NORTHWOOD WELL PUMPHOUSE
BLAINE COUNTY, IDAHO

STANDBY POWER MODIFICATIONS

OWNER:
CITY OF KETCHUM
PO BOX 2315
110 RIVER RANCH ROAD
KETCHUM, IDAHO 83340

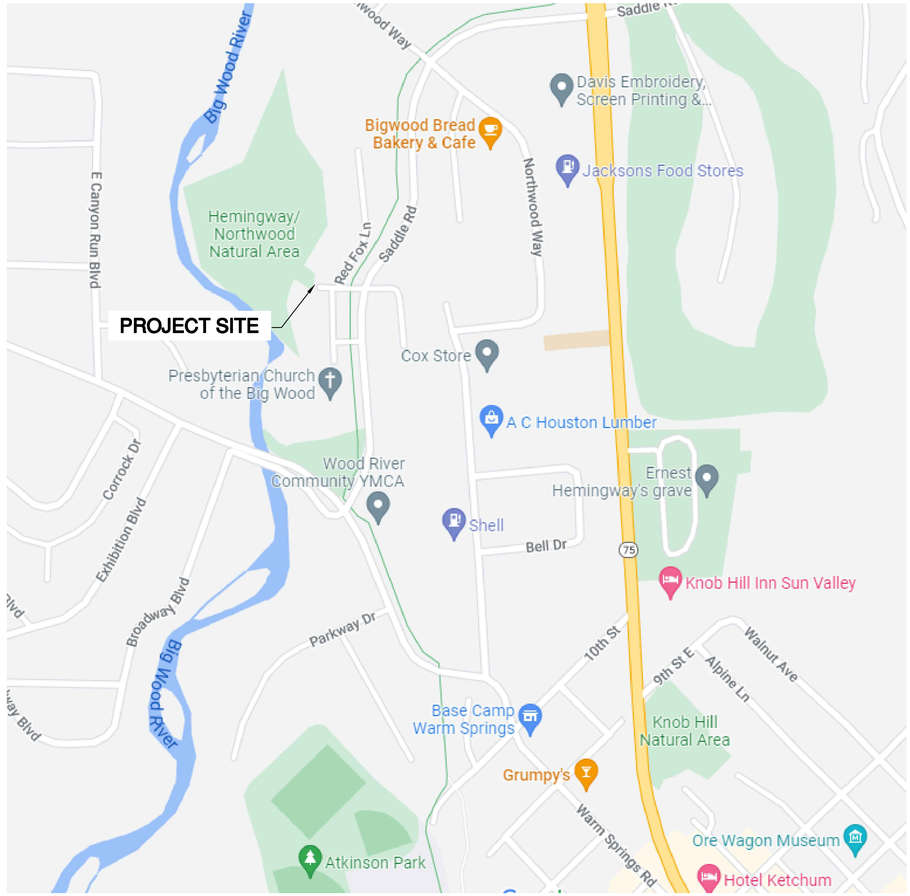
DC ENGINEERING
Careful listening. Dynamic solutions.
www.dcengineering.net
208.288.2181 Project:21KET01

ENGINEER:
DC ENGINEERING, INC
440 E. CORPORATE DRIVE
SUITE 103
MERIDIAN, IDAHO 83642
(208)288-2181

LOCATION MAP

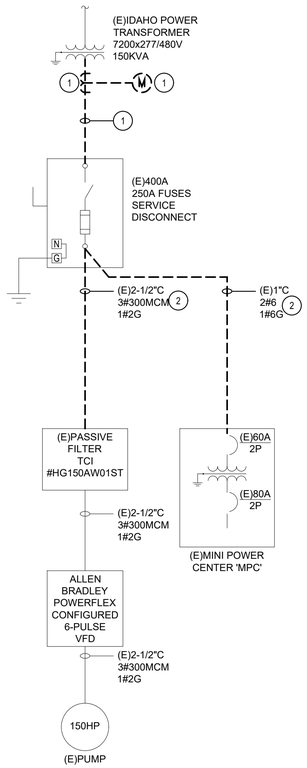
DC PROJECT NUMBER
21KET01
APRIL 2022

DRAWING INDEX:



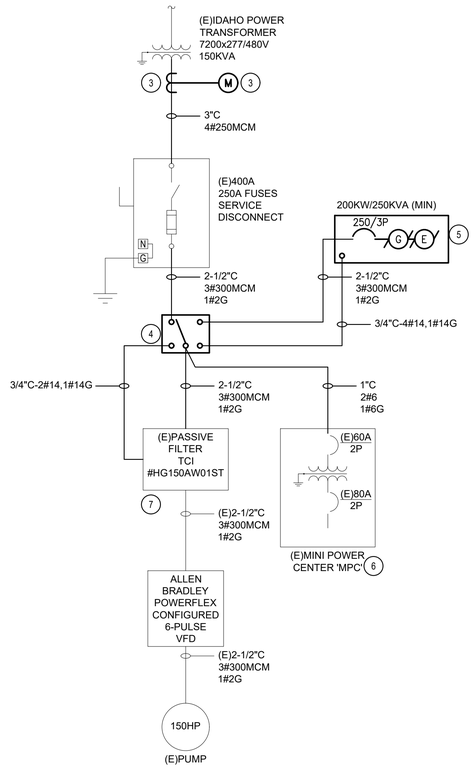
VICINITY MAP

ONE-LINE DIAGRAMS



EXISTING ONE-LINE DIAGRAM

SCALE: N.T.S.



MODIFIED ONE-LINE DIAGRAM

SCALE: N.T.S.

KEY NOTES (#)

1. REMOVE DIRECT BURIED SERVICE ENTRANCE CONDUCTORS, CT ENCLOSURE, AND METER. COORDINATE WITH IDAHO POWER.
2. DISCONNECT AND REMOVE EXISTING CONDUIT AND CONDUCTORS.
3. NEW CT METER STRUCTURE LOCATED ADJACENT TO IDAHO POWER TRANSFORMER. SEE DETAIL ON SHEET E-4.
4. NEW AUTOMATIC TRANSFER SWITCH.
5. NEW GENERATOR. GENERATOR SIZE SHOWN BASED ON GENERATOR SIZING SOFTWARE, IDENTIFIED LOAD CHARACTERISTICS, LOAD STARTUP SEQUENCE, AND OTHER PERFORMANCE REQUIREMENTS AS OUTLINED IN THE SPECIFICATIONS. BECAUSE THE GENERATOR SIZING SOFTWARE TERMS OF USE DO NOT WARRANT THE SOFTWARE ACCURACY AND COMPLETENESS, THE CONTRACTOR SHALL CONFIRM GENERATOR SIZE WITH GENERATOR SUPPLIER.
6. SEE PANELBOARD SCHEDULE THIS SHEET FOR NEW BREAKERS AND ASSOCIATED WORK.
7. EXISTING PASSIVE FILTER IS A TRANSCOIL (TCI) HG150CW-1ST. FURNISH AND INSTALL CONTROL POWER TRANSFORMER AND CONTACTOR, WHICH ALLOWS CAPACITORS TO BE DISCONNECTED FROM THE FILTER CIRCUIT WHEN THE AUTOMATIC TRANSFER SWITCH IS IN THE "GENERATOR" POSITION. COORDINATE WITH TCI FOR MATERIAL AND CONNECTION REQUIREMENTS.

PANELBOARD SCHEDULE

PANEL: MPC				PROJECT: NORTHWOOD WELL PUMPHOUSE										
VOLTAGE: 240/120V		PHASE: 1		WIRE: 3		AMPERE RATING: 60A			SC RATING:			MAIN: 80A		
ENTRY: EXISTING		MOUNTING: EXISTING												
		LOAD TYPES:		1 = LIGHTING 2 = RECEPTACLES 3 = MISC 4 = MOTOR 5 = KITCHEN		REMARKS:								
LOAD (VA)	LOAD SERVED	NOTE	LOAD TYPE	AMPS/ POLES		CKT NO	PHASE	CKT NO	AMPS/ POLES		LOAD TYPE	NOTE	LOAD SERVED	LOAD (VA)
475	LIGHTS	E	1	20	1	1	A	2	20	1	2	E	RECEPTACLES	80
800	EXHAUST FAN	E	4	20	1	3	B	4	20	1	3	E	FLOW METER/BATTERY CHARGER	500
2500	UNIT HEATER	E	3	30	2	5	A	6	20	1	4	E	EXHAUST FAN	1028
2500	---	E	3	-	-	7	B	8					SPACE	
1500	UNIT HEATER	E	3	20	2	9	A	10	**30**	**2**	**3**	N	**GENERATOR PANEL**	**1200**
1500	---	E	3	-	-	11	B	12	-	-	**3**	N	---	**1200**

ELECTRICAL LEGEND

CIRCUITING SYMBOLS

- CONDUIT STUBBED, CAPPED, AND MARKED WITH PULL CORD.
- CONDUIT UP.
- CONDUIT DOWN.
- X-# — HOMERUN. PANEL AND CIRCUIT AS INDICATED.
- CIRCUIT CONCEALED IN CEILING OR WALL. 3/4"-2#12,1#12G UNO.
- CIRCUIT CONCEALED IN FLOOR OR UNDERGROUND. 3/4"-2#12,1#12G UNO.

X"-X#X,X#XG — GROUNDING CONDUCTOR SIZE; RACEWAY SIZE; CONDUCTOR SIZE; CONDUCTOR QUANTITY

ONE LINE

- BRANCH PANEL — BRANCH PANEL.
- A — CIRCUIT BREAKER. SIZE AND TYPE AS SPECIFIED.
- 30AF / 30AT — CIRCUIT BREAKER. FRAME SIZE (AF) AND TRIP PLUG/RATING (AT), 3 POLE, UNO.
- 15A — FUSE. SIZE AND TYPE AS SPECIFIED, PROVIDE FUSE FOR EACH POLE, 3 POLE, UNO.
- 30A — INTERRUPTER SWITCH. SIZE AS INDICATED, 3 POLE, UNO.
- 30AS / 30AF — FUSED SWITCH. SWITCH SIZE (AS) & FUSE SIZE (AF) AS INDICATED, 3 POLE, UNO.
- INDIVIDUAL BREAKER FRAME (AF) SIZE AND TRIP PLUG RATING (AT), NEMA 1 UNO, 3 POLE UNO.
- M — METER.
- AM — AMMETER.
- VM — VOLTMETER.
- K — KIRK KEY LOCK.
- GFP — GROUND FAULT PROTECTION.
- SPD — SURGE PROTECTION DEVICE.
- AFM — ARC FLASH MITIGATION.
- VFD — VARIABLE FREQUENCY DRIVE.
- TVSS — TRANSIENT VOLTAGE SURGE SUPRESSION.
- ST — SHUNT TRIP COIL.
- KWH — KILOWATT HOUR METER.
- KVAR — KILOVAR DEMAND METER.
- TEST — TEST BLOCK.
- OVERHEAD SERVICE DROP.
- GENERATOR SET. MAIN BREAKER SIZE INDICATED.
- TRANSFER SWITCH.
- GUTTER.
- METER AND BASE.
- NEUTRAL — NEUTRAL.
- TRANSFORMER
- STARTER AND OVERLOAD, NEMA SIZE AS INDICATED.
- GROUND

GENERAL NOTES

(RE: ALL ELECTRICAL SHEETS)

1. ALL ELECTRICAL EQUIPMENT AND SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, INTERNATIONAL FIRE CODE, AND ALL OTHER STATE AND LOCAL CODES. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER IN WRITING IF PORTIONS OF THE DESIGN SET OR FIELD CONDITIONS DO NOT MEET REQUIRED CODES.
2. PROVIDE FIRESTOPPING FOR ALL FLOOR, CEILING AND FIREWALL PENETRATIONS FROM ELECTRICAL FIXTURE, DEVICE, RACEWAY, AND CABLE PENETRATIONS.
3. ELECTRICAL DEVICES AND LINEWORK ARE SHOWN BOLD FOR NEW, BOLD/DASHED FOR DEMO AND SCREENED FOR EXISTING.

