

KNIGHTDALE PROPOSED BATTERY ENERGY STORAGE FACILITY

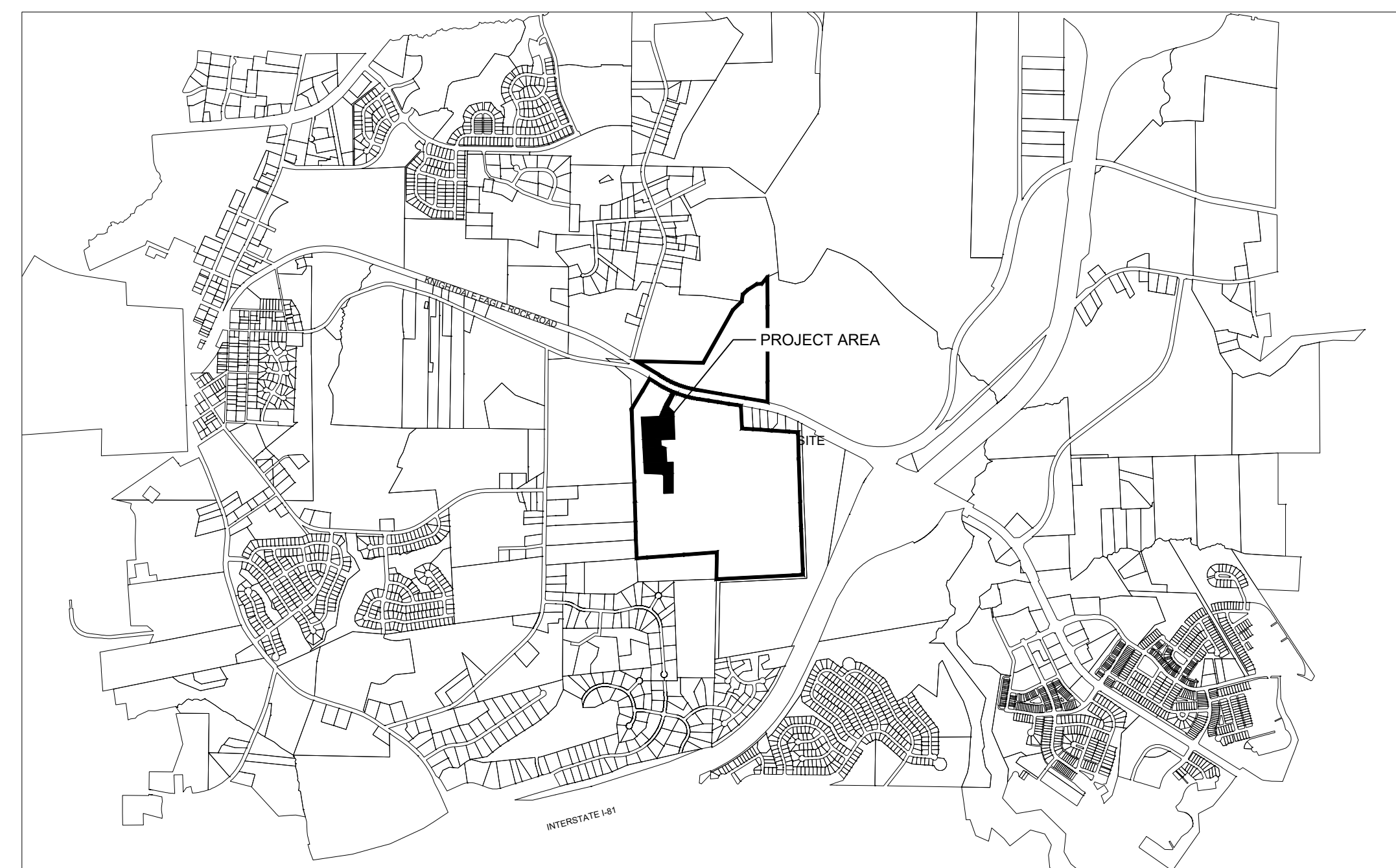
5201 KNIGHTDALE EAGLE ROCK ROAD

KNIGHTDALE, NC 27545

TOK PROJECT # ZCP-3-23

SITE DATA TABLE	
TOTAL SITE AREA	201.3 ACRES
PROJECT LOCATION	5201 KNIGHTDALE EAGLE ROCK ROAD, MARKS CREEK, WAKE COUNTY, NORTH CAROLINA
KNIGHTDALE ZONING	DUKE ENERGY PROGRESS; ZONING: MI
PROPOSED ZONING	MI
EXISTING LAND USE	UTILITIES - CLASS 1 & 2 (SUBSTATION)
PROPOSED LAND USES	UTILITIES - CLASS 1 & 2 (BATTERY STORAGE FACILITY)
RIVER BASIN	NEUSE RIVER
RECEIVING WATER	MARK'S CREEK
WATERSHED CLASSIFICATION	C; NSW
PROPOSED BATTERY UNITS	60
INFRASTRUCTURE	TOTAL 201.3 ACRES, BESS FACILITY 11.3 ACRES
IMPERVIOUS AREA	4.7 ACRES
DISTURBED AREA	11.4 ACRES
PROPERTY OWNER 1	DUKE ENERGY PROGRESS INC.
SITE PARKING	SUBSTATION YARD OR OUTSIDE THE GATE
SETBACK TO WEST PROPERTY LINE	150'-0"
SETBACK TO NORTHERN RIGHT OF WAY	450'-0"

PHASING AND TIMETABLE	
TREE CUTTING START DATE	01-NOV-24
SITE CIVIL WORK START DATE	02-DEC-24
PLANNED STATE OF COMPLETION	30-SEP-25



CONTACT LIST		
CONTACTS	NAME	ADDRESS
OWNER	DUKE ENERGY PROGRESS, LLC	7804 FAIRVIEW ROAD, SUITE C BOX 214, CHARLOTTE, NC 28226 ATTN: GREG MCELMURRY, PHONE: 704-264-9879
ELECTRICAL ENGINEER (SUBSTATION)	ETHAN BROWN	175 REGENCY WOODS PLACE, SUITE 300, CARY, NC 24515-0000
ELECTRICAL ENGINEER (BESS)	OLUFEMI OYEBANJO	920 MEMORIAL CITY WAY, SUITE 600, HOUSTON, TX 77024
STRUCTURAL ENGINEER	DIVYA SRI LAKSHIMI DINAVAHU	2880 ZANKER RD STE 203, SAN JOSE, CA 95134
CIVIL ENGINEER	HANNAH ULRICH	11401 LAMAR AVENUE, OVERLAND PARK, KS 66211

SHEET LIST	
DRAWING NUMBER:	DRAWING NAME:
KND01-CV-C-SI-CS-01	COVER SHEET
KND01-CV-C-SI-PL-02	ENVIRONMENTAL SURVEY
KND01-CV-C-SI-PL-01	SITE PLAN
KND01-AD-A-YD-00-PL-02	LANDSCAPE PLAN
KND01-LT-E-PL-01	ELECTRICAL LIGHTING PLAN
KND01-LT-E-SD-01	ELECTRICAL LIGHTING DETAILS
KND01-LT-E-SY-00-PL-01	ELECTRICAL LIGHTING PLAN
KND01-LT-E-SY-00-SD-01	ELECTRICAL LIGHTING DETAILS
KND01-CV-C-FE-PL-01	SURFACING AND FENCING PLAN
KND01-CV-C-FE-SD-01	FENCING DETAILS
KND01-CV-C-GR-SD-01	SURFACING DETAILS
KND01-AD-A-YD-00-PL-01	ARCHITECTURAL PLAN
KND01-AD-A-YD-00-SD-01	ARCHITECTURAL ELEVATION AND SECTIONS
KND01-VEN-LG-E-SD-01	BESS CONTAINER ARCHITECTURAL PLAN
KND01-VEN-LG-E-SD-02	MVT SKID ARCHITECTURAL PLAN
KND01-VEN-LG-AE-00-SD-03	SITE CONTROL CENTER ARCHITECTURAL PLAN
KND01-GA-M-SY-00-EV-01	ELECTRICAL ELEVATION VIEW
KND01-UG-E-PL-01	UNDERGROUND UTILITY PLAN
KND01-CV-C-GR-PL-01	STORMWATER MANAGEMENT PLAN
KND01-CV-C-GR-PL-02	STORMWATER MANAGEMENT PLAN

SUPPLEMENTAL REGULATIONS 5.10.H – GRID SCALE BATTERY STORAGE FACILITIES (UNIFIED DEVELOPMENT ORDINANCE)

- NO GRID-SCALE BATTERY STORAGE FACILITY SHALL BE LOCATED WITHIN A ONE HUNDRED (100) FOOT RADIUS OF THE FOOTPRINT OF ANY PRE-EXISTING ADJACENT RESIDENTIAL DWELLING.
- GRID-SCALE BATTERY STORAGE FACILITIES SHALL ONLY BE PERMITTED WHEN CO-LOCATED ON A SITE WITH A SUBSTATION FACILITY.
- A TYPE D BUFFER YARD SHALL BE REQUIRED ON ALL SIDES OF A GRID-SCALE BATTERY STORAGE FACILITY ADJACENT TO A RESIDENTIAL ZONING DISTRICT. ALL OTHER REQUIRED BUFFER YARDS SHALL BE CONSISTENT WITH SECTION 7.4 (D)(1).
- ALL SIDES OF A GRID-SCALE BATTERY STORAGE FACILITY SHALL BE SCREENED FROM OFF-SITE VIEW BY USE OF A FENCE OR MASONRY WALL. THE MATERIALS OF THE FENCE OR MASONRY WALL SHALL BE CONSISTENT WITH THOSE LISTED IN SECTION 7.6 (C). THE HEIGHT OF ANY FENCE OR MASONRY WALL SHALL BE CONSISTENT WITH THE HEIGHT OF THE ENERGY STORAGE CONTAINER. THE MAXIMUM HEIGHT OF SUCH FENCE OR MASONRY WALL SHALL NOT EXCEED 8 FEET IN HEIGHT REGARDLESS OF THE HEIGHT OF THE ENERGY STORAGE CONTAINER.
- THE GRID-SCALE BATTERY STORAGE FACILITY SHALL HAVE AT LEAST ONE ENTRANCE OF SUFFICIENT DESIGN TO ALLOW FOR THE PROVISION OF EMERGENCY SERVICES, AS APPROVED BY THE KNIGHTDALE FIRE DEPARTMENT.
- PRIOR TO CONSTRUCTION DRAWING APPROVAL, A THIRD-PARTY NOISE ANALYSIS SHALL BE SUBMITTED ESTABLISHING THAT THE GRID-SCALE BATTERY STORAGE FACILITY AS DESIGNED WILL NOT EXCEED NOISE LEVEL LIMITS AT THE PROPERTY LINE(S) SET FORTH IN THE APPLICABLE NOISE ORDINANCE.
- THE NOISE LEVEL LIMITS APPLICABLE TO THE GRID-SCALE BATTERY STORAGE FACILITY SHALL BE DETERMINED BY THE LOCATION OF THE FACILITY. IF THE FACILITY IS LOCATED IN TOWN LIMITS, THE NOISE LEVEL LIMITS SET FORTH IN THE TOWN'S CODE OF ORDINANCES (KNIGHTDALE NOISE ORDINANCE) SHALL APPLY. IF THE FACILITY IS LOCATED OUTSIDE OF TOWN LIMITS BUT WITHIN THE TOWN'S EXTRA-TERRITORIAL JURISDICTION, THE NOISE LEVEL LIMITS SET FORTH IN WAKE COUNTY'S CODE OF ORDINANCES SHALL APPLY.
- AN ADDITIONAL NOISE ANALYSIS SHALL BE REQUIRED IF THE FACILITY EXCEEDS THE APPLICABLE NOISE LEVEL LIMITS. IF WARRANTED BY THE NOISE ANALYSIS, NOISE DAMPENING MEASURE SHALL BE INSTALLED IN ANY AREA THAT PRODUCES EXCESSIVE NOISE.

NOTE: THE INFORMATION ON THIS SHEET WAS PREPARED BY ERM NC, INC. ON 05/09/2023 AND MODIFIED BY BLACK & VEATCH

ISSUED FOR PERMITTING

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B	4/SEP/2024	ISSUED FOR 60% REVIEW	CLC	MJM	HGUSLD	
A	23/AUG/2024	ISSUED FOR PERMITTING	CLC	MJM	HGUSLD	
E	27/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGUSLD	

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DESIGNER: MJM DRAWN: CLC
CHECKED: HGU DATE: 27/SEP/24

DUKE ENERGY
KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM


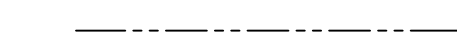



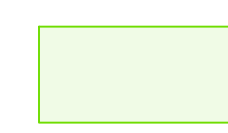
COVER SHEET
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

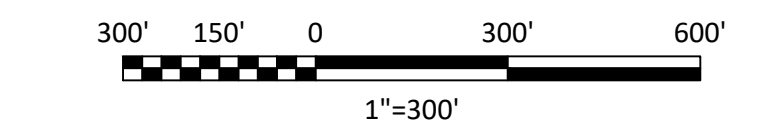
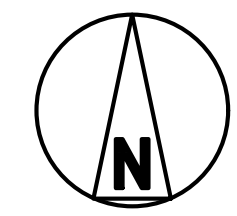
PROJECT	DRAWING NUMBER	REV
419596	KND01-CV-C-SI-CS-01	E
CODE	AREA	

NOTES

- THE INFORMATION ON THIS SHEET WAS PREPARED BY ERM NC, INCL. ON 05/09/2023 AND MODIFIED BY BLACK & VEATCH.
- ENTIRE SITE AND WORK AREA IS WITHIN THE EXTRA-TERRITORIAL JURISDICTION OF THE TOWN OF KNIGHTDALE, WAKE COUNTY.
- LANDSCAPED AREAS REQUIRED BY CHAPTER 7 OF THE UDO SHALL NOT CONTAIN ANY DEVELOPMENT, IMPERVIOUS SURFACES, OR SITE FEATURES THAT DO NOT FUNCTION TO MEET THE APPLICABLE STANDARDS FOR THAT AREA OR THAT REQUIRE REMOVAL OF EXISTING SIGNIFICANT VEGETATION [UDO, SEC. 7.4.E.1].
- NO GRADING, DEVELOPMENT, OR LAND-DISTURBING ACTIVITIES SHALL OCCUR WITHIN A BUFFER YARD IF FOREST CANOPY, SPECIMEN TREES, OR SIGNIFICANT VEGETATION EXISTS WITHIN THESE AREAS, UNLESS APPROVED BY THE LAND USE ADMINISTRATOR. IF GRADING WITHIN A BUFFER YARD IS PROPOSED, SLOPES OF 1:3 OR LESS ARE ENCOURAGED TO ENSURE THE PROPER TRANSITION OF GRADES TO THE ADJACENT PROPERTY AND TO FACILITATE LANDSCAPING AND MAINTENANCE [UDO, SEC. 7.4.E.2].
- ALL AREAS WITHIN REQUIRED BUFFER YARDS, STREAM BUFFERS, SLOPE AREAS GREATER THAN 25%, AND WETLANDS ARE TREE SAVE AREAS AND ALL VEGETATION AND SOIL IS TO REMAIN UNDISTURBED [UDO, SEC. 7.4.H.1].
- ALL TREES GREATER THAN 12" DBH WITHIN FRONT SETBACK, STREET TREE PLANTING STRIP, AND SLOPE AREAS OF 15-25% ARE TO REMAIN UNDISTURBED OR REPLACEMENT TREES ARE REQUIRED AT A RATE OF 1 TREE PER 12" DBH, AND SHOULD BE INCORPORATED INTO OPEN SPACE AMENITIES/PUBLIC GATHERING AREAS/PEDESTRIAN PLAZA WHEREVER POSSIBLE. REQUIRED STREET TREES, PARKING LOT LANDSCAPING, AND BUFFER YARD PLANTINGS ARE NOT TO BE COUNTED TOWARDS REPLACEMENT REQUIREMENTS [UDO, SEC. 7.4.H.1].
- ALL TREES GREATER THAN 24" DBH ON-SITE ARE TO REMAIN UNDISTURBED OR REPLACEMENT TREES ARE REQUIRED AT A RATE OF 1 TREE PER 12" DBH, AND SHOULD BE INCORPORATED INTO OPEN SPACE AMENITIES/PUBLIC GATHERING AREAS/PEDESTRIAN PLAZA WHEREVER POSSIBLE. REQUIRED STREET TREES, PARKING LOT LANDSCAPING, AND BUFFER YARD PLANTINGS ARE NOT TO BE COUNTED TOWARDS REPLACEMENT REQUIREMENTS [UDO, SEC. 7.4.H.1].

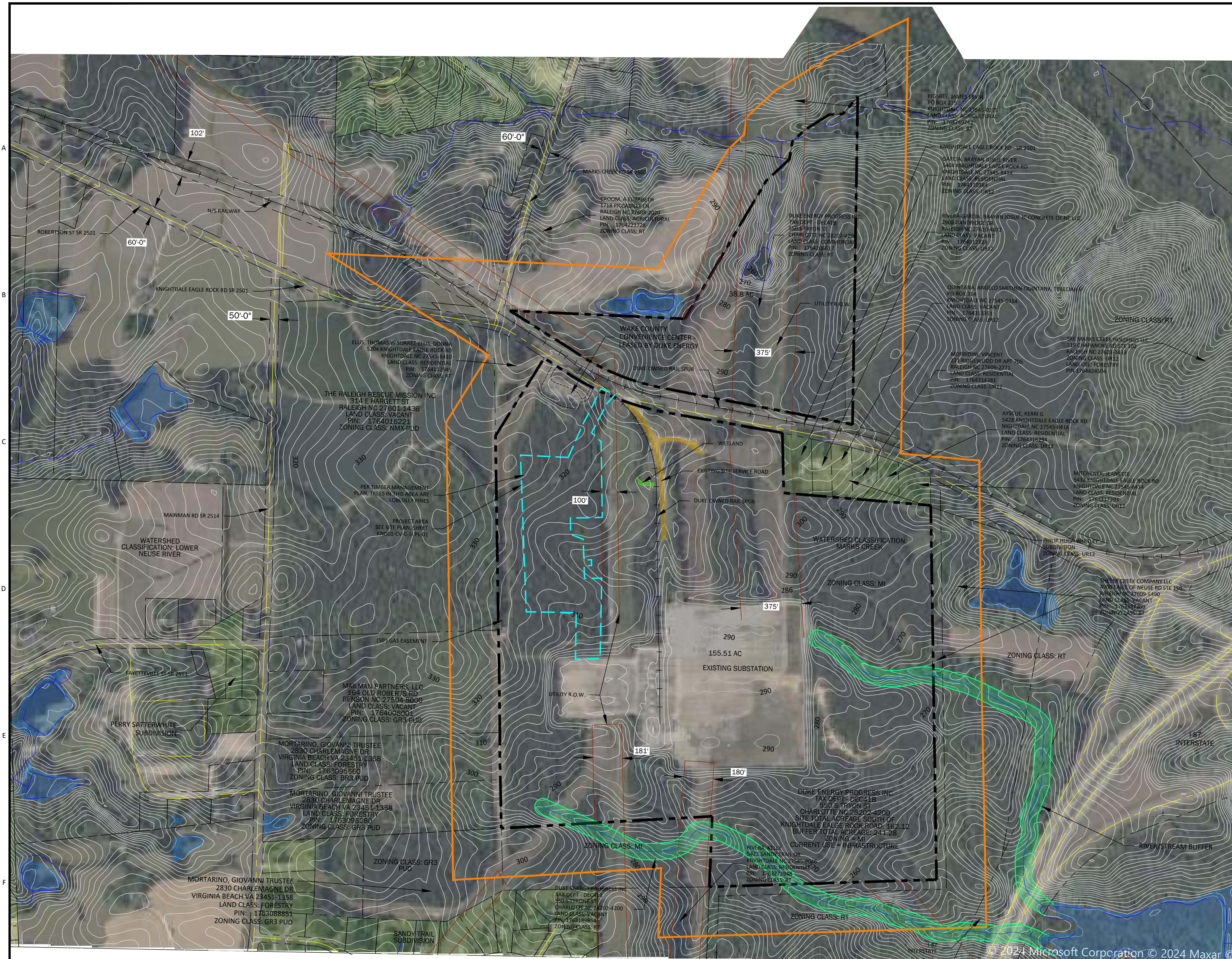
LEGEND

-  RIVER AND STREAMS
-  PARCELS
-  SUBJECT PROPERTY
-  PROJECT BOUNDARY
-  300FT PROPERTY BUFFER
-  SUBDIVISION



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C	12/SEP/2024	ISSUED FOR PERMITTING					
B	4/SEP/2024	ISSUED FOR 60% REVIEW					
A	08/22/2024	ISSUED FOR PERMITTING					

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DESIGNER: MJM DRAWN: CLC
CHECKED: HGU DATE: 27/SEP/24

DUKE ENERGY
KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

ENVIRONMENTAL SURVEY
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
419596 KND01-CV-C-SI.PL-02		D
CODE		
AREA		

NOTES

1. TREE CLEARING SHALL BE LIMITED TO THE LIMITS OF DISTURBANCE AS SHOWN ON THIS PLAN.

HORIZONTAL DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT *STATE PLANE COORDINATES WERE ESTABLISHED BASED IN NGS MONUMENTS "ROSE" AND "TOMB".

VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988

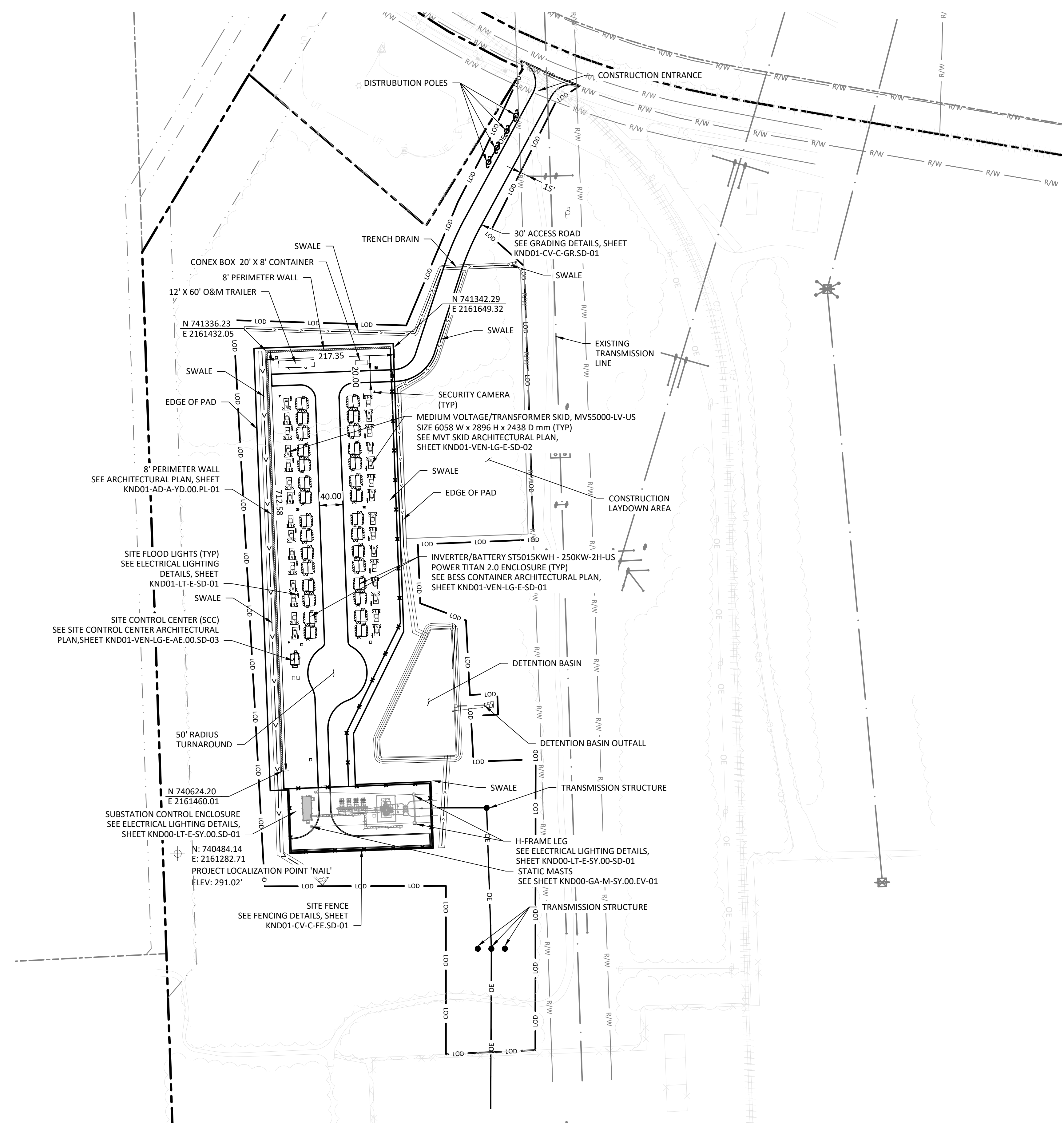
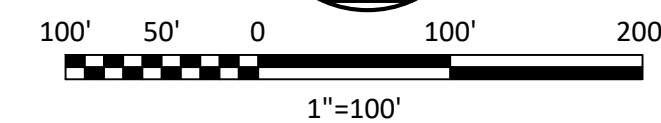
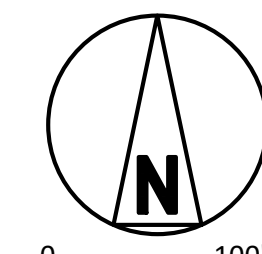
BENCHMARK: PROJECT LOCALIZATION POINT 'NAIL'
N: 740,484.141'
E: 2,163,003.135'
ELV: 291.02'

