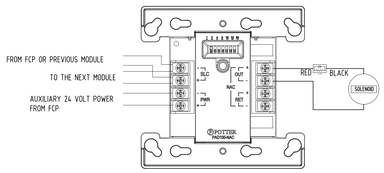
HORN & STROBE DETAIL

SCALE:NTS P/N:HS-24WR-WP



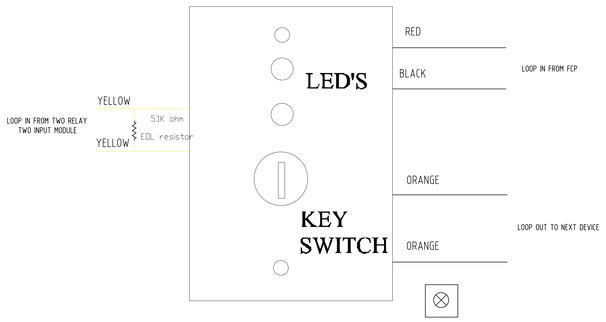
NAC MODULE DETAIL

SCALE:NTS P/N: PAD100-NAC



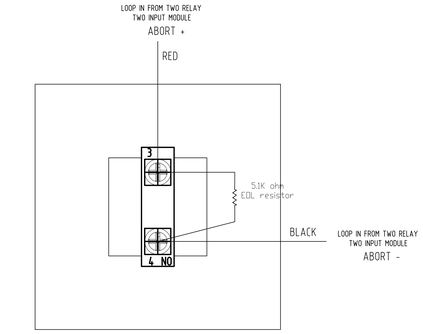
NAC MODULE DETAIL

SCALE:NTS P/N: PAD100-NAC



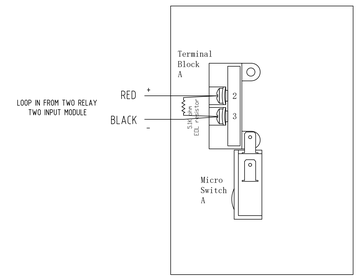
DISABLE SWITCH DETAIL

SCALE:NTS P/N: RCDS SERIES



ABORT SWITCH DETAIL

SCALE:NTS P/N: ABORT



PULL STATION DETAIL

SCALE:NTS P/N: RMS-1T-WP-LP

南京和本机电设备科技有限公司
Nanjing Heben M&E Equipment Technology Co.,Ltd.

PROJECT							
SUBPROJECT	Fire Protection System						
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	DETAILS		
DISCIP.	Fire Protection	PHASE	Schematic				
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO.	D04

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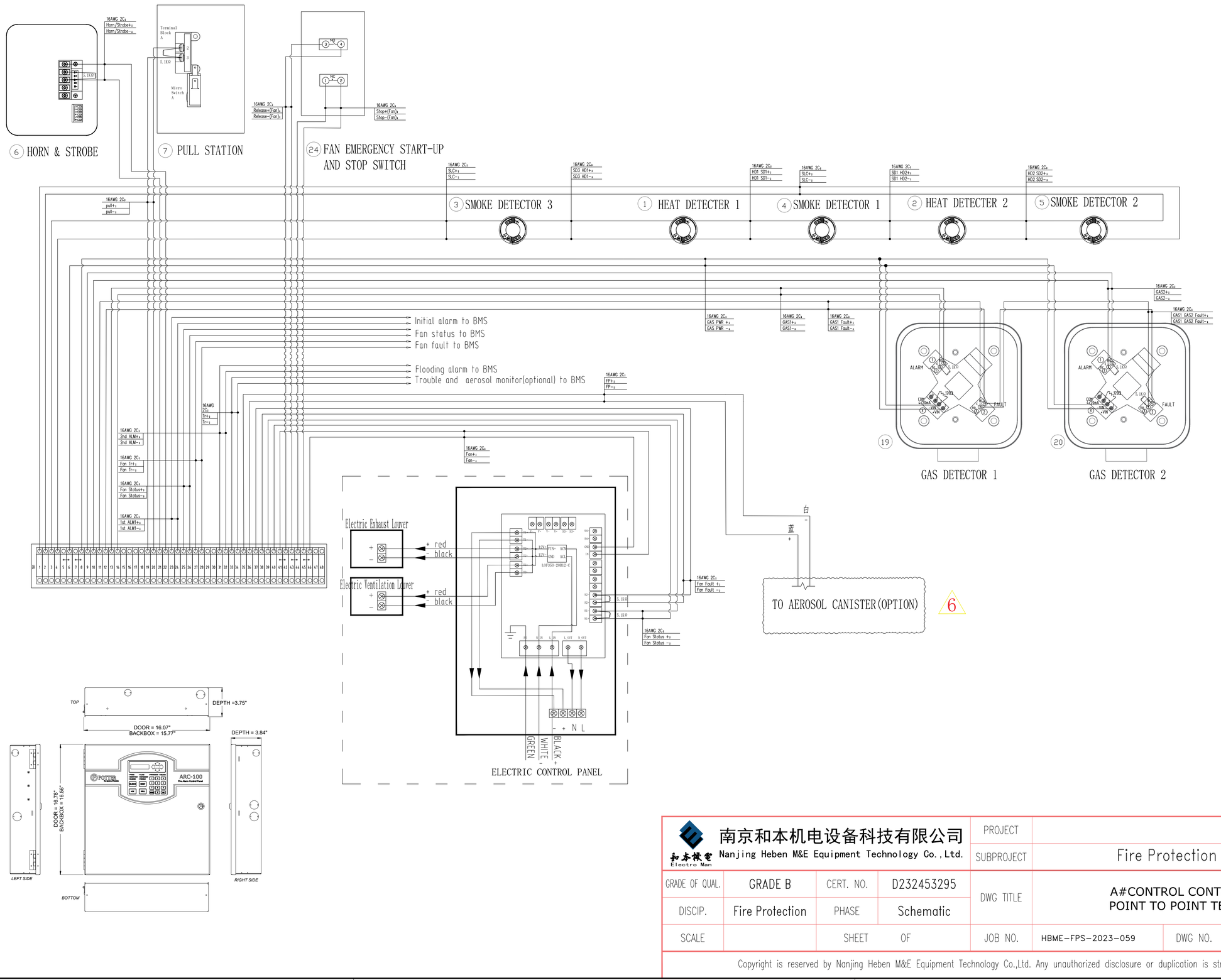
A# CONTAINER