ABBREVIATIONS

A	AMPERES
AC	ABOVE COUNTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AF	AMPERE FRAME
AFCI	ARC FAULT CIRCUIT INTERRUPT
AHF	ACTIVE HARMONIC FILTER
AHJ	AUTHORITY HAVING JURISDICTION
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
C	CONDUIT
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CM	CEILING MOUNTED
CO	CONDUIT ONLY. PROVIDE PULL-LINE
DC	DIRECT CURRENT
DET	DETAIL
(E)	EXISTING
EF	EXHAUST FAN
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
F	FUSE
FACP	FIRE ALARM CONTROL PANEL
FVNR	FULL VOLTAGE NON-REVERSING
G/GND	GROUND
GFI	GROUND FAULT INTERRUPTION
GFP	GROUND FAULT PROTECTION
H	HEAT
HH	HANDHOLE
HOA	HAND OFF AUTO
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
ID	IN-DUCT
IC	INTERRUPTING CAPACITY
IG	ISOLATED GROUND
J/JB	JUNCTION BOX
KW	KILOWATT
KWH	KILOWATT HOUR
M	MAGNETIC CONTACTOR COIL
MB	MAIN BREAKER
MCC	MOTOR CONTROL CENTER
MLO	MAIN LUGS ONLY
MS	MOTOR STARTER
MTS	MANUAL TRANSFER SWITCH
MH	MANHOLE
MW	MICROWAVE
N	NEUTRAL
NC	NORMALLY CLOSED
NCL	NON CRITICAL LOAD
NEC	NATIONAL ELECTRICAL CODE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OL	OVERLOAD
OS	OCCUPANCY SENSOR
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
P	PHOTO
PC	PHOTOCELL
PVC	POLYVINYL CHLORIDE
RCPT	RECEPTACLE
(R)	RELOCATED
(RE)	REPLACED
REF	REFRIGERATOR
RVSS	REDUCED VOLTAGE SOFT START
SER	SERVICE ENTRANCE RATED
SPST	SINGLE POLE SINGLE THROW
TC	TIME CLOCK
TDR	TIME DELAY RELAY
TJB	TERMINAL JUNCTION BOX
TSP	TWISTED SHIELDED PAIR
TTB	TELEPHONE TERMINAL BOARD
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
TYP	TYPICAL
UH	UNIT HEATER
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLT
VA	VOLT AMPERE
VFD	VARIABLE FREQUENCY DRIVE
WG	PROVIDE PROTECTIVE WIRE GUARD
WP	WEATHER PROOF/NEMA 3R
XFMR	TRANSFORMER

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OWNER REVIEW SET NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER REGISTERED 7051 STATE OF IDAHO JOHN J. BARRUTIA JR.
5/26/22

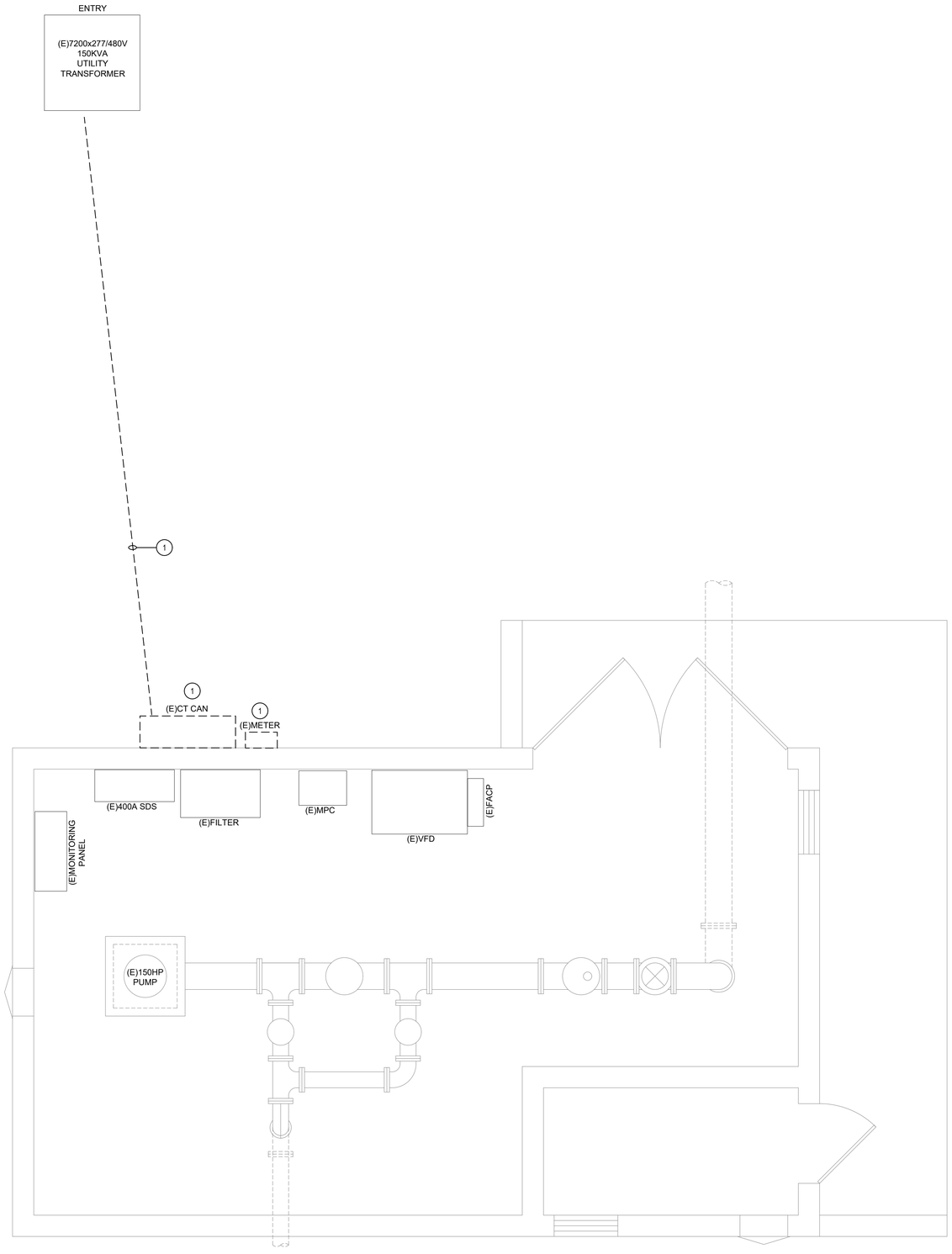
NO.	REVISIONS	DATE

NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS

ELECTRICAL LEGEND AND NOTES

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET
E-1



NORTH

1 DEMO ELECTRICAL PLAN

SCALE: 1/2" = 1'-0"

GENERAL NOTES:

1. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR DISPOSAL OF ALL ELECTRICAL EQUIPMENT DEMOLISHED WITH THIS PROJECT UNLESS OTHERWISE NOTED TO BE RETURNED TO OWNER.
2. REMOVE ALL ELECTRICAL ITEMS SHOWN DASHED, UNLESS OTHERWISE INDICATED. REMOVE WIRE BACK TO OVERCURRENT PROTECTIVE DEVICE OR TO UPSTREAM DEVICE REMAINING. MAINTAIN CIRCUITING/CONTINUITY TO EXISTING DEVICES NOT AFFECTED BY DEMOLITION. CONCEALED CONDUIT MAY BE ABANDONED IN PLACE. SURFACE CONDUIT NO LONGER USED SHALL BE REMOVED.
3. PROVIDE CUTTING AND PATCHING AS REQUIRED, WHETHER OR NOT SPECIFICALLY INDICATED.
4. IF AN ITEM IS TO BE REPLACED, THE CONTRACTORS SHALL RECONNECT ALL EXISTING CONNECTIONS.

KEY NOTES: (#)

1. DISCONNECT AND REMOVE EXISTING SERVICE ENTRANCE CONDUCTORS, CT CAN, AND METER. TO BE REPLACED. SEE SHEET E-3.

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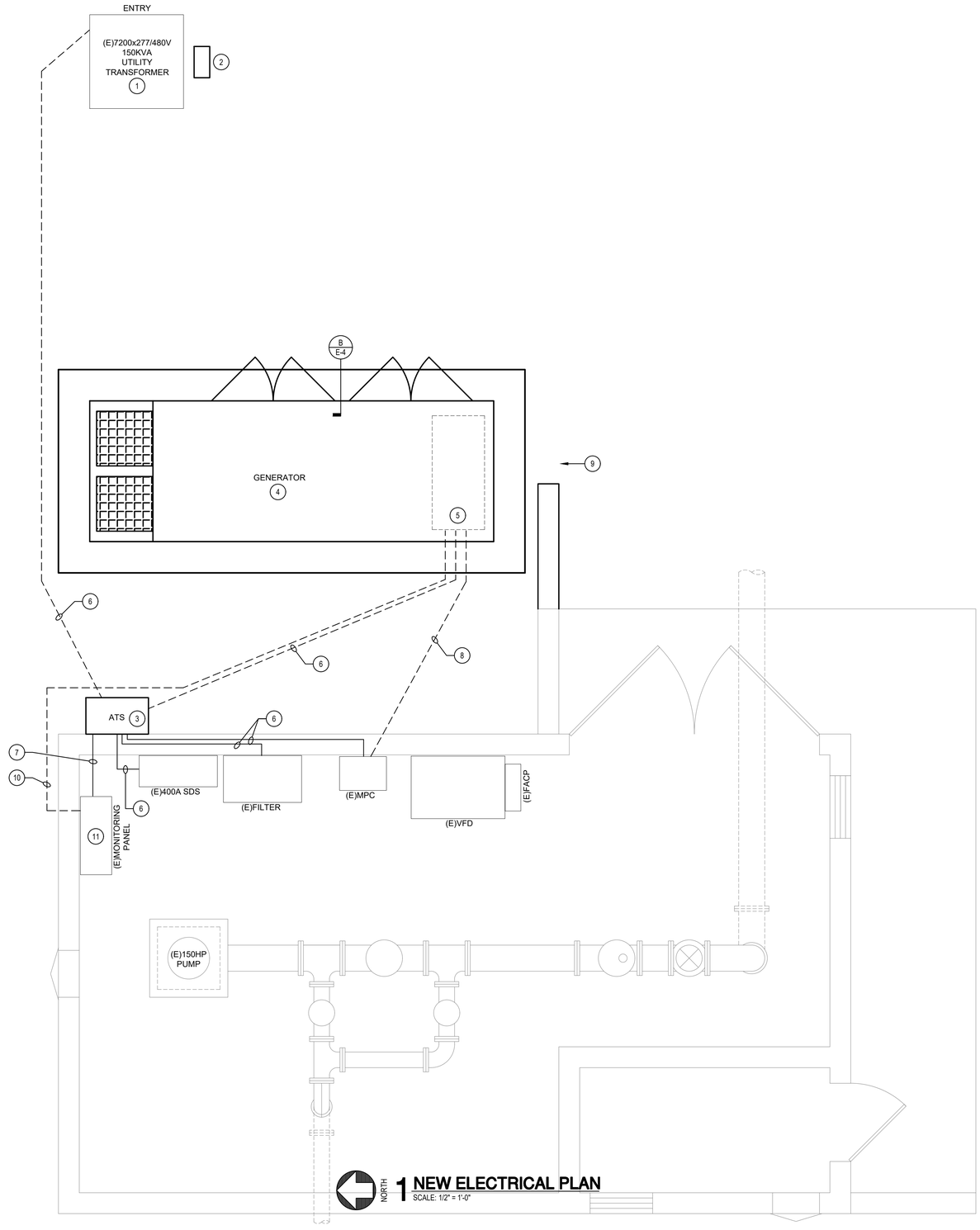
STANDBY POWER MODIFICATIONS