LEGEND

- ADJACENT PARCEL BOUNDARY
- PROPOSED SECURITY FENCE
- EXISTING FENCE
- PROPOSED ROAD
- EXISTING TREE LIMITS
- EXISTING RAILROAD
- EXISTING OVERHEAD LINE
- PROPERTY BOUNDARY
- PROPOSED OVERHEAD ELECTRIC LINES
- HIGH POWERED OVERHEAD ELECTRIC LINES
- EXISTING RIGHT-OF-WAY
- EXISTING FIBER OPTIC CABLE
- LIMITS OF DISTURBANCE
- EXISTING TREE LINE
- PROPOSED PERIMETER WALL
- PROPOSED VEGETATED SWALE
- RIP RAP

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C	12/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SD	SLD
B	4/SEP/2024	ISSUED FOR 60% REVIEW	CLC	MJM	HGU	SD	SLD
A	22/AUG/2024	ISSUED FOR PERMIT	CLC	MJM	HGU	SD	SLD
E	27/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SD	SLD

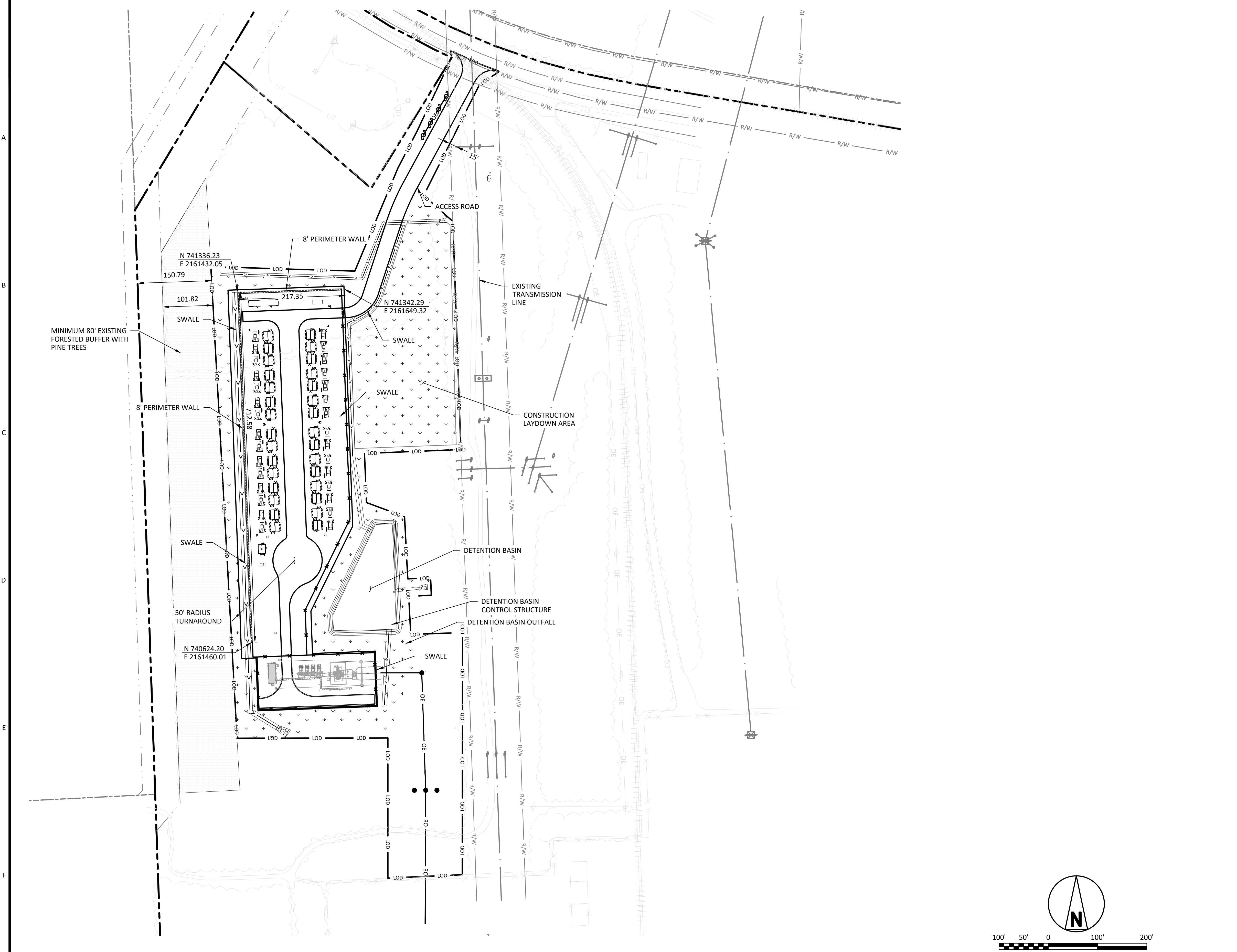
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CHECKED: HGU DATE: 27/SEP/24

DUKE ENERGY
KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

SITE PLAN
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

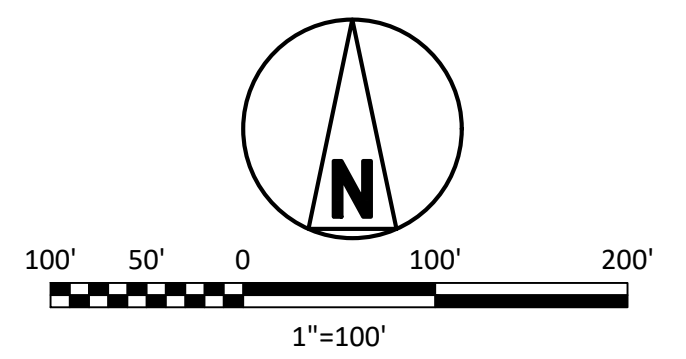
PROJECT	DRAWING NUMBER	REV
419596 KND01-CV-C-SI.PL-01	419596 KND01-CV-C-SI.PL-01	E
CODE	AREA	



LEGEND

	ADJACENT PARCEL BOUNDARY
	PROPOSED SECURITY FENCE
	EXISTING FENCE
	PROPOSED ROAD
	EXISTING TREE LIMITS
	EXISTING RAILROAD
	EXISTING OVERHEAD LINE
	PROPERTY BOUNDARY
	PROPOSED OVERHEAD ELECTRIC LINES
	HIGH POWERED OVERHEAD ELECTRIC LINES
	EXISTING RIGHT-OF-WAY
	EXISTING FIBER OPTIC CABLE
	LIMITS OF DISTURBANCE
	EXISTING TREE LINE
	PROPOSED PERIMETER WALL
	PROPOSED VEGETATED SWALE
	RIP RAP
	BUFFER AREA

NOTE:
 THE LAND USE ADMINISTRATOR RESERVES THE RIGHT TO REQUIRE ADDITIONAL VEGETATION TO BE PLANTED PRIOR TO CERTIFICATE OF OCCUPANCY TO MEET THE PERFORMANCE STANDARDS OF THE TYPE D BUFFER.



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A	22/AUG/2024	ISSUED FOR PERMIT	CLC	MJM	HGU	SLD	
E	27/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SLD	

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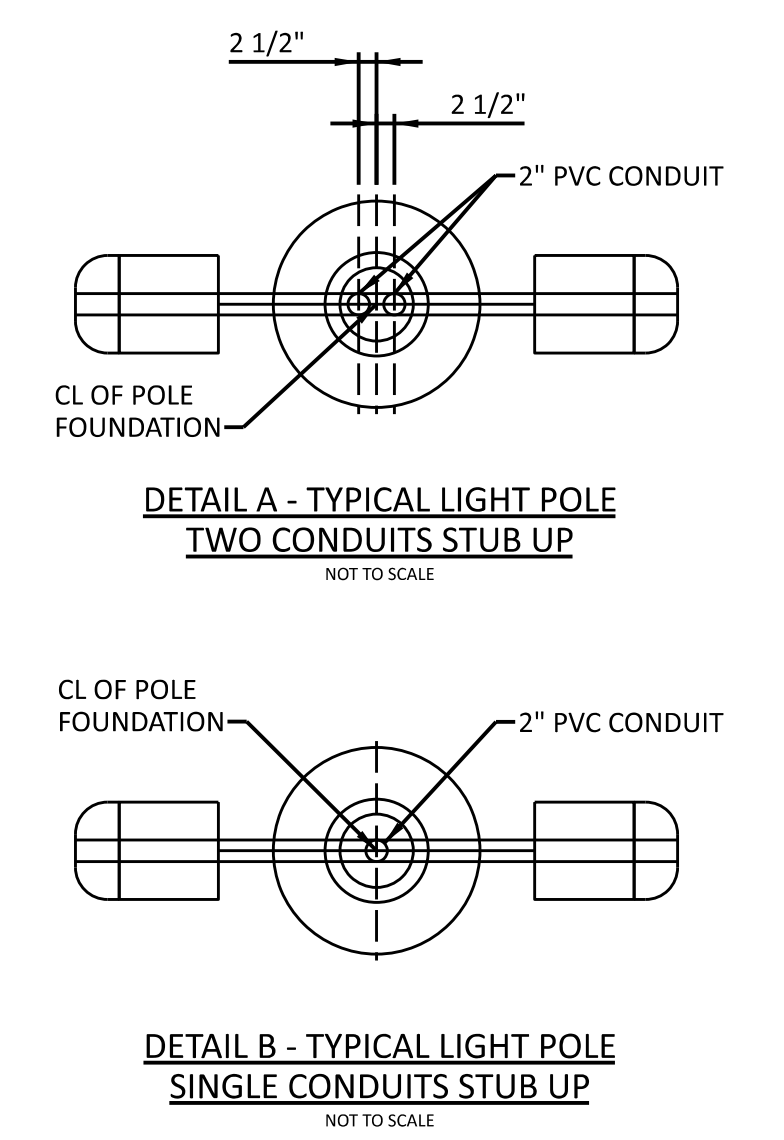
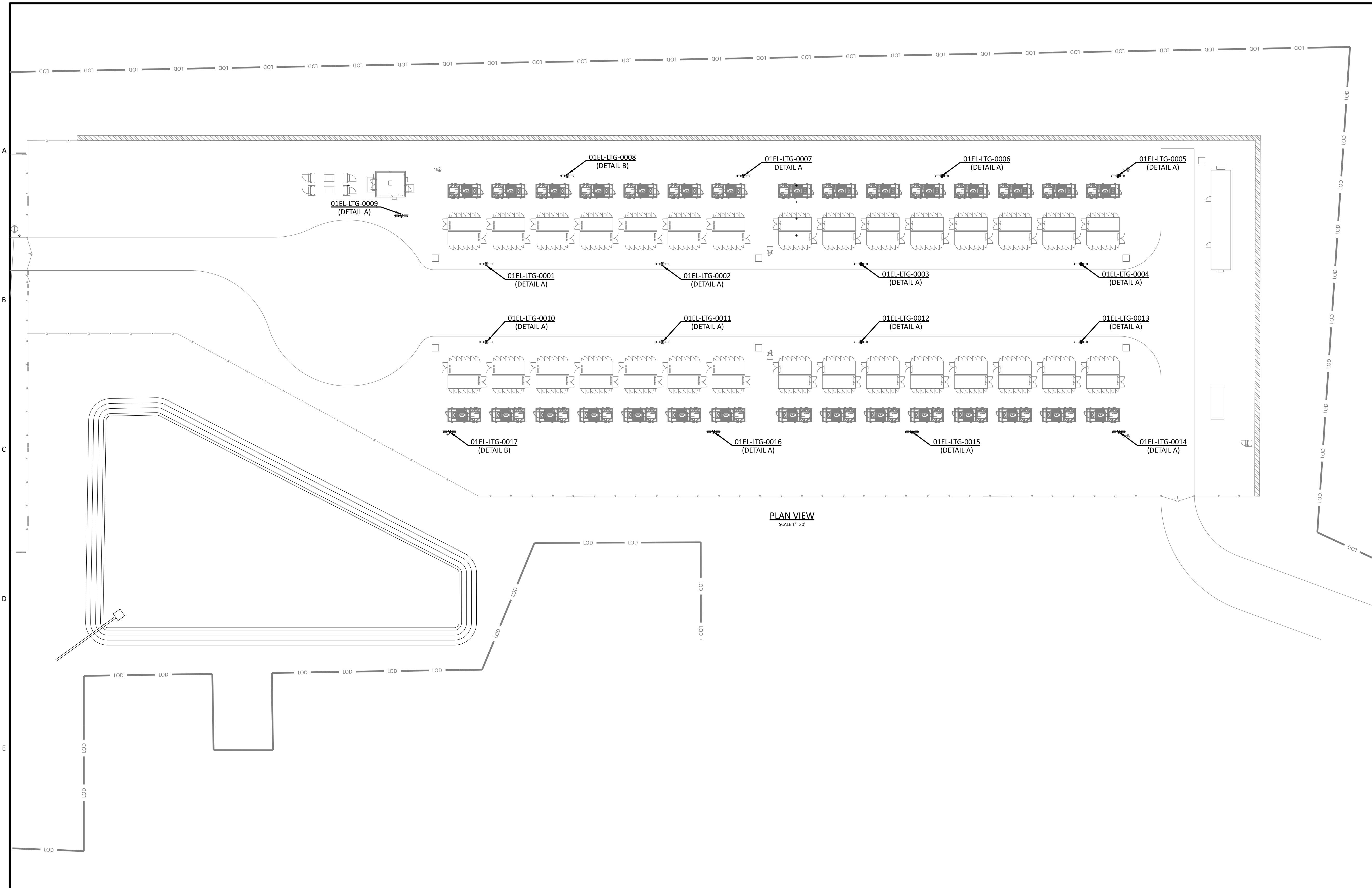
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DUKE ENERGY
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

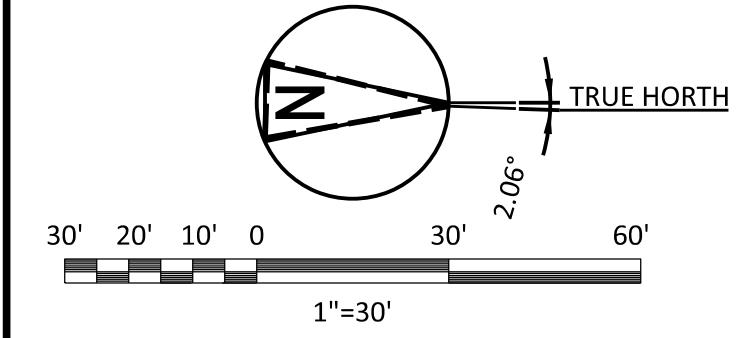
LANDSCAPE PLAN
 5201 KNIGHTDALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
419596 KND01-AD-A-YD.00.PL-02	E	
CODE	AREA	

- NOTES:
- SEE DWG KND01-CV-C-EC-PL-XX FOR CIVIL SITE PLAN.
 - SEE DWG KND01-CV-C-FD-XX FOR CAMERA & LIGHT POLE FOUNDATION PLAN AND DETAILS.
 - SEE DWG KND01-CV-C-FD-PL-XX FOR STRUCTURAL FOUNDATION LAYOUT.
 - SEE DWG KND01-EN-E-EG-01 FOR ELECTRICAL GRAPHIC SYMBOLS AND GENERAL NOTES.
 - SEE SERIES DWG KN01-LG-E-PL-01 FOR BESS ELECTRICAL ARRANGEMENT.
 - SEE SERIES DWG KND01-UG-E-PL-01 THRU 09 FOR UNDERGROUND CONDUIT.
 - SEE SERIES DWG KND01-GD-E-PL-01 THRU 07 FOR SITE GROUNDING.
 - SEE SERIES DWG KND01-EL-E-CA-01 FOR CIRCUIT LIST AND KND01-EL-E-CA-02 FOR RACEWAY LIST AND DESCRIPTION.



PLAN VIEW
SCALE 1"=30'



REFERENCE DRAWINGS:
 KND00-LT-E-SY.00.PL-01 34.5KV - 230KV SUBSTATION LIGHTING PLAN
 KND01-LT-E-PL-02 BESS ELECTRICAL LIGHTING SURVEY
 KND01-LT-E-SD-01 BESS ELECTRICAL LIGHTING DETAILS

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B&V PROJECT NUMBER: 419596

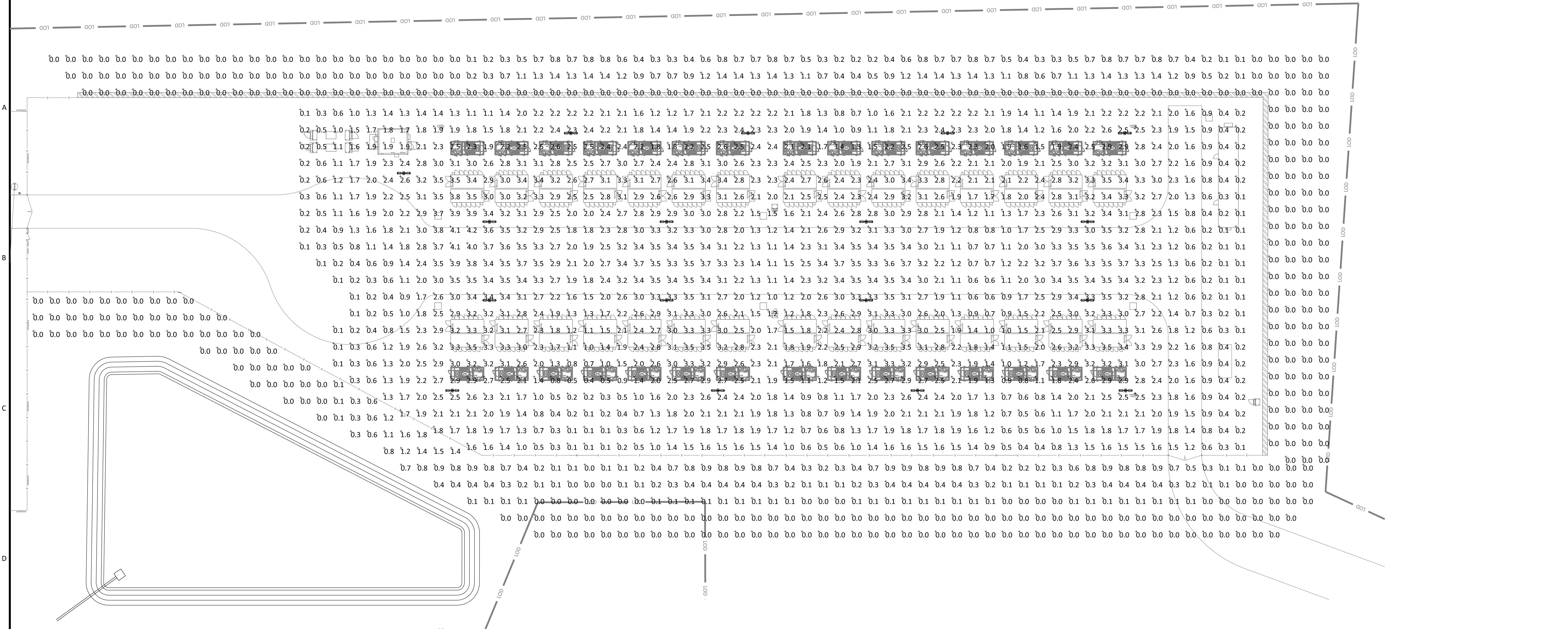
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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
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B	03/SEP/24	ISSUED FOR CLIENT 60% REVIEW	BCA	BCA	OOO	OOO	BC
A	23/AUG/24	ISSUED FOR PERMIT	BCA	BCA	OOO	OOO	BC

BLACK & VEATCH 11401 LAMAR AVENUE OVERLAND PARK, KANSAS 66211	
DESIGNER BCA	DRAWN BCA
CHECKED OOO	DATE 03/SEP/24

DUKE ENERGY KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM	
BESS ELECTRICAL LIGHTING PLAN	

PROJECT KND01-LT-E-PL-01	DRAWING NUMBER C
CODE	AREA



PHOTOMETRIC CALCULATION DISCLAIMER:
 LIGHTING CALCULATIONS HAVE BEEN PERFORMED IN ACCORDANCE WITH IES RECOMMENDED PROCEDURES USING AGI32-V20.1. DIFFERENCES BETWEEN CALCULATED VALUES AND POST INSTALLATION VALUES MAY OCCUR DUE TO VARIATIONS WITH FINAL INSTALLATION, PHYSICAL AND/OR ENVIRONMENTAL FACTORS.

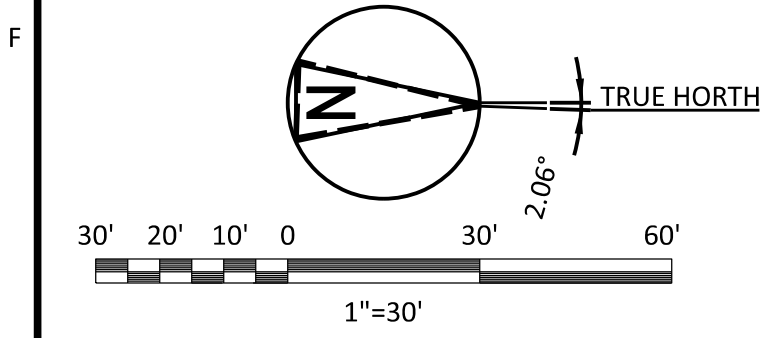
- LIGHT FIXTURE LIST NOTES:**
- POLE SHALL BE ROUND TAPERED ALUMINUM 25' TO BE MOUNTED ON SITE BUILT CONC. FOUNDATIONS. NAFCO# VA-RTAA-25-7040-F-AB-FP-BK-PD-NECHH-FST OR ENGINEER APPROVED SIMILAR. POLES REQUIRE A FESTOON BOX LOCATED ON THE SAME SIDE AS THE HAND HOLE, AND 36" ABOVE BASE. PROVIDE GFCI RECEPTACLE AND WATERPROOF IN USE COVER TO FIT HUBBELL #GFRTW20W WITH TAYMAC #HBLSS26WIS COVER OR ENGINEER APPROVED ALTERNATE.
 SEE STRUCTURAL DRAWING KND01-CV-C-FD-XX FOR POLE BASE DETAIL.
 WIND LOADING SHALL BE CONFIRMED BY MANUFACTURER BEFORE SHIPPING TO SUPPORT LIGHT FIXTURES IN 125 MPH WITH (2) 55 LB 1.2 SQ FT FIXTURES INSTALLED.
 - CONTRACTOR SHALL ORDER BACK PLATES FOR EACH FIXTURE BUT SHALL NOT INSTALL THEM UNTIL RESIDENTIAL NEIGHBORS HAVE ACCEPTED INSTALLATION WITHOUT THEM. IF NOT USED AT CLOSE OF PROJECT, TURN OVER ACCESSORIES TO OWNER.
 - PHOTOMETRIC CALCULATION NUMBERS (WHERE SHOWN, ARE IN FOOTCANDLES) SPACED AT 10' X 10'.
 CALCULATION STATISTICS, WITHIN FENCED AREA:
 ILLUMINANCE (FC)
 AVERAGE = 2.05
 MAXIMUM = 4.2
 MINIMUM = 0.1
 MIN/AVG RATIO = 0.05
 MIN/MAX RATIO = 0.02

LIGHTING FIXTURE LIST								
SYMBOL	TYPE	FIXTURE DESCRIPTION / PART NUMBER	INPUT WATTS	VOLTAGE	TOTAL LUMENS	TOTAL LLF	MOUNTING	QTY
	LP1	(2) HOLOPHANE MCLEDM-P1-30K-MVOLT-AR-HSS-LT-VT-GRSD-US-SH (1) HOLOPHANE VERTICAL ARMS BR944 (1) NAFCO# VA-RTAA-25-7040-F-AB-FP-BK-PD-NECHH-FST	105 (ea)	120V THRU 277	9275 (ea)	0.83 (ea)	POLE MOUNTED SEE NOTES	34 FIXTURES 17 POLES

PHOTOMETRIC CALCULATION DISCLAIMER:
 LIGHTING CALCULATIONS HAVE BEEN PERFORMED IN ACCORDANCE WITH IES RECOMMENDED PROCEDURES USING AGI32-V20.1. DIFFERENCES BETWEEN CALCULATED VALUES AND POST INSTALLATION VALUES MAY OCCUR DUE TO VARIATIONS WITH FINAL INSTALLATION, PHYSICAL AND/OR ENVIRONMENTAL FACTORS.

- REFERENCE DRAWINGS:**
- KND00-LT-E-SY.00.PL-01 34.5KV - 230KV SUBSTATION LIGHTING PLAN
 - KND01-LT-E-PL-01 BESS ELECTRICAL LIGHTING PLAN
 - KND01-LT-E-SD-01 BESS ELECTRICAL LIGHTING DETAILS

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DESIGNER: BCA CHECKED: OOO		DRAWN: BCA DATE: 03/SEP/24		BLACK & VEATCH 15401 LAMAR AVENUE OVERLAND PARK, KANSAS 66211		DUKE ENERGY KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM ELECTRICAL LIGHTING STUDY OVERALL BESS SITE 5201 KNIGHTDALE EAGLE ROCK ROAD KNIGHTDALE, NC 27545		PROJECT: KND01-LT-E-PL-02 DRAWING NUMBER: A REV: A		B&V PROJECT NUMBER: 419596	
REVISIONS AND RECORD OF ISSUE				REVISIONS AND RECORD OF ISSUE				REVISIONS AND RECORD OF ISSUE			



Catalog Number	
Notes	Type

MGLEDM
Mongoose Medium LED



The Mongoose Medium LED offset roadway and area lighting product provides significant energy and maintenance savings vs. HID luminaires. It offers the ultimate in application flexibility with a uniquely designed advanced optical system and attractive appearance. This combined with multiple lighting distributions, mounting options and the ability to tilt the fixture offers unequalled performance in a diverse set of applications ranging from interstates and parking lots.

Mechanical

- Rugged grade A360 diecast aluminum (<1% copper)
- Tool-less access with stainless steel latches
- Terminal block in arm
- Rigorous 5-stage pretreatment polyester topcoat to ensure maximum durability that achieves a scribe creepage rating of 8 after 5,000 hours of salt spray
- Removable "power tray" facilitates maintenance
- Corrosion resistant stainless-steel latches ensure secure closure over the long fixture life
- Horizontal mast arms or vertical tenon (VH) and universal mounting to round and square poles (UN) options
- Universal mount mates to all major manufacturer's hole patterns
- All Mountings are 3G vibration rated per ANSI C136.31
- Adjustable fixture tilt from 0-45 degrees provides flexibility to optimize lighting performance

Electrical

- Standard surge protection is 20kV/10kA "Extreme Level" per ANSI C136.2
- LED light engines are rated > 100,000 hrs @ 25°C, L70
- Electronic driver has an expected life of > 100,000 hours at 25°C
- Rated for -40°C (-40°F) minimum ambient
- Programmable electronic driver with 0-10V control leads
- Driver voltage options: 120-277V 50/60 Hz and 347 50/60 Hz and 480V 50/60 Hz
- Luminaire ships with a 0-10v dimmable driver. Luminaire is continuous and step dimming capable via AO option or controls installed on P7 photocontrol receptacle option.

Optical

- Performance is comparable to 150-400 watt HPS or 175-1,000 watt MH
- IP66 rated borosilicate glass optics ensure longevity and minimize dirt depreciation
- IP66 rated optics

Molded Silicone optics: Area (Type 5) (AR), Forward Throw (FT), Medium Roadway (MR), Narrow Roadway (NR) and Wide Roadway (WR)

Borosilicate glass reflector optics: Area (AG), Forward Throw (FG), Medium Roadway (MG), Narrow Roadway (NG) and Wide Roadway (WG)

- 3500K, 4000K and 5000K CCT, 70 CRI
- Optional Uplight Skirt (US) when used with reflector ensures zero uplight above 90°
- House side shield (HSS), light trespass shield and option available
- Wing guard kit option available

Controls

- 7 pin NEMA photocontrol receptacle
- Premium solid-state locking-style photocontrol (PSS) – 10 year rated life
- Extreme long life solid state locking-style photocontrol (PCLL) – 20 year rated life
- Field adjustable output
- Field adjustable output
- night Air motion and daylight sensor
- Programmable motion and daylight sensor

Certification & Standards

- CSA Certified to US and Canadian standards
- Suitable for operation in an ambient temperature up to 40°C / 104°F for standard product
- Designlights Consortium (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

BUY AMERICAN ACT

This product is assembled in the USA and meets the Buy American(n) government procurement requirements under FAR, DFARS and DOT regulations. Please refer to www.acuitybrands.com/buy-american for additional information.

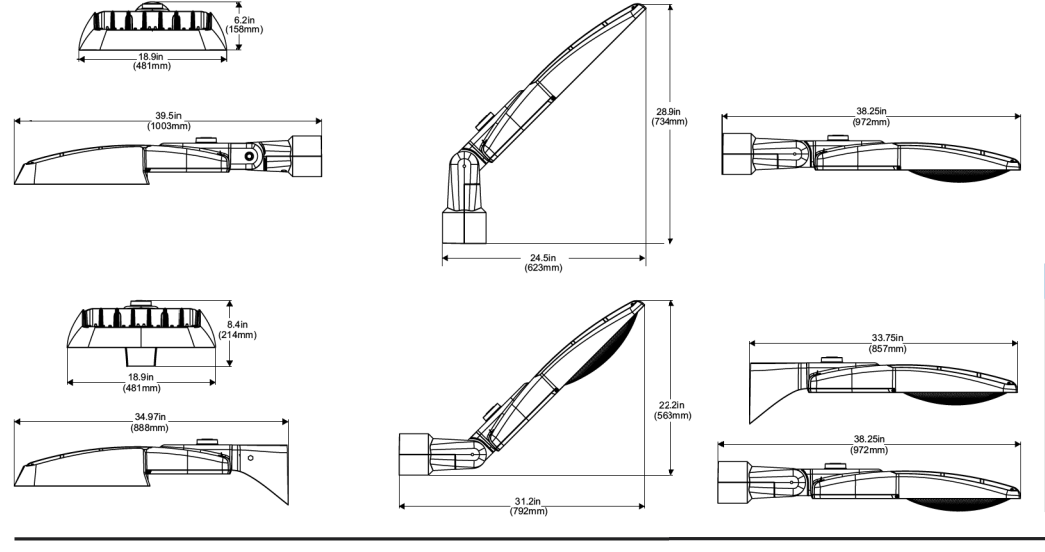
Warranty

5-year limited warranty. This is the only warranty provided and no other statements in this specification sheet create any warranty of any kind. All other express and implied warranties are disclaimed. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25°C



DIMENSIONAL DATA



Mounting/Option	Tilt	Weight	EPA
VH	0°	33 lbs.	1.64
VH with Reflector & US	0°	44 lbs.	1.94
VH	45°	33 lbs.	2.85
VH with Reflector & US	45°	44 lbs.	3.15
UN	0°	31 lbs.	1.64
UN with Reflector & US	0°	38 lbs.	1.94

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MGLEDM
Mongoose Medium LED



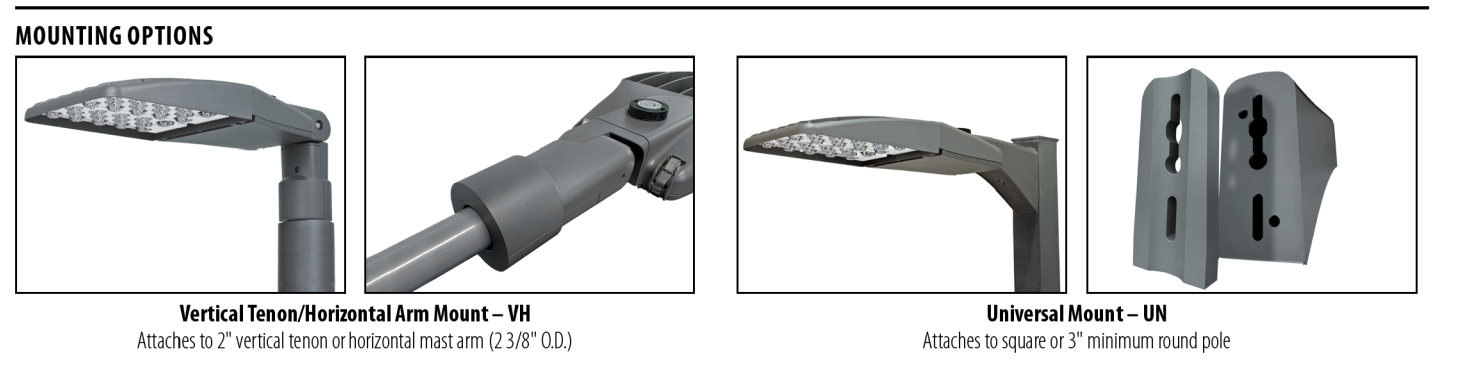
ORDERING INFORMATION

Series	LED performance package	Color temperature	Voltage	Optics
MGLEDM Mongoose Medium	P1 15,900 Lumens	30K 3,000 K CCT	MVOLT Auto-sensing voltage (120 thru 277)	AG Area with Reflector
	P2 19,000 Lumens	40K 4,000 K CCT		AR Area
	P3 22,400 Lumens	50K 5,000 K CCT	347 347 Volt	FG Forward Throw with Reflector
	P4 25,800 Lumens		480 480 Volt	FT Forward Throw
	P5 28,900 Lumens			MG Medium Roadway with Reflector
	P6 31,900 Lumens			MR Medium Roadway
	P7 35,100 Lumens			NG Narrow Roadway with Reflector
	P8 38,000 Lumens			NR Narrow Roadway
				WG Wide Roadway with Reflector
				WR Wide Roadway

Mounting	Super Durable Paint	Options	NEMA Label Options
VH Vertical Tenon/Horizontal Arm	GRSD Vitracat Gray	Adjustable/Programmable Options	NEMA Label Options
UN Universal (Rd. 8 Sq)	GRSD Vitracat Graphite	AO Field Adjustable Output	NL1 NEMA LABEL
	BRSD Vitracat Black	Control Options	NEMA Receptacle Options
	GRSD Vitracat Green	PCLL 20L Extreme Long Life Twostick Photocontrol for Solid State (20 year rated life)	PRP 7-pin Photocontrol Receptacle
	WRSD Vitracat White	PCCS D55 Premium Twostick Photocontrol for Solid State (10 year rated life)	SH Shielding Options
	BZSD Vitracat Bronze	POC2 Programmable occ. and daylight sensor, for mounting applications up to 20'	US Uplight Skirt
	DBSD Vitracat Dark Bronze	POC4 Programmable occ. and daylight sensor, for mounting applications between 20' & 40'	HSS House Side Shield
		RSGR Night Air Occ. and daylight sensor	SH Shielding Cap Option

Accessories: Order as separate catalog number.

Wire Guard Kit	Mongoose Medium Wire Guard Kit
Light Trespass Shield	Mongoose Medium Light Trespass Shield
Uplight Skirt	Mongoose Medium Uplight Skirt, Vitracat Gray
	Mongoose Medium Uplight Skirt, Vitracat Graphite
	Mongoose Medium Uplight Skirt, Vitracat Black
	Mongoose Medium Uplight Skirt, Vitracat Green
	Mongoose Medium Uplight Skirt, Vitracat White
	Mongoose Medium Uplight Skirt, Vitracat Bronze
	Mongoose Medium Uplight Skirt, Vitracat Dark Bronze
House Side Shield	Mongoose Medium House Side Shield



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MGLEDM
Mongoose Medium LED



PERFORMANCE DATA

Performance Package	Distribution	Input Watts	30K (3000K CCT, 70 CRI)				40K (4000K CCT, 70 CRI)				50K (5000K CCT, 70 CRI)				LLD @ 25°C					
			Lumens	LPW	B	U	G	Lumens	LPW	B	U	G	Lumens	LPW	B	U	G	50k Hours	75k Hours	100k Hours
P1	AG	105	15,680	149	4	2	2	16,129	154	4	2	2	16,329	156	4	2	2	0.97	0.97	0.96
	AR		16,915	161	4	0	2	17,400	166	4	0	2	17,616	168	4	0	2			
	FG		14,519	138	2	3	3	14,935	142	2	3	3	15,120	144	3	3	3			
	FT		15,763	150	2	0	3	16,215	154	2	0	3	16,416	156	2	0	3			
	MG		15,064	143	2	2	2	15,496	148	2	2	2	15,687	149	3	2	2			
	MR		16,193	154	2	0	2	16,657	159	3	0	3	16,863	161	3	0	3			
	NG		15,292	146	3	2	2	15,731	150	3	2	2	15,925	152	3	2	2			
	NR		16,326	155	3	0	2	16,794	160	3	0	2	17,002	162	3	0	2			
WG	14,577	139	3	2	3	14,994	143	3	2	3	15,180	145	3	2	3					
WR	15,746	150	3	0	3	16,198	154	3	0	3	16,398	156	3	0	3					
P2	AG	126	19,225	153	4	2	2	19,776	157	4	2	2	20,021	159	4	3	2	0.97	0.97	0.96
	AR		20,740	165	4	0	2	21,335	169	4	0	2	21,999	171	4	0	2			
	FG		17,802	141	3	3	3	18,313	145	3	3	4	18,539	147	3	3	4			
	FT		19,328	153	3	0	4	19,882	158	3	0	4	20,128	160	3	0	4			
	MG		18,470	147	3	2	3	19,000	151	3	2	3	19,235	153	3	2	3			
	MR		19,854	158	3	0	3	20,423	162	3	0	3	20,676	164	3	0	3			
	NG		18,750	149	3	2	2	19,288	153	3	2	2	19,527	155	3	2	3			
	NR		20,018	159	3	0	2	20,592	163	3	0	2	20,847	165	3	0	2			
WG	17,873	142	3	3	3	18,385	146	3	3	3	18,613	148	3	3	3					
WR	19,307	153	3	0	3	19,860	158	3	0	3	20,106	160	3	0	3					

NOTES:

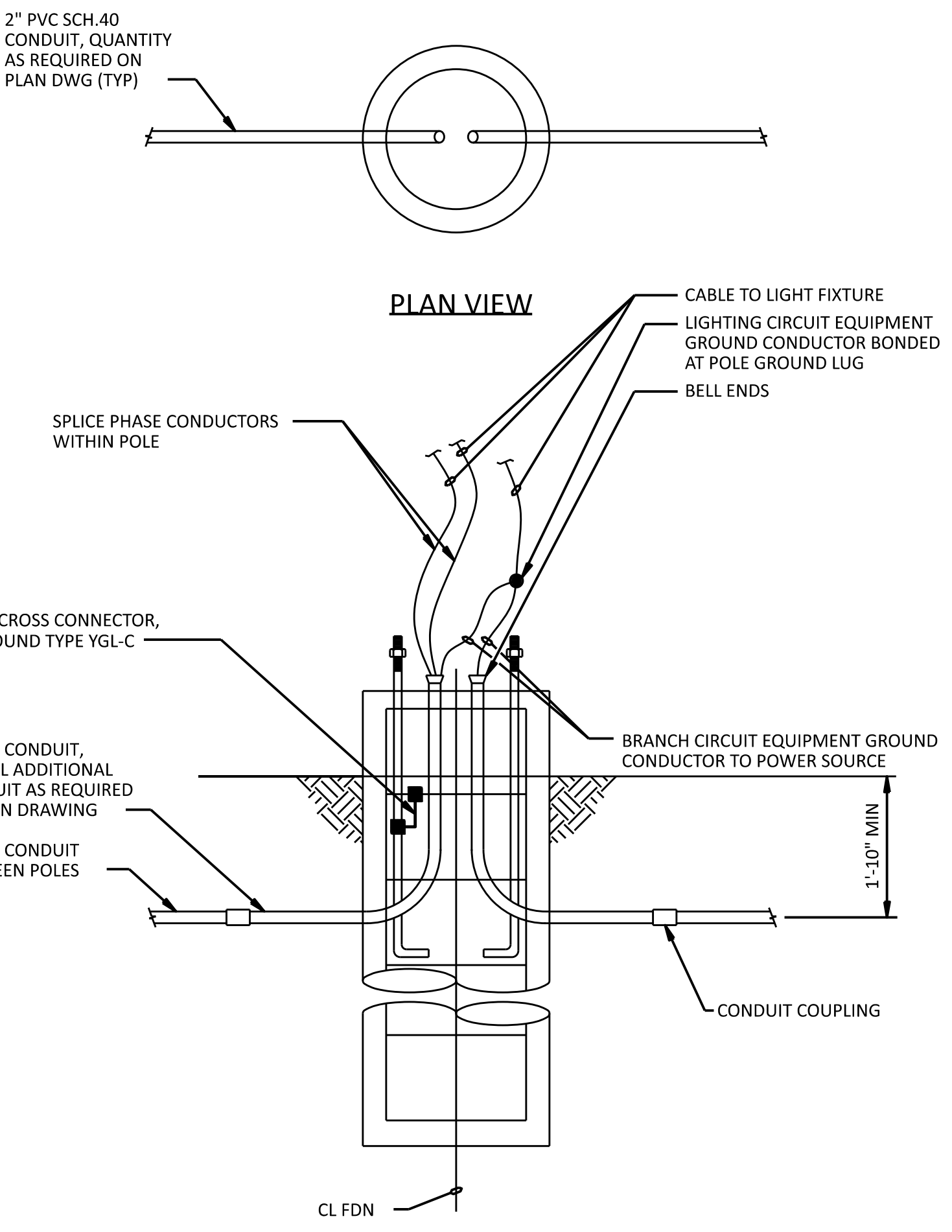
- FOR ELECTRICAL GRAPHIC SYMBOLS, SEE DRAWING KND01-EN-E-EG-01.
- ALL ELEVATIONS REFER TO THE BOTTOM OF THE LIGHTING FIXTURE.
- ALL LIGHTING SHALL BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND SECTION 7.7 OF THE TOWN OF KNIGHTDALE UDO.
- ALL ABOVE GRADE CONDUITS SHALL BE RIGID GALVANIZED STEEL. ALL BELOW GRADE CONDUITS SHALL BE PVC SCHEDULE 40.
- ALL ABOVE GRADE LIGHTING CONDUITS SHALL BE FIELD ROUTED BY THE CONTRACTOR. ALL BELOW GRADE LIGHTING CONDUITS WERE INSTALLED UNDER THE UNDERGROUND RACEWAY DRAWING AND ARE LABELED IN LIGHTING PLAN DRAWING.
- ALL SL FIXTURE BRANCH CIRCUIT CONDUCTORS SHALL BE SIZE #10 AWG, UNLESS OTHERWISE NOTED.
- ALL SWL FIXTURE CONDUCTORS BETWEEN POLES AND CONTACTOR SHALL BE #10 AWG MINIMUM, UNLESS OTHERWISE NOTED. ALL LIGHTING CIRCUIT CONDUCTORS WITHIN THE LIGHTING POLES SHALL BE #12 AWG MINIMUM, UNLESS OTHERWISE NOTED.
- CONNECTIONS BETWEEN THE UNDERGROUND LIGHTING CONDUCTORS AND THE LIGHTING CONDUCTORS WITHIN THE LIGHTING POLES SHALL BE INSTALLED, SIZE AS RECOMMENDED BY THE FIXTURE MANUFACTURER.
- ALL GROUNDING CONDUCTORS SHALL BE GREEN.
- ONLY HOME RUNS TO PANEL ARE SHOWN ON THE DRAWING. THE CONTRACTOR SHALL INSTALL ALL LIGHTING CIRCUITING TO LIGHTING FIXTURES AND RECEPTACLES FOR AN OPERATING SYSTEM. ALL AC CIRCUITS SHALL HAVE A GROUND CONDUCTOR.

REFERENCE DRAWINGS:

KND01-LT-E-PL-01 SITE LIGHTING PLAN

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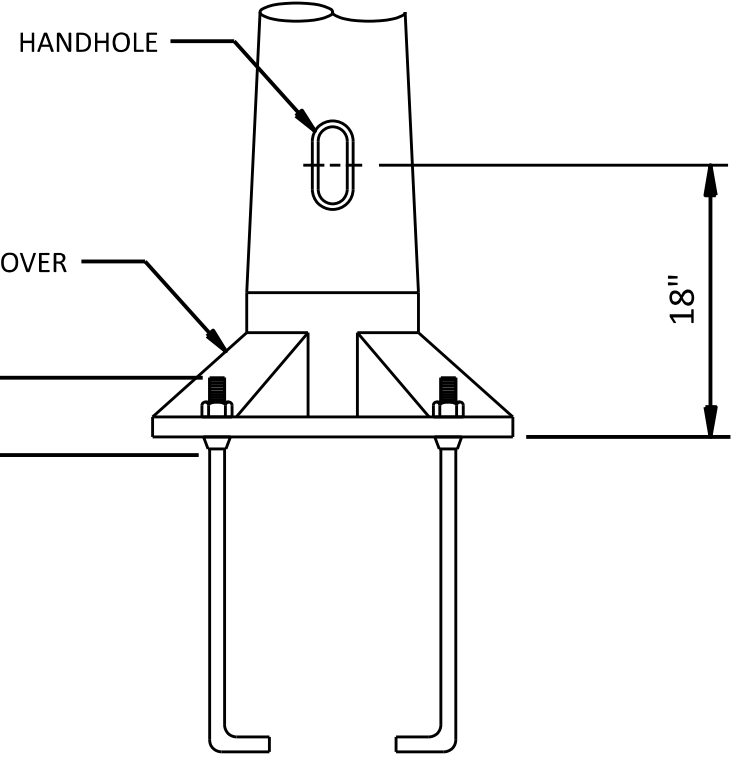


ELEVATION

DETAIL A

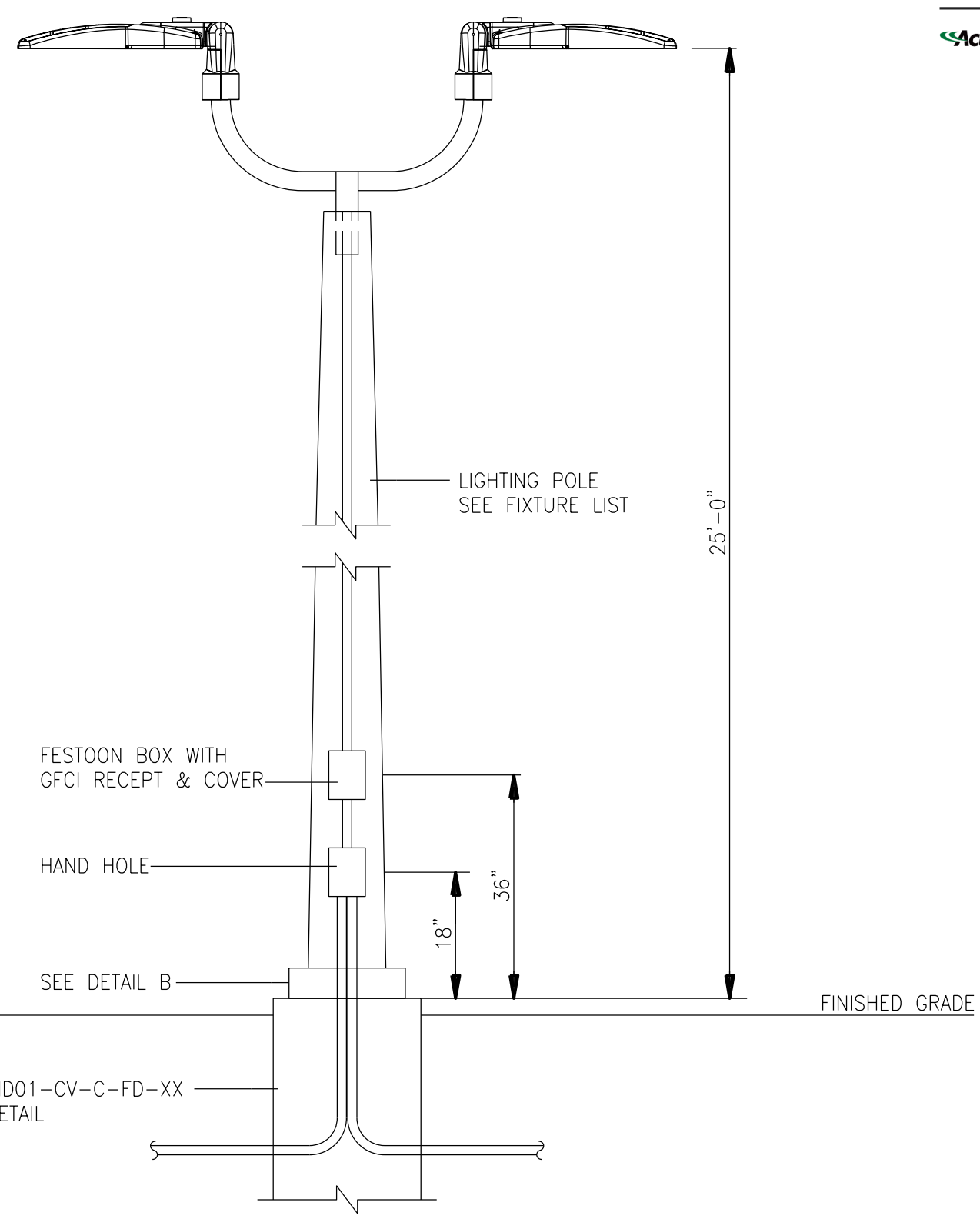
TYPICAL SITE LIGHTING POLE CONCRETE FOUNDATION
NO SCALE

NOTES:
 1. FOR FOUNDATION INSTALLATION SEE CIVIL DRAWING KND01-CV-C-FD-XX.



DETAIL B

TYPICAL SITE LIGHTING POLE - HANDHOLE
NO SCALE



DETAIL C

TAPERED ALUMINUM POLE FOR LIGHTING
NO SCALE

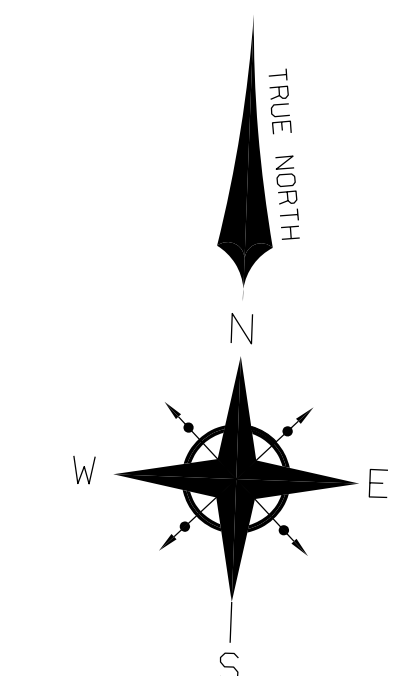
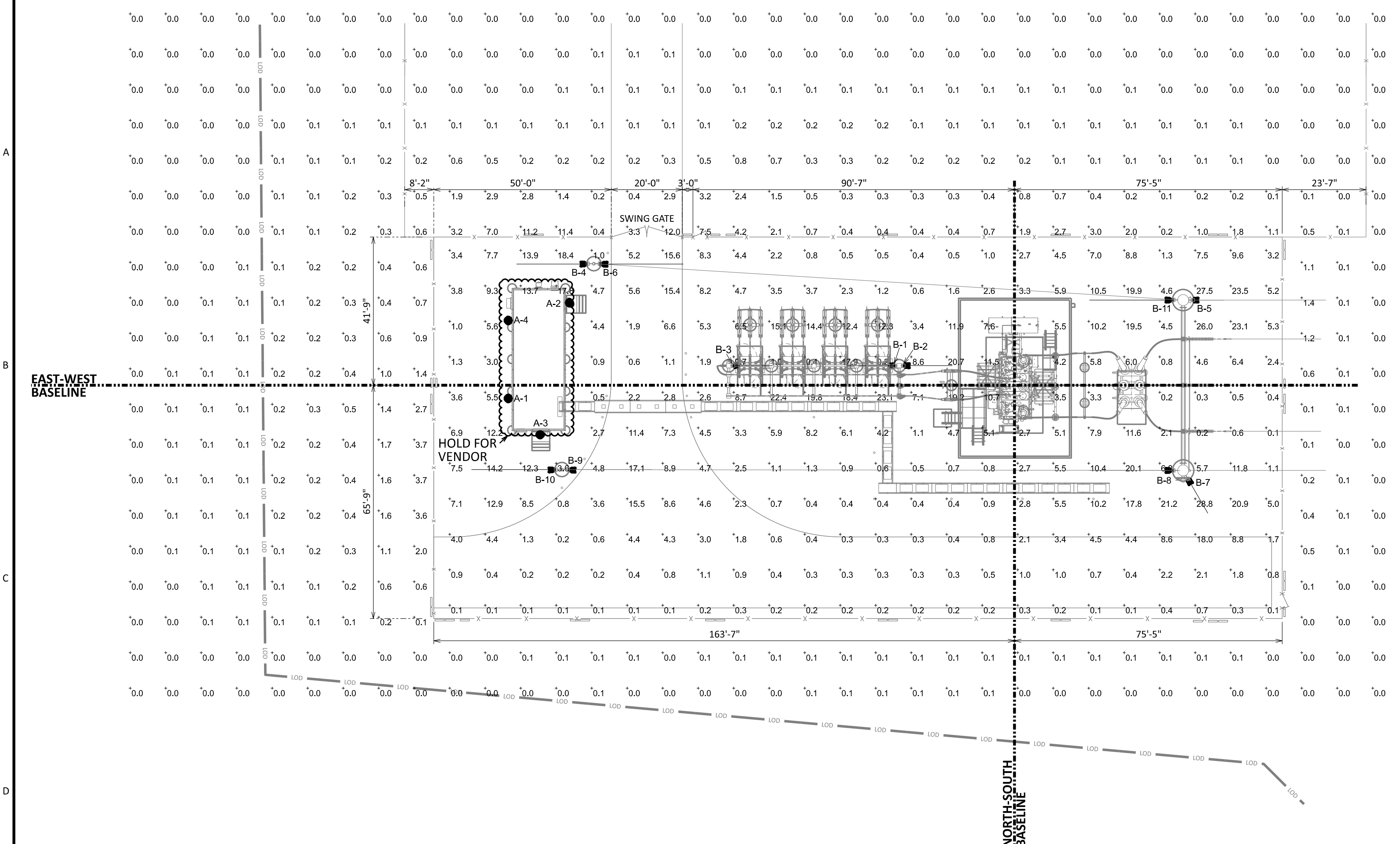
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B	03/SEP/24	ISSUED FOR CLIENT 60% REVIEW	BCA	BCA	OOO	OOO	BC
A	23/AUG/24	ISSUED FOR PERMIT	BCA	BCA	OOO	OOO	BC

BLACK & VEATCH
 DESIGNER: BCA
 CHECKED: OOO

DUKE ENERGY
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM
 BESS ELECTRICAL LIGHTING DETAILS
 5201 KNIGHTDALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
KND01-LT-E-SD-01		C
CODE	AREA	

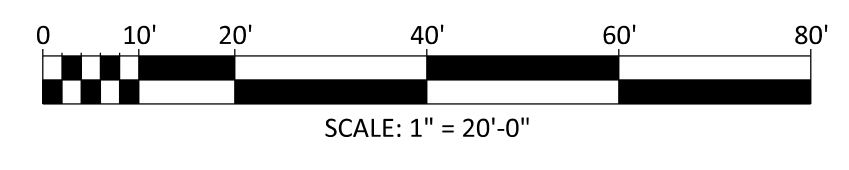


Luminaire Locations			
No.	Label	MH	Tilt
1	A	10'-6"	0.00
2	A	10'-6"	0.00
3	A	10'-6"	0.00
4	A	10'-6"	0.00
1	B	23'-6"	30.00
2	B	23'-6"	30.00
3	B	23'-6"	25.00
4	B	23'-9"	40.00
5	B	23'-0"	20.00
6	B	23'-9"	45.00
7	B	23'-0"	25.00
8	B	23'-0"	45.00
9	B	23'-9"	45.00
10	B	23'-9"	45.00
11	B	23'-0"	45.00

Schedule													
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Filename	Lumens Per Lamp	Lumen Multiplier	Light Loss Factor	Efficiency	Wattage	Distribution
	A	4	COOPER LIGHTING SOLUTIONS - LUMARK (FORMERLY EATON)	XTOR3B-W	CROSSTOUR 26W WALL MOUNT LED	1	XTOR3B-W.ies	2709	1	0.85	100%	25.5	
	B	11	American Electric Lighting	ACPOLED P40 XXXXX 55 ACPOLEDV	ACP Small LED Floodlight with P40 Performance Package, Flood (5x5) (formally FL), 4000K CCT, 70CRI with Full Visor	1	ACPOLED P40 XXXXX 55 ACPOLEDV.ies	Absolute	1	0.85	100%	154	5 X 5

Statistics					
Description	Symbol	Max	Min	Avg	AVERAGE TO MINIMUM FC RATIO
Substation	+	28.8 fc	0.1 fc	5.3 fc	53
Perimeter	+	12.0 fc	0.0 fc	0.4 fc	-

NOTE:
1. FIELD TO CONFIRM SUFFICIENT LIGHT ORIENTATION AND ILLUMINATION LEVELS WITH DUKE PERSONNEL.

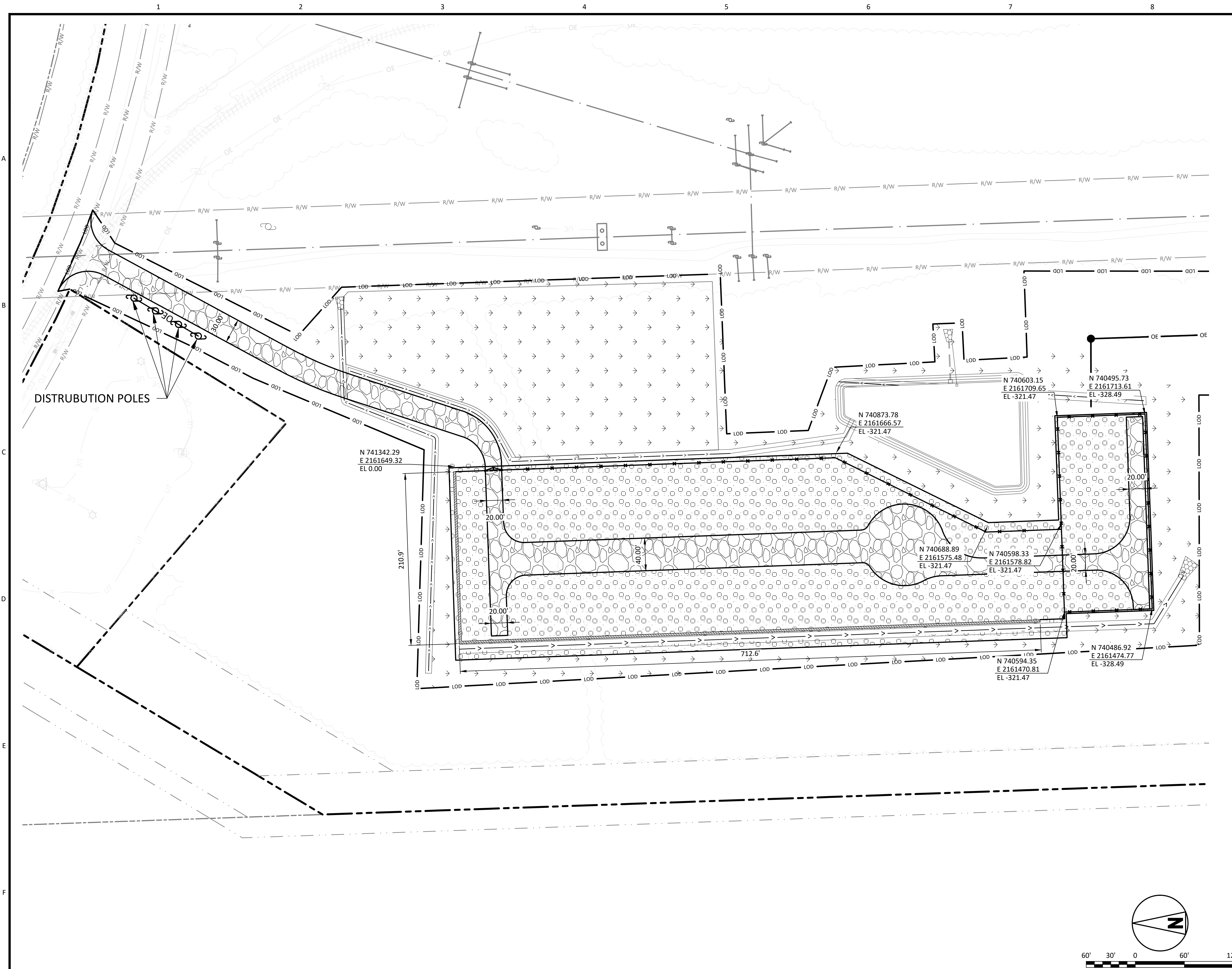


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				DUKE ENERGY KNIGHTDALE BESS		PROJECT 419596 KND00-LT-E-SY.00.PL-01		DRAWING NUMBER A	
DESIGNER BCA		DRAWN BCA		ELECTRICAL LIGHTING PLAN 5201 KNIGHTDALE EAGLE ROCK ROAD KNIGHTDALE, NC 27545		CODE AREA			
CHECKED VC		DATE 23/AUG/24							
REVISIONS AND RECORD OF ISSUE				DRN DES CHK PDE APP					
A 23/AUG/24 ISSUED FOR PERMIT									



NOTES

1. BARBED WIRE OR CHAIN LINK FENCES ARE RESTRICTED TO THE REAR YARD, SHALL NOT BE VISIBLE FROM A STREET RIGHT-OF-WAY, AND SHALL NOT BE ADJACENT TO ANY LOT IN OR ZONED FOR RESIDENTIAL USE PER SECTION 7.6.C OF THE UDO."

LEGEND

- ADJACENT PARCEL BOUNDARY
- PROPOSED SECURITY FENCE
- EXISTING FENCE
- PROPOSED ROAD
- EXISTING TREE LIMITS
- EXISTING RAILROAD
- EXISTING OVERHEAD LINE
- PROPERTY BOUNDARY
- PROPOSED OVERHEAD ELECTRIC LINES
- EXISTING RIGHT-OF-WAY
- EXISTING FIBER OPTIC CABLE
- LIMITS OF DISTURBANCE
- EXISTING TREE LINE
- PROPOSED PERIMETER WALL
- PROPOSED VEGETATED SWALE
- RIP RAP
- GRASS SURFACING
- ABC PER NCDOT SPECIFICATIONS (2018)
- #57 Stone pattern symbol"/> #57 STONE PER NCDOT SPECIFICATIONS (2018)

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A	22/AUG/2024	ISSUED FOR PERMIT	CLC	MJM	HGU	SLD	

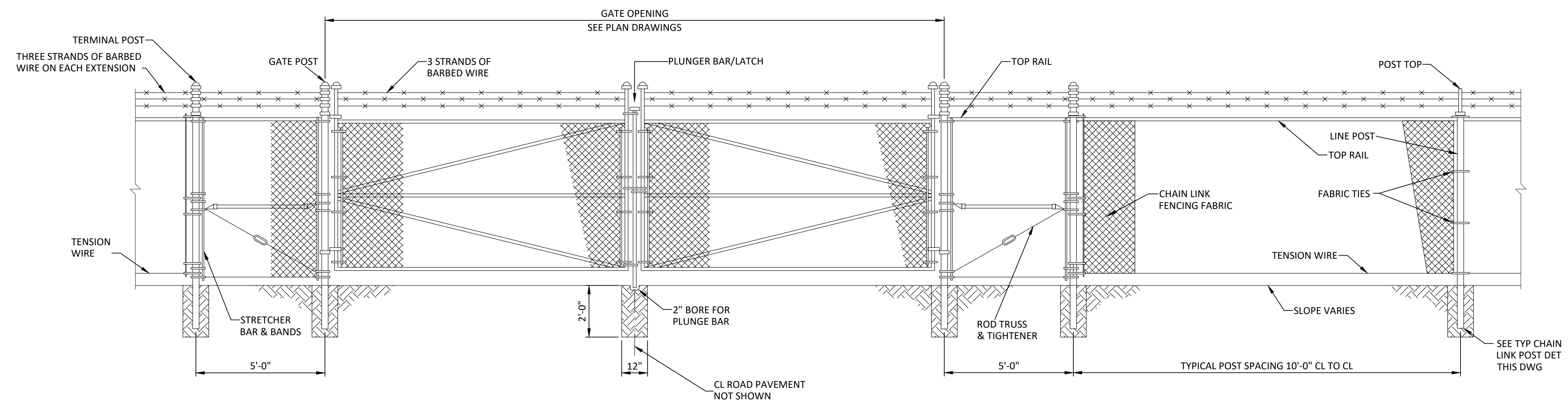
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DESIGNER: MJM DRAWN: CLC
CHECKED: HGU DATE: 27/SEP/24

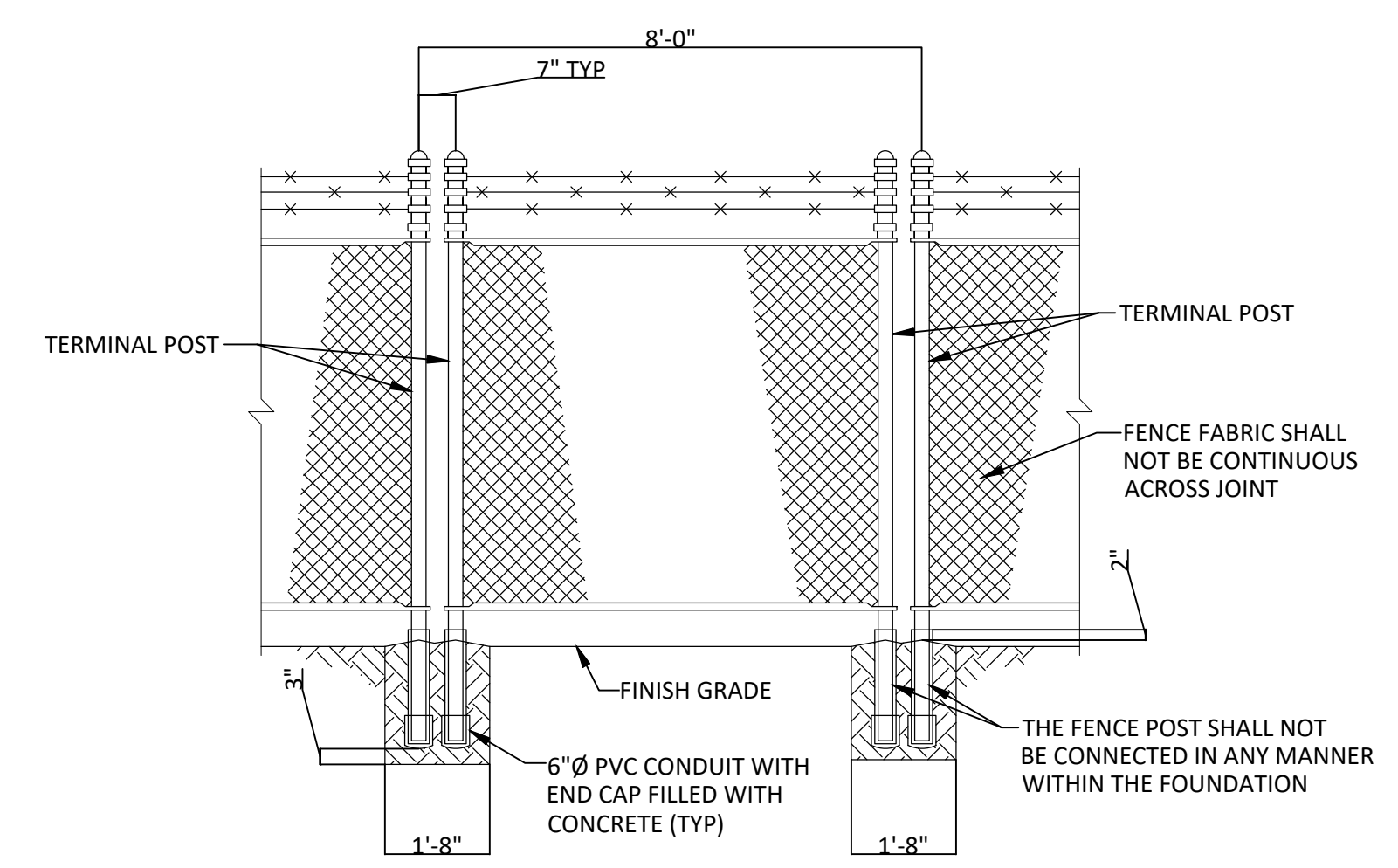
DUKE ENERGY
KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

SURFACING AND FENCING PLAN
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

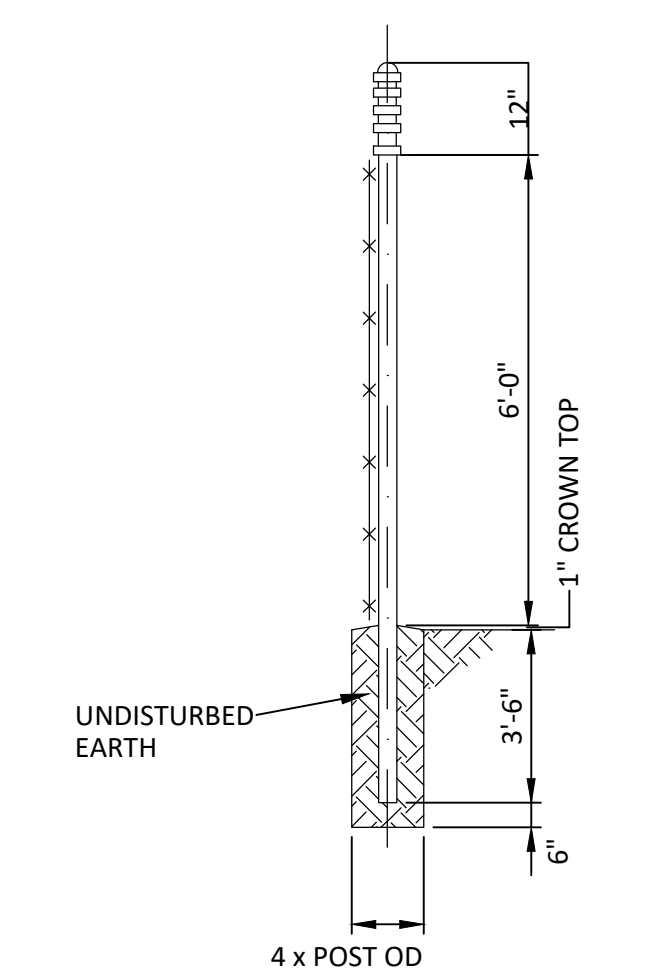
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CODE		
AREA		



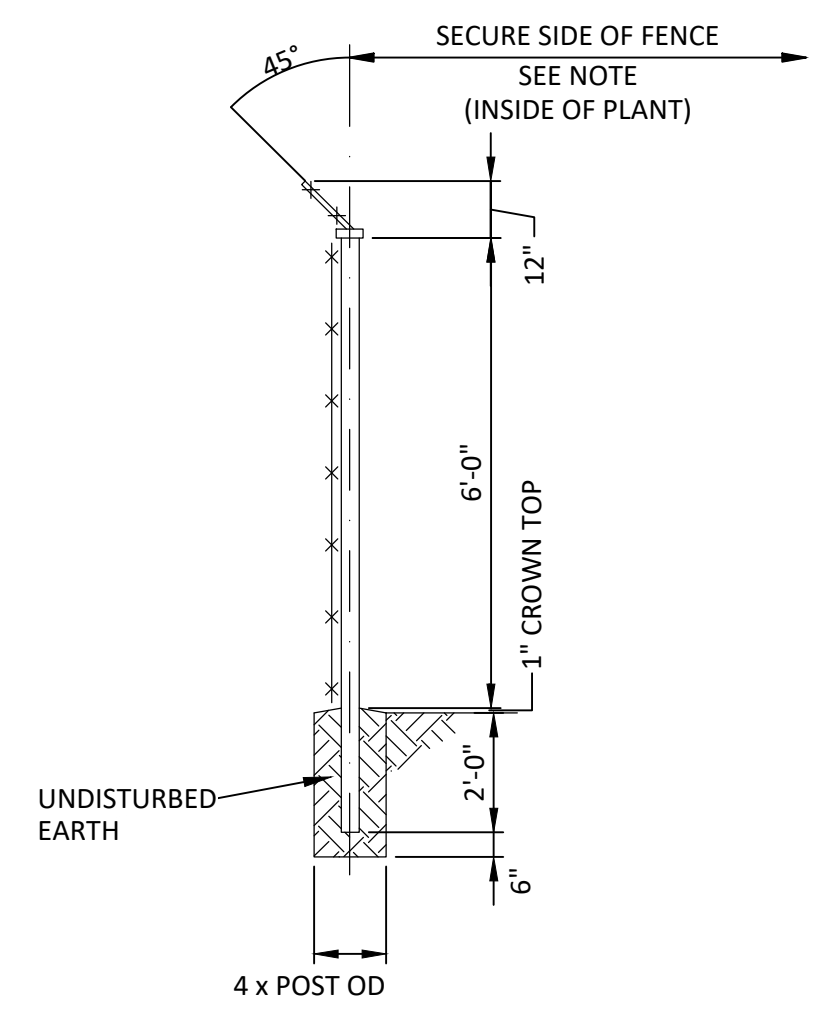
TYPICAL CHAIN LINK SECURITY FENCE WITH SWING GATE
NO SCALE



TYPICAL FENCE ISOLATION JOINT
NO SCALE



TYPICAL CHAIN LINK TERMINAL, GATE, END AND CORNER POST
NO SCALE



TYPICAL CHAIN LINK LINE POST
NO SCALE

NOTE: WIRE TIES, RAILS, POSTS AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN LINK FABRIC SHALL BE CONSTRUCTED ON THE UNSECURE SIDE OF THE FENCE ALIGNMENT.

NOTE: WIRE TIES, RAILS, POSTS AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN LINK FABRIC SHALL BE CONSTRUCTED ON THE UNSECURE SIDE OF THE FENCE ALIGNMENT.