南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT			
				SUBPROJECT	Fire Protection System		
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	A#CONTROL CONTAINER AND POINT TO POINT TERMINAL 1		
DISCIP.	Fire Protection	PHASE	Schematic				
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO.	D05

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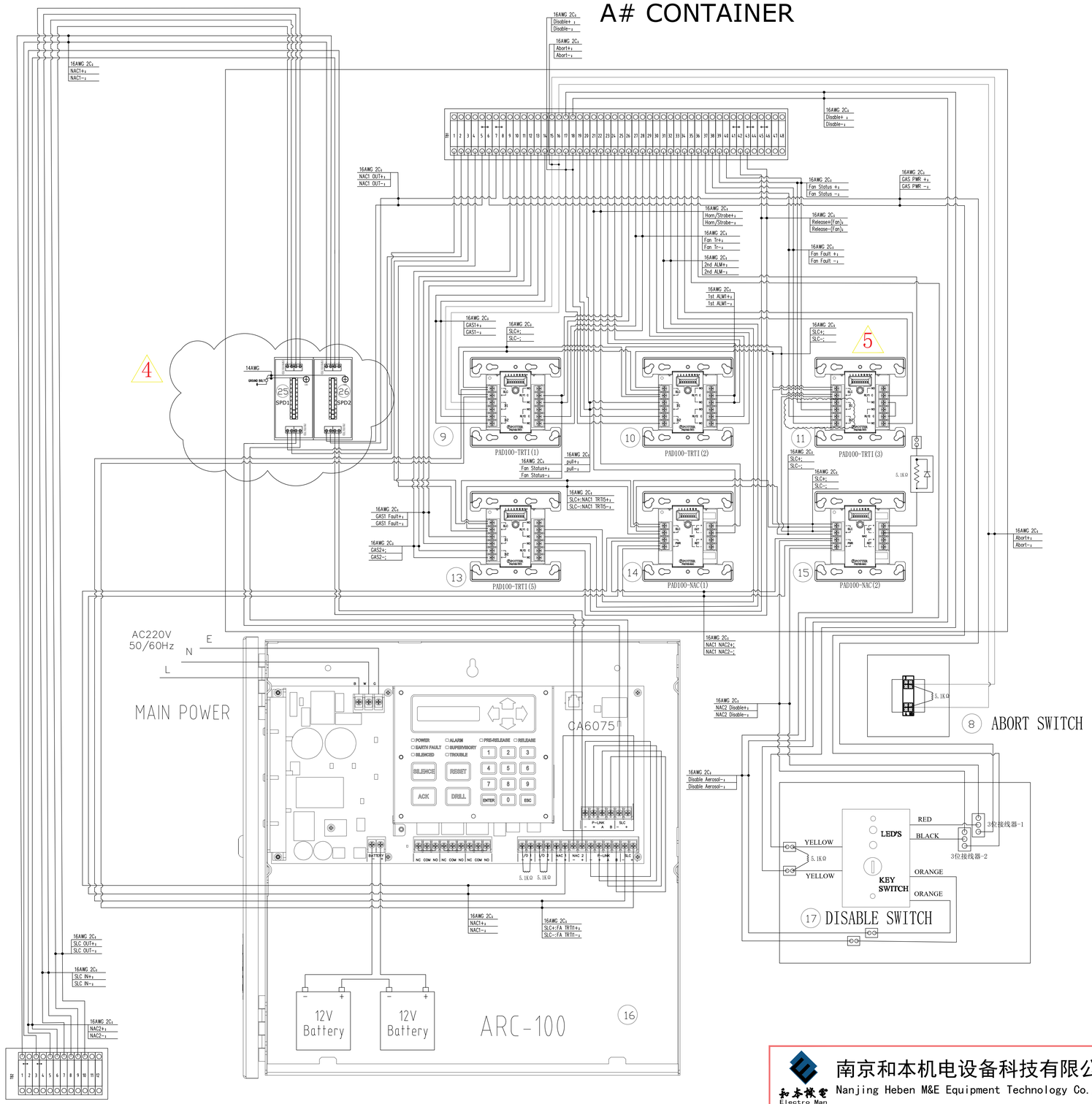
A# CONTAINER