DEMO ELECTRICAL PLAN

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET
E-2



1 NEW ELECTRICAL PLAN

SCALE: 1/2" = 1'-0"

GENERAL NOTES:

1. COORDINATE WITH IDAHO POWER AND CITY OF KETCHUM FOR WORK ASSOCIATED WITH SERVICE MODIFICATIONS TO MINIMIZE DOWNTIME.

KEY NOTES: (#)

1. APPROXIMATE LOCATION OF EXISTING UTILITY TRANSFORMER.
2. NEW METER INSTALLED ADJACENT TO TRANSFORMER. METER BASE BY CONTRACTOR. METER AND CT'S BY UTILITY. SEE DETAIL ON SHEET E-4.
3. AUTOMATIC TRANSFER SWITCH. SEE SPECIFICATIONS.
4. NEW GENERATOR. SEE SPECIFICATIONS AND ONE-LINE DIAGRAM ON SHEET E-1. COORDINATE CONDUIT STUB UP LOCATIONS WITH SUPPLIER PRIOR TO ROUGH-IN.
5. MAKE CONNECTIONS TO GENERATOR AND ACCESSORIES.
6. SEE MODIFIED ONE-LINE DIAGRAM ON SHEET E-1 FOR CONDUIT AND CONDUCTORS.
7. PROVIDE AND INSTALL 3/4" CONDUIT WITH 4#14 AND 1#14 GROUND FOR STATUS SIGNALS:
   - "NORMAL POWER"
   - "STANDBY POWER".
8. PROVIDE AND INSTALL 3/4" CONDUIT WITH 3#12 AND 1#12 GROUND FOR GENERATOR PANEL/BLOCK HEATER/BATTERY CHARGER (AS APPLICABLE) TO PANEL 'MCP' CIRCUIT 10,12. SEE PANEL SCHEDULE ON SHEET E-1.
9. EXTEND RETAINING WALL. CONTRACTOR TO COORDINATE LENGTH WITH THE REQUIRED EXTENTS OF GRADING. REFER TO STRUCTURAL SHEET S-2, DETAIL 7.
10. PROVIDE AND INSTALL 3/4" CONDUIT WITH 8#14 AND 1#14 GROUND FOR STATUS SIGNALS:
    - "GENERATOR RUNNING"
    - "GENERATOR ALARM"
    - "LOW FUEL"
    - "LOW BATTERY"
11. MODIFICATIONS AND PROGRAMMING TO ACCOMMODATE GENERATOR AND ATS SIGNALS AT EXISTING MONITORING PANEL BY OTHERS.

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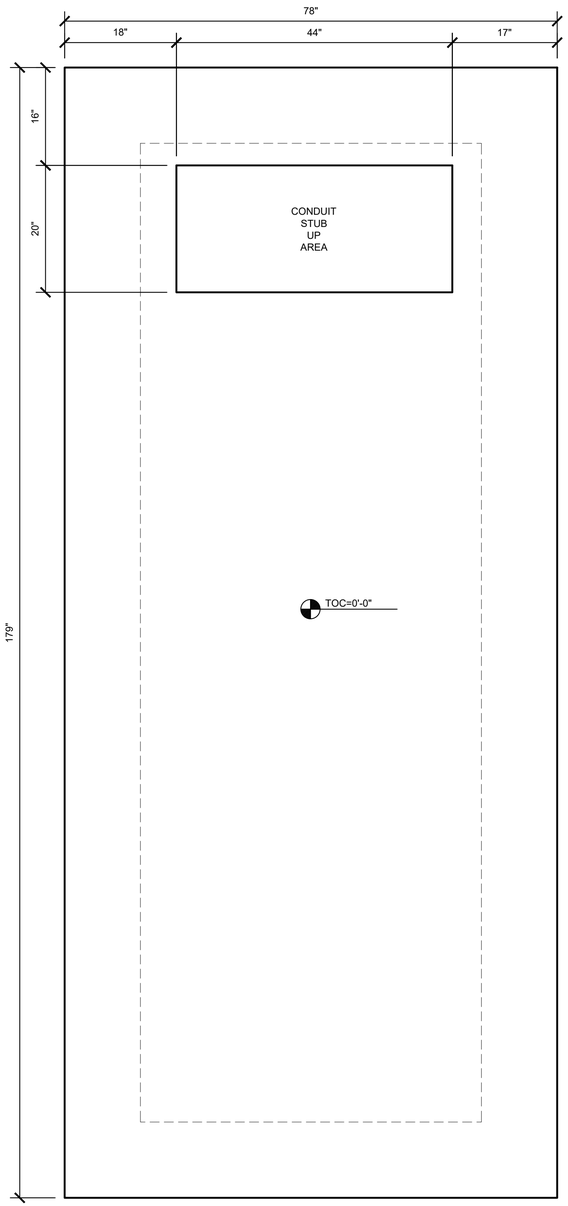
NEW ELECTRICAL PLAN

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

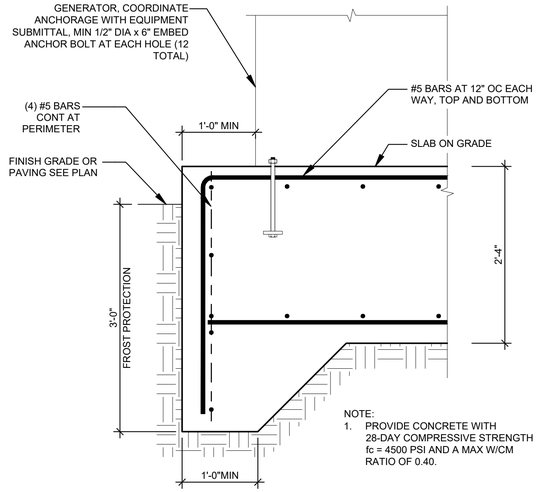
SHEET
E-3



A GENERATOR PAD DETAIL
SCALE: 1" = 1'-0"

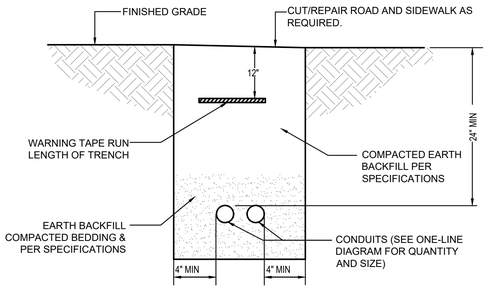
GENERAL NOTES

1. ADD DIMENSIONS SHOWN ON GENERATOR PAD DETAIL ARE MINIMUM. COORDINATE SPECIFIC REQUIREMENTS WITH ELECTRICAL CONTRACTOR AND GENERATOR EQUIPMENT CUTSHEETS FOR OVERALL PAD SIZE AND CONDUIT STUB UP REQUIREMENTS.

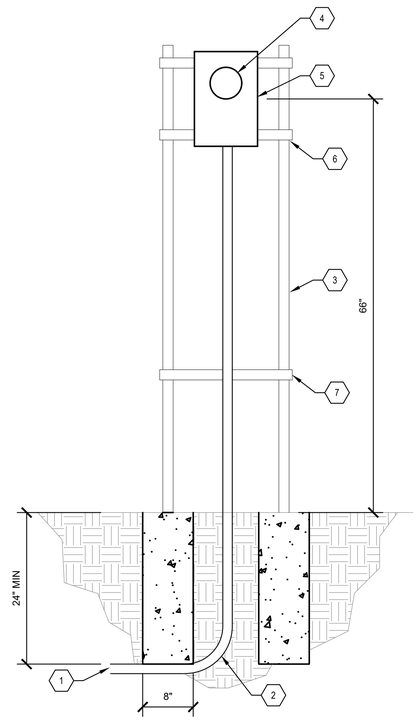


NOTE:
1. PROVIDE CONCRETE WITH 28-DAY COMPRESSIVE STRENGTH fc = 4500 PSI AND A MAX W/CM RATIO OF 0.40.

B EDGE OF SLAB DETAIL
SCALE: N.T.S.



C TRENCHING DETAIL
SCALE: N.T.S.



ITEM	DESCRIPTION	FURNISHED BY		INSTALLED BY	
		IDAHO POWER	CONTRACTOR	IDAHO POWER	CONTRACTOR
1	CT WIRE TO UTILITY TRANSFORMER SECONDARY COMPARTMENT	X		X	
2	1-1/2" RISER WITH PVC 90° BURIED 24" DEEP (MIN)		X		X
3	12 GUAGE, 1-5/8" x 1-5/8" UNISTRUT		X		X
4	METER	X		X	
5	METER BASE		X		X
6	UNISTRUT FOR MOUNTING OF METER BASE		X		X
7	UNISTRUT INSTALLED BETWEEN BOTTOM OF METER BASE AND GROUND FOR MOUNTING OF PIPE STRAPS		X		X

D CT METER INSTALLATION
SCALE: N.T.S.

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JOHN J. BARRUTIA JR.
7051
STATE OF IDAHO
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NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS

ELECTRICAL DETAILS

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET
E-4

ELECTRICAL SPECIFICATIONS (PAGE 1 OF 2)

PART 1 - GENERAL

1.01 SUBMITTALS

A. PROVIDE SUBMITTALS FOR ALL MATERIALS INCLUDING MANUFACTURER DESCRIPTIVE LITERATURE, COMPONENT DATA, SCHEMATICS, WIRING AND INTERCONNECTION DIAGRAMS, FUNCTIONAL RELATIONSHIP BETWEEN ALL ELECTRICAL COMPONENTS, AND SHOP DRAWINGS INDICATING DIMENSIONS, WEIGHTS, CLEARANCES, AND FIELD CONNECTIONS.

B. GENERATOR SIZING CALCULATIONS: SUBMIT PROJECT SPECIFIC SIZING CALCULATION BASED ON SPECIFIED LOADS AND ASSOCIATED STARTUP SEQUENCE.

C. INFORMATION SUBMITTALS:
1. OPERATION MAN MAINTENANCE DATA:
   a. PROVIDE FOR ALL EQUIPMENT, AS WELL AS EACH DEVICE HAVING FEATURES THAT CAN REQUIRE ADJUSTMENT, CONFIGURATION, REPAIR, OR MAINTENANCE.
   b. MINIMUM INFORMATION SHALL INCLUDE MANUFACTURER'S PREPRINTED INSTRUCTION MANUAL, ONE COPY OF THE APPROVED SUBMITTAL INFORMATION FOR THE ITEM, TABULATION OF ANY SETTINGS, AND COPIES OF ANY TEST REPORTS.
2. WARRANTY DETAILS.

1.02 APPROVAL BY AUTHORITY HAVING JURISDICTION

A. PROVIDE THE WORK IN ACCORDANCE WITH NFPA 70, NATIONAL ELECTRICAL CODE (NEC). WHERE REQUIRED BY THE AUTHORITY HAVING JURISDICTION (AHJ), MATERIAL AND EQUIPMENT SHALL BE LABELED OR LISTED BY A NATIONALLY RECOGNIZED TESTING LABORATORY OR OTHER ORGANIZATION ACCEPTABLE TO THE AHJ, IN ORDER TO PROVIDE A BASIS FOR APPROVAL UNDER THE NEC.