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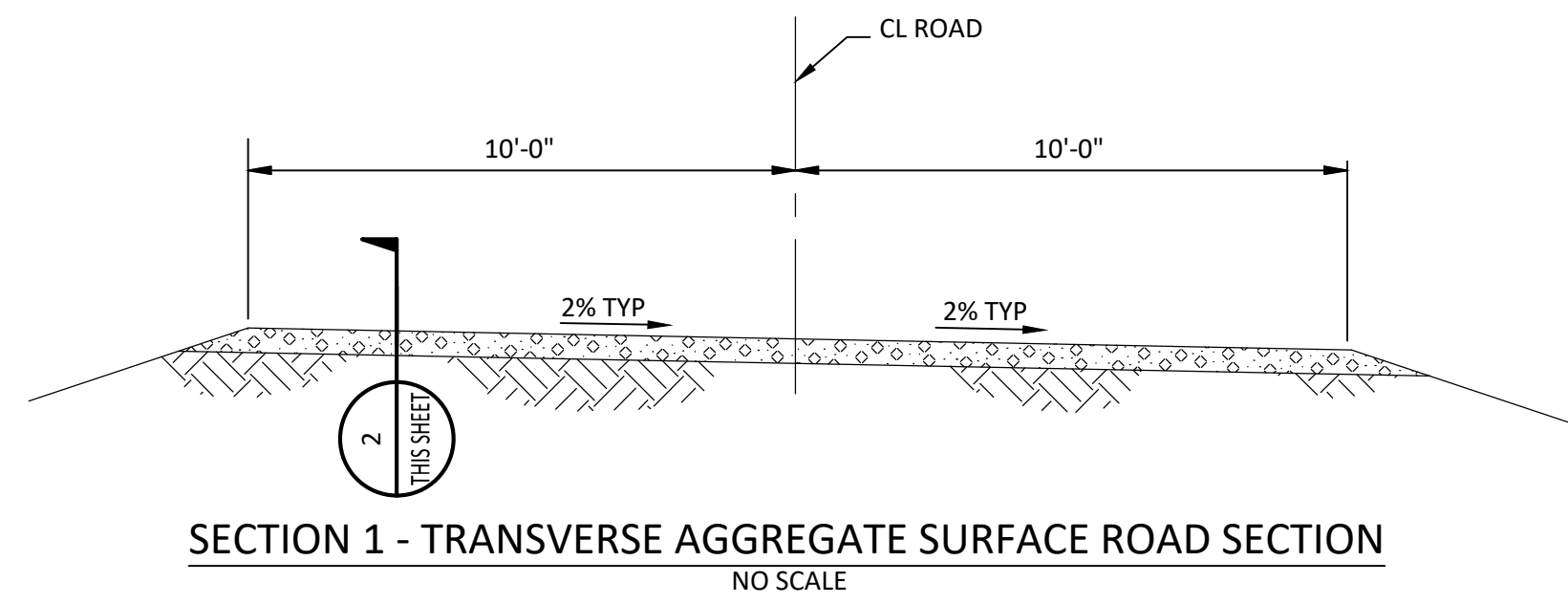
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DESIGNER: MJM
DRAWN: CLC
CHECKED: HGU
DATE: 27/SEP/2024

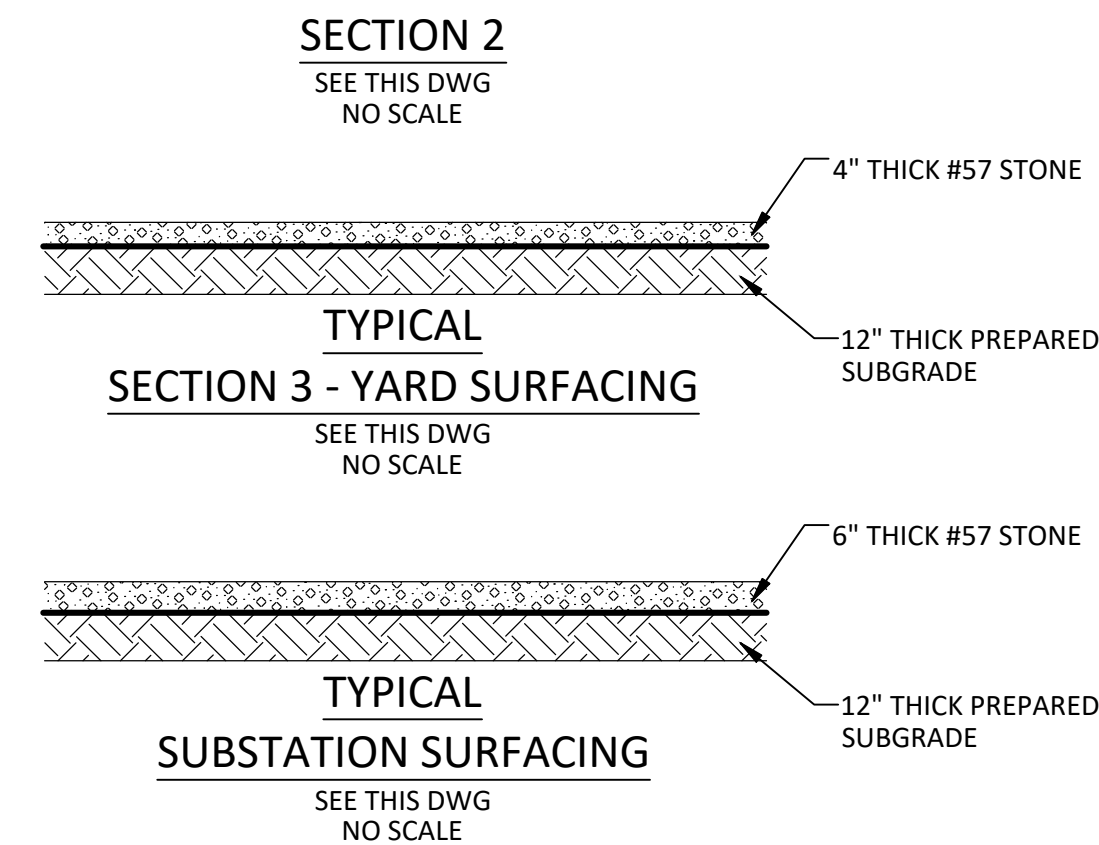
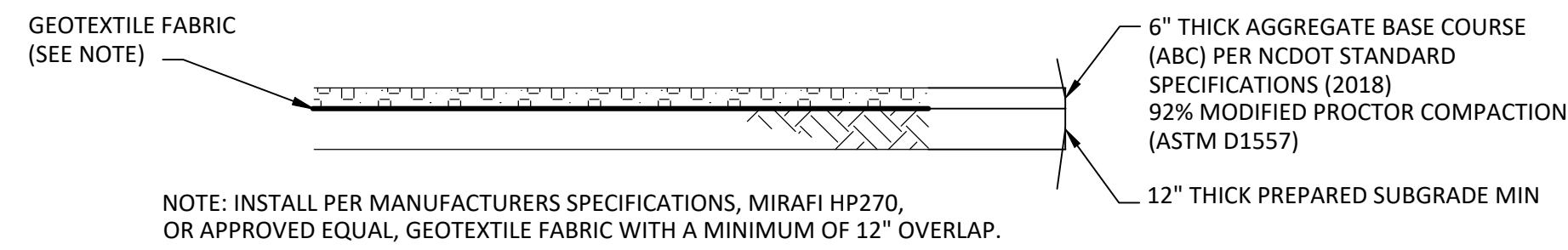
DUKE ENERGY
KIGHTDALE BATTERY ENERGY STORAGE SYSTEM

FENCING DETAILS
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

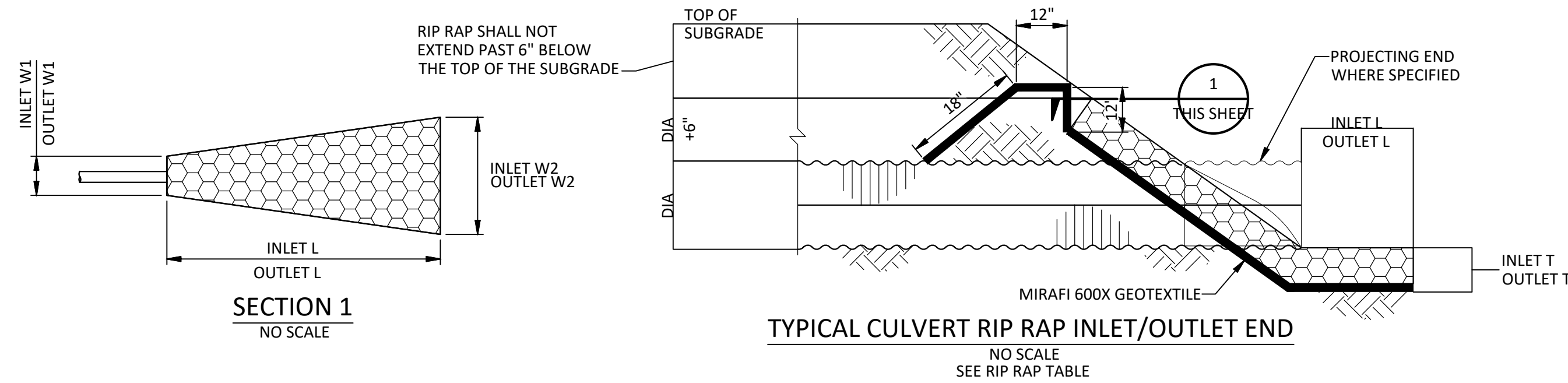
PROJECT	DRAWING NUMBER	REV
419596 KND01-CV-C-ECDS-01		B
CODE	AREA	
-	-	



RIPRAP SCHEDULE							
OUTLET	SHEET	L (FT)	T (FT)	W1 (FT)	W2 (FT)	D50 (FT)	REMARKS
BASIN OUTFALL	GR.PL-02	14	0.5	4.5	16.0	0.50	
SWALE 1	GR.PL-01	8	0.5	3.0	9.0	5	
SWALE 2	GR.PL-02	14	0.5	4.0	16.0	0.5	



DITCH NO.	COORDINATES				LENGTH (FT)	START INV ELV	END INV ELV	SLOPE (FT/FT)	LINING	DESIGN LIFE	REMARKS
	START		END								
	NORTHING	EASTING	NORTHING	EASTING							
S-1	741373.79	2161398.82	741481.42	2161843.09	518	327.15	319.19	VARIES		PERMANENT	OFFSITE DIVERSION
S-2	741336.08	2161426.57	740448.39	2161516.95	916	317.17	313.17	0.005	GRASS	PERMANENT	OFFSITE DIVERSION
S-3	741469.83	2161766.32	740851.99	2161706.11	736	320.67	305.46	0.005	GRASS	PERMANENT	CONVEYANCE
S-4A	740495.88	2161719.25	740649.74	2161713.76	110	316.20	315.82	0.003	GRASS	PERMANENT	CONVEYANCE
S-4B	740497.37	2161730.03	740650.30	2161739.52	44	311.87	305.38	0.237	RIPRAP	PERMANENT	CONVEYANCE
D-1	741471.43	2161846.77	740863.24	2161711.88	763	318.00	305.38	0.010	EC BLANKET	TEMPORARY	CONVEYANCE
D-2	740415.74	2161746.18	740204.10	2161744.09	212	309.00	303.00	0.005	EC BLANKET	TEMPORARY	OFFSITE DIVERSION



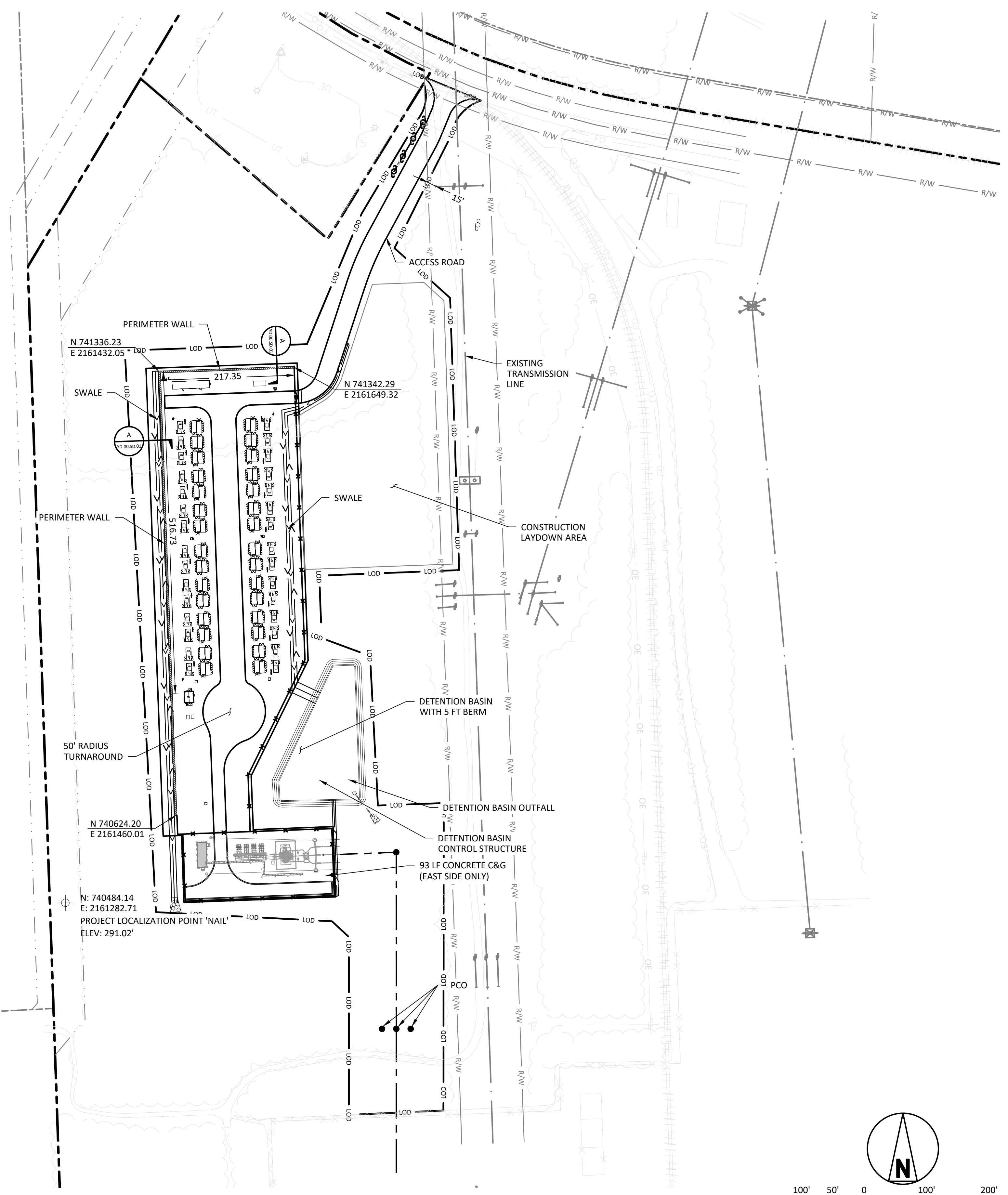
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C	12/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SDSLD	
B	4/SEP/2024	ISSUED FOR 60% REVIEW	CLC	MJM	HGU	SDSLD	
A	22/AUG/2024	ISSUED FOR PERMIT	CLC	MJM	HGU	SDSLD	

 DESIGNER: MJM CHECKED: HGU	 DRAWN: CLC DATE: 27/SEP/2024	PROJECT: KNIGHTDALE BATTERY ENERGY STORAGE FACILITY DRAWING NUMBER: KND01-CV-C-GR.SD-01		REV: E
		SURFACING DETAILS 5201 KNIGHTDALE EAGLE ROCK ROAD KNIGHTDALE, NC 27545		CODE: - AREA: -

A
B
C
D
E
F



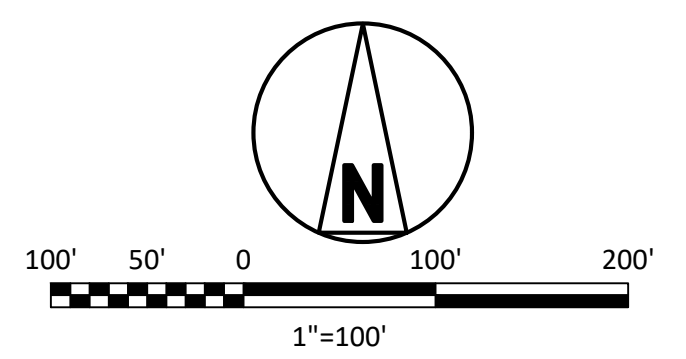
LEGEND

	ADJACENT PARCEL BOUNDARY
	PROPOSED SECURITY FENCE
	EXISTING FENCE
	PROPOSED ROAD
	EXISTING TREE LIMITS
	EXISTING RAILROAD
	EXISTING OVERHEAD LINE
	PROPERTY BOUNDARY
	PROPOSED OVERHEAD ELECTRIC LINES
	EXISTING RIGHT-OF-WAY
	EXISTING FIBER OPTIC CABLE
	LIMITS OF DISTURBANCE
	EXISTING TREE LINE
	PERIMETER WALL
	PROPOSED UNDERGROUND ELECTRIC LINES
	RIGHT OF WAY

HORIZONTAL DATUM: NAD83 NORTH CAROLINA STATE PLANES, US FOOT
 *STATE PLANE COORDINATES WERE ESTABLISHED BASED IN NGS MONUMENTS "ROSE" AND "TOMB".

VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988

BENCHMARK: PROJECT LOCALIZATION POINT 'NAIL'
 N: 740,484.141'
 E: 2,163,003.135'
 ELV: 291.02'



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A	26/AUG/2024	ISSUED FOR PERMITTING	CLC	DSD	HGU	DSD	

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SIGNED _____ DATE _____ REG. NO. _____

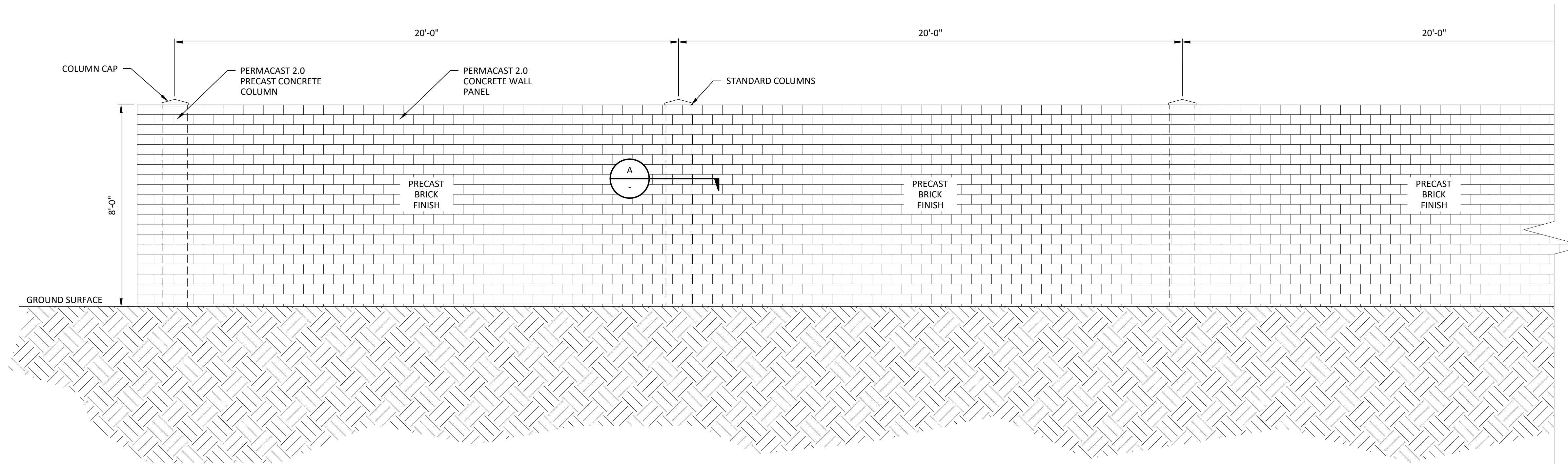
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DESIGNER: _____ DRAWN: CLC
 CHECKED: DSD DATE: 26/AUGUST/24

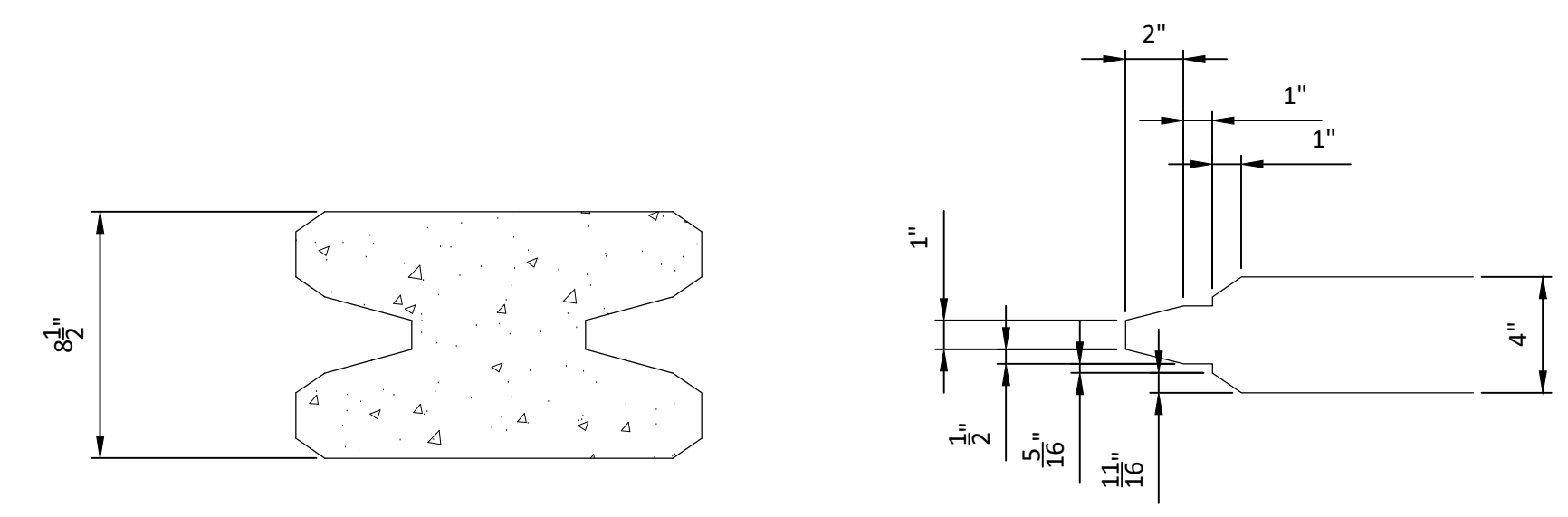
DUKE ENERGY
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

ARCHITECTURAL PLAN
 5201 KNIGHTDALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

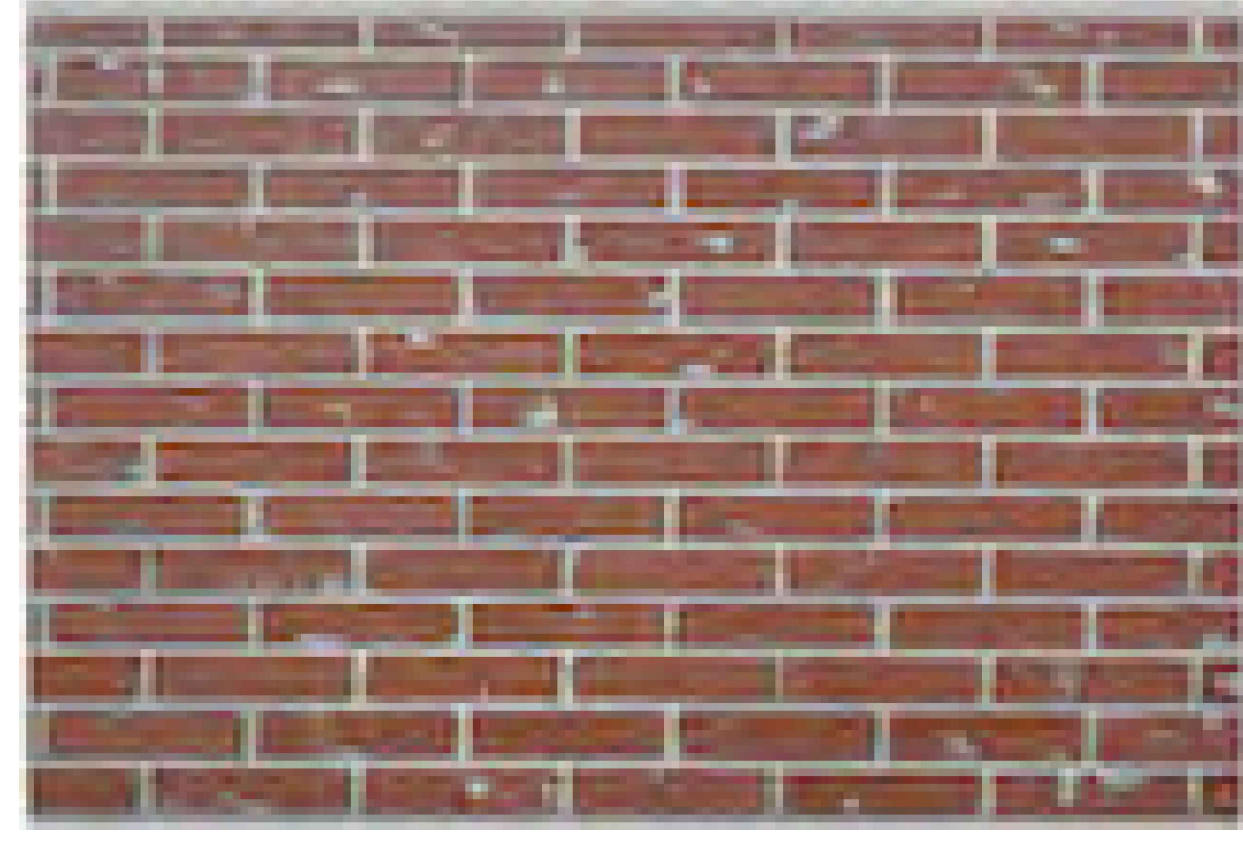
PROJECT	DRAWING NUMBER	REV
419596 KND01-AD-A-YD.00.PL-01	419596 KND01-AD-A-YD.00.PL-01	B
CODE	AREA	



ELEVATION A - TYPICAL 8 FT. X 20 FT WALL ELEVATION
SCALE: 1" = 30'-0"



SECTION A
TYPICAL PANEL / POST CONNECTION
SCALE: 1" = 6"



BRICK FINISH

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A	26/AUG/2024	ISSUED FOR PERMITTING	DCV	DCV	DSD	DSD	

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DESIGNER: _____ DRAWN: DCV
CHECKED: HGU DATE: 27/SEP/2024

DUKE ENERGY
DUKE ENERGY
KNIGHTDALE EPC

ARCHITECTURAL ELEVATION AND SECTIONS
5201 KNIGHTDALE EAGLE ROCK ROAD
KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
419596 KND01-AD-A-YD.00.SD-01		B
CODE	AREA	

ST5015UX-2H-US ST5015UX-4H-US

PowerTitan 2.0 Liquid Cooled Energy Storage System

NEW



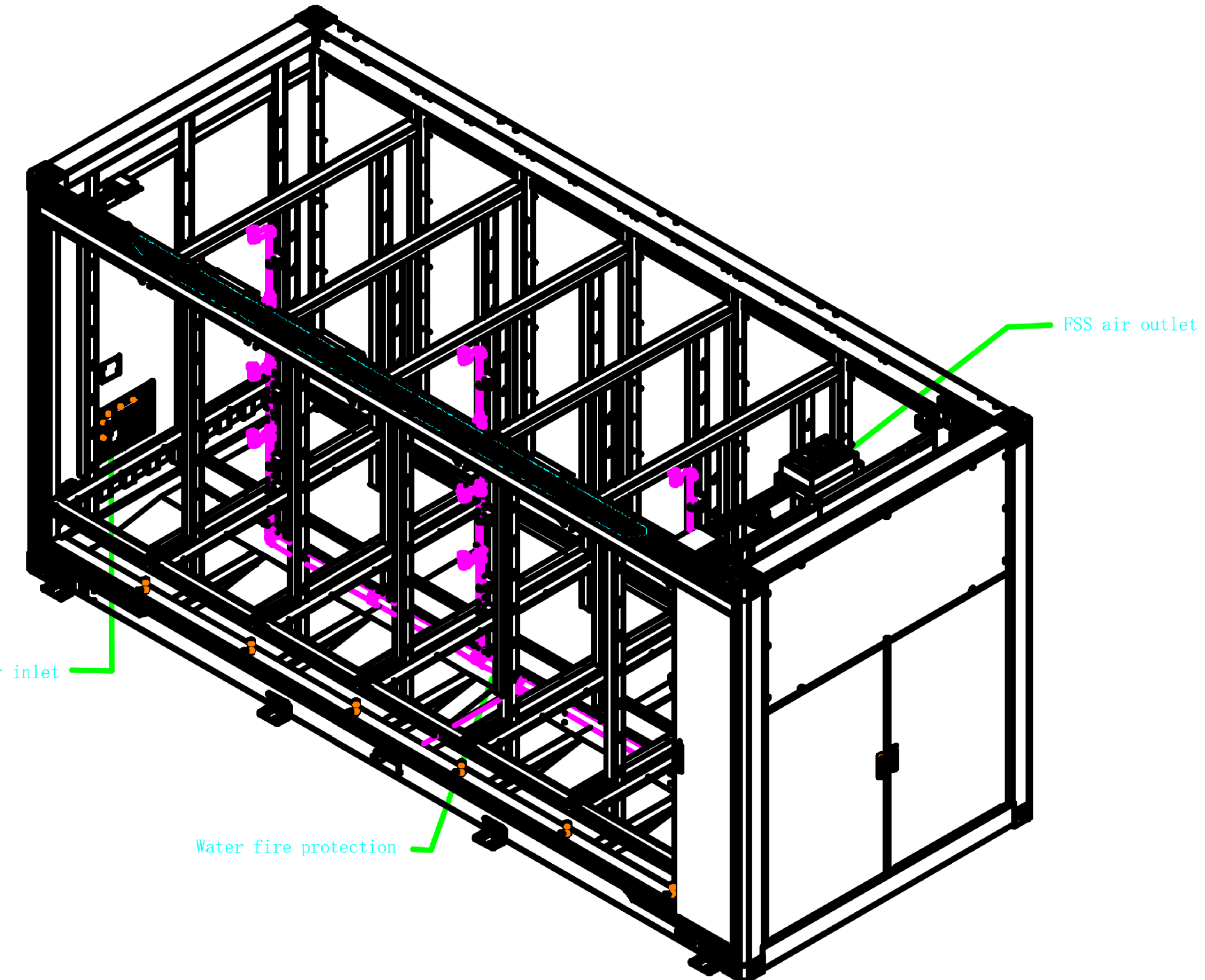
Product name	ST5015UX-2H-US	ST5015UX-4H-US
DC side		
Cell type	LFP	
Battery configuration	3.2 V / 314 AH	
Nominal capacity	46812P	
Nominal voltage range	501S kWh	
AC side		
Nominal AC power	210 kVA * 12	210 kVA * 6
DC current distortion rate	< 3% (Nominal Power)	
DC component	< 0.5%	
Nominal AC voltage	690 V	
AC voltage range	607 V ~ 759 V	
Termination (LV)	352 A * 3 Phase * 6	352 A * 3 Phase * 3
Power factor	> 0.99 (Nominal Power)	
Adjustable range of reactive power	-100% ~ 100%	
Nominal frequency	60 Hz	
Isolation method	Transformerless	
System parameter		
Dimension (W * H * D)	6058 mm * 2896 mm * 2438 mm	
Weight	42500 kg / 93696.5 lbs	42000 kg / 92594.0 lbs
Degree of protection	Type 3S	
Anti-corrosion degree	C4	
Operation temperature range	-30 °C ~ 50 °C (> 45 °C Derating)	
Operation humidity range	-22 °F ~ 122 °F (> 113 °F Derating)	
Max. operation altitude	3000 m / 9842.5 ft	
Temperature control method	Intelligent Liquid Cooling	
Fire suppression system	Default: NFPA 68 compliance vent panel, smoke and heat, detectors, Mini FACP Optional: Sprinkler, sound beacon, NFPA 69, compliance ventilation system, Flammable gas detector	
Communication	Ethernet	
Standard	UL 9540A, NFPA 855, NFPA 68, NFPA 69 (optional) IEEE 1547, UL 1973, UL 1741SB, UL 9540	



Front View

- OPTIMAL COST**
 - Intelligent liquid-cooled temperature control system to optimize the auxiliary power consumption
 - Pre-assembled, no battery module handling on site, transportation of complete system
- EFFICIENT AND FLEXIBLE**
 - High-efficiency heat dissipation, increase battery life and system discharge capacity
 - Front single-door-open design, supporting back to back layout drawing
 - Function test in factory, limited on-site work, accelerate commissioning process
- SAFE AND RELIABLE**
 - Electrical safety management, overcurrent fast breaking and arc extinguishing protection
 - The electrical cabinet and battery cabinet are separated to prevent thermal runaway
- CONVENIENT O&M**
 - One-click system upgrade
 - Automatic coolant refilling design
 - Online intelligent monitoring

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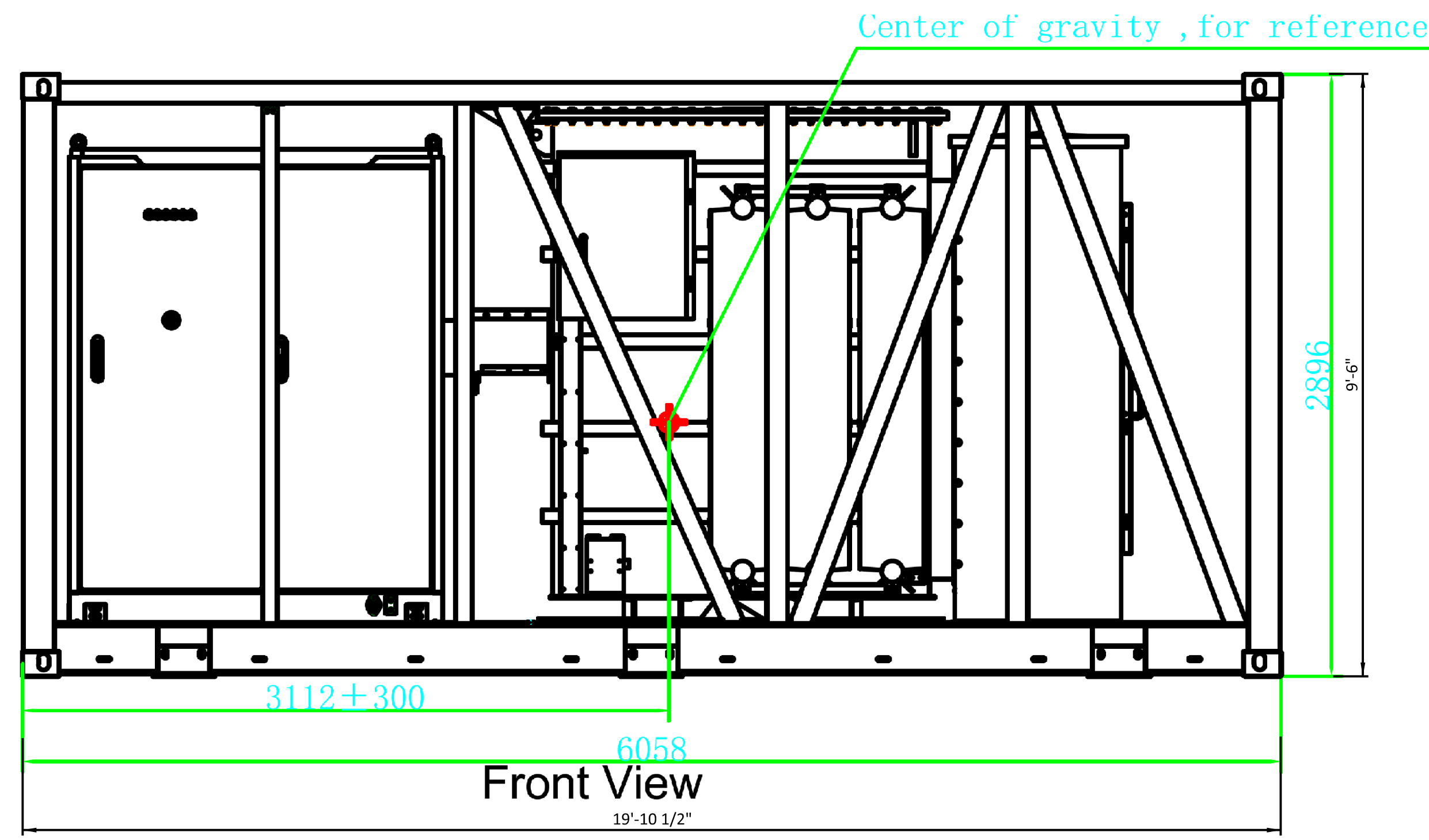


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B&V PROJECT NUMBER: 419596

MicroStation v23.00.01.44
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DESIGNER: BCA		DRAWN: RSN		DUKE ENERGY		PROJECT: KN001-VEN-LG-E-SD-01		DRAWING NUMBER: A	
CHECKED: OOO		DATE: 23/AUG/24		BLACK & VEATCH		KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM		REV: A	
NO		DATE		REVISIONS AND RECORD OF ISSUE		BESS CONTAINER ARCHITECTURAL PLAN		CODE	
						5201 KNIGHTDALE EAGLE ROCK ROAD		AREA	
						KNIGHTDALE, NC 27545			



SUNGROW
Clean power for all

MVS5140-LS-US

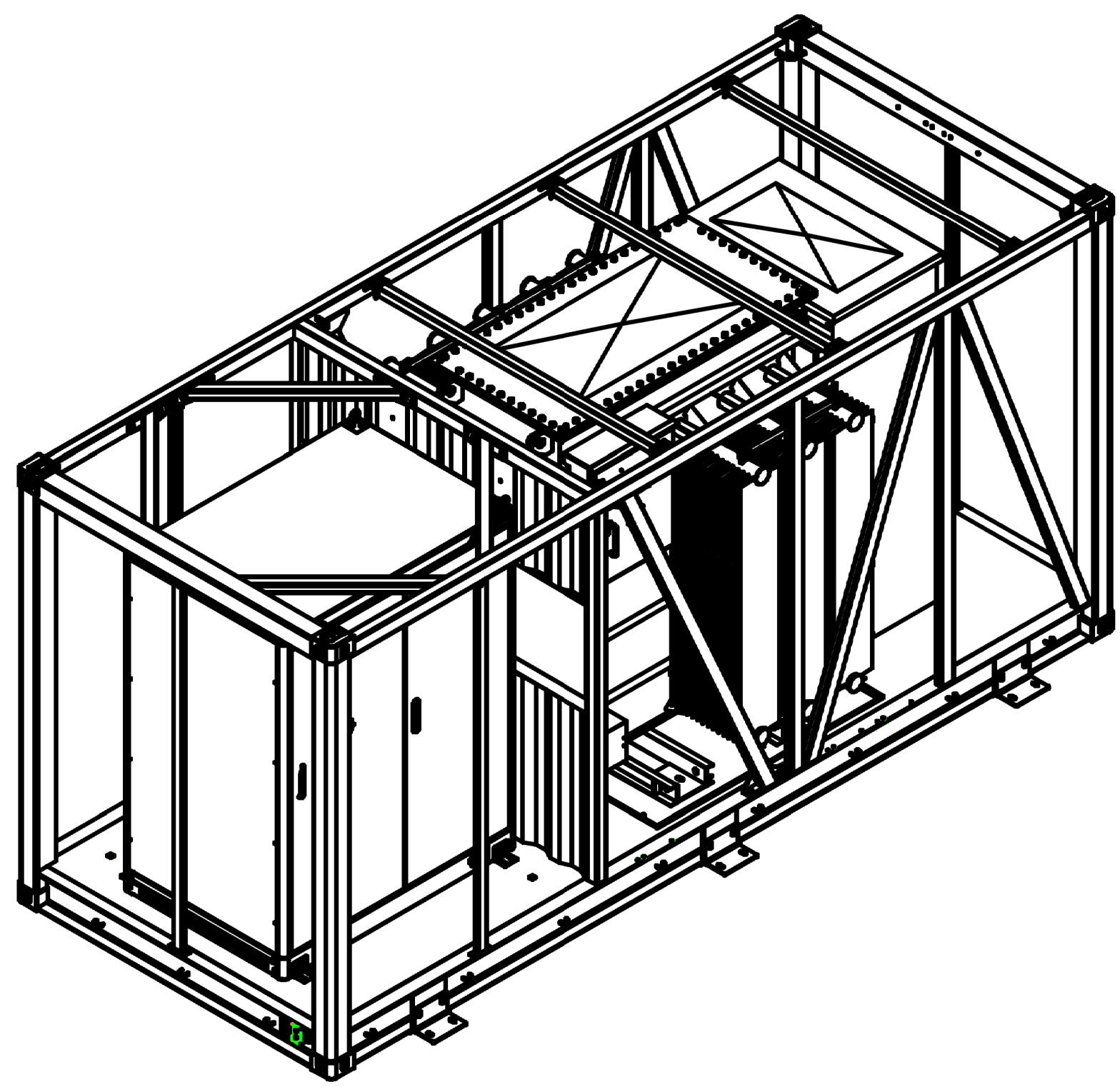
MV Turnkey Solution for **PowerTitan 2.0** MVS Liquid Cooling Energy Storage System

NEW

Product Name	MVS5140-LS-US
MV transformer	
Rated power	5140 kVA
MV / LV voltage	34.5 kV / 0.69 kV
Transformer vector	Dy1
Windings	2 windings
Rated frequency	60 Hz
Impedance	9 % (± 7.5 % , IEEE tolerance)
Efficiency standard	99 % @ 100 % load
Material of winding (MV / LV)	Aluminum / Aluminum
Legged core design	3 Legged core Design
High voltage configuration	Loop-feed, Dead Front
Overcurrent protection	Expulsion fuses in series with Partial-Range Current-Limiting Fuses
Cooling method	KNAN
Insulation fluid	Degradable oil
Smart control cabinet	
Protection	AC Breaker
Surge protection	Type II
AC Insulation detection	Support
Cooling Method	Air cooling and HVAC
UPS	
	15 min (Default)
	2 / 3 / 4 h (Optional)
General data	
Dimensions (W * H * D)	6058 mm * 2896 mm * 2438 mm 238.5" * 114.0" * 96.0"
Weight	15300 kg 33730 lbs
Cable entry	Bottom entry
Degree of protection	Type 3S
Anti-corrosion degree	C4
Operation temperature range	-40 °C ~ 60 °C -40 °F ~ 140 °F
	> 40 °C (104 °F) derating (Default)
	> 45 °C (113 °F) derating (Optional)
Operation humidity range	0 % ~ 100 %
Max. operating altitude	3000 m 9842.5 ft
Communication	Ethernet, Optical fiber, RS485
Standard	UL 891, IEEE C57.12.00, IEEE C57.12.80, IEEE C57.12.90

* 15min UPS only supplies power for the control and communication devices in the MVS
 ** 2/3/4 h UPS supplies power for the control and communication devices in the the MVS, and the ventilation system in the battery container

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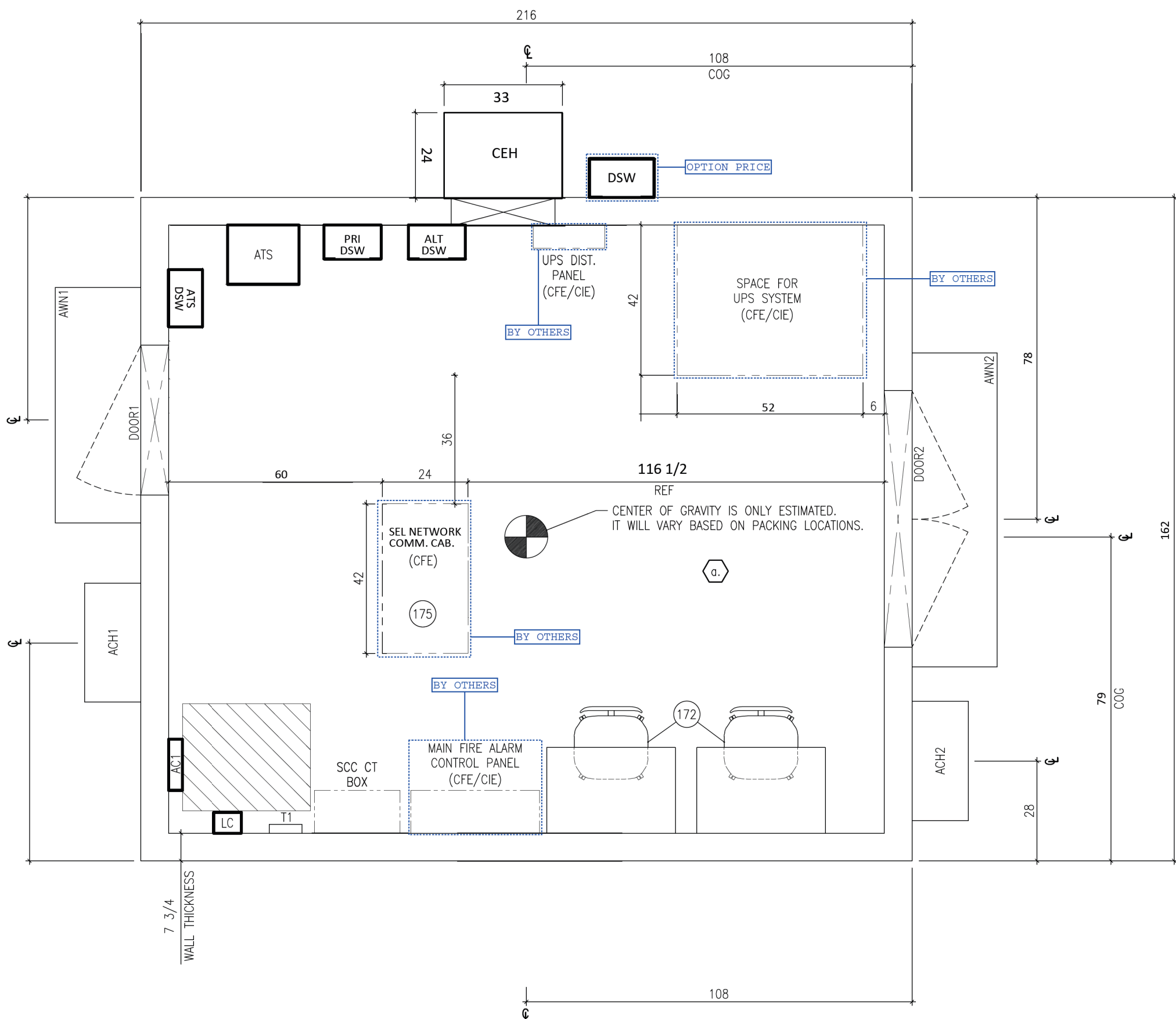


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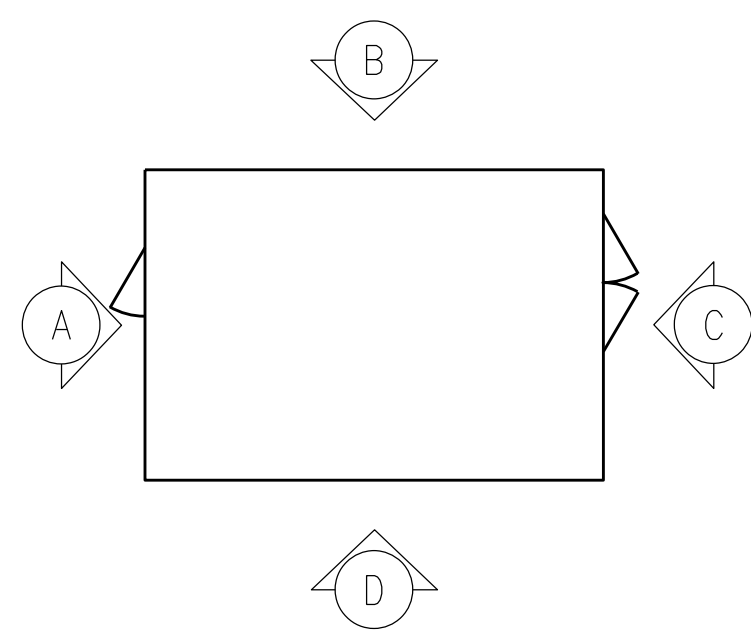
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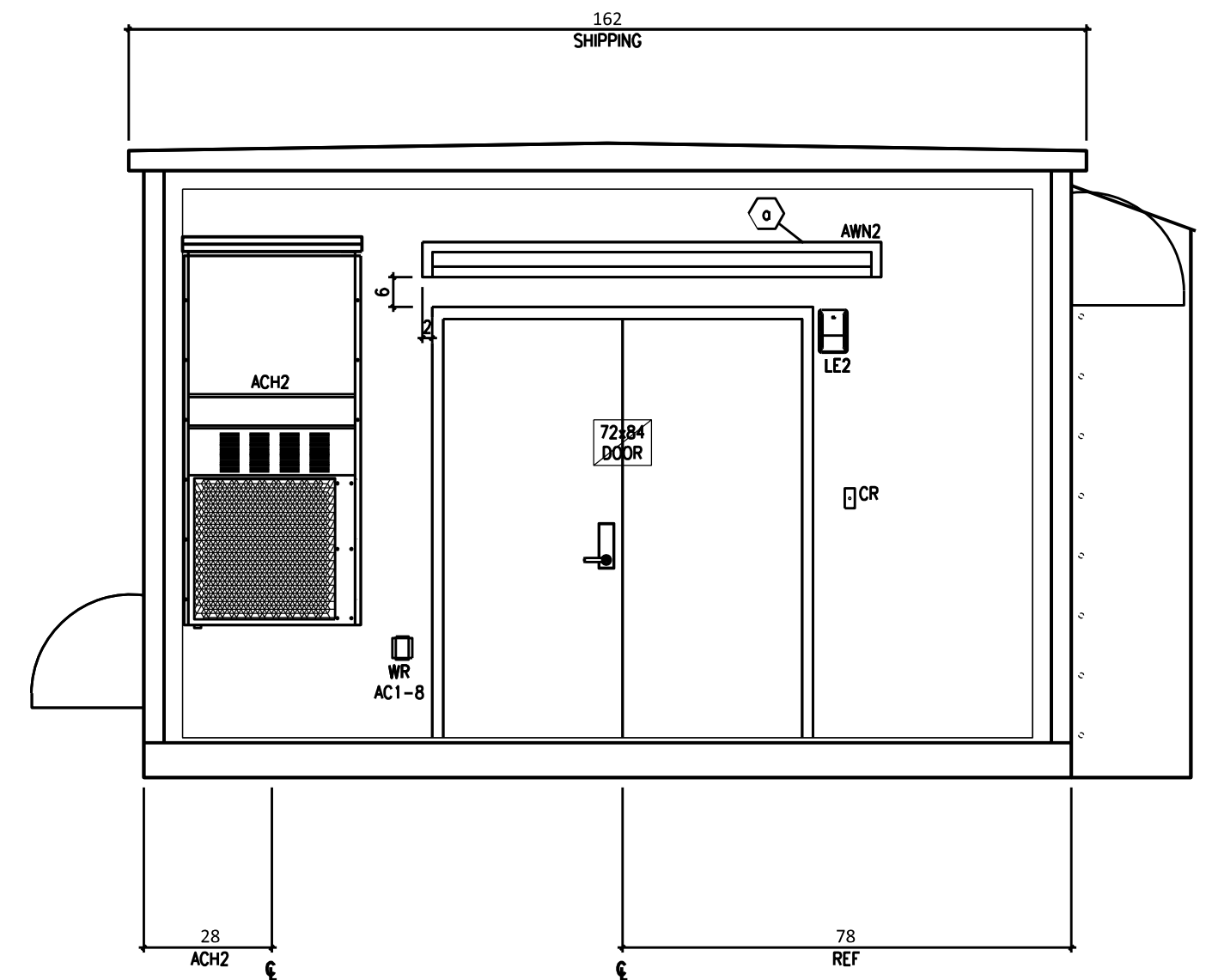
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DESIGNER	BCA	DRAWN	RSN	MVT SKID ARCHITECTURAL PLAN 5201 KNIGHTDALE EAGLE ROCK ROAD KNIGHTDALE, NC 27545	
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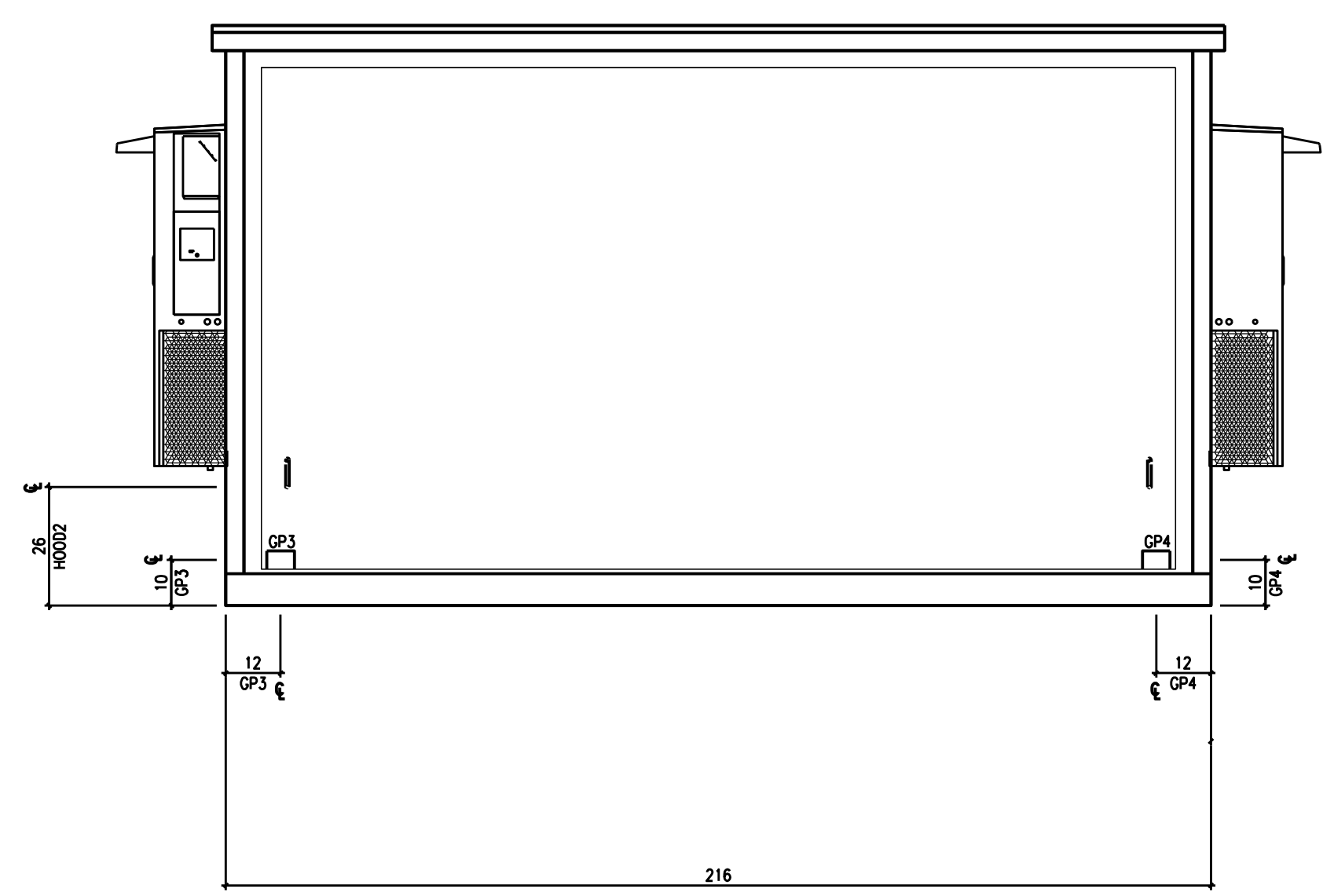
PLAN VIEW



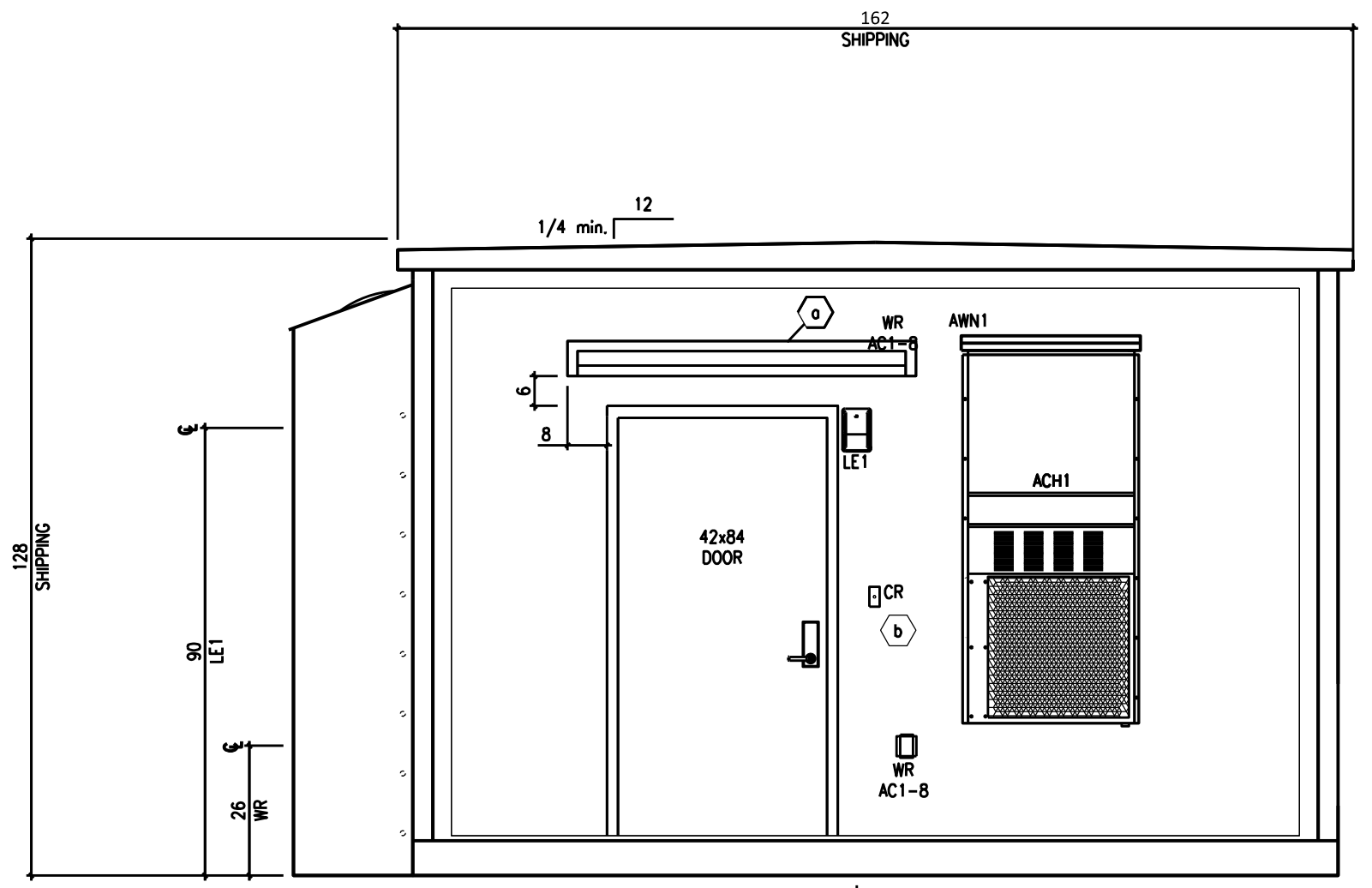
ELEVATION KEY



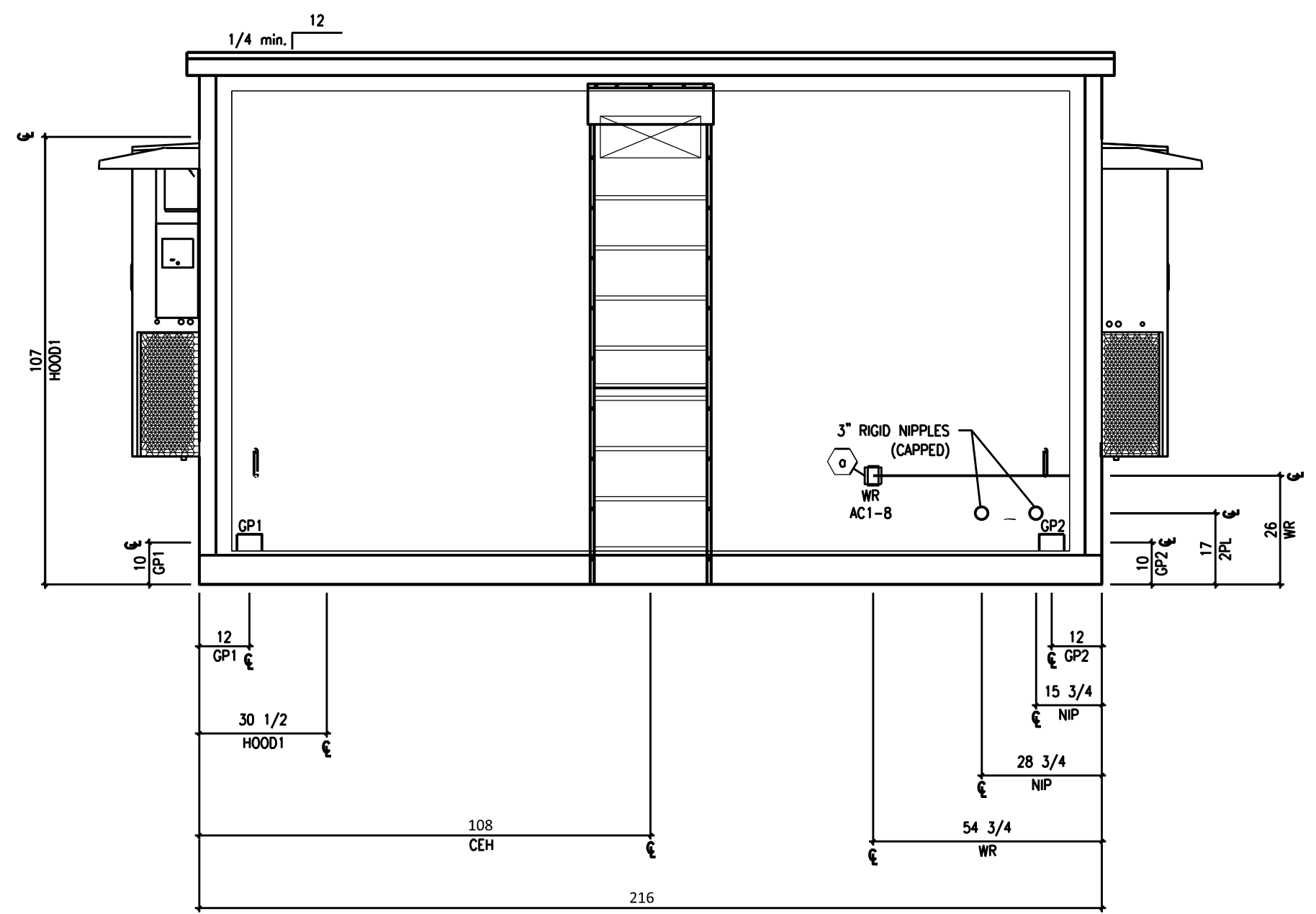
ELEVATION C



ELEVATION D



ELEVATION A



ELEVATION B

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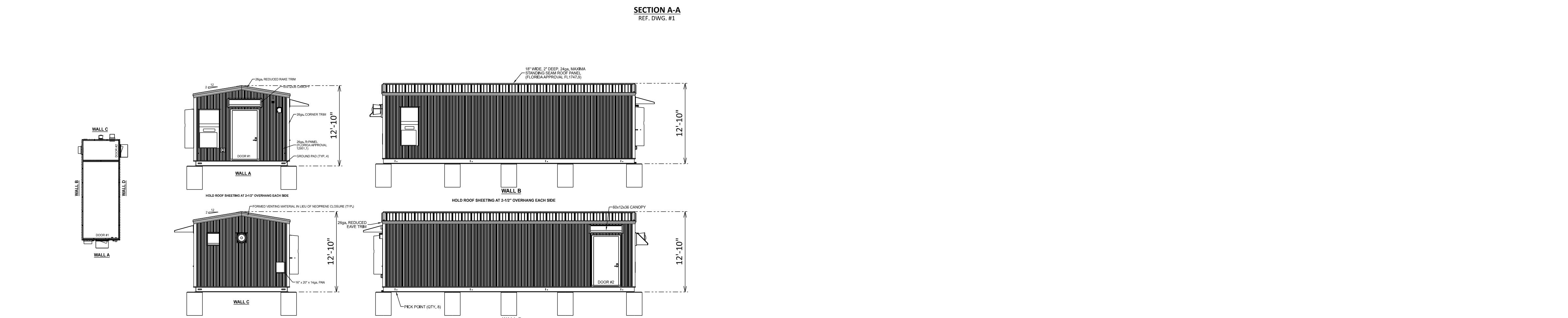
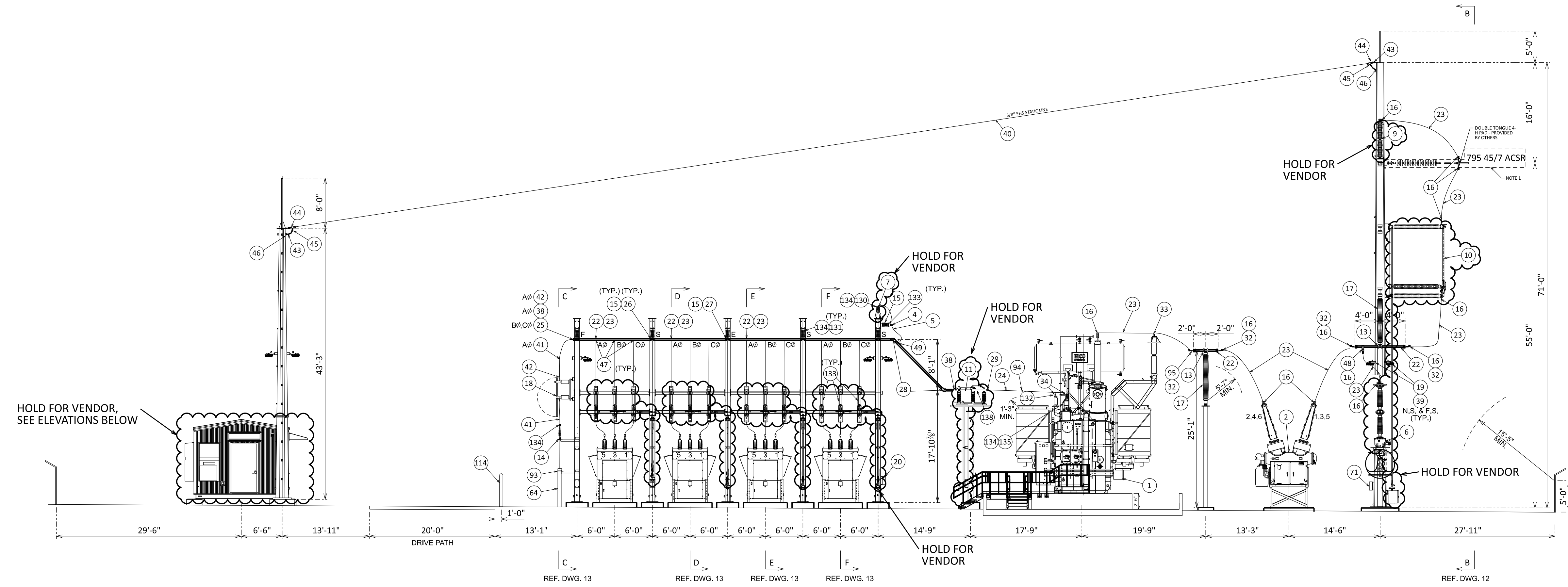
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DESIGNER	BCA	DRAWN	RSN
CHECKED	OOO	DATE	23/AUG/24

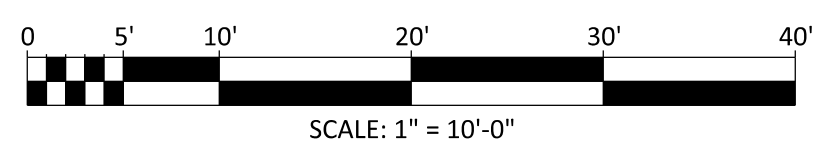
BLACK & VEATCH
11401 LAMAR AVENUE
OVERLAND PARK, KANSAS 66211
DUKE ENERGY
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM
 SITE CONTROL CENTER ARCHITECTURAL PLAN
 5201 KNIGHTDALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
KN001-VEN-LG-E-AE.00.SD-03	A	
CODE	AREA	



- LEGEND:**
- (XX) BOM ITEM NO. SEE REFERENCE DWG #7, #8 AND #9
 - F FIXED BUS SUPPORT
 - S SLIP BUS SUPPORT
 - E EXPANSION BUS SUPPORT
 - N.S. NEAR SIDED
 - F.S. FAR SIDED

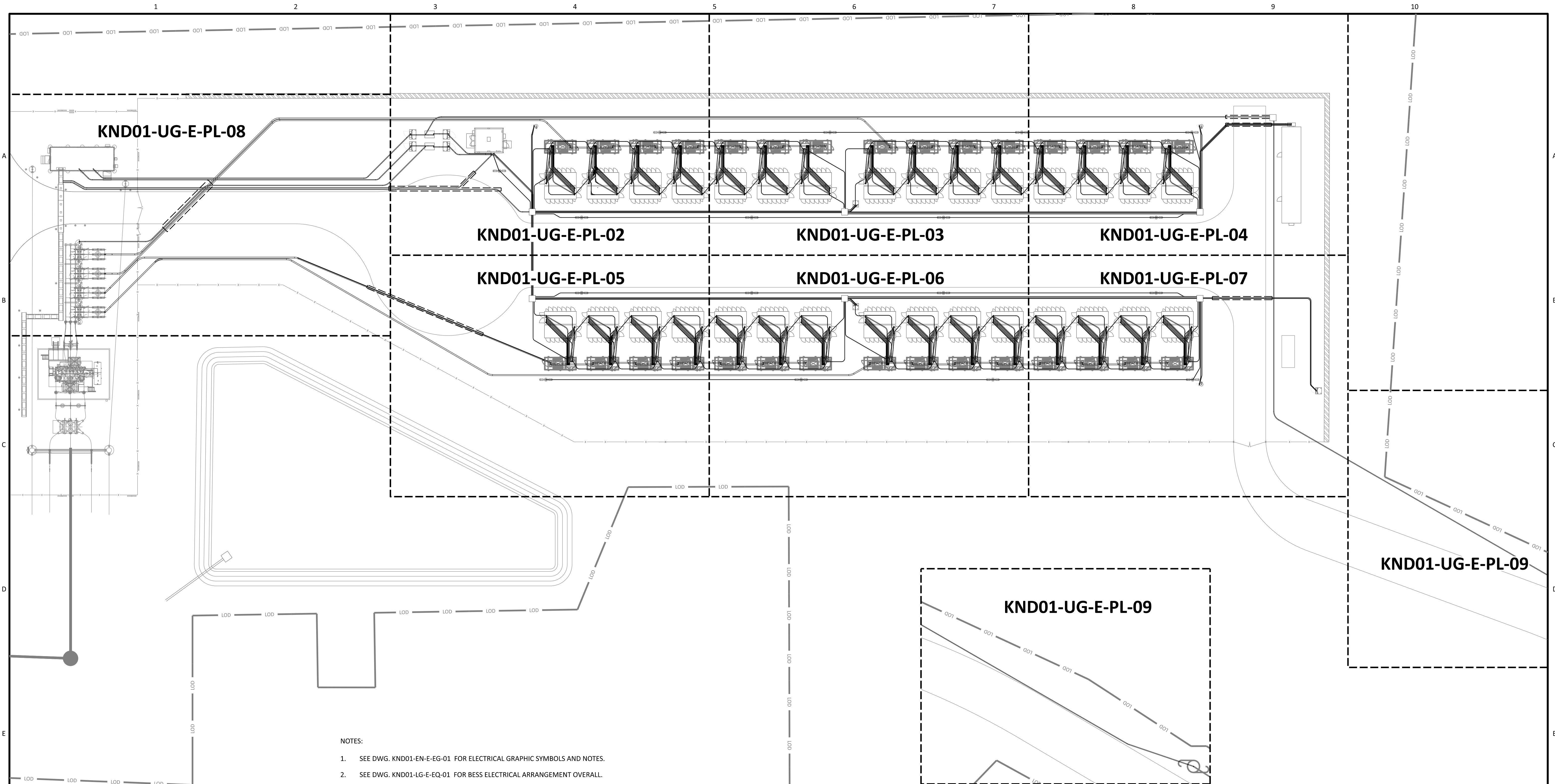
- NOTES:**
1. INCOMING LINE AND DEAD END EQUIPMENT PROCURED AND INSTALLED BY OTHERS.
 2. ALL VERTICAL DIMENSIONS ARE FROM BOTTOM OF STEEL.
 3. MAINTAIN 8'-6" CLEARANCE FROM THE BOTTOM OF BREAKER BUSHING TO THE TOP OF CONCRETE.



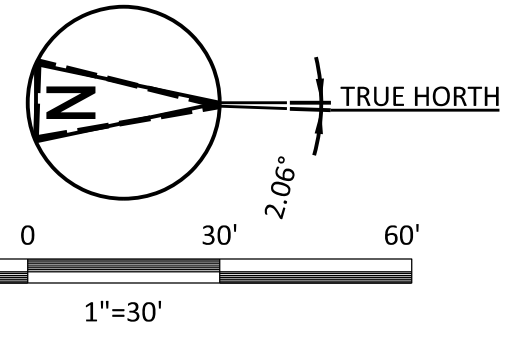
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				DUKE ENERGY KNIGHTDALE BESS		PROJECT 419596 KND00-GA-M-SY.00.EV-01		DRAWING NUMBER 419596 KND00-GA-M-SY.00.EV-01		REV A	
DESIGNER BCA		DRAWN BCA		ELECTRICAL ELEVATION VIEW 5201 KNIGHTDALE EAGLE ROCK ROAD KNIGHTDALE, NC 27545		CODE		AREA		NO. DATE REVISIONS AND RECORD OF ISSUE	
CHECKED VC		DATE 23/AUG/24								A 23/AUG/24 ISSUED FOR PERMIT	
										BCA BCA VC BCA ERB DRN DES CHK PDE APP	



- NOTES:**
- SEE DWG. KND01-EN-E-EG-01 FOR ELECTRICAL GRAPHIC SYMBOLS AND NOTES.
 - SEE DWG. KND01-LG-E-EQ-01 FOR BESS ELECTRICAL ARRANGEMENT OVERALL.
 - SEE DWG. KND01-GD-E-PL-01 FOR GROUNDING BESS PLANT OVERALL.
 - SEE DWG. KND01-CV-C-FD-XX FOR EQUIPMENT FOUNDATION PLAN AND DETAILS.
 - ALL CONDUITS CROSSING THE ROADWAY SHALL BE COVERED IN CONCRETE PRIOR TO BACKFILL. CONCRETE ENCASEMENT SHALL EXTEND 5' FROM EACH SIDE OF THE ROAD AND INCLUDE THE WIDTH OF THE TRENCH.
 - POLYWATER J LUBRICANT SHALL BE USED FOR ALL MEDIUM VOLTAGE CABLE PULL WITHIN UNDERGROUND CONDUITS.



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B&V PROJECT NUMBER: 419596

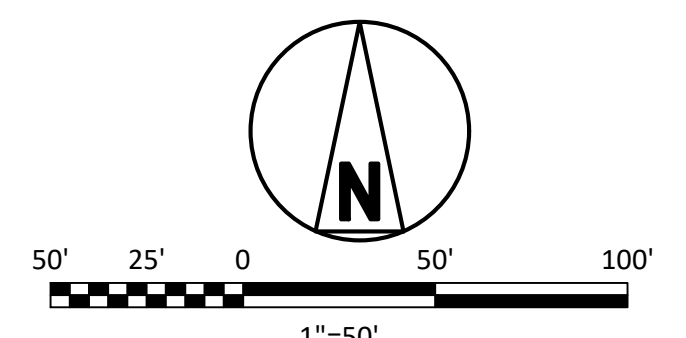
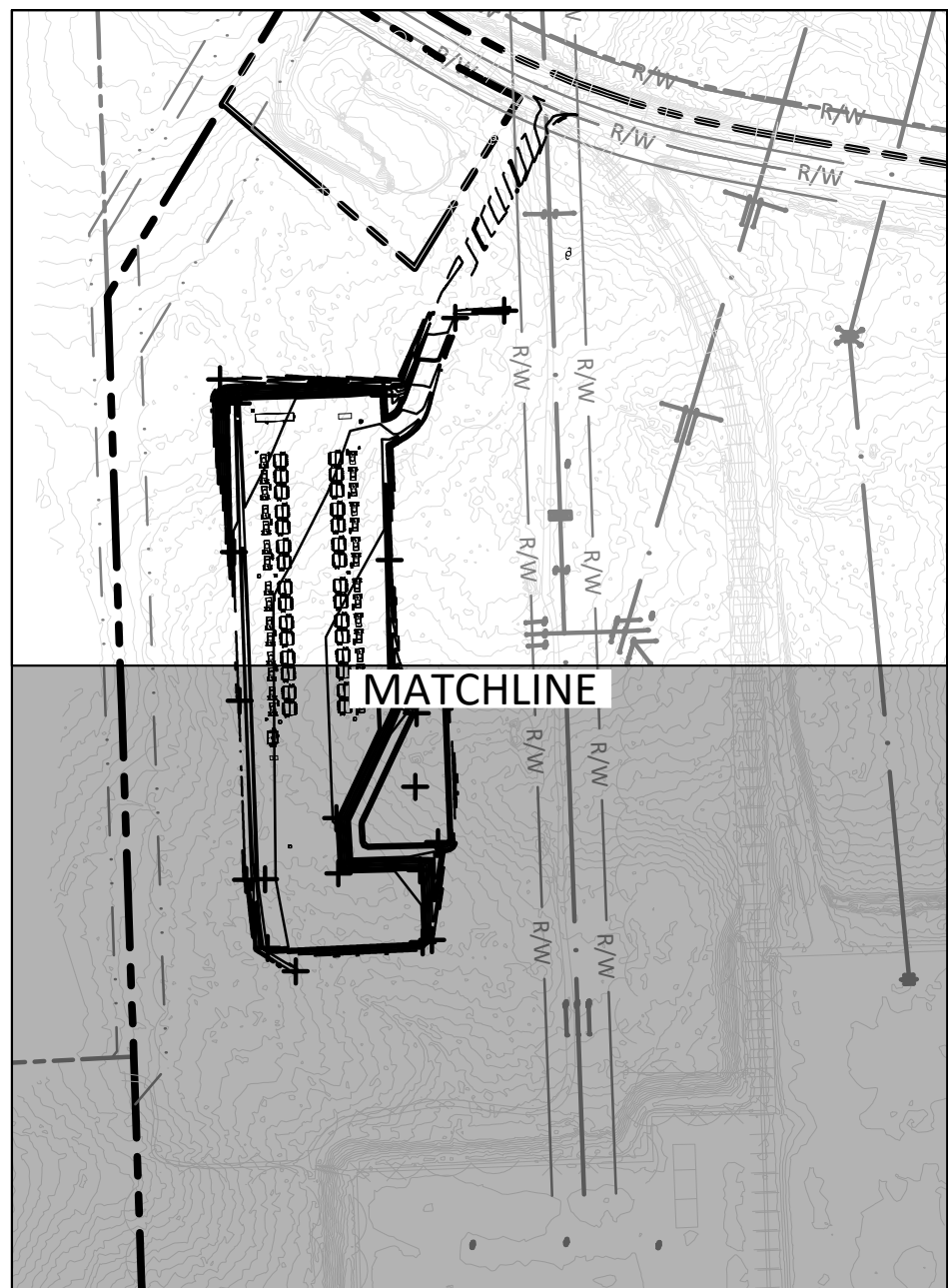
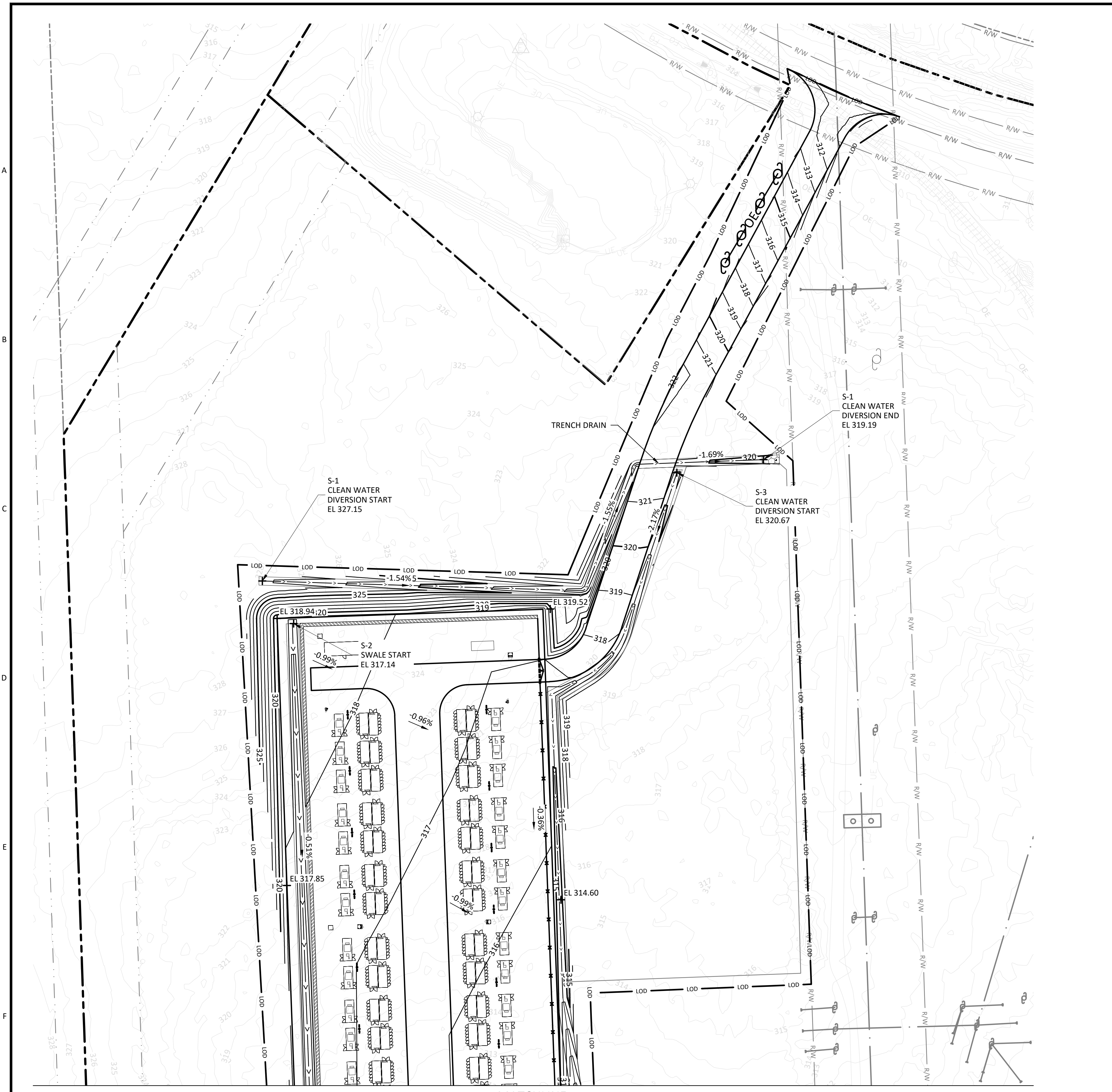
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A	23/AUG/24	ISSUED FOR PERMIT	RSN	RSN	OOO	OOO	BC

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11401 LAMAR AVENUE
OVERLAND PARK, KANSAS 66211

DESIGNER: RSN
 CHECKED: OOO

DUKE ENERGY
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM
 ELECTRICAL UNDERGROUND CONDUIT BESS OVERALL
 5201 KNIGHTDALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
KND01-UG-E-PL-01	KND01-UG-E-PL-01	C
CODE	AREA	



NOTES

1. SPOT ELEVATIONS AND CONTOURS ON THESE DRAWINGS ARE TOP OF FINAL SURFACE GRADE (SEE TYPICAL AGGREGATE SURFACING SECTIONS ON KND01-CV-C-GR.SD-01). SUBTRACT AGGREGATE SURFACING THICKNESS TO OBTAIN TOP OF CONSTRUCTION WORKING SURFACE AND TOP OF SUBGRADE.
2. GRADE PLANS SHALL SLOPE UNIFORMLY BETWEEN FINISH SPOT ELEVATIONS AND CONTOURS SHOWN ON THE PLANS.
3. UNLESS NOTED OTHERWISE, SLOPES SHALL BE 3:1 (H:V).
4. SLOPE GRADE TO DRAIN IN DIRECTION OF FLOW ARROWS.
5. PERFORM FIELD IN-PLACE DENSITY TESTS ACCORDING TO ASTM D695 (NUCLEAR METHOD), 98% STANDARD PROCTOR MAXIMUM DRY DENSITY FOR STRUCTURAL/SUBBASE AND BASE BACKFILL, 95% STANDARD PROCTOR MAXIMUM DRY DENSITY FOR NON-STRUCTURAL/ON-SITE FILL MATERIAL BACKFILL.
6. PREVENT SURFACE WATER AND SUBSURFACE OR GROUNDWATER FROM ENTERING EXCAVATIONS, FROM PONDING ON PREPARED SUBGRADES, AND FROM FLOODING PROJECT SITE & SURROUNDING AREA. PROTECT SUBGRADES AND FOUNDATION SOILS FROM SOFTENING AND DAMAGE BY RAIN OR WATER ACCUMULATION.
7. PLACE BACKFILL AND FILL MATERIALS IN LAYERS NOT MORE THAN 8 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY APPROPRIATE COMPACTION EQUIPMENT AND NOT MORE THAN 4 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND OPERATED TAMPERS.
8. FILL MATERIALS SHALL BE IMPORTED FROM A MINE OR SITE APPROVED BY THE NCDEQ FOR PROPER EROSION CONTROL.
9. HORIZONTAL CONTROL IS BASED ON NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NAD83. VERTICAL CONTROL IS BASED ON NAVD88.
10. SURVEY PROVIDED BY THE JOHN R. MCADAMS COMPANY, INC ON 03/26/2024. BEYOND LIMITS OF SURVEY, ELEVATION DATA SHOWN IS BASED ON PUBLICLY AVAILABLE DATA. CONTRACTOR TO FIELD VERIFY ELEVATIONS BEYOND LIMITS OF SURVEY.

LEGEND

- ADJACENT PARCEL BOUNDARY
- PROPOSED SECURITY FENCE
- EXISTING FENCE
- PROPOSED ROAD
- EXISTING TREE LIMITS
- EXISTING RAILROAD
- EXISTING OVERHEAD LINE
- PROPERTY BOUNDARY
- PROPOSED OVERHEAD ELECTRIC LINES
- HIGH POWERED OVERHEAD ELECTRIC LINES
- EXISTING RIGHT-OF-WAY
- EXISTING FIBER OPTIC CABLE
- LIMITS OF DISTURBANCE
- EXISTING TREE LINE
- PROPOSED PERIMETER WALL
- PROPOSED VEGETATED SWALE
- EXISTING MINOR CONTOUR LINES
- EXISTING MAJOR CONTOUR LINES
- MINOR CONTOUR LINES
- MAJOR CONTOUR LINES
- RIP RAP

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NO	DATE	REVISIONS AND RECORD OF ISSUE	DRN	DES	CHK	PDE	APP
D	25/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SLD	
C	12/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SLD	
B	4/SEP/2024	ISSUED FOR 60% REVIEW	CLC	MJM	HGU	SLD	
A	22/AUG/2024	ISSUED FOR PERMIT	CLC	MJM	HGU	SLD	
E	27/SEP/2024	ISSUED FOR PERMITTING	CLC	MJM	HGU	SLD	

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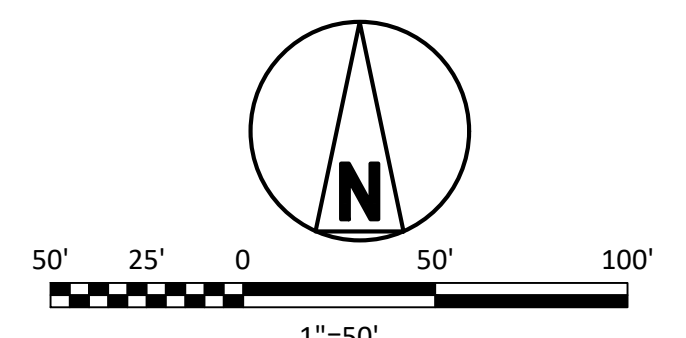
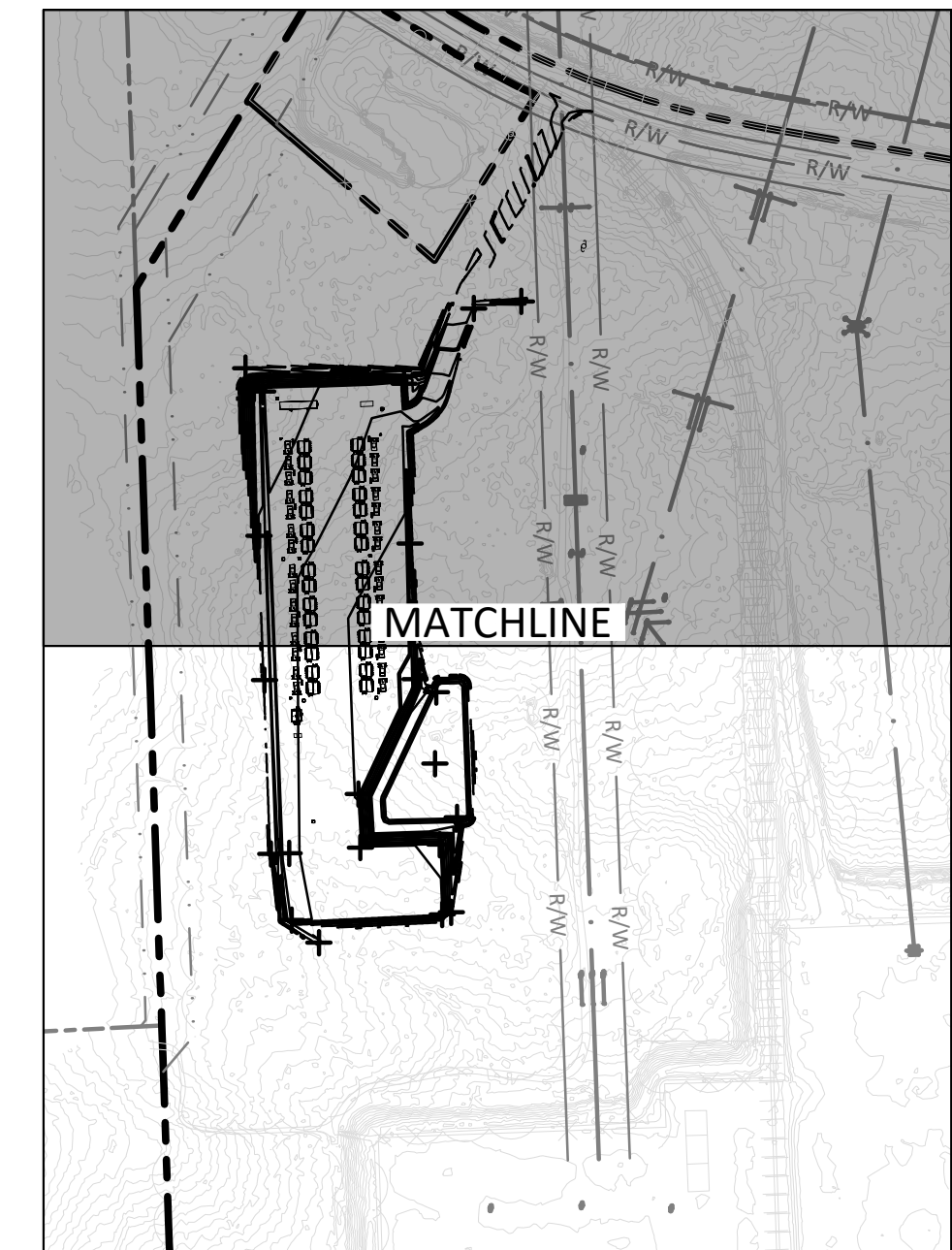
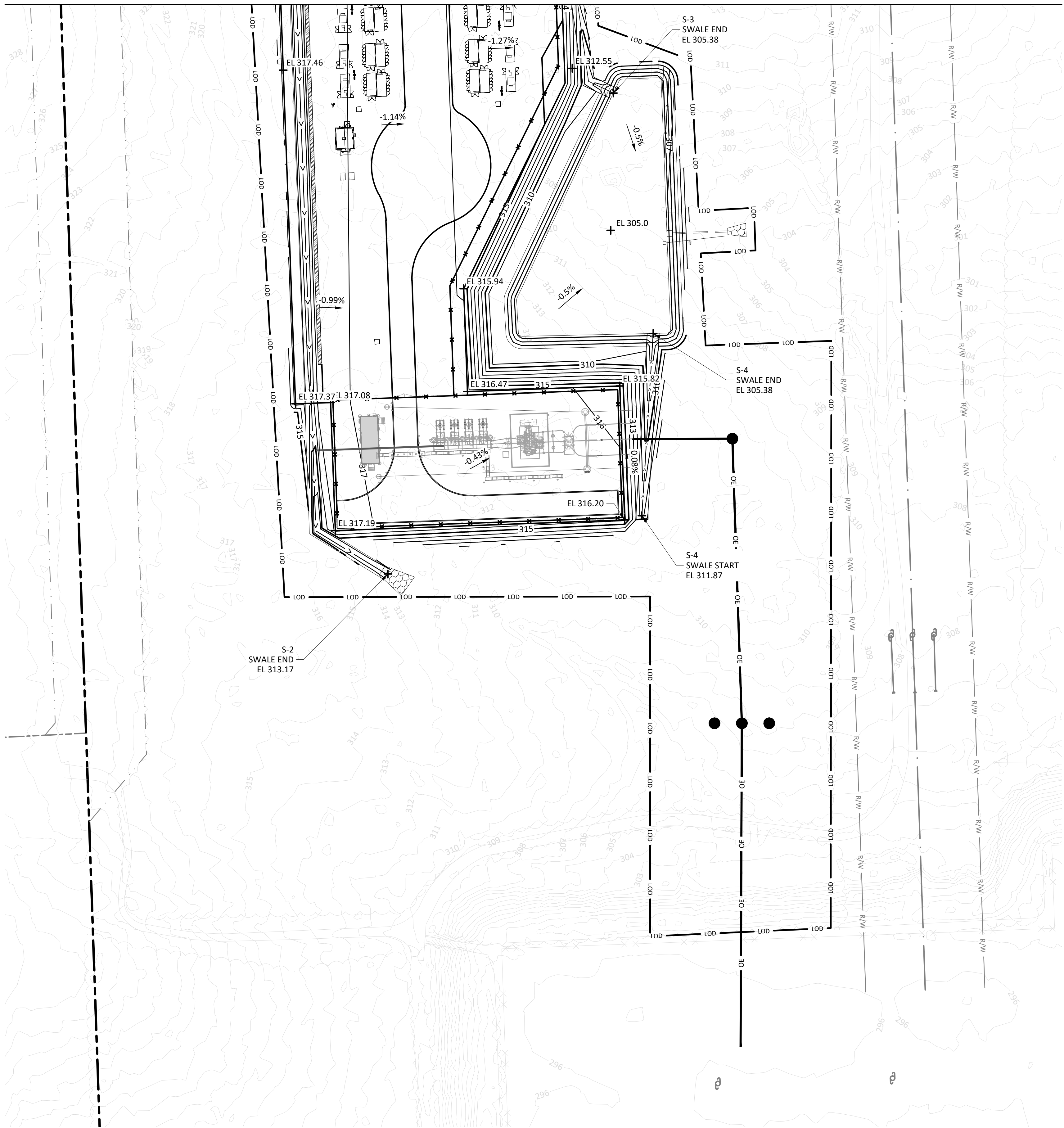
DESIGNER: MJM DRAWN: CLC
 CHECKED: HGU DATE: 27/SEP/24

DUKE ENERGY DUKE KNIGHTDALE EPC
 KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

GRADING AND DRAINAGE PLAN
 5201 KNIGHTALE EAGLE ROCK ROAD
 KNIGHTDALE, NC 27545

PROJECT	DRAWING NUMBER	REV
419596 KND01-CV-C-GR.PL-01		E
CODE		
AREA		

MATCHLINE



NOTES

1. SPOT ELEVATIONS AND CONTOURS ON THESE DRAWINGS ARE TOP OF FINAL SURFACE GRADE (SEE TYPICAL AGGREGATE SURFACING SECTIONS ON KND01-CV-C-GR.SD-01). SUBTRACT AGGREGATE SURFACING THICKNESS TO OBTAIN TOP OF CONSTRUCTION WORKING SURFACE AND TOP OF SUBGRADE.
2. GRADE PLANS SHALL SLOPE UNIFORMLY BETWEEN FINISH SPOT ELEVATIONS AND CONTOURS SHOWN ON THE PLANS.
3. UNLESS NOTED OTHERWISE, SLOPES SHALL BE 3:1 (H:V).
4. SLOPE GRADE TO DRAIN IN DIRECTION OF FLOW ARROWS.
5. PERFORM FIELD IN-PLACE DENSITY TESTS ACCORDING TO ASTM D695 (NUCLEAR METHOD), 98% STANDARD PROCTOR MAXIMUM DRY DENSITY FOR STRUCTURAL/SUBBASE AND BASE BACKFILL, 95% STANDARD PROCTOR MAXIMUM DRY DENSITY FOR NON-STRUCTURAL/ON-SITE FILL MATERIAL BACKFILL.
6. PREVENT SURFACE WATER AND SUBSURFACE OR GROUNDWATER FROM ENTERING EXCAVATIONS, FROM PONDING ON PREPARED SUBGRADES, AND FROM FLOODING PROJECT SITE & SURROUNDING AREA. PROTECT SUBGRADES AND FOUNDATION SOILS FROM SOFTENING AND DAMAGE BY RAIN OR WATER ACCUMULATION.
7. PLACE BACKFILL AND FILL MATERIALS IN LAYERS NOT MORE THAN 8 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY APPROPRIATE COMPACTION EQUIPMENT AND NOT MORE THAN 4 INCHES IN LOOSE DEPTH FOR MATERIAL COMPACTED BY HAND OPERATED TAMPERS.
8. FILL MATERIALS SHALL BE IMPORTED FROM A MINE OR SITE APPROVED BY THE NCDEQ FOR PROPER EROSION CONTROL.
9. HORIZONTAL CONTROL IS BASED ON NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NAD83. VERTICAL CONTROL IS BASED ON NAVD83.
10. SURVEY PROVIDED BY THE JOHN R. MCADAMS COMPANY, INC ON 03/26/2024. BEYOND LIMITS OF SURVEY, ELEVATION DATA SHOWN IS BASED ON PUBLICLY AVAILABLE DATA. CONTRACTOR TO FIELD VERIFY ELEVATIONS BEYOND LIMITS OF SURVEY.

LEGEND

- ADJACENT PARCEL BOUNDARY
- PROPOSED SECURITY FENCE
- EXISTING FENCE
- PROPOSED ROAD
- EXISTING TREE LIMITS
- EXISTING RAILROAD
- EXISTING OVERHEAD LINE
- PROPERTY BOUNDARY
- PROPOSED OVERHEAD ELECTRIC LINES
- HIGH POWERED OVERHEAD ELECTRIC LINES
- EXISTING RIGHT-OF-WAY
- EXISTING FIBER OPTIC CABLE
- LIMITS OF DISTURBANCE
- EXISTING TREE LINE
- PROPOSED PERIMETER WALL
- PROPOSED VEGETATED SWALE
- EXISTING MINOR CONTOUR LINES
- EXISTING MAJOR CONTOUR LINES
- MINOR CONTOUR LINES
- MAJOR CONTOUR LINES
- RIP RAP

ISSUED FOR PERMITTING

THE DISTRIBUTION AND USE OF THE NATIVE FORMAT CAD FILE OF THIS DRAWING IS UNCONTROLLED. THE USER SHALL VERIFY TRACEABILITY OF THIS DRAWING TO THE LATEST CONTROLLED VERSION.

Civil 3D 2022 Imperial
 Full Size 1=1
 2/14/2022 4:09 PM
 Cam128649
 ANSI D 34x22

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KNIGHTDALE BATTERY ENERGY STORAGE SYSTEM

GRADING AND DRAINAGE PLAN
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PROJECT	DRAWING NUMBER	REV
419596 KND01-CV-C-GR.PL-02		E
CODE		
AREA		