CONTROL CONTAINER EQUIPMENT LIST

MANUFACTURER	No.	DESCRIPTION	PRODUCT MODEL NUMBER
POTTER	1	HEAT DETECTOR	PAD100-HD
	2	HEAT DETECTOR	
	3	SMOKE DETECTOR	PAD200-PD
	4	SMOKE DETECTOR	
	5	SMOKE DETECTOR	
	6	HORN & STROBE	HS-24WR-WP
	7	PULL STATION	RMS-1T-WP-LP
	8	ABORT SWITCH	ABORT
	9	TWO RELAY TWO INPUT MODULE	PAD100-TRTI
	10	TWO RELAY TWO INPUT MODULE	
	11	TWO RELAY TWO INPUT MODULE	
	13	TWO RELAY TWO INPUT MODULE	
	14	NAC MODULE	PAD100-NAC
	15	NAC MODULE	
	16	CONTROL PANEL	ARC-100
	17	DISABLEMENT SWITCH	RCDS-1
HONEYWELL	19	GAS DETECTOR 1 (H2)	SPLCF6BARCXNZZ
	20	GAS DETECTOR 2 (H2)	SPLCF6BARCXNZZ
HEBEN	21	EXPLOSION-PROOF EXHAUST FAN	TPF03
	22	EXPLOSION-PROOF VENTILATION LOUVER	TPF04
	23	EXPLOSION-PROOF VENTILATION LOUVER	TPF04
	24	FAN EMERGENCY START-UP AND STOP SWITCH	SSB01
DITEK	25	SURGE PROTECTOR	DTK-2MHLP24BWB
	26	SURGE PROTECTOR	DTK-2MHLP24BWB

南京和本机电设备科技有限公司
Nanjing Heben M&E Equipment Technology Co.,Ltd.

PROJECT						
SUBPROJECT	Fire Protection System					
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	A#CONTROL CONTAINER AND POINT TO POINT TERMINAL 2	
DISCIP.	Fire Protection	PHASE	Schematic			
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO. D06