B. MATERIALS AND EQUIPMENT MANUFACTURED WITHIN THE SCOPE OF STANDARDS PUBLISHED BY UNDERWRITERS LABORATORIES, INC. (UL) SHALL CONFORM TO THOSE STANDARDS AND SHALL HAVE AN APPLIED UL LISTING MARK OR LABEL.

1.04 ENVIRONMENTAL CONDITIONS

A. UNLESS OTHERWISE SPECIFIED, EQUIPMENT AND MATERIALS SHALL BE SIZED AND DE-RATED FOR THE AMBIENT CONDITIONS BUT NOT LESS THAN THE FOLLOWING WITHOUT EXCEEDING THE MANUFACTURER'S STATED TOLERANCES.
1. AMBIENT TEMPERATURE OF 40 DEGREES C.
2. RELATIVE HUMIDITY UP TO 95 PERCENT.
3. ELEVATION OF 6000 FEET.
4. GROUND SNOW LOAD OF 143 PSF.
5. WIND LOAD OF 90 MPH.
6. LIVE LOAD OF 100 PSF.
7. SEISMIC DESIGN CATEGORY: C.

PART 2 - PRODUCTS

2.01 GENERAL

A. PRODUCTS SHALL COMPLY WITH ALL APPLICABLE PROVISIONS OF NFPA 70.

B. LIKE ITEMS OF EQUIPMENT: END PRODUCTS OF ONE MANUFACTURER IN ORDER TO ACHIEVE STANDARDIZATION FOR APPEARANCE, OPERATION, MAINTENANCE, SPARE PARTS, AND MANUFACTURER'S SERVICE.

C. EQUIPMENT FINISH:

2. MANUFACTURER'S STANDARD FINISH COLOR, EXCEPT WHERE SPECIFIC COLOR IS INDICATED.

2.02 ENCLOSURES

A. FINISH: SHEET METAL STRUCTURAL AND ENCLOSURE PARTS SHALL BE COMPLETELY PAINTED USING AN ELECTRODEPOSITION PROCESS SO INTERIOR AND EXTERIOR SURFACES AS WELL AS BOLTED STRUCTURAL JOINTS HAVE A COMPLETE FINISH COAT ON AND BETWEEN THEM.

B. COLOR: MANUFACTURER'S STANDARD COLOR (GRAY) BAKED-ON ENAMEL, UNLESS OTHERWISE SHOWN.

C. BARRIERS: PROVIDE METAL BARRIERS WITHIN ENCLOSURES TO SEPARATE WIRING OF DIFFERENT SYSTEMS AND VOLTAGE.

D. ENCLOSURE SELECTIONS: EXCEPT AS SHOWN OTHERWISE, PROVIDE ELECTRICAL ENCLOSURES ACCORDING TO THE FOLLOWING:

1. INDOOR - INDUSTRIAL USE - UNFINISHED - NEMA 12 TYPE
2. OUTDOOR - DENOTED AS 'WP' - ANY FINISH - NEMA 3R TYPE

2.04 JUNCTION AND PULL BOXES

A. CONDUIT BODIES USED AS JUNCTION BOXES: AS SPECIFIED UNDER ARTICLE CONDUIT AND FITTINGS.

B. LARGE SHEET STEEL BOX:
1. NEMA 250, TYPE 12.
2. BOX: CODE-GUAGE, GALVANIZED STEEL.
3. COVER: HINGED WITH CLAMPS.
4. MACHINE SCREWS: CORROSION-RESISTANT.

2.11 SUPPORT AND FRAMING CHANNELS.

A. CARBON STEEL FRAMING CHANNEL:

1. MATERIAL: ROLLED, MILD STRIP STEEL, 12 GAUGE, ASTM A1011/A1011M, GRADE 33.
2. FINISH: HOT-DIP GALVANIZED AFTER FABRICATION.

B. STAINLESS STEEL FRAMING CHANNEL: ROLLED, ASTM A167, TYPE 316 STAINLESS STEEL, 12 GAUGE.

C. MANUFACTURERS:

1. B-LINE SYSTEMS, INC.
2. UNISTRUT CORP.

2.12 NAMEPLATES

A. MATERIAL: LAMINATED PLASTIC.

B. ATTACHMENT: ADHESIVE.

C. COLOR: BLACK, ENGRAVED TO A WHITE CORE, OR AS SHOWN.

D. ENGRAVING:

1. DEVICES AND EQUIPMENT: NAME OR TAG SHOWN, OR AS REQUIRED.
2. PANELBOARDS:
   a. DESIGNATION.
   b. SERVICE VOLTAGE.
   c. PHASES.
3. MINIMUM REQUIREMENT: LABEL METERING AND POWER DISTRIBUTION EQUIPMENT, LOCAL CONTROL PANELS, JUNCTION BOXES, MOTOR CONTROLS, AND TRANSFORMERS.

E. LETTER HEIGHT:

1. PUSHBUTTONS, SELECTOR SWITCHES, AND OTHER DEVICES: 1/8 INCH.
2. EQUIPMENT AND PANELBOARDS: 1/4 INCH.

2.13 CONDUIT AND FITTINGS

A. INTERMEDIATE METAL CONDUIT (IMC):

1. MEET REQUIREMENTS OF NEMA C80.6 AND UL 1242.
2. MATERIAL: HOT-DIP GALVANIZED, WITH CHROMATED AND LACQUARED PROTECTIVE LAYER.

B. PVC SCHEDULE 40 CONDUIT:

1. MEET REQUIREMENTS OF NEMA TC 2 AND UL 651.
2. UL LISTED FOR CONCRETE ENCASEMENT, UNDERGROUND DIRECT BURIAL, CONCEALED, OR DIRECT SUNLIGHT EXPOSURE, AND 90 DEGREE C INSULATED CONDUCTORS.

D. FLEXIBLE METAL, LIQUID-TIGHT CONDUIT:

1. UL 360 LISTED FOR 105 DEGREES C INSULATED CONDUCTORS.
2. MATERIAL: GALVANIZED STEEL, WITH AN EXTRUDED PVC JACKET.

F. FITTINGS:

1. PROVIDE BUSHINGS, GROUNDING BUSHINGS, CONDUIT HUBS, CONDUIT BODIES, COUPLINGS, UNIONS, EXPANSION FITTINGS, AND CABLE SEALING FITTINGS, AS APPLICABLE.
2. INTERMEDIATE METAL CONDUIT:
   a. MEET REQUIREMENTS OF UL 514B.
   b. TYPE: THREADED, GALVANIZED.
4. PVC CONDUIT:
   a. MEET REQUIREMENTS OF NEMA TC 3.
   b. TYPE: PVC, SLIP-ON.
5. FLEXIBLE METAL, LIQUID-TIGHT CONDUIT:
   a. METAL INSULATED THROAT CONNECTORS WITH INEGRAL NYLON OR PLASTIC BUSHING RATED FOR 105 DEGREE C.
   b. INSULATED THROAT AND SEALING O-RINGS.

2.14 CONDUCTORS AND CABLE

A. CONDUCTORS 600 VOLTS AND BELOW:

6. CONFORM TO APPLICABLE REQUIREMENTS OF NEMA WC 71, WC 72, AND WC 74.
7. CONDUCTOR TYPE:
   a. 120 AND 277 VOLT LIGHTING, NO. 10 AWG, AND SMALLER: SOLID COPPER.
   b. 120 VOLT RECEPTACLE CIRCUITS, NO. 10 AWG AND SMALLER: SOLID COPPER.
   c. ALL OTHER CIRCUITS: STRANDED COPPER.
3. INSULATION: TYPE THHN/THWN, EXCEPT FOR SIZES NO. 6 AND LARGER, WITH XHHW-2 INSULATION.

B. 600 VOLT RATED CABLE:

1. GENERAL:
   a. TYPE TC, MEETING REQUIREMENTS OF UL 1277, INCLUDING VERTICAL TRAY FLAME TEST AT 20,000 BTU PER HOUR, AND NFPA 70, ARTICLE 340, OR UL 13 MEETING REQUIREMENTS OF NFPA 70, ARTICLE 725.
   b. PERMANENTLY AND LEGIBLY MARKED WITH MANUFACTURER'S NAME, MAXIMUM WORKING VOLTAGE FOR WHICH CABLE WAS TESTED, TYPE OF CABLE, AND UL LISTED WORK.
   c. SUITABLE FOR INSTALLATION IN OPEN AIR, IN CABLE TRAYS, OR CONDUIT.
   d. MINIMUM TEMPERATURE RATING: 90 DEGREES C DRY LOCATIONS, 75 DEGREES C WET LOCATIONS.
   e. OVERALL OUTER JACKET: PVC, FLAME-RETARDANT, SUNLIGHT AND OIL RESISTANT.
2. TYPE TSP, NO. 16 AWG, TWISTED, SHIELDED PAIR, INSTRUMENTATION CABLE: SINGLE PAIR, DESIGNED FOR NOISE REJECTION FOR PROCESS CONTROL, COMPUTER, OR DATA LOG APPLICATIONS MEETING NEMA WC 55 REQUIREMENTS.
   a. OUTER JACKET: 45 MILS NOMINAL THICKNESS.
   b. INDIVIDUAL PAIR SHIELD: 1.35 MILS, DOUBLE-FACED ALLUMINUM/SYNTHETIC POLYMER OVERLAPPED TO PROVIDE 100 PERCENT COVERAGE.
   c. DIMENSIONS: 0.31 INCH NOMINAL OUTSIDE DIAMETER.
   d. CONDUCTORS:
      d.a. BARE SOFT ANNEALED COPPER, CLASS B, SEVEN-STRAND CONCENTRIC, MEETING REQUIREMENTS OF ASTM B8.
      d.b. 20 AWG, SEVEN-STRAND TINNED COPPER DRAIN WIRE.
      d.c. INSULATION: 15 MILS NOMINAL PVC.
      d.d. JACKET: 4 MILS NOMINAL NYLON.
      d.e. COLOR CODE: PAIR CONDUCTORS BLACK AND RED.
   e. MANUFACTURERS: OKONITE CO.

C. ACCESSORIES:

1. TAPE:
   a. GENERAL PURPOSE, FLAME RETARDANT: 7 MILS, VINYL PLASTIC, SCOTCH BRAND 33, RATED FOR 90 DEGREES C MINIMUM, MEETING REQUIREMENTS OF UL 510.
   b. FLAME RETARDANT, COLD AND WEATHER RESISTANT: 8.5 MILS, VINYL PLASTIC, SCOTCH BRAND 88.
   c. ARC AND FIREPROOFING:
      c.a. 30 MILS, ELASTOMER.
      c.b. MANUFACTURERS AND PRODUCTS:
         c.b.a. 3M: SCOTCH BRAND 77, WITH SCOTCH BRAND 69 GLASS CLOTH TAPEBINDER.
         c.b.b. PLYMOUNT: PLYARC 53, WITH PLYGLAS 77 GLASS CLOTH TAPEBINDER.
2. IDENTIFICATION DEVICES:
   a. SLEEVE-TYPE, PERMANENT, PVC, YELLOW OR WHITE, WITH LEGIBLE MACHINE-PRINTED BLACK MARKINGS.
   b. MANUFACTURER AND PRODUCTS: RAYCHEM: TYPE D-SCE OR ZH-SCE.
3. CONNECTORS AND TERMINATIONS:
   a. NYLON, SELF-INSULATED CRIMP CONNECTORS:
      a.a. MANUFACTURERS AND PRODUCTS:
         a.a.a. THOMAS & BETTS: STA-KON.
         a.a.b. BURNDY: INSULUG.
         a.a.c. ILSCO.
4. SELF-INSULATED, FREESPRING WIRE CONNECTOR (WIRE NUTS):
   a. PLATED STEEL, SQUARE WIRE SPRINGS.
   b. UL STANDARD 486C.
   c. MANUFACTURERS AND PRODUCTS:
      c.a. THOMAS & BETTS.
      c.b. IDEAL: TWISTER.
5. CABLE LUGS:
   a. IN ACCORDANCE WITH NEMA CC 1.
   b. RATED 600 VOLTS OF SAME MATERIAL AS CONDUCTOR METAL.
   c. UN-INSULATED CRIMP CONNECTORS AND TERMINATORS:
      c.a. SUITABLE FOR USE WITH 75 DEGREES C WIRE AT FULL NFPA 70, 75 DEGREES C AMPACITY.
      c.b. MANUFACTURERS AND PRODUCTS:
         c.b.a. THOMAS & BETTS: COLOR-KEYED.
         c.b.b. BURNDY: HYDENT.
         c.b.c. ILSCO.
   d. UN-INSULATED, BOLTED, TWO-WAY CONNECTORS AND TERMINATORS:
      d.a. MANUFACTURES AND PRODUCTS:
         d.a.a. THOMAS & BETTS: LOCKTITE.
         d.a.b. BURNDY: QUIKLUG.
         d.a.c. ILSCO.
6. CABLE TIES:
   a. NYLON, ADJUSTABLE, SELF-LOCKING, AND REUSABLE.
   b. MANUFACTURER AND PRODUCT: THOMAS & BETTS: TY-RAP.
7. HEAT SHRINKABLE INSULATION:
   a. THERMALLY STABILIZED, CROSSLINKED POLYOLEFIN.
   b. MANUFACTURER AND PRODUCT: THOMAS & BETTS: SHRINK-KON.

2.15 GROUNDING

A. GROUND RODS: PROVIDE COPPER WITH MINIMUM DIAMETER OF 5/8 INCH AND LENGTH OF 10 FEET.

B. GROUND CONDUCTORS: AS SPECIFIED IN ARTICLE CONDUCTORS AND CABLE.

C. CONNECTORS:

1. EXOTHERMIC WELD TYPE:
   a. OUTDOOR WELD: SUITABLE FOR EXPOSURE TO ELEMENTS OR DIRECT BURIAL.
   b. INDOOR WELD: UTILIZE LOW-SMOKE, LOW-EMISSION PROCESS.
   c. MANUFACTURERS:
      c.a. ERICO PRODUCTS, INC: CADWELD AND CADWELD EXOLON.
      c.b. THERMOWELD.
2. COMPRESSION TYPE:
   a. COMPRESS-DEFORMING TYPE: WROUGHT COPPER EXTRUSION MATERIAL.
   b. SINGLE INDENTION FOR CONDUCTORS 6 AWG AND SMALLER.
   c. DOUBLE INDENTION WITH EXTENDED BARREL FOR CONDUCTORS 4 AWG AND LARGER.
   d. SINGLE BARRELS PRE-FILLED WITH OXIDE-INHIBITING AND ANTI-SEIZING COMPOUND.
   e. MANUFACTURERS:
      e.a. BURNDY CORP.
      e.b. THOMAS & BETTS CO.
      e.c. ILSCO.
3. MECHANICAL TYPE:
   a. SPLIT-BOLT, SADDLE, OR CONE SCREW TYPE: COPPER ALLY MATERIAL.
   b. MANUFACTURERS:
      b.a. BURNDY CORP.
      b.b. THOMAS & BETTS CO.

2.17 AUTOMATIC TRANSFER SWITCH:

A. MANUFACTURERS:
1. ASCO POWER TECHNOLOGIES.
2. CATERPILLAR, INC.: ELECTRIC POWER DIVISION.
3. CUMMINS POWER GENERATION.
4. GENERAC POWER SYSTEMS, INC.
5. KOHLER POWER SYSTEMS.
6. OR EQUIVALENT.

B. PERFORMANCE REQUIREMENTS:
1. SERVICE: 480/277-VOLTS, THREE-PHASE, FOUR-WIRE GROUNDED WYE, HAVING AN AVAILABLE SHORT CIRCUIT CURRENT OF 18,000-AMPS AT LINE TERMINALS.
2. CURRENT: 260-AMPS (MIN).
3. COMPLY WITH NFPA 110 AND UL 1008.
4. OPEN TRANSITION, 3-POLE OPERATION.
5. REPETITIVE ACCURACY OF SOLID-STATE CONTROLS: +/- 2 PERCENT OR BETTER OVER AN OPERATING TEMPERATURE RANGE OF MINUS 20 TO PLUS 70 DEGREES C.
6. VOLTAGE TRANSIENTS: COMPONENTS SHALL MEET OR EXCEED VOLTAGE-SURGE WITHSTAND CAPABILITY REQUIREMENTS WHEN TESTED ACCORDING TO IEEE C62.62. COMPONENTS SHALL MEET OR EXCEED VOLTAGE-IMPULSE WITHSTAND TEST OF NEMA ICS 1.
7. ELECTRICAL OPERATION: MECHANICALLY AND ELECTRICALLY INTERLOCKED IN BOTH DIRECTIONS TO PREVENT SIMULTANEOUS CONNECTION TO BOTH POWER SOURCES.
8. PROVIDE WITH AUXILIARY CONTACT TO CONTROL PASSIVE HARMONIC FILTER CAPACITOR CONTROL CONTACTOR.
9. ENCLOSURE: NEMA 250, TYPE 3R.
10. COMPLY WITH LEVEL 2 EQUIPMENT ACCORDING TO NFPA 110.
11. DIGITAL COMMUNICATION INTERFACE: ETHERNET PORTS TO SUPPORT TCP/IP COMMUNICATIONS. MODBUS TCP/IP, SNMP, HTTP, AND SMTP OPEN PROTOCOLS SHALL BE SIMULTANEOUSLY SUPPORTED.
12. CONTROLLER FEATURES:
   a. CONTROLLER OPERATES THROUGH A PERIOD OF LOSS OF CONTROL POWER.
   b. UNDERVOLTAGE SENSING FOR EACH PHASE OF NORMAL SOURCE: SENSE LOW PHASE-TO-GROUND VOLTAGE ON EACH PHASE. PICKUP VOLTAGE SHALL BE ADJUSTABLE FROM 85 TO 100 PERCENT OF NOMINAL, AND DROPOUT VOLTAGE SHALL BE ADJUSTABLE FROM 75 TO 98 PERCENT OF PICKUP VALUE. FACTORY SET FOR PICKUP AT 90 PERCENT AND DROPOUT AT 85 PERCENT.
   c. VOLTAGE/FREQUENCY LOCKOUT RELAY: PREVENT PREMATURE TRANSFER TO GENERATOR. PICKUP VOLTAGE SHALL BE ADJUSTABLE FROM 85 TO 100 PERCENT OF NOMINAL FACTORY SET FOR PICKUP AT 90 PERCENT. PICKUP FREQUENCY SHALL BE ADJUSTABLE FROM 90 TO 100 PERCENT OF NOMINAL. FACTORY SET FOR PICKUP AT 95 PERCENT.
   d. TIME DELAY FOR RETRANSFER TO NORMAL SOURCE: ADJUSTABLE FROM ZERO TO 30 MINUTES, AND FACTORY SET FOR 10 MINUTES. OVERRIDE SHALL AUTOMATICALLY DEFEAT DELAY ON LOSS OF VOLTAGE OR SUSTAINED UNDERVOLTAGE OF EMERGENCY SOURCE. PROVIDED NORMAL SUPPLY HAS BEEN RESTORED.
   e. TEST SWITCH: SIMULATE NORMAL-SOURCE FAILURE.
   f. SWITCH-POSITION PILOT LIGHTS: INDICATE SOURCE TO WHICH LOAD IS CONNECTED.
   g. SOURCE-AVAILABLE INDICATING LIGHTS: SUPERVISE SOURCES VIA TRANSFER-SWITCH NORMAL- AND EMERGENCY-SOURCE SENSING CIRCUITS.
      g.a. NORMAL POWER SUPERVISION: GREEN LIGHT WITH NAMEPLATE ENGRAVED "NORMAL SOURCE AVAILABLE."
      g.b. EMERGENCY POWER SUPERVISION: RED LIGHT WITH NAMEPLATE ENGRAVED "EMERGENCY SOURCE AVAILABLE"
   h. UNASSIGNED AUXILIARY CONTACTS: TWO NORMALLY OPEN, SINGLE-POLE, DOUBLE-THROW CONTACTS FOR EACH SWITCH POSITION, RATED 10-AMPS AT 240-VOLTS A.C.
   i. TRANSFER OVERRIDE SWITCH: OVERRIDES AUTOMATIC RETRANSFER CONTROL SO AUTOMATIC TRANSFER SWITCH WILL REMAIN CONNECTED TO EMERGENCY POWER SOURCE REGARDLESS OF CONDITION OF NORMAL SOURCE. PILOT LIGHT INDICATES OVERRIDE STATUS.
   j. ENGINE STARTING CONTACTS: ONE ISOLATED AND NORMALLY CLOSED, AND ONE ISOLATED AND NORMALLY OPEN; RATED 10-AMPS AT 32-VOLTS D.C. MINIMUM.
   k. ENGINE SHUTDOWN CONTACTS: TIME DELAY ADJUSTABLE FROM ZERO TO FIVE MINUTES, AND FACTORY SET FOR FIVE MINUTES. CONTACTS SHALL INITIATE SHUTDOWN AT REMOTE ENGINE-GENERATOR CONTROLS AFTER RETRANSFER OF LOAD TO NORMAL SOURCE.
   l. ENGINE-GENERATOR EXERCISER: SOLID-STATE, PROGRAMMABLE-TIME SWITCH STARTS ENGINE GENERATOR AND TRANSFERS LOAD TO IT FROM NORMAL SOURCE FOR A PRESET TIME, THEN RETRANSFERS AND SHUTS DOWN ENGINE AFTER A PRESET COOL-DOWN PERIOD. INITIATES EXERCISE CYCLE AT PRESET INTERVALS ADJUSTABLE FROM 7 TO 30 DAYS. RUNNING PERIODS SHALL BE ADJUSTABLE FROM 10 TO 30 MINUTES. FACTORY SETTINGS SHALL BE FOR 7-DAY EXERCISE CYCLE, 20-MINUTE RUNNING PERIOD, AND 5-MINUTE COOL-DOWN PERIOD. EXERCISER FEATURES INCLUDE THE FOLLOWING:
      l.a. EXERCISER TRANSFER SELECTOR SWITCH: PERMITS SELECTION OF EXERCISE WITH AND WITHOUT LOAD TRANSFER.
      l.b. PUSH-BUTTON PROGRAMMING CONTROL WITH DIGITAL DISPLAY OF SETTINGS.
      l.c. INTEGRAL BATTERY OPERATION OF TIME SWITCH WHEN NORMAL CONTROL POWER IS UNAVAILABLE.

2.18 GENERATOR:

A. PROVIDE A LEGALLY REQUIRED STANDBY SYSTEM PER ARTICLE 701 OF THE NATIONAL ELECTRIC CODE:

a. DIESEL ENGINE.
b. DIESEL FUEL-OIL SYSTEM.
c. CONTROL AND MONITORING.
d. GENERATOR OVERCURRENT AND FAULT PROTECTION.
e. GENERATOR, EXCITER, AND VOLTAGE REGULATOR.
f. OUTDOOR ENGINE GENERATOR ENCLOSURE.
g. VIBRATION ISOLATION DEVICES.

B. AUTOMATIC TRANSFER SWITCH INCLUDES SENSORS AND RELAYS TO INITIATE AUTOMATIC-STARTING AND -STOPPING SIGNALS FOR ENGINE GENERATORS.

C. WARRANTY:

1. MANUFACTURER'S WARRANTY: MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF PACKAGED ENGINE GENERATORS AND ASSOCIATED AUXILIARY COMPONENTS THAT FAIL IN MATERIALS OR WORKMANSHIP FOR A 5-YEAR WARRANTY PERIOD FROM DATE OF DELIVERY TO PROJECT SITE. WARRANTY MUST INCLUDE COST OF PARTS, TRAVEL, AND LABOR FOR THE ENTIRE PERIOD.

D. MANUFACTURER:
   a. GENERAC POWER SYSTEMS, INC.
   b. CATERPILLAR, INC.: ELECTRIC POWER DIVISION.
   c. CUMMINS POWER GENERATION.
   d. KOHLER POWER SYSTEMS.
   e. OR EQUIVALENT.
1. SOURCE LIMITATIONS: OBTAIN PACKAGED ENGINE GENERATORS, AUTOMATIC TRANSFER SWITCH, AND AUXILIARY COMPONENTS FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.

E. ENGINE/GENERATOR REQUIREMENTS:

1. POWER RATING: STANDBY.
2. POWER FACTOR: 0.8, LAGGING.
3. FREQUENCY: 60 HZ.
4. VOLTAGE: 480-VOLTS A.C.
5. PHASE: THREE-PHASE, FOUR WIRE, WYE.
6. POWER OUTPUT RATINGS: NOMINAL AT 0.8 POWER FACTOR EXCLUDING POWER REQUIRED FOR THE CONTINUED AND REPEATED OPERATION OF THE UNIT AND AUXILIARIES.
7. ENGINE GENERATOR PERFORMANCE:
   a. STEADY-STATE VOLTAGE OPERATIONAL BANDWIDTH: 1 PERCENT OF RATED OUTPUT VOLTAGE FROM NO LOAD TO FULL LOAD.
   b. TRANSIENT VOLTAGE PERFORMANCE: NOT MORE THAN 10 PERCENT VARIATION FOR 100% STEP-LOAD INCREASE OR DECREASE. VOLTAGE SHALL RECOVER AND REMAIN WITHIN THE STEADY-STATE OPERATING BAND WITHIN 0.5 SECOND.
   c. STEADY-STATE FREQUENCY OPERATIONAL BANDWIDTH: +/- 0.25 PERCENT OF RATED FREQUENCY FROM NO LOAD TO FULL LOAD.
   d. STEADY STATE FREQUENCY STABILITY: WHEN SYSTEM IS OPERATING AT ANY CONSTANT LOAD WITHIN THE RATED LOAD, THERE SHALL BE NO RANDOM SPEED VARIATIONS OUTSIDE THE STEADY-STATE OPERATIONAL BAND AND NO HUNTING OR SURGING OF SPEED.
   e. TRANSIENT FREQUENCY PERFORMANCE: LESS THAN 2-HZ VARIATION. FREQUENCY SHALL RECOVER AND REMAIN WITHIN THE STEADY-STATE OPERATING BAND WITHIN TWO SECONDS.
   f. OUTPUT WAVEFORM: AT NO LOAD, HARMONIC CONTENT MEASURED LINE TO NEUTRAL SHALL NOT EXCEED 2 PERCENT TOTAL WITH NO SLOT RIPPLE. TELEPHONE INFLUENCE FACTOR, DETERMINED ACCORDING TO NEMA MG 1, SHALL NOT EXCEED 50 PERCENT.
   g. SUSTAINED SHORT-CIRCUIT CURRENT: FOR A THREE-PHASE, BOLTED SHORT CIRCUIT AT SYSTEM OUTPUT TERMINALS, SYSTEM SHALL SUPPLY A MINIMUM OF 300 PERCENT OF RATED FULL-LOAD CURRENT FOR NOT LESS THAN 10 SECONDS AND THEN CLEAR THE FAULT AUTOMATICALLY, WITHOUT DAMAGE TO WINDING INSULATION OR OTHER GENERATOR SYSTEM COMPONENTS.
   h. EXCITATION SYSTEM: PERFORMANCE SHALL BE UNAFFECTED BY VOLTAGE DISTORTION CAUSED BY NONLINEAR LOAD. PROVIDE PERMANENT MAGNET EXCITATION FOR POWER SOURCE TO VOLTAGE REGULATOR.
   i. START TIME: COMPLY WITH NFPA 110, TYPE 10 SYSTEM REQUIREMENTS.
9. FUEL: DIESEL FUEL OIL, GRADE DF-2 ULS TYPE.
10. JACKET COOLANT HEATER: ELECTRIC-IMMERSION TYPE, FACTORY INSTALLED IN COOLANT JACKET SYSTEM. COMPLY WITH UL 499.
11. INTEGRAL COOLING SYSTEM: CLOSED LOOP, LIQUID COOLED, WITH RADIATOR FACTORY MOUNTED ON ENGINE GENERATOR SET MOUNTING FRAME AND INTEGRAL ENGINE-DRIVEN COOLANT PUMP.
12. MUFFLER/SILENCER: CRITICAL TYPE.
13. AIR-INTAKE FILTER: HEAVY-DUTY, ENGINE-MOUNTED AIR CLEANER WITH REPLACEABLE DRY-FILTER ELEMENT AND "BLOCKED FILTER" INDICATOR.
14. STARTING SYSTEM: 12-VOLT OR 24-VOLT ELECTRIC, WITH NEGATIVE GROUND.
15. SUBBASE-MOUNTED, DOUBLE-WALL, FUEL-OIL TANK: FACTORY INSTALLED AND PIPED, COMPLYING WITH UL 142 FUEL-OIL TANK WITH CAPACITY SUITABLE FOR 24 HOURS OF OPERATION AT FULL LOAD. PROVIDE 5-GALLON FILL/SPILL CONTAINMENT AND OVERFILL PREVENTION VALVE IN ACCORDANCE WITH IDAHO RULES FOR PUBLIC DRINKING WATER SYSTEMS, SECTION 512.02.C.
16. CONTROL AND MONITORING PANEL: DIGITAL ENGINE GENERATOR CONTROLLER WITH MODERN DISPLAY TECHNOLOGY, CONTROLS, AND MICROPROCESSOR, CAPABLE OF LOCAL AND REMOTE CONTROL, MONITORING, AND PROGRAMMING, WITH BATTERY BACKUP.
17. COMMUNICATIONS: A SEPARATE TERMINAL BLOCK, FACTORY WIRED TO FOUR FORM C RELAYS THAT CAN BE ASSIGNED TO ANY ALARM OR FAULT. PROVIDE ETHERNET CONNECTIONS FOR DATA TRANSMISSION OF INDICATIONS TO REMOTE DATA TERMINALS USING MODBUS RTU PROTOCOL.
18. GENERATOR OVERCURRENT PROTECTIVE DEVICE: MOLDED-CASE CIRCUIT BREAKER, ELECTRONIC-TRIP TYPE, COMPLYING WITH UL 489.
19. GENERATOR PROTECTOR: MICROPROCESSOR-BASED UNIT.
20. GROUND-FAULT INDICATION: COMPLY WITH NFPA 70. INDICATEGROUND FAULT WITH OTHER ENGINE GENERATOR ALARM INDICATIONS.
21. VOLTAGE REGULATOR: SOLID-STATE TYPE, SEPARATE FROM EXCITER, PROVIDING PERFORMANCE AS SPECIFIED. ADJUSTMENT ON CONTROL AND MONITORING PANEL: PROVIDE PLUS OR MINUS 5 PERCENT ADJUSTMENT OF OUTPUT-VOLTAGE OPERATING BAND.
22. WINDINGS: TWO-THIRDS PITCH STATOR WINDING AND FULLY LINKED AMORTISSEUR WINDING.
23. THE LOAD STARTUP SEQUENCE SUBSEQUENT TO AN ELECTRIC UTILITY POWER OUTAGE (AND USED FOR GENERATOR SIZING) IS ALL LOADS SHOWN ON THE SINGLE-LINE DIAGRAM AND PANELBOARD SCHEDULE IN ONE STEP.
24. OUTDOOR ENCLOSURE:
   a. VANDAL-RESISTANT, SOUND-ATTENUATING, WEATHERPROOF STEEL HOUSING.
   b. SOUND ATTENUATION: SOUND LEVEL MEASUREMENTS SHALL BE TAKEN AT A DISTANCE OF 23 FEET ON ALL FOUR SIDES OF THE GENERATOR. THE AVERAGE OF ALL FOUR MEASUREMENTS SHALL BE 78 DBA OR LESS.
   c. INTERIOR LIGHTS WITH SWITCH: FACTORY-WIRED, VAPOR-PROOF LUMINAIRES WITHIN HOUSING; ARRANGED TO ILLUMINATE CONTROLS AND ACCESSIBLE INTERIOR. ARRANGE FOR EXTERNAL ELECTRICAL CONNECTION.
   d. AC LIGHTING SYSTEM AND CONNECTION POINT FOR OPERATION WHEN REMOTE SOURCE IS AVAILABLE.
   e. CONVENIENCE OUTLETS: FACTORY-WIRED, GFCI. ARRANGE FOR EXTERNAL ELECTRICAL CONNECTION.
   f. POWER DISTRIBUTION: PROVIDE PANELBOARD LOCATED ON ENGINE/GENERATOR SKID AND WIRED TO SERVE ALL SPECIFIED SKID MOUNTED LOADS. PANELBOARD SHALL BE SUITABLE FOR CONNECTION TO 240-VOLT, SINGLE-PHASE, 3-WIRE, 30-AMP FEEDER CIRCUIT AS SHOWN ON DRAWINGS.
25. FINISHES: MANUFACTURER'S STANDARD FINISH OVER CORROSION-RESISTANT PRETREATMENT AND COMPATIBLE PRIMER.

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OWNER REVIEW SET NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER REGISTERED JOHN J. BARRUTIA JR. 7051 STATE OF IDAHO
5/26/22

NO.	REVISIONS	DATE

NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS
ELECTRICAL SPECIFICATIONS

SCALE: NONE
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET
E-5

ELECTRICAL SPECIFICATIONS (PAGE 2 OF 2)

PART 3 - EXECUTION

3.01 GENERAL

A. INSTALL MATERIALS AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

B. WORK SHALL COMPLY WITH ALL APPLICABLE PROVISION OF NECA 1.

C. INSTALL MATERIALS AND EQUIPMENT IN HAZARDOUS AREAS IN A MANNER ACCEPTABLE TO REGULATORY AUTHORITY HAVING JURISDICTION FOR THE CLASS, DIVISION, AND GROUP OF HAZARDOUS AREAS SHOWN.

D. ELECTRICAL DRAWINGS SHOW GENERAL LOCATION OF EQUIPMENT, DEVICES, AND RACEWAYS, UNLESS SPECIFICALLY DIMENSIONED.

3.02 DEMOLITION

A. GENERAL DEMOLITION:

1. WHERE SHOWN, DE-ENERGIZE AND DISCONNECT NON-ELECTRICAL EQUIPMENT FOR REMOVAL BY OTHERS.
2. WHERE SHOWN, DE-ENERGIZE, DISCONNECT, AND REMOVE ELECTRICAL EQUIPMENT.
3. REMOVE AFFECTED CIRCUITS AND RACEWAYS BACK TO SERVING PANELBOARD OR CONTROL PANEL. WHERE AFFECTED CIRCUITS ARE CONSOLIDATED WITH OTHERS. REMOVE RACEWAYS BACK TO FIRST SHARED CONDULET OR BOX. WHERE UNDERGROUND OR EMBEDDED RACEWAYS ARE TO BE ABANDONED, REMOVE RACEWAY TO 1 INCH BLOW SURFACE OF STRUCTURE OR 12 INCHES BELOW GRADE AND RESTORE EXISTING SURFACE.

3.03 PROTECTION FOLLOWING INSTALLATION

A. PROTECT MATERIALS AND EQUIPMENT FROM CORROSION, PHYSICAL DAMAGE, AND EFFECTS OF MOISTURE ON INSULATION.

B. CAP CONDUIT RUNS DURING CONSTRUCTION WITH MANUFACTURED SEALS.

C. CLOSE OPENINGS IN BOXES OR EQUIPMENT DURING CONSTRUCTION.

3.05 JUNCTION AND PULL BOXES

A. BOX TYPE (STEEL RACEWAY SYSTEM)"
1. OUTDOOR LOCATIONS: CAST METAL.
2. INDOOR DRY LOCATIONS:
   a. EXPOSED RIGID CONDUIT: CAST METAL.

B. INSTALL WHERE SHOWN AND WHERE NECESSARY TO TERMINATE, TAP-OFF, OR REDIRECT MULTIPLE CONDUIT RUNS.

C. INSTALL PULL BOXES WHERE NECESSARY IN RACEWAY SYSTEM TO FACILITATE CONDUCTOR INSTALLATION.

D. INSTALL IN CONDUIT RUNS AT LEAST EVERY 150 FEED OR AFTER THE EQUIVALENT OF THREE RIGH-ANGLE BENDS.

E. USE OUTLET BOXES AS JUNCTION AND PULL BOXES WHEREVER POSSIBLE AND ALLOWED BY APPLIED BY APPLICABLE CODES.

F. USE CONDUIT BODIES AS JUNCTION BOXES WHERE NO SPLICES ARE REQUIRED AND THEIR USE IS ALLOWED BY APPLICABLE CODES.

G. INSTALLED BOXES SHALL BE ACCESSIBLE.

H. DO NOT INSTALL ON FINISHED SURFACES.

I. INSTALL PLUMB AND LEVEL.

J. SUPPORT BOXES INDEPENDENTLY OF CONDUIT BY ATTACHMENT TO BUILDING STRUCTURE OR STRUCTURAL MEMBER.

K. FLUSH MOUNTED:

1. INSTALL WITH CONCEALED CONDUIT.
2. HOLES IN SURROUNDING SURFACE SHALL BE NO LARGER THAN REQUIRED TO RECEIVE BOX.
3. MAKE EDGES OF BOXES FLUSH WITH FINAL SURFACE.

K. MOUNTING HARDWARE:

1. INDOOR DRY AREAS: GALVANIZED.
2. OUTDOOR WET AREAS: STAINLESS STEEL.

3.13 NAMEPLATES

A. PROVIDE IDENTIFYING NAMEPLATE ON ALL EQUIPMENT.

3.14 SURGE PROTECTIVE DEVICE (SPD) EQUIPMENT

A. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, INCLUDING LEAD LENGTH, OVERCURRENT PROTECTION, AND GROUNDING.

3.15 CONDUIT AND FITTINGS

A. GENERAL:

1. CRUSHED OR DEFORMED RACEWAYS NOT PERMITTED.
2. MAINTAIN RACEWAY ENTIRELY FREE OF OBSTRUCTIONS AND MOISTURE.
3. IMMEDIATELY AFTER INSTALLATION, PLUG AND CAP RACEWAY ENDS WITH WATERTIGHT AND DUST-TIGHT SEALS UNTIL TIME FOR PULLING IN CONDUCTORS.
4. SEALING FITTINGS: PROVIDE DRAIN SEAL IN VERTICAL RACEWAYS WHERE CONDENSATE MAY COLLECT ABOVE SEALING FITTINGS.
5. AVOID MOISTURE TRAPS WHERE POSSIBLE. WHERE UNAVOIDABLE IN EXPOSED CONDUIT RUNS, PROVIDE JUNCTION BOX AND DRAIN FITTING AT CONDUIT LOW POINT.
6. GROUP RACEWAYS INSTALLED IN SAME AREA.
7. FOLLOW STRUCTURAL SURFACE CONTOURS WHEN INSTALLING EXPOSED RACEWAYS. AVOID OBSTRUCTION OF PASSAGEWAYS.
8. RUN EXPOSED RACEWAYS PARALLEL OR PERPENDICULAR TO WALLS, STRUCTURAL MEMBERS, OR INTERSECTIONS OF VERTICAL PLANES.
9. BLOCK WALLS: DO NOT INSTALL RACEWAYS IN SAME HORIZONTAL COURSE WITH REINFORCING STEEL.
10. INSTALL WATERTIGHT FITTINGS IN OUTDOOR, UNDERGROUND, OR WET LOCATIONS.
11. PAINT THREADS AND CUT ENDS, BEFORE ASSEMBLY OF FITTINGS, GALVANIZED CONDUIT, PVC-COATED GALVANIZED CONDUIT, OR IMC INSTALLED IN EXPOSED OR DAMP LOCATIONS WITH ZINC-RICH PAINT OR LIQUID GALVANIZING COMPOUND.
12. METAL CONDUIT TO BE REAMED, BURRS REMOVED, AND CLEANED BEFORE INSTALLATION OF CONDUCTORS, WIRES, OR CABLES.
13. DO NO INSTALL RACEWAYS IN CONCRETE EQUIPMENT PADS, FOUNDATIONS, OR BEAMS.
14. HORIZONTAL RACEWAYS INSTALLED UNDER FLOOR SLABS SHALL LIE COMPLETELY UNDER SLAB, WITH NO PART EMBEDDED WITHIN SLAB.
15. INSTALL CONCEALED, EMBEDDED, AND BURIED RACEWAYS SO THAT THEY EMERGE AT RIGHT ANGLES TO SURFACE AND HAVE NO CURVED PORTION EXPOSED.
16. INSTALL CONDUITS FOR FIBER OPTIC CABLES, TELEPHONE CABLES, AND CATEGORY 5 DATA CABLES IN STRICT CONFORMANCE WITH THE REQUIREMENTS OF EIA/TIA 569.

B. INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE:

1. MINIMUM COVER 2 INCHES, INCLUDING ALL FITTINGS.
2. CONDUIT PLACEMENT SHALL NOT REQUIRE CHANGES IN REINFORCING STEEL LOCATION OR CONFIGURATION.
3. PROVIDE NONMETALLIC SUPPORT DURING PLACEMENT OF CONCRETE TO ENSUE RACEWAY REMAINS IN POSITION.
4. CONDUIT LARGER THAN 1 INCH SHALL NOT BE EMBEDDED IN CONCRETE SLABS, WALLS, FOUNDATIONS, COLUMNS OR BEAMS, UNLESS APPROVED BY ENGINEER.
5. SLABS AND WALLS:
   a. TRADE SIZE OF CONDUIT NOT TO EXCEED ONE-FOURTH OF THE SLAB OR WALL THICKNESS.
   b. INSTALL WITHIN MIDDLE ONE-THIRD OF SLAB OR WALL.
   c. SEPARATE CONDUIT LESS THAN 2-INCH TRADE SIZE BY A MINIMUM TEN TIMES CONDUIT TRADE SIZE, CENTER-TO-CENTER, UNLESS OTHERWISE SHOWN.
   d. SEPARATE CONDUIT 2 INCHES AND GREATER TRADE SIZE BY A MINIMUM EIGHT TIMES CONDUIT TRADE SIZE, CENTER-TO-CENTER, UNLESS OTHERWISE SHOWN.
   e. CROSS CONDUIT AT AN ANGLE GREATER THAN 45 DEGREES, WITH MINIMUM SEPARATION OF 1 INCH.
   f. SEPARATE CONDUIT BY A MINIMUM SIX TIMES THE OUTSIDE DIMENSION OF EXPANSION AND DEFLECTION FITTINGS AT EXPANSION JOINTS.
   g. CONDUIT SHALL NOT BE INSTALLED BELOW THE MAXIMUM WATER SURFACE ELEVATION IN WALLS OF WATER HOLDING STRUCTURES.
6. COLUMNS AND BEAMS:
   a. TRADE SIZE OF CONDUIT NOT TO EXCEED ONE-FOURTH OF BEAM THICKNESS.
   b. CONDUIT CROSS-SECTIONAL AREA NOT TO EXCEED 4 PERCENT OF BEAM OR COLUMN CROSS SECTION.

C. CONDUIT APPLICATION:

1. MINIMUM DIAMETER 3/4 INCH.
2. OUTDOOR, EXPOSED: INTERMEDIATE METAL CONDUIT.
3. INDOOR, EXPOSED: INTERMEDIATE METAL CONDUIT.
6. DIRECT EARTH BURIAL: PVC SCHEDULE 40.
7. UNDER SLABS-ON-GRADE: PVC SCHEDULE 40.

D. CONNECTIONS:

1. FOR MOTORS, WALL, OR CEILING MOUNTED FANS AND UNIT HEATERS, DRY TYPE TRANSFORMERS, ELECTRICALLY OPERATED VALVES, INSTRUMENTATION, AND OTHER EQUIPMENT WHERE FLEXIBLE CONNECTION IS REQUIRED TO MINIMIZE VIBRATION:
   a. GENERAL: FLEXIBLE METAL, LIQUID-TIGHT CONDUIT.
   b. WET OR CORROSIVE AREAS: FLEXIBLE METAL LIQUID-TIGHT.
   c. LENGTH: 18 INCHES MINIMUM, 60 INCHES MAXIMUM, SUFFICIENT TO ALLOW MOVEMENT OR ADJUSTMENT OF EQUIPMENT.
2. OUTDOOR AREAS: FLEXIBLE METAL, LIQUID-TIGHT CONDUIT.
3. TRANSITION FROM UNDERGROUND OR CONCRETE EMBEDDED TO EXPOSED: PVC-COATED RIGID STEEL CONDUIT.
4. UNDER EQUIPMENT PADS: PVC-COATED RIGID STEEL CONDUIT.

E. PENETRATIONS:

1. MAKE AT RIGHT ANGLES, UNLESS OTHERWISE SHOWN.
2. NOTCHING OR PENETRATION OF STRUCTURAL MEMBERS, INCLUDING FOOTINGS AND BEAMS NOT PERMITTED.
3. FIRE-RATED WALLS, FLOORS, OR CEILINGS: FIRESTOP OPENINGS AROUND PENETRATIONS TO MAINTAIN FIRE-RESISTANCE RATING.
4. CONCRETE WALLS, FLOORS, OR CEILINGS (ABOVE GROUND): PROVIDE NON-SHRINK GROUT DRY-PACK.
5. ENTERING STRUCTURES:
   a. GENERAL: SEAL RACEWAY AT THE FIRST BOX OR OUTLET WITH OAKUM OR EXPANDABLE PLASTIC COMPOUND TO PREVENT THE ENTRANCE OF GASES OR LIQUIDS FROM ONE AREA TO ANOTHER.
   b. CONCRETE ROOF OR MEMBRANE WATERPROOFED WALL OR FLOOR: PROVIDE WATERTIGHT SEAL.
   c. HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) EQUIPMENT:
      c.a. PENETRATE EQUIPMENT IN AREA ESTABLISHED BY MANUFACTURER.
      c.b. TERMINATE CONDUIT WITH FLEXIBLE METAL CONDUIT AT JUNCTION BOX OR CONDULET ATTACHED TO EXTERIOR SURFACE OF EQUIPMENT PRIOR TO PENETRATING EQUIPMENT.
      c.c. SEAL PENETRATION WITH JOINT SEALANT.
   d. CORROSIVE-SENSITIVE AREAS:
      d.a. SEAL ALL CONDUIT PASSING THROUGH CHLORINE ROOM WALLS.
      d.b. SEAL CONDUIT ENTERING EQUIPMENT PANELBOARDS AND FIELD PANELS CONTAINING ELECTRONIC EQUIPMENT.
      d.c. SEAL PENETRATION WITH JOINT SEALANT.
   e. EXISTING OR PRECAST WALL (UNDERGROUND): CORE DRILL WALL AND INSTALL WATERTIGHT ENTRANCE SEAL DEVICE.
   f. NON-WATERPROOFED WALL OR FLOOR (UNDERGROUND, WITHOUT CONCRETE ENCASEMENT):
      f.a. PROVIDE SCHEDULE 40 GALVANIZED PIPE SLEEVE OR WATERTIGHT ENTRANCE SEAL DEVICE.
      f.b. FILL SPACE BETWEEN RACEWAY AND SLEEVE WITH EXPANDABLE PLASTIC COMPOUND OR OAKUM AND LEAD JOINT ON EACH SIDE.

F. SUPPORT:

1. SUPPORT FROM STRUCTURAL MEMBER ONLY, AT INTERVALS NOT EXCEEDING NFPA 70 REQUIREMENTS, AND IN ANY CASE NOT EXCEEDING 8 FEET. DO NOT SUPPORT FROM PIPING, PIPE SUPPORTS, OR OTHER RACEWAYS.

2. APPLICATION/TYPE OF CONDUIT STRAP:
   a. STEEL CONDUIT: ZINC-COATED STEEL, PRE-GALVANIZED STEEL, OR MALLEABLE IRON.
   b. NONMETALLIC CONDUIT: NONMETALLIC OR PVC-COATED METAL.
3. PROVIDE AND ATTACH WALL BRACKETS, STRAP HANGERS, OR CEILING TRAPEZE AS FOLLOWS:
   a. WOOD: WOOD SCREWS.
   b. HOLLOW MASONRY UNITS: TOGGLE BOLTS.
   c. CONCRETE OR BRICK: EXPANSION SHIELDS, OR THREADED STUDS DRIVEN IN BY POWDER CHARGE, WITH LOCK WASHERS AND NUTS.
   d. STEELWORK: MACHINE SCREWS.
   e. LOCATION/TYPE OF HARDWARE:
      e.a. DRY, NON-CORROSIVE AREAS: GALVANIZED.
      e.b. WET, NON-CORROSIVE AREAS: STAINLESS STEEL.

G. BENDS:

1. INSTALL CONCEALED RACEWAYS WITH A MINIMUM OF BENDS IN THE SHORTEST PRACTICAL DISTANCE.
2. MAKE BENDS AND OFFSETS OF LONGEST PRACTICAL RADIUS. BENDS IN CONDUITS AND DUCTS BEING INSTALLED FOR FIBER OPTIC CABLES SHALL BE NOT LESS THAN 20 TIMES CABLE DIAMETER, 15 INCHES MINIMUM.
3. INSTALL WITH SYMMETRICAL BENDS OR CAST METAL FITTINGS.
4. AVOID FIELD-MADE BENDS AND OFFSETS, BUT WHERE NECESSARY, MAKE WITH ACCEPTABLE HICKEY OR BENDING MACHINE. DO NOT HEAT METAL RACEWAYS TO FACILITATE BENDING.
5. MAKE BENDS IN PARALLEL OR BANKED RUNS FROM SAME CENTER OR CENTERLINE WITH SAME RADIUS SO THAT BENDS ARE PARALLEL.
6. FACTORY ELBOWS MAY BE INSTALLED IN PARALLEL OR BANKED RACEWAYS IF THERE IS CHANGE IN PLANE OF RUN AND RACEWAYS ARE SAME SIZE.
7. PVC CONDUIT:
   a. BENDS 30 DEGREES AND LARGER: PROVIDE FACTORY-MADE ELBOWS.
   b. 90-DEGREE BENDS: PROVIDE RIGID STEEL ELBOWS, PVC-COATED WHERE DIRECT BURIED.
   c. USE MANUFACTURER'S RECOMMENDED METHOD FOR FORMING SMALLER BENDS.
8. FLEXIBLE CONDUIT: DO NOT MAKE BENDS THAT EXCEED ALLOWABLE CONDUCTOR BENDING RADIUS OF CABLE TO BE INSTALLED OR THAT SIGNIFICANTLY RESTRICTS CONDUIT FLEXIBILITY.

H. EXPANSION AND DEFLECTION FITTINGS: PROVIDE ON ALL RACEWAYS AT STRUCTURAL EXPANSION JOINTS AND IN LONG TANGENTIAL RUNS.

I. PVC CONDUIT

1. SOLVENT WELDING:
   a. PROVIDE MANUFACTURER RECOMMENDED SOLVENT: APPLY TO ALL JOINTS.
   b. INSTALL SUCH THAT JOINT IS WATERTIGHT.
2. ADAPTERS:
   a. PVC TO METALLIC FITTINGS: PVC TERMINAL TYPE.
   b. PVC TO RIGID METAL CONDUIT: PVC FEMALE ADAPTER.
3. BELLED-END CONDUIT: BEVEL THE UNBELLED END OF THE JOINT PRIOR TO JOINING.

K. TERMINATION AT ENCLOSURES:

1. CAST METAL ENCLOSURE: PROVIDE MANUFACTURER'S PRE-MOLDED INSULATION SLEEVE INSIDE METALLIC CONDUIT TERMINATING IN THREADED HUBS.
2. NONMETALLIC, CABINETS, AND ENCLOSURES: TERMINATE CONDUIT IN THREADED CONDUIT HUBS, MAINTAINING ENCLOSURE INTEGRITY.
3. SHEET METAL BOXES, CABINETS, AND ENCLOSURES:
   a. INTERMEDIATE METAL CONDUIT:
      a.a. PROVIDE ONE LOCK NUT EACH ON INSIDE AND OUTSIDE OF ENCLOSURE.
      a.b. INSTALL GROUNDING BUSHING.
      a.c. PROVIDE BONDING JUMPER FROM GROUNDING BUSHING TO EQUIPMENT GROUND BUS OR GROUND PAD. IF NEITHER GROUND BUS NOR PAD EXISTS, CONNECT JUMPER TO LAG BOLT ATTACHED TO METAL ENCLOSURE.
      a.d. INSTALL INSULATED BUSHING ON ENDS OF CONDUIT WHERE GROUNDING IS NOT REQUIRED.
      a.e. PROVIDE INSULATED THROAT WHEN CONDUIT TERMINATES IN SHEET METAL BOXES HAVING THREADED HUBS.
      a.f. UTILIZE SEALING LOCKNUTS OR THREADED HUBS ON OUTSIDE OF NEMA 3R AND NEMA 12 ENCLOSURES.
      a.g. TERMINATE CONDUITS WITH THREADED CONDUIT HUBS AT NEMA 4 AND 4X BOXES AND ENCLOSURES.
   b. FLEXIBLE METAL CONDUIT: PROVIDE TWO-SCREW TYPE, INSULATED, MALLEABLE IRON CONNECTORS.
   c. PVC SCHEDULE 40 CONDUIT: PROVIDE PVC TERMINAL ADAPTOR WITH LOCKNUT.
4. FREE-STANDING ENCLOSURES:
   a. TERMINATE METAL CONDUIT ENTERING BOTTOM WITH GROUNDING BUSHING. PROVIDE A GROUNDING JUMPER EXTENDING TO EQUIPMENT GROUND BUS OR GROUNDING PAD.
   b. TERMINATE PVC CONDUIT ENTERING BOTTOM WITH BELL END FITTINGS.

L. EMPTY RACEWAYS:

1. PROVIDE PERMANENT, REMOVABLE CAP OVER EACH END.
2. PROVIDE NYLON PULL CORD.
3. IDENTIFY WITH WATERPROOF TAGS ATTACHED TO PULL CORD AT EACH END, AND AT INTERMEDIATE PULL POINT.

3.16 CONDUCTORS AND CABLE

A. CONDUCTOR STORAGE, HANDLING, AND INSTALLATION SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

B. DO NOT EXCEED MANUFACTURER'S RECOMMENDATIONS FOR MAXIMUM PULLING TENSIONS AND MINIMUM BENDING RADII.

C. CONDUIT SYSTEM SHALL BE COMPLETE PRIOR TO DRAWING CONDUCTORS. LUBRICATE PRIOR TO PULLING INTO CONDUIT. LUBRICATION TYPE SHALL BE APPROVED BY CONDUCTOR MANUFACTURER.

D. TERMINATE ALL CONDUCTORS AND CABLES UNLESS OTHERWISE SHOWN.

E. DO NOT SPLICE CONDUCTORS, UNLESS SPECIFICALLY INDICATED OR APPROVED BY ENGINEER.

F. BUNDLING: WHERE SINGLE CONDUCTORS AND CABLES IN MANHOLES, HAND HOLES, VAULTS, CABLE TRAYS, AND OTHER INDICATED LOCATIONS ARE NOT WRAPPED TOGETHER BY SOME OTHER MEANS, BUNDLING CONDUCTORS FROM EACH CONDUIT THROUGHOUT THEIR EXPOSED LENGTH WITH CABLE TIES PLACED AT INTERVALS NOT EXCEEDING 12 INCHES.

G. WIRING WITHIN EQUIPMENT AND LOCAL CONTROL PANELS: REMOVE SURPLUS WIRE, DRESS, BUNDLE, AND SECURE.

H. POWER CONDUCTOR COLOR CODING:

1. NO. 6 AWG AND LARGER: APPLY GENERAL PURPOSE, FLAME RETADANT TAPE AT EACH END, AND AT ACCESSIBLE LOCATIONS WRAPPED AT LEAST SIX FULL OVERLAPPING TURNS, COVERING AN AREA 1-1/2 TO 2 INCHES WIDE.
2. NO. 8 AWG AND SMALLER: PROVIDE COLORED CONDUCTORS.
3. COLORS:
   a. NEUTRAL WIRE: WHITE
   b. LIVE WIRES, 120/240 VOLT, SINGLE PHASE SYSTEM: BLACK AND RED.
   c. LIVE WIRES, 120/208 VOLT, THREE PHASE SYSTEM: BLACK, RED, AND BLUE.
   d. LIVE WIRES, 277/480 VOLT, THREE PHASE SYSTEM: BROWN, ORANGE, AND YELLOW.
   e. GROUND WIRE: GREEN.

I. CIRCUIT IDENTIFICATION:

1. ASSIGN CIRCUIT NAME BASED ON DEVICE OR EQUIPMENT AT LOAD END OF CIRCUIT. WHERE THIS WOULD RESULT IN SAME NAME BEING ASSIGNED TO MORE THAN ONE CIRCUIT, ADD NUMBER OR LETTER TO EACH OTHERWISE IDENTICAL CIRCUIT NAME TO MAKE IT UNIQUE.
2. METHOD: IDENTIFY WITH THE SLEEVES. TAPED-ON MARKERS OR TAGS RELYING ON ADHESIVES NOT PERMITTED.

J. CONNECTIONS AND TERMINATIONS:

1. INSTALL WIRE NUTS ONLY ON SOLID CONDUCTORS.
2. INSTALL NYLON SELF-INSULATED CRIMP CONNECTORS AND TERMINATORS FOR INSTRUMENTATION AND CONTROL CIRCUIT CONDUCTORS.
3. TAPE INSULATE ALL UN-INSULATED CONNECTIONS.
4. INSTALL CRIMP CONNECTORS AND COMPRESSION LUGS WITH TOOLS APPROVED BY CONNECTOR MANUFACTURER.

3.17 GROUNDING

A. GROUNDING SHALL BE IN COMPLIANCE WITH NFPA 70 AND AS SHOWN.

B. GROUND ELECTRICAL SERVICE NEUTRAL AT SERVICE ENTRANCE EQUIPMENT TO SUPPLEMENTARY GROUNDING ELECTRODES.

C. GROUