

CONSTRUCT DIRECT CURRENT FAST CHARGING STATIONS

MONTAUK AND ROARING RIVER STATE PARK

SALEM & CASSVILLE, MISSOURI

OWNER: STATE OF MISSOURI
MIKE PARSON,
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES,
DIVISION OF STATE PARKS

PROJECT MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
DESIGN AND CONSTRUCTION

APPLICABLE CODES: 2020 NATIONAL ELECTRICAL CODE
2021 INTERNATIONAL BUILDING CODE

SHEET INDEX

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E-002	ELECTRICAL SITE PLAN - ROARING RIVER
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E-602	DETAILS - MONTAUK & ROARING RIVER

CASCO

12 SUNNEN DR. SUITE 100
ST. LOUIS, MO 63143
ARCHITECTS / ENGINEERS
314-821-1100

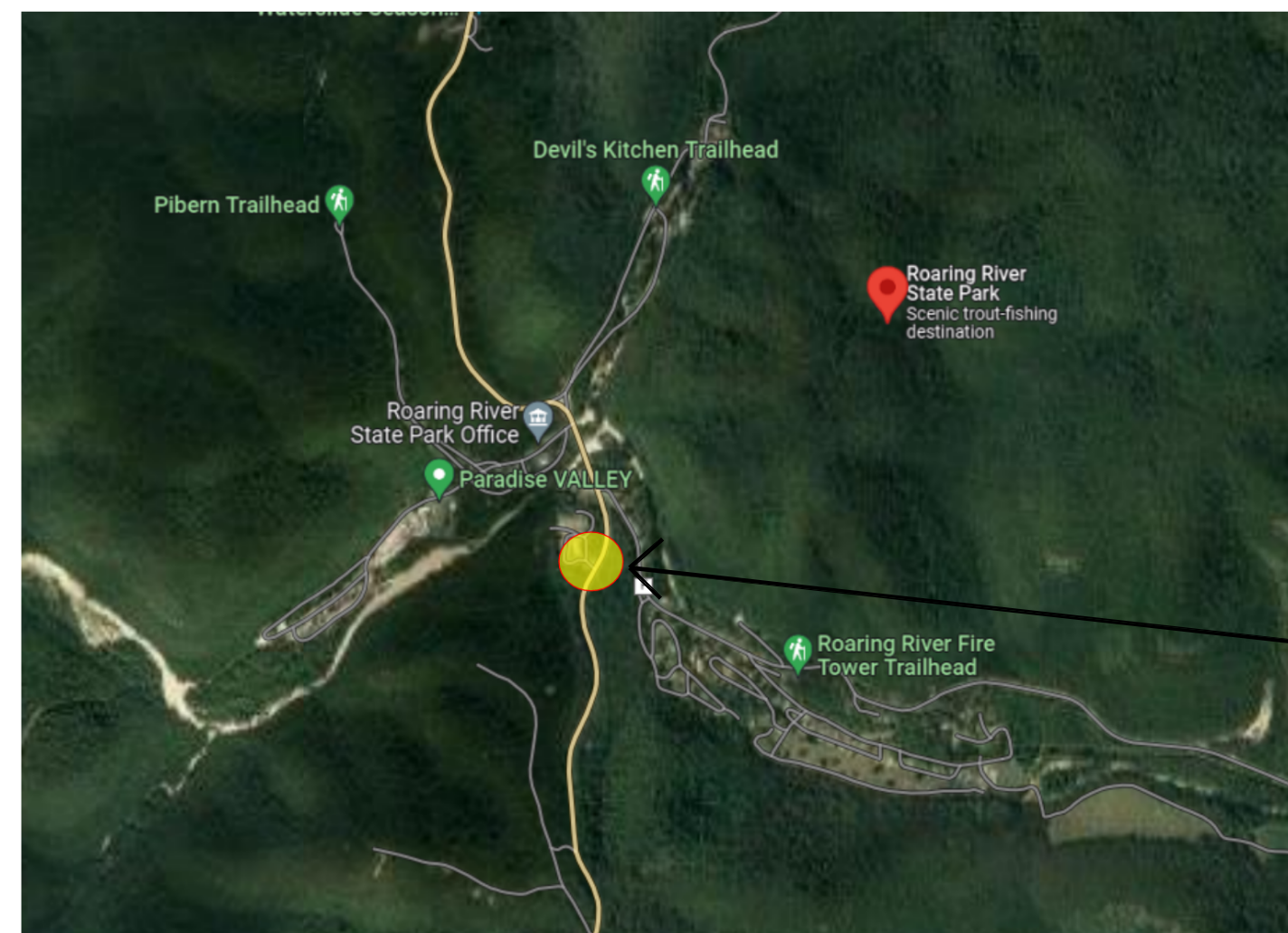
CASCO DIVERSIFIED CORPORATION
MISSOURI STATE CERTIFICATE OF AUTHORITY #000613 (ENG)

DESIGNER: CASCO DIVERSIFIED CORPORATION

PROJECT NUMBER: X2222-01

SITE NUMBER: 5307 (MONTAUK)
5309 (ROARING)

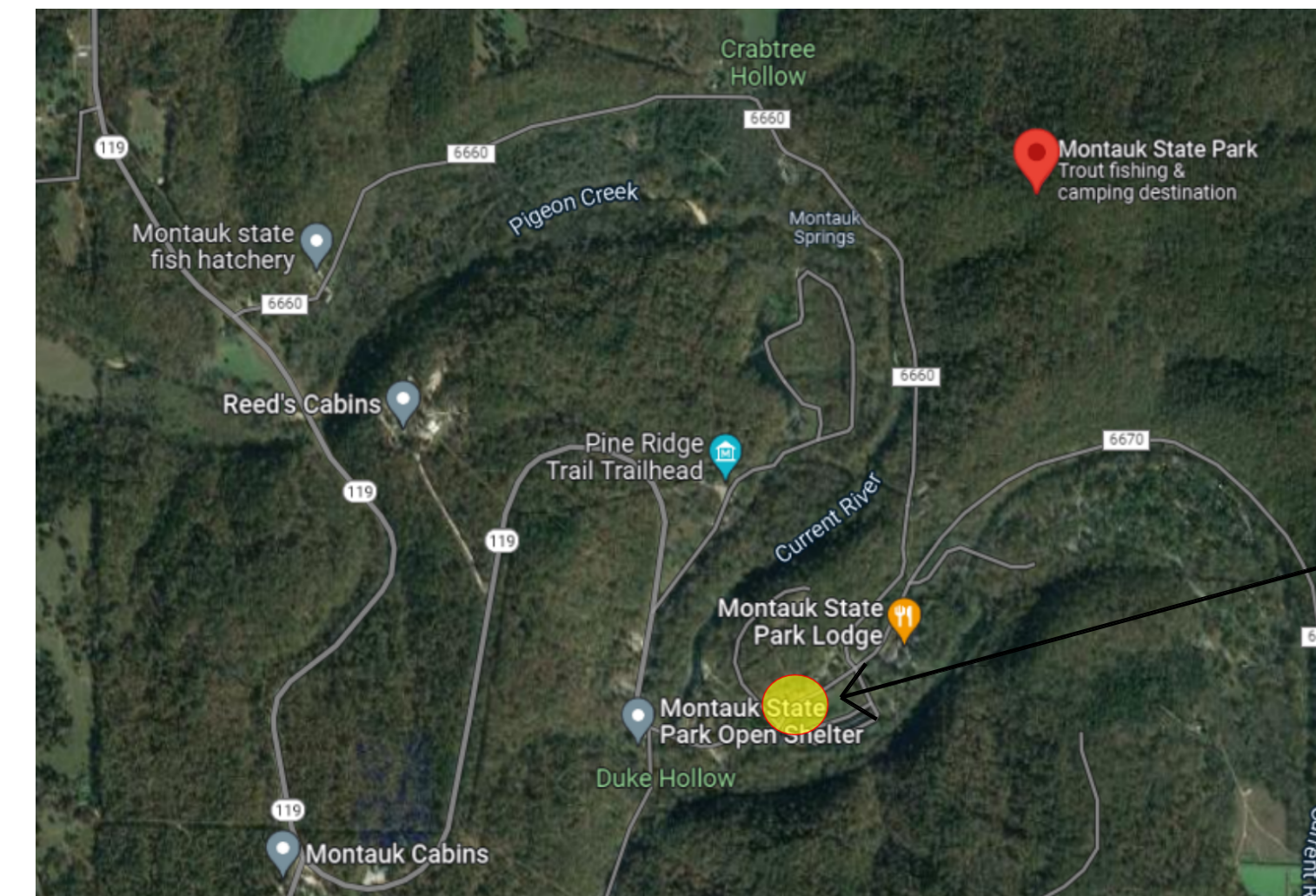
ASSET NUMBER: 7815307018 (MONTAUK)
7815309028 (ROARING)



ROARING RIVER STATE PARK

ADDRESS:
24667 STATE HWY 112
CASSVILLE, MO 65625

VICINITY MAP



MONTAUK STATE PARK

ADDRESS:
420 COUNTY RD 6670
SALEM, MO 65560



NORTH

SHEET NUMBER:
G-001



4/13/23

PROFESSIONAL SEAL

DAVID A. TRETTER
LICENSE: 021293
EXPIRES: 12/31/23

CASCO Diversified Corporation
MO Certificate of Authority #000613 Eng.

CASCO
12 Sunnen Drive, Suite 100, St. Louis, MO 63143 T: 314.821.1100

OFFICE OF
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DIVISION OF FACILITIES
MANAGEMENT,
DESIGN AND
CONSTRUCTION

DEPARTMENT OF
NATURAL RESOURCES,
STATE PARKS

CONSTRUCT DIRECT
CURRENT FAST CHARGING
STATIONS

ROARING RIVER STATE PARK
MONTAUK STATE PARK

PROJECT # X2222-01
SITE # 5307 (MONTAUK)
5309 (ROARING)
ASSET# 7815307018 (MONTAUK)
7815309028 (ROARING)

REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
REVISION: _____
DATE: _____
ISSUE DATE: 04/13/2023

CAD DWG FILE: _____
DRAWN BY: DM
CHECKED BY: DAT
DESIGNED BY: DM

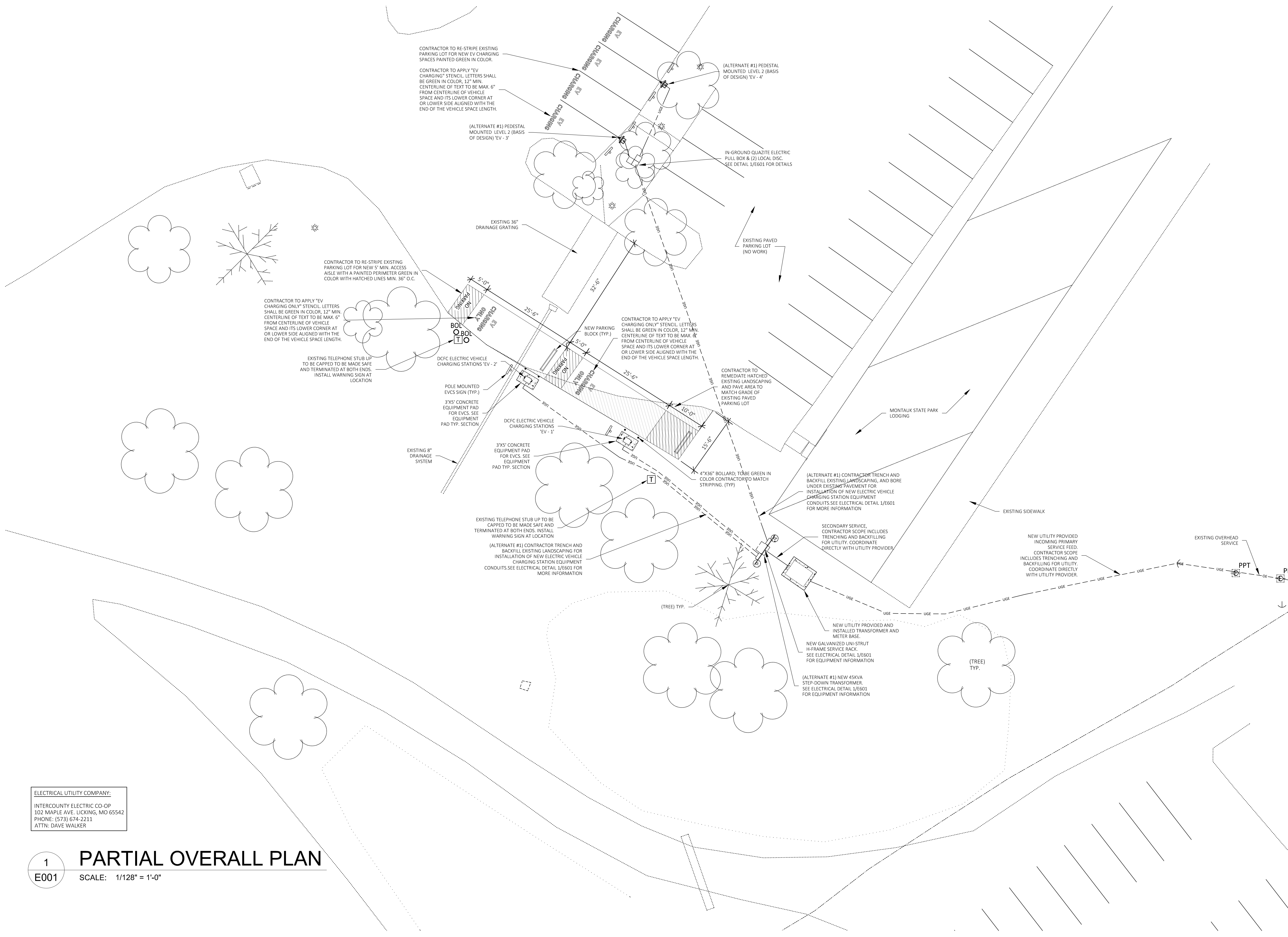
SHEET TITLE:

ELECTRICAL SITE
PLAN -
MONTAUK

SHEET NUMBER:

E-001

2 OF 5 SHEETS
APRIL 13, 2023



ELECTRICAL UTILITY COMPANY:
INTERCOUNTY ELECTRIC CO-OP
102 MAPLE AVE. LICKING, MO 65542
PHONE: (573) 674-2211
ATTN: DAVE WALKER

1 PARTIAL OVERALL PLAN
E001 SCALE: 1/128" = 1'-0"



PROFESSIONAL SEAL

DAVID A. TRETTER
LICENSE: E-21293
EXPIRES: 12/31/23

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ROARING RIVER STATE PARK
MONTAUK STATE PARK

PROJECT # X2222-01

SITE # 5307 (MONTAUK)

5309 (ROARING)

ASSET# 7815307018 (MONTAUK)

7815309028 (ROARING)

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DATE: _____

REVISION: _____

DATE: _____

ISSUE DATE: 04/13/2023

CAD DWG FILE: _____

DRAWN BY: _____

CHECKED BY: _____

DESIGNED BY: _____

SHEET TITLE:

ELECTRICAL

SITE PLAN -

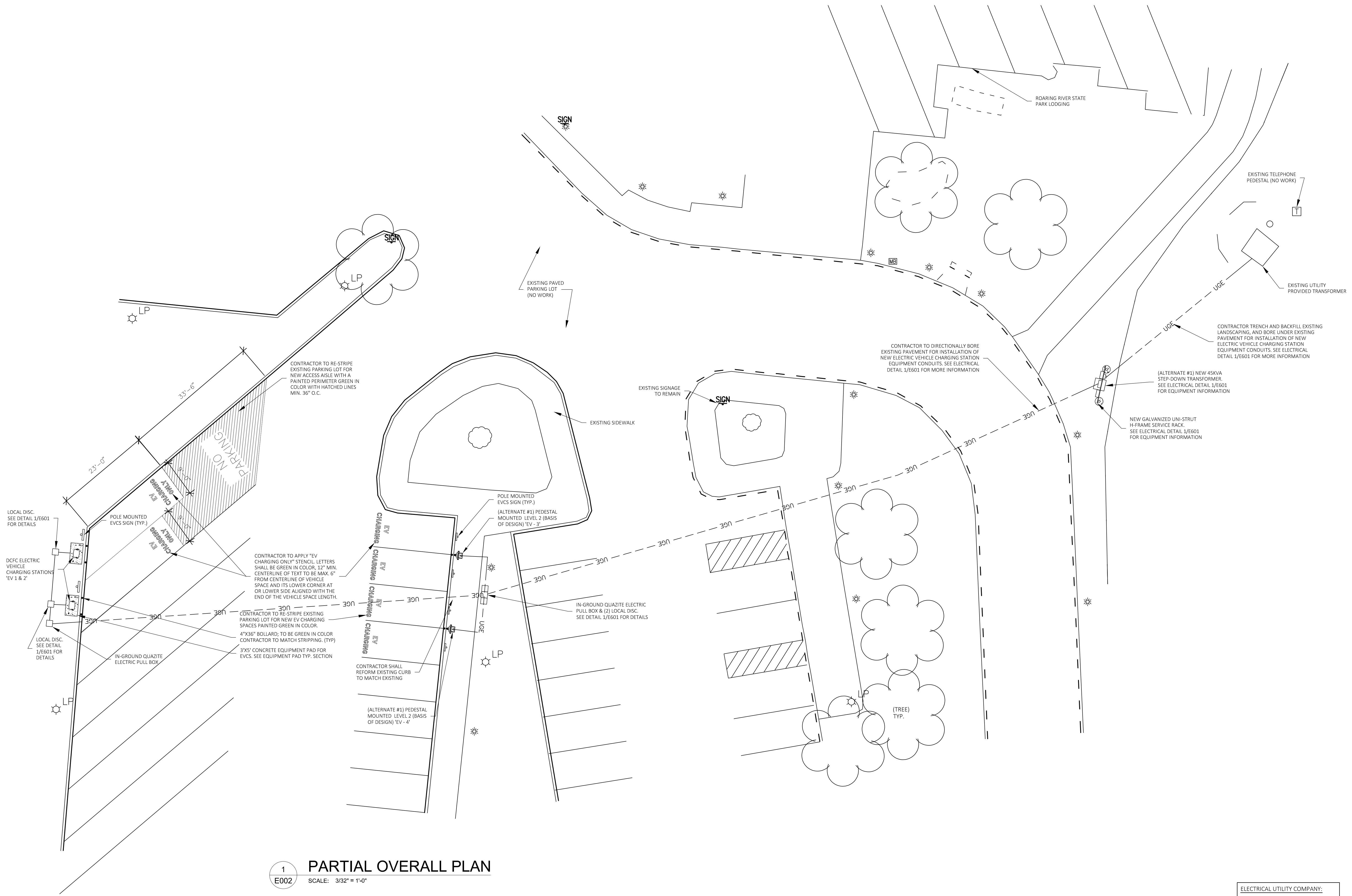
ROARING

SHEET NUMBER:

E-002

3 OF 5 SHEETS

APRIL 13, 2023



1
E002 PARTIAL OVERALL PLAN
SCALE: 3/32" = 1'-0"

ELECTRICAL UTILITY COMPANY:
BARRY ELECTRIC CO-OP
4015 MAIN ST., CASSVILLE, MO 65625
PHONE: (417) 847-2131



PROFESSIONAL SEAL
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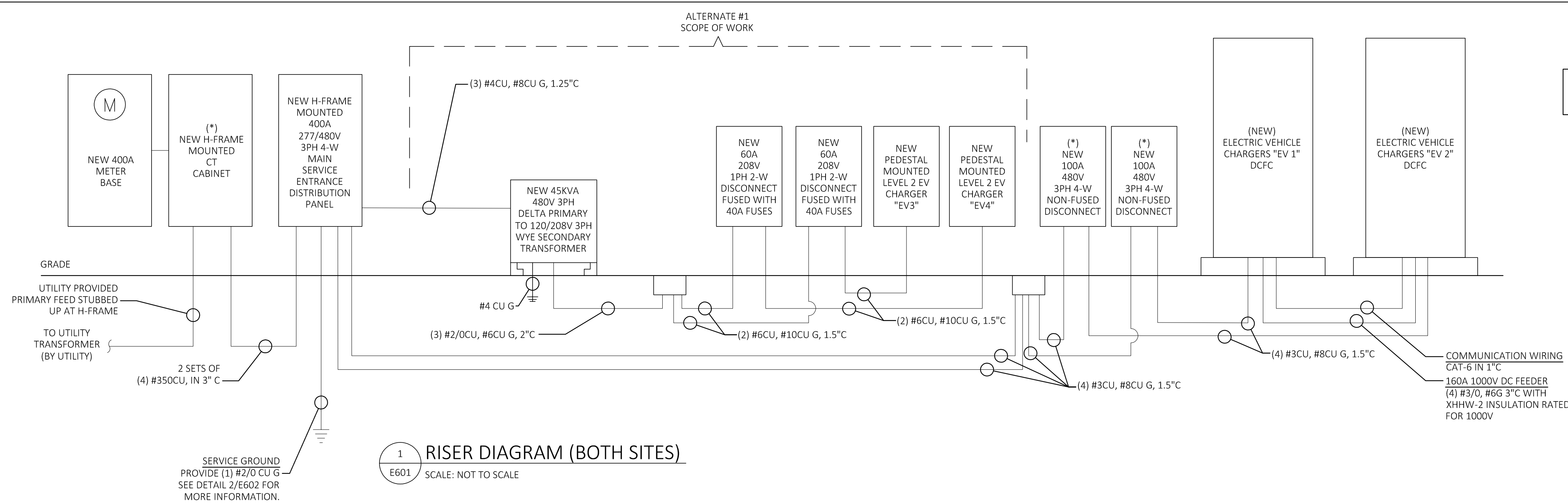
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DATE:
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CAD DWG FILE:
DRAWN BY: DM
CHECKED BY: DAT
DESIGNED BY: DM

SHEET TITLE:
ELECTRICAL
SCHEDULE -
MONTAUK &
ROARING RIVER

SHEET NUMBER:
E-601
4 OF 5 SHEETS
APRIL 13, 2023



RISER DIAGRAM NOTES:
1. ALL EQUIPMENT SHALL BE NEMA 3R RATED
2. ITEMS MARKED "(*)" ARE FOR ROARING RIVER SITE ONLY

1 RISER DIAGRAM (BOTH SITES)
E601 SCALE: NOT TO SCALE

MOUNT: SURFACE		277/480		3-PHASE, 4W		PANEL MDP		CAPACITY: 400A		INT CAP: 65KA	
LOCATION: REFER TO SITE PLAN						LUGS: MCB		DEMAND LOAD: 245A		AV. FAULT: 43.1 KA	
CKT	CONT	REC	HVAC	MISC	NP	DESCRIPTION	AMP	POLE	AMP	POLE	DESCRIPTION
	1	21.6				EV 1	100	3	100	3	EV 2
	21.6										2
	11.09					XFMR: T-1 SERV. EV 3&4	70	3	3		PROVISIONS
	11.09					RATED 45 KVA					4
	11.09					LOAD 33 KVA					

PHASE BALANCE		LOAD TYPE		CONNECTED		DEMAND		DEMAND FORMULA		TOTAL LOAD	
φ	LOAD	%	REC	%	CONTINUOUS	%	CONTINUOUS	LOAD X 125% NEC 210.19 CONTINUOUS	10KVA + 50% REMAINDER NEC 220.44	CONNECTED	DEMAND
A	67.9 KVA	33%	HVAC	0.0 KVA	0.0 KVA	0.0 KVA	0.0 KVA	LOAD X 80% (USED MCA IN CALCULATION)	163.0 KVA	163.0 KVA	203.7 KVA
B	67.9 KVA	33%	MISC	0.0 KVA	0.0 KVA	0.0 KVA	0.0 KVA	LOAD X 100% NEC 210.19 NON-CONT.	163.0 KVA	163.0 KVA	203.7 KVA
C	67.9 KVA	33%	NP	0.0 KVA	0.0 KVA	0.0 KVA	0.0 KVA	0 NONCOINCIDENTAL LOADS NEC 220.60	163.0 KVA	163.0 KVA	203.7 KVA

NOTES:
A. THIS IS THE BREAKER SCHEDULE OF THE NEW SERVICE ENTRANCE RATED MAIN DISTRIBUTION PANEL
B. ALL CIRCUIT BREAKERS TO BE FURNISHED WITH PADLOCKING AND SHUNT TRIP PROVISIONS

ABBREVIATIONS
(NOTE: NOT ALL ABBREVIATIONS ARE USED)

AFF	ABOVE FINISHED FLOOR	EVCS	ELECTRIC VEHICLE CHARGING STATION
AL	ALUMINUM	EW/C	ELECTRIC WATER COOLER
AMP	AMPERE	EXISTG	EXISTING
ATS	AUTO-TRANSFER-SWITCH	GFCI OR GFI	GROUND FAULT CURRENT INTERRUPTER
BFG	BELOW FINISHED GRADE	GRS	GALVANIZED RIGID STEEL CONDUIT
BLDG	BUILDING	FL	FLOOR
CB	CIRCUIT BREAKER	FLUOR	FLUORESCENT
CKT	CIRCUIT	GND OR (G)	GROUND
CLG	CEILING	IG	ISOLATED GROUND
COND OR "C"	CONDUIT	JB	JUNCTION BOX
CONN	CONNECT	MCB	MAIN CIRCUIT BREAKER
CONT	CONTRACTOR	MDP	MAIN DISTRIBUTION PANEL
CU	COPPER	MID	MAIN LUG ONLY
CT	CURRENT TRANSFORMER	MTO HT	MOUNTING HEIGHT
DCFC	DIRECT CURRENT FAST CHARGING	NF	NON FUSED
DIM	DIMMER	NIC	NOT IN CONTRACT
DISC SW	DISCONNECT SWITCH	RTU	ROOF TOP UNIT
DP	DOUBLE POLE	SW	SWITCH
DT	DOUBLE THROW	UG	UNDER GROUND
DRP	DISTRIBUTION POWER PANEL	UNO	UNLESS NOTED OTHERWISE
EC	ELECTRICAL CONTRACTOR	VF	VERIFY IN FIELD
EF	EXHAUST FAN	WP	WEATHER-PROOF
EM	EMERGENCY	XFMR	TRANSFORMER
EV	ELECTRIC VEHICLE		

EQUIPMENT SCHEDULE
FILE: 2202557.xlsm

PLAN MARK	EQUIPMENT SERVED	LOAD	VOLT/ PHASE	MCA	MOCOPD	REMARKS
EV 1	ELECTRIC VEHICLE CHARGING STATION	64.85KVA	480/277/3	78.0A	100A	DCFC STATION WITH (2) POWER MODULES. EV CHARGERS TO BE EQUAL TO THE BASIS OF DESIGN. EVCS INPUT SHALL MATCH MCA.
EV 2	ELECTRIC VEHICLE CHARGING STATION	64.85KVA	480/277/3	78.0A	100A	DCFC STATION WITH (2) POWER MODULES. EV CHARGER TO BE EQUAL TO BASIS OF DESIGN. EVCS INPUT SHALL MATCH MCA.
EV 3	ELECTRIC VEHICLE CHARGING STATION	8.32KVA	208/1	40.0A	50A	LEVEL 2 EV CHARGER TO BE EQUAL TO BASIS OF DESIGN. EVCS INPUT SHALL MATCH MCA.
EV 4	ELECTRIC VEHICLE CHARGING STATION	8.32KVA	208/1	40.0A	50A	LEVEL 2 EV CHARGER TO BE EQUAL TO BASIS OF DESIGN. EVCS INPUT SHALL MATCH MCA.

UT. XFMR FAULT CALC
2202557.xlsm

SERVICE ENTRANCE	CALCULATION
VOLTAGE (L-L): 480V	I-FLA=[RATED KVA * 1000]/[V-LL*SQRT(PHASE)]
PHASE (PH): 3	
AMPS: 400A	I-FLA= 601A
FULL LOAD KVA: 333KVA	
TRANSFORMER: 500KVA	M=100%/Z= 76.9
IMPEDANCE (%Z): 1.3%Z	I-SC=I-FLA*M= 46.3 KA

CALCULATION IS BASED ON ESTIMATED TRANSFORMER SIZE WITH %Z FROM BUSSMANN SPD. CONTRACTOR SHALL CONTACT UTILITY AND VERIFY I-SC AVAILABLE AT SECONDARY OF TRANSFORMER. CONTACT ENGINEER FOR RE-CALCULATION IF LARGER THAN CALCULATED.

MDP FEEDER FAULT CALC
2202557.xlsm

STARTING I-SC:	46 KA	IMPEDANCE BASED ON 3 SINGLE CONDUCTORS IN NON-MAGNETIC CONDUIT (WORSE CASE)
VOLTAGE (L-L):	480V	
PHASE (PH):	3	
FEEDER SIZE:	350	CALCULATION
FEEDER MATERIAL:	CU	f=[SQRT(PHASE)*L*IS-C]/[Q*C*V-LL]
PARALLEL SETS (Q):	2 SETS	
FEEDER LENGTH (L):	20FT	f= 0.073
FEET PER OHMS (C):	22.737 FT/OHMS	M=1/(1+f)= 0.932
		I-SC=I-SC*M= 43.1 KA

NOTE: CALCULATION BASED ON BUSSMANN SPD

EV 1 FEEDER FAULT CALC
2202557.xlsm

STARTING I-SC:	43 KA	IMPEDANCE BASED ON 3 SINGLE CONDUCTORS IN NON-MAGNETIC CONDUIT (WORSE CASE)
VOLTAGE (L-L):	480V	
PHASE (PH):	3	
FEEDER SIZE:	3	CALCULATION
FEEDER MATERIAL:	CU	f=[SQRT(PHASE)*L*IS-C]/[Q*C*V-LL]
PARALLEL SETS (Q):	1 SETS	
FEEDER LENGTH (L):	35FT	f= 1.131
FEET PER OHMS (C):	4,811 FT/OHMS	M=1/(1+f)= 0.469
		I-SC=I-SC*M= 20.2 KA

NOTE: CALCULATION BASED ON BUSSMANN SPD

EV 2 FEEDER FAULT CALC
2202557.xlsm

STARTING I-SC:	43 KA	IMPEDANCE BASED ON 3 SINGLE CONDUCTORS IN NON-MAGNETIC CONDUIT (WORSE CASE)
VOLTAGE (L-L):	480V	
PHASE (PH):	3	
FEEDER SIZE:	3	CALCULATION
FEEDER MATERIAL:	CU	f=[SQRT(PHASE)*L*IS-C]/[Q*C*V-LL]
PARALLEL SETS (Q):	1 SETS	
FEEDER LENGTH (L):	48FT	f= 1.552
FEET PER OHMS (C):	4,811 FT/OHMS	M=1/(1+f)= 0.392
		I-SC=I-SC*M= 16.9 KA

NOTE: CALCULATION BASED ON BUSSMANN SPD

EV 3 FEEDER FAULT CALC
2202557.xlsm

STARTING I-SC:	20 KA	IMPEDANCE BASED ON 3 SINGLE CONDUCTORS IN NON-MAGNETIC CONDUIT (WORSE CASE)
VOLTAGE (L-L):	480V	
PHASE (PH):	3	
FEEDER SIZE:	3	CALCULATION
FEEDER MATERIAL:	CU	f=[SQRT(PHASE)*L*IS-C]/[Q*C*V-LL]
PARALLEL SETS (Q):	1 SETS	
FEEDER LENGTH (L):	48FT	f= 0.728
FEET PER OHMS (C):	4,811 FT/OHMS	M=1/(1+f)= 0.579
		I-SC=I-SC*M= 11.7 KA

NOTE: CALCULATION BASED ON BUSSMANN SPD

EV 4 FEEDER FAULT CALC
2202557.xlsm

STARTING I-SC:	17 KA	IMPEDANCE BASED ON 3 SINGLE CONDUCTORS IN NON-MAGNETIC CONDUIT (WORSE CASE)
VOLTAGE (L-L):	480V	
PHASE (PH):	3	
FEEDER SIZE:	3	CALCULATION
FEEDER MATERIAL:	CU	f=[SQRT(PHASE)*L*IS-C]/[Q*C*V-LL]
PARALLEL SETS (Q):	1 SETS	
FEEDER LENGTH (L):	48FT	f= 0.608
FEET PER OHMS (C):	4,811 FT/OHMS	M=1/(1+f)= 0.622
		I-SC=I-SC*M= 10.5 KA

NOTE: CALCULATION BASED ON BUSSMANN SPD



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ROARING RIVER STATE PARK
MONTAUK STATE PARK

PROJECT # X2222-01
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CHECKED BY: _____
DESIGNED BY: _____

SHEET TITLE:

DETAILS -
MONTAUK &
ROARING RIVER

SHEET NUMBER:

E-602

CONTRACTOR RESPONSIBILITIES:

- CONTRACTOR MAY ONLY UTILIZE ONE MANUFACTURER FOR BOTH SITES WHEN SELECTING CHARGING STATIONS. CHARGEPOINT IS THE BASIS OF DESIGN, BUT THE CONTRACTOR MAY SELECT ANOTHER MANUFACTURER AS IDENTIFIED IN THE SPECIFICATIONS. THIS IS NOT A SOLE SOURCE PROJECT. IT IS IMPERATIVE THAT ONE MANUFACTURER IS UTILIZED FOR ALL SITES TO ALLOW THE STATE ONE SOLE CONTACT FOR MAINTENANCE, SYSTEM UPGRADES, AND PAYMENT FOR CHARGING. NO EXCEPTIONS.
- CONTRACTOR WILL BE RESPONSIBLE FOR DIRECT COORDINATION AND COMMUNICATION WITH THE CHARGING STATION MANUFACTURER FROM START TO FINISH TO ENSURE WARRANTIES ARE IN PLACE. SYSTEM IS ONLINE (IN COORDINATION WITH STATE IT). PAYMENT SYSTEM AND APPLICATIONS ARE READY FOR USE. COMPLETE INSTALLATION OF ALL EQUIPMENT. MANUFACTURER COMMISSIONING/CERTIFICATION OF UNITS, TRAINING OF STATE PERSONNEL WITH STEP BY STEP INSTRUCTIONS DOCUMENTED, AND TROUBLE SHOOTING GUIDE.
- COORDINATION WITH STATE PERSONNEL IS CRITICAL TO ASSURE SUCCESS ON THIS PROJECT. WHICH MAY INCLUDE BUT ARE NOT LIMITED TO: DIRECTIONAL SIGNAGE AND CHARGING STATION SIGNAGE PLACEMENT. NETWORK COORDINATION WITH STATE INFORMATION TECHNOLOGY GROUP, AND REGULAR COMMUNICATION WITH STATE CONSTRUCTION MANAGER AND PARKS STAFF.
- CHARGING STATIONS WILL CONNECT TO STATE PROVIDED WIRELESS INTERNET (LOCATED WITHIN THE FACILITY AT EACH LOCATION (OR AT A LOCATION DETERMINED BY STATE IT). HARDWIRED INTERNET CONNECTION IS NOT PROPOSED TO EACH CHARGING STATION.

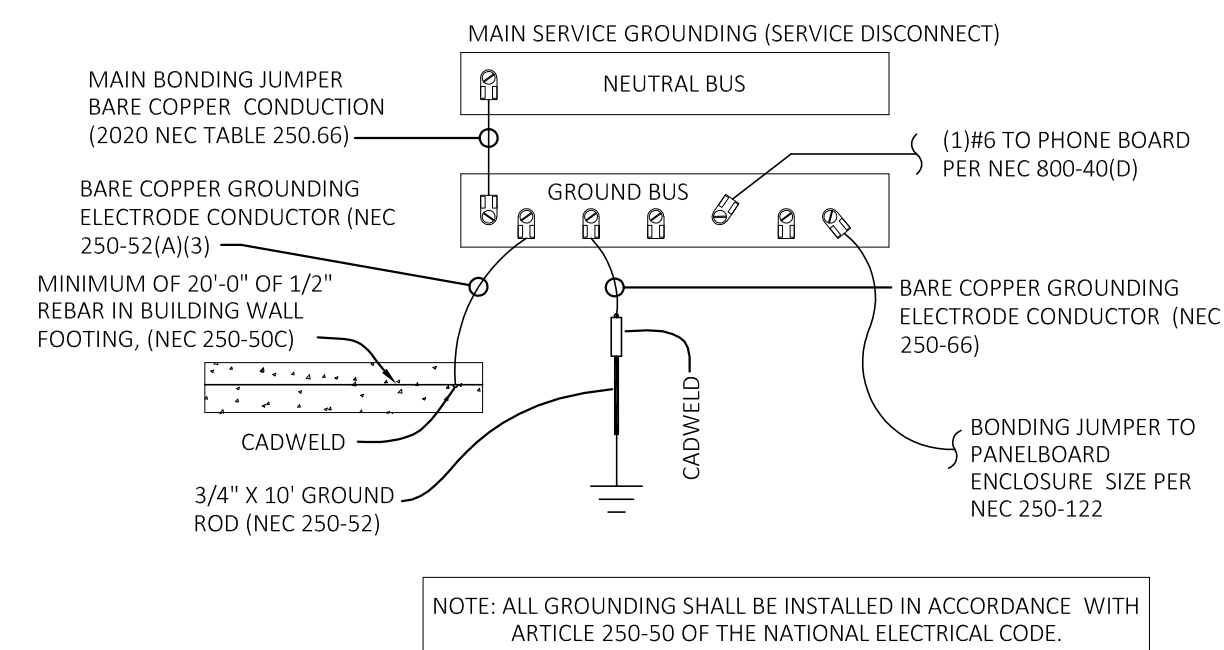
GENERAL NOTES (ALL SHEETS):

- ALL WORK SHOWN SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR, UNO.
- BEFORE SUBMITTING THE BID PROPOSAL, CONTRACTOR SHALL VISIT THE JOB SITE AND FULLY ACQUAINT THEMSELVES WITH THE JOB CONDITIONS AND VERIFY SERVICE CONNECTION.
- COORDINATE UNDERGROUND ROUTING, INCLUDING ALL NECESSARY PULL BOXES, SIZE AND NUMBER OF CONDUITS, CONDUCTORS, AND SWITCHGEAR TO MAKE A COMPLETE AND OPERATING ELECTRICAL SERVICE WITHOUT ADDITIONAL COST TO THE OWNER.
- ELECTRICAL WORK AND MATERIALS SHALL COMPLY WITH 20 NEC AND ALL STATE CODES AND ORDINANCES. (IN THE CASE OF CONFLICT AMONG REQUIREMENTS, THE MORE RESTRICTIVE SHALL APPLY.)
- ALL SPECIFIED MANUFACTURER'S ARE PER A BASIS OF DESIGN AND CAN BE REPLACED WITH APPROVED EQUIVALENTS.

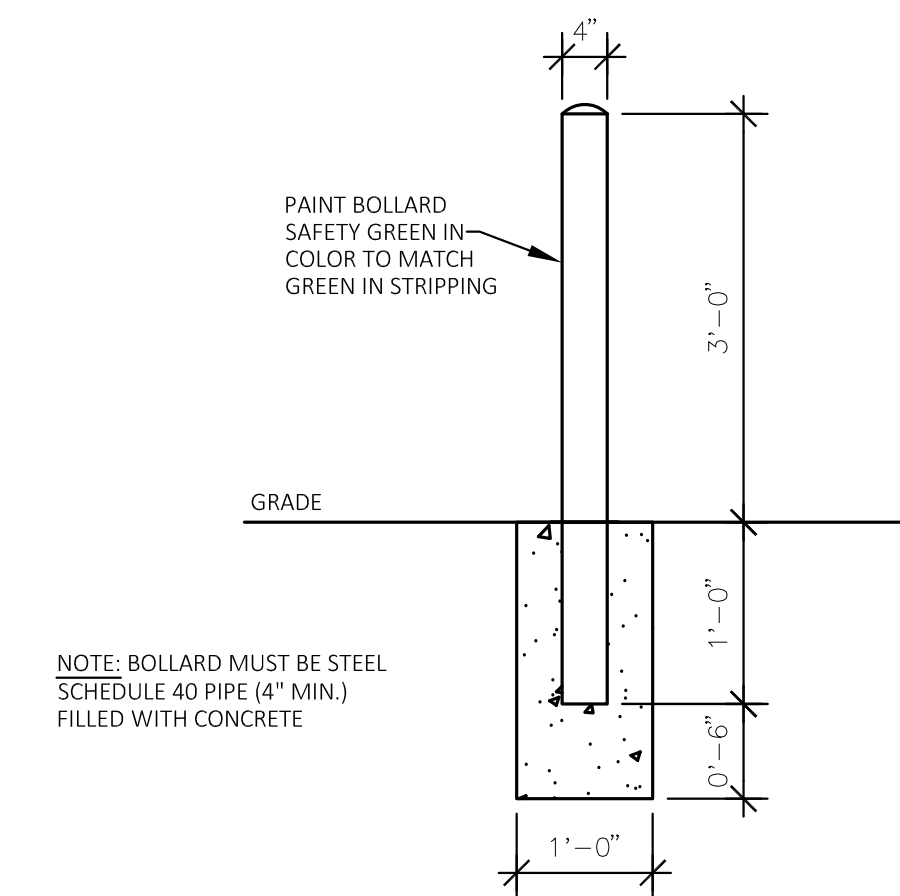
ALTERNATE #1: CONTRACTOR SHALL PROCURE AND INSTALL LEVEL 2 CHARGING STATIONS AT EACH STATE PARK AS NOTED ON THE SITE PLANS. ALL WORK UNDER ALTERNATE #1 SHALL INCLUDE STEP DOWN TRANSFORMER, CONNECTIONS, UNDERGROUND CONDUIT AND WIRE, SITE WORK, TRENCHING, CONCRETE, PAINTING OF STALLS, AND SIGNAGE. A COMPLETE INSTALLATION FROM TRANSFORMER TO PARKING SPACES TO ALLOW FOR FULL USE OF EQUIPMENT AND PARKING SPACES.

GENERAL GROUNDING NOTES:

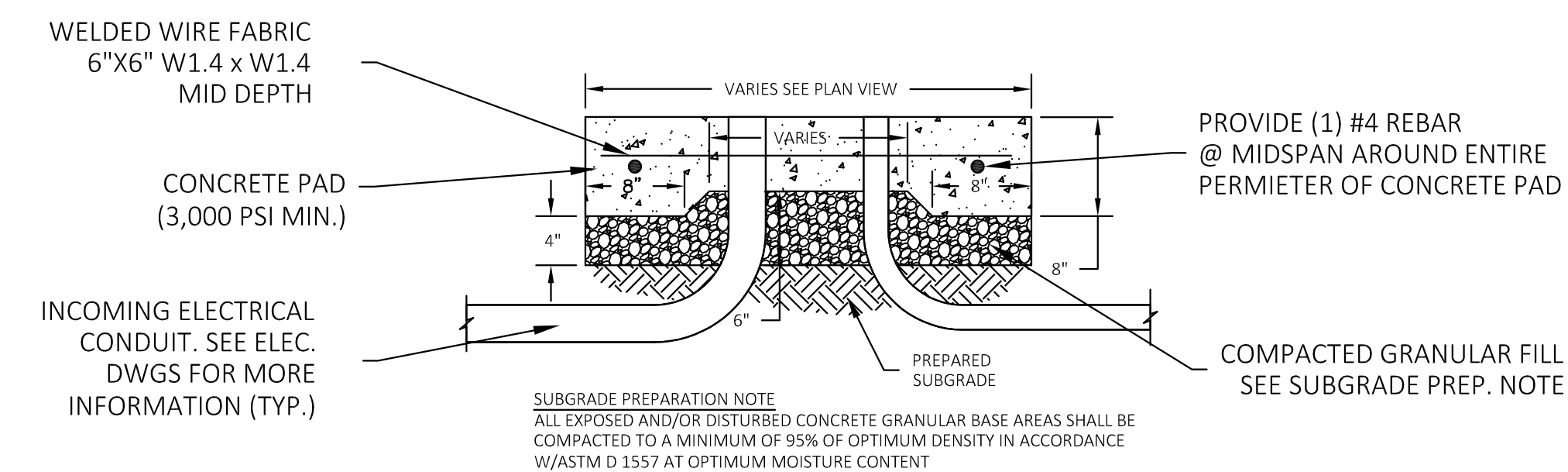
- FULL SIZE GROUND MEANS THAT GROUND CONNECTOR SIZE SHALL BE AS SHOWN ON SERVICE EQUIPMENT ON THE POWER RISER DIAGRAM.
- AFTER GROUNDING SYSTEM IS INSTALLED, GROUND RESISTANCE SHALL BE MEASURED, TO ASSURE THAT GROUND VALUE OF 15 OHM MAXIMUM RESISTANCE IS ACHIEVED. IF NOT, ADDITIONAL GROUNDING SHALL BE PROVIDED TO MEET THE SPECIFIC VALUE.
- ALL CONNECTIONS TO GROUND RODS SHALL BE EXOTHERMIC WELD CONNECTIONS
- TOP OF GROUND ROD SHALL BE 12" (MINIMUM) BELOW GRADE. PROVIDE NON-METALIC INSPECTION WELL WITH REMOVABLE COVER.
- GROUND CONNECTOR SHALL BE LOCATED WITHIN OR NEAR BOTTOM OF CONCRETE FOUNDATION OR FOOTING THAT IS IN DIRECT CONTACT WITH THE EARTH, AND SHALL CONSIST OF AT LEAST 20 FEET OF ONE OR MORE STEEL REINFORCING BARS OR RODS OF NOT LESS THAN 1/2 INCH DIAMETER OR OF AT LEAST 20 FEET OF BARE COPPER CONDUCTOR.
- SEE THE RISER DIAGRAM DETAIL 1/E601 FOR THE SIZE OF THE MAIN BONDING JUMPER AND BARE COPPER GROUNDING ELECTRODE CONDUCTORS.
- NOT ALL GROUNDING OPTIONS MAY APPLY. CONTRACTOR TO VERIFY AVAILABLE GROUNDING METHODS.



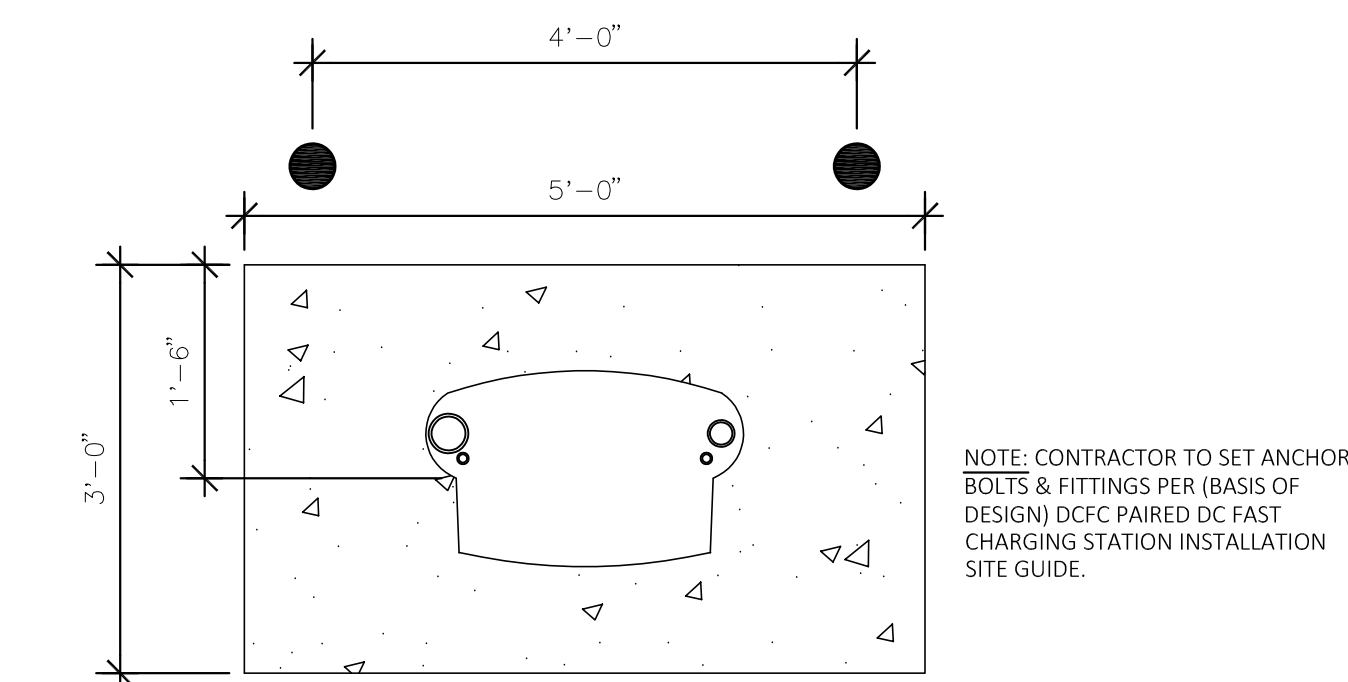
1 GROUNDING DETAIL
SCALE: NOT TO SCALE



3 EV EQUIPMENT PAD/BOLLARD DIMENSIONS
SCALE: NOT TO SCALE



2 EV CONC. PAD & EQUIPMENT PAD TYPICAL SECTION
SCALE: NOT TO SCALE



3 EV EQUIPMENT PAD/BOLLARD DIMENSIONS
SCALE: NOT TO SCALE