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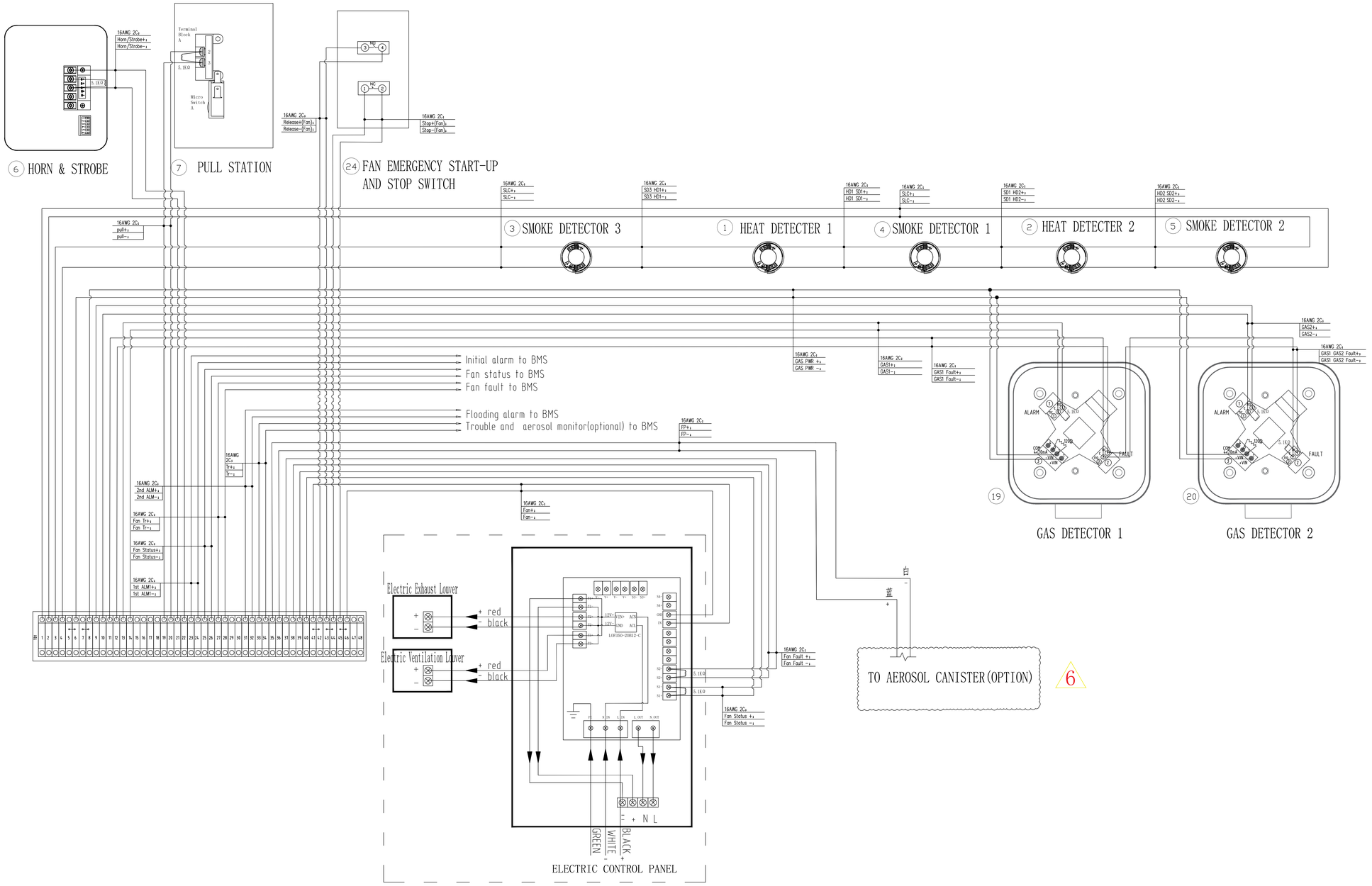
B/C/D# CONTAINER



南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT		
				SUBPROJECT	Fire Protection System	
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	B/C/D#CONTROL CONTAINER AND POINT TO POINT TERMINAL 1	
DISCIP.	Fire Protection	PHASE	Schematic			
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO. D07

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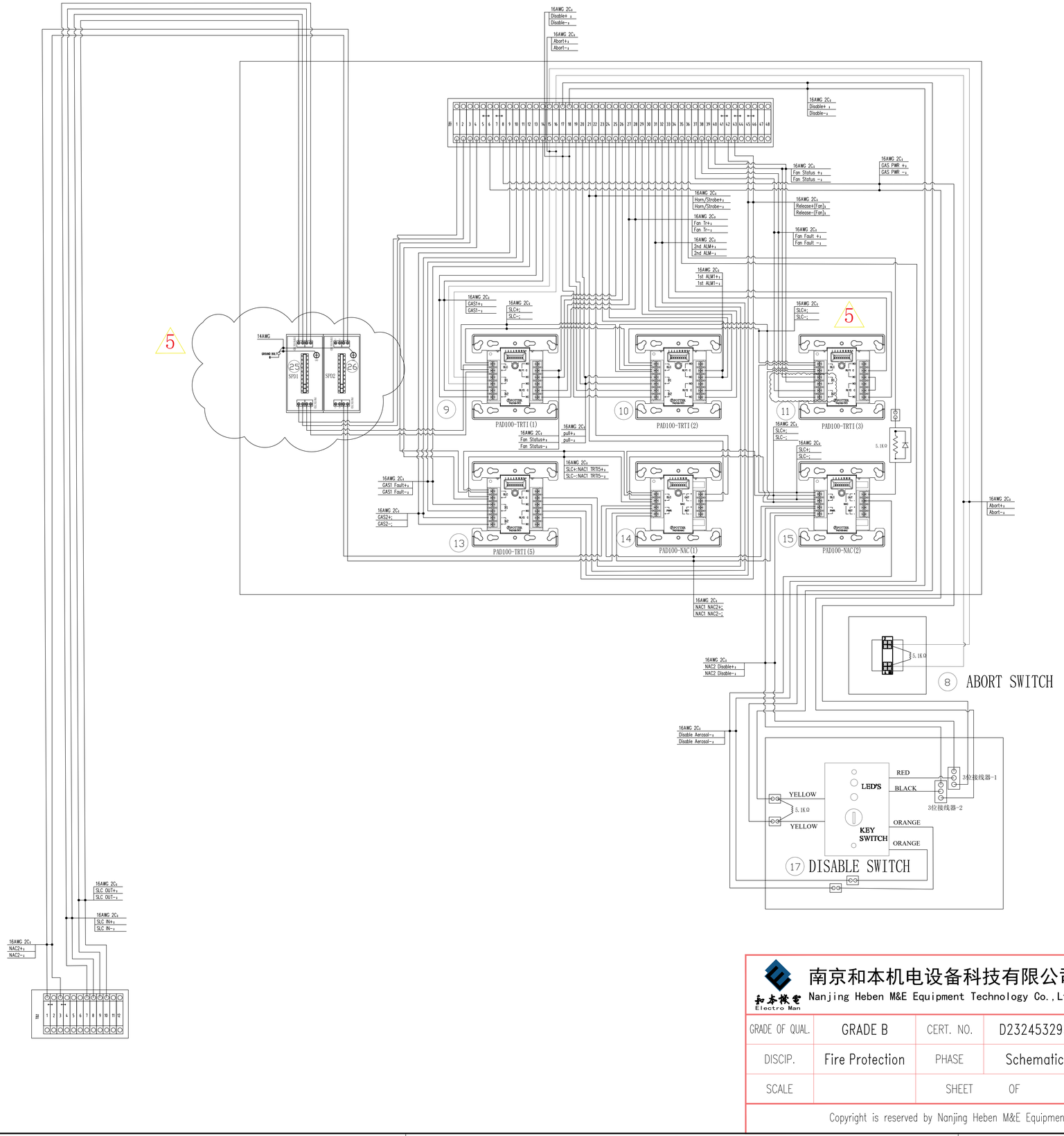
B/C/D# CONTAINER



CONTROL CONTAINER EQUIPMENT LIST

MANUFACTURER	No.	DESCRIPTION	PRODUCT MODEL NUMBER
POTTER	1	HEAT DETECTOR	PAD100-HD
	2	HEAT DETECTOR	
	3	SMOKE DETECTOR	PAD200-PD
	4	SMOKE DETECTOR	
	5	SMOKE DETECTOR	
	6	HORN & STROBE	HS-24WR-WP
	7	PULL STATION	RMS-1T-WP-LP
	8	ABORT SWITCH	ABORT
	9	TWO RELAY TWO INPUT MODULE	PAD100-TRTI
	10	TWO RELAY TWO INPUT MODULE	
	11	TWO RELAY TWO INPUT MODULE	
	13	TWO RELAY TWO INPUT MODULE	
	14	NAC MODULE	PAD100-NAC
	15	NAC MODULE	
	17	DISABLEMENT SWITCH	RCDS-1
HONEYWELL	19	GAS DETECTOR 1 (H2)	SPLCF6BARCXNZZ
	20	GAS DETECTOR 2 (H2)	SPLCF6BARCXNZZ
HEBEN	21	EXPLOSION-PROOF EXHAUST FAN	TPF03
	22	EXPLOSION-PROOF VENTILATION LOUVER	TPF04
	23	EXPLOSION-PROOF VENTILATION LOUVER	TPF04
	24	FAN EMERGENCY START-UP AND STOP SWITCH	SSB01
DITEK	25	SURGE PROTECTOR	DTK-2MHLP24BWB
	26	SURGE PROTECTOR	DTK-2MHLP24BWB

南京和本机电设备科技有限公司
Nanjing Heben M&E Equipment Technology Co.,Ltd.

PROJECT							
SUBPROJECT	Fire Protection System						
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	B/C/D#CONTROL CONTAINER AND POINT TO POINT TERMINAL 2		
DISCIP.	Fire Protection	PHASE	Schematic				
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO.	D08

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System Power Requirements							
Potter ARC-100Fire Alarm Control Panel							
24h standby+2h secondary alarm（aerosol5s）							
		Quiescent Load			Fire Alarm Load		
Equipment		I(A)	X	Total	I(A)	X	Total
ARC-100 control panel		0.130	1.0	0.130	0.220	1.0	0.220
CA-6075 expander		0.012	1.0	0.012	0.044	1.0	0.044
NCF-1000 Network card		0.095	1.0	0.095	0.095	1.0	0.095
PAD-PD smoke detector		0.000	12.0	0.004	0.000	12.0	0.004
PAD-HD heat detector		0.000	8.0	0.002	0.000	8.0	0.002
PAD100-TRTI relay/input module		0.000	16.0	0.004	0.000	16.0	0.004
PAD100-NAC notification module		0.000	8.0	0.002	0.000	8.0	0.002
RCDS disable swtich		0.010	4.0	0.040	0.010	4.0	0.040
gas detector		0.066	8.0	0.528	0.096	8.0	0.768
horn and strobe					0.170	4.0	0.680
aerosol（optional）					0.600	4.0	2.400
Total		Quiescent Load total		0.81644	Alarm Load total		1.858
			x24hr =	19.59456	x2h+Aerosol 5s =		3.72021333
				Total Load (Quiescent + Alarm) =			23.3147733
				x 1.25(Battery De-rating factor) =			29.1434667
Equip two batterys with 12V/33Ah or 35Ah							

FCP BATTERY CALCULATIONS

NTS

南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT			
				SUBPROJECT	Fire Protection System		
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	FCP BATTERY CALCULATIONS		
DISCIP.	Fire Protection	PHASE	Schematic				
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO.	D09

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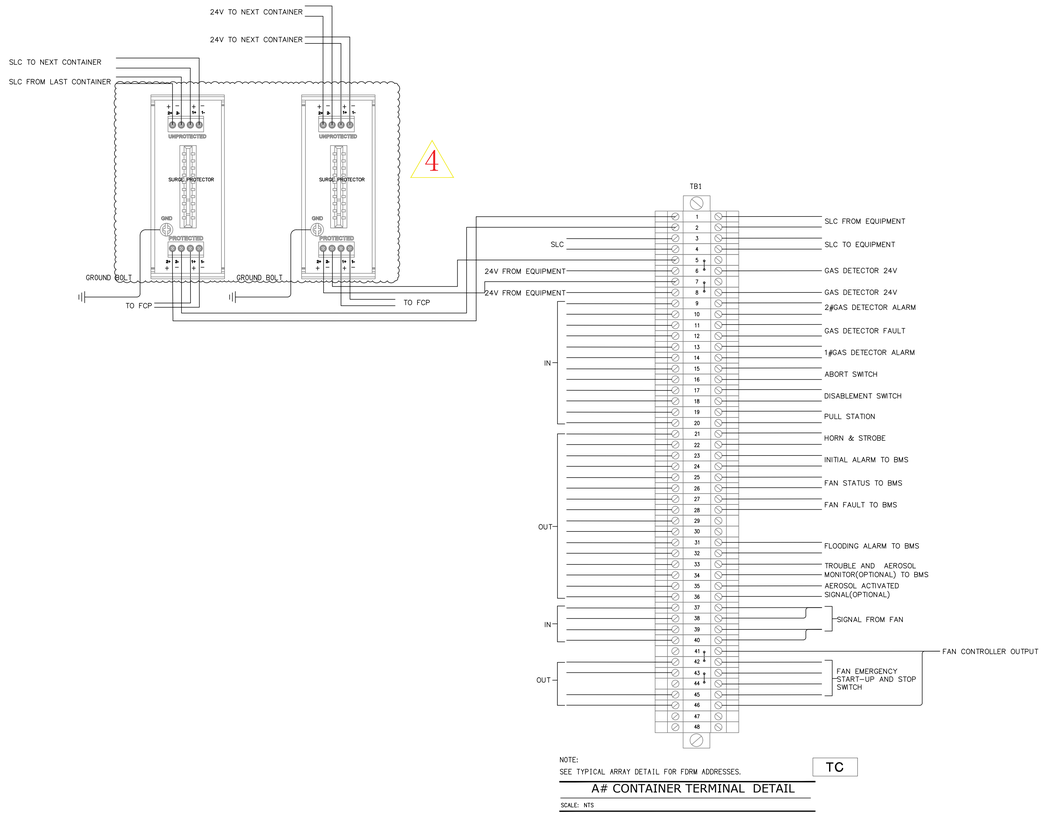
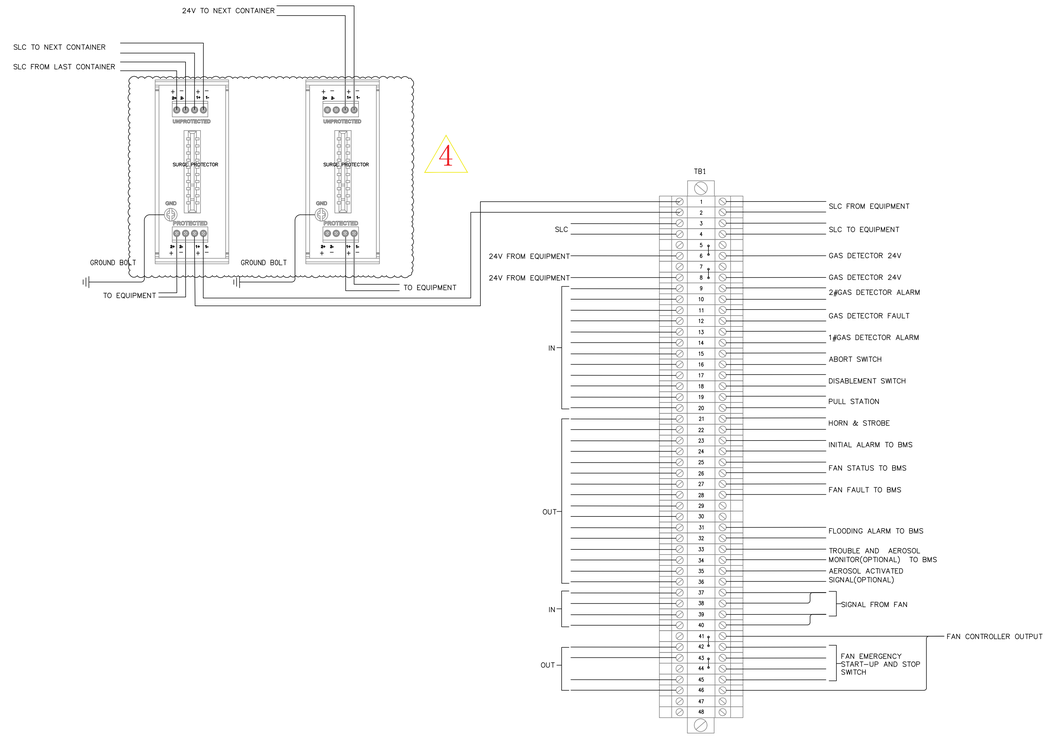


NOTE:
SEE TYPICAL ARRAY DETAIL FOR FDRM ADDRESSES.

TC

A# CONTAINER TERMINAL DETAIL

SCALE: NTS



NOTE:
SEE TYPICAL ARRAY DETAIL FOR FDRM ADDRESSES.

TC

B/C/D# CONTAINER TERMINAL DETAIL

SCALE: NTS

南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT	EnerC+(USA)
				SUBPROJECT	Fire Protection System
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	CONTAINER TERMINAL DETAIL
DISCIP.	Fire Protection	PHASE	Schematic		
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059
				DWG NO.	D10

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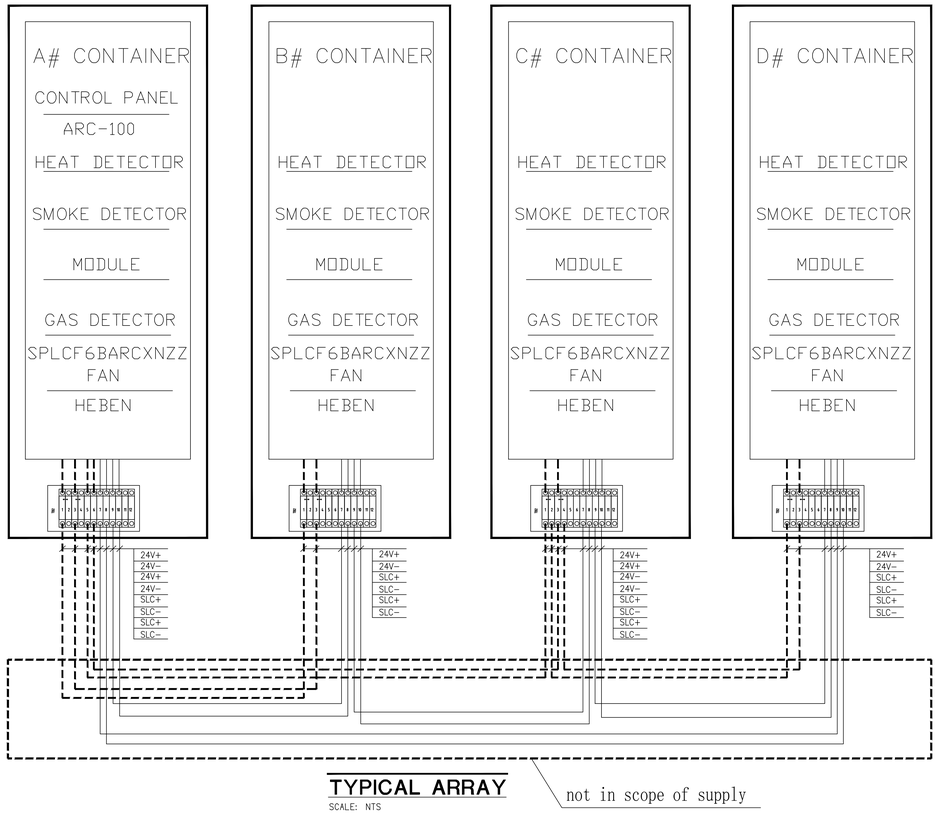

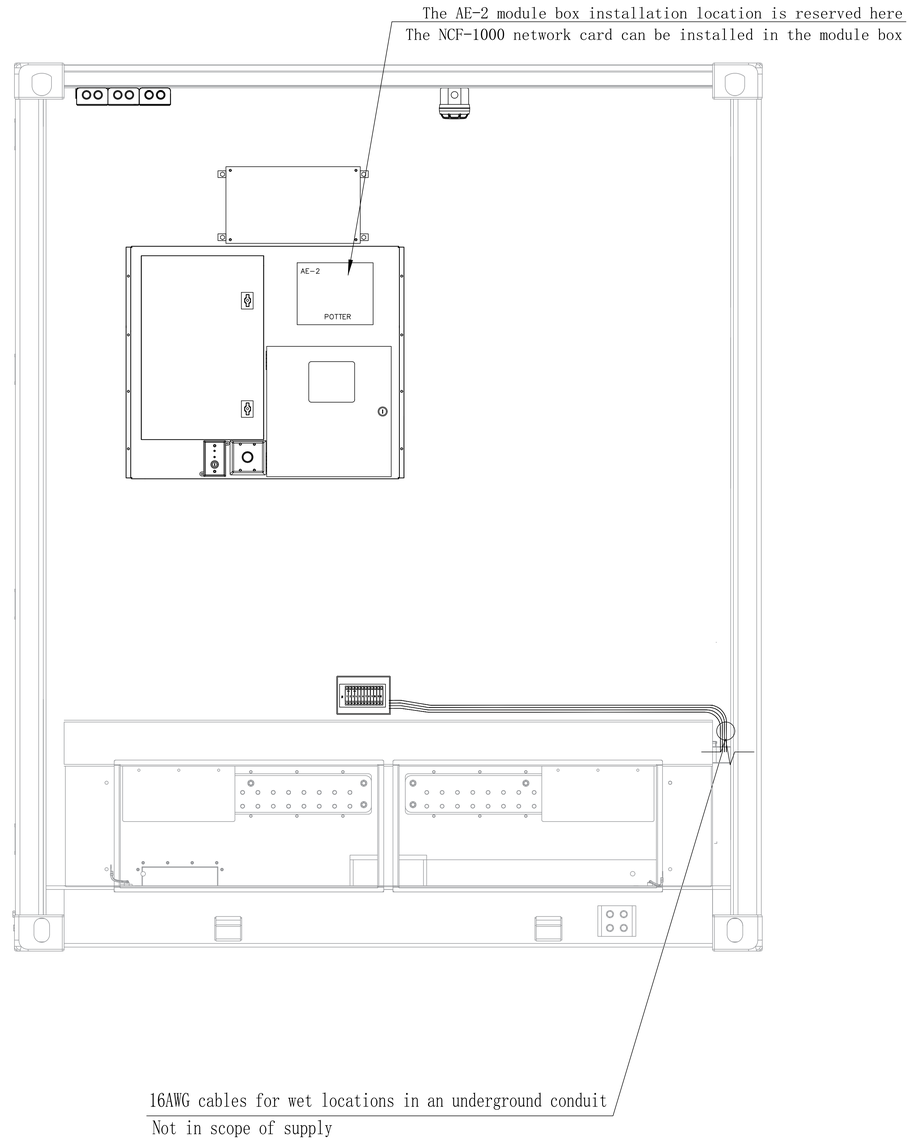

Notes: 1. Cables between containers is belong to site design, and not in scope of supply.
2. Cables between containers recommend to use wet locations and located in an underground conduit.
3. Maximum distance between containers is 10m.

南京和本机电设备科技有限公司 Nanjing Heben M&E Equipment Technology Co.,Ltd.				PROJECT		
				SUBPROJECT	Fire Protection System	
GRADE OF QUAL.	GRADE B	CERT. NO.	D232453295	DWG TITLE	SUGGESTION OF CONNECTION BETWEEN CONTAINERS	
DISCIP.	Fire Protection	PHASE	Schematic			
SCALE		SHEET	OF	JOB NO.	HBME-FPS-2023-059	DWG NO. D11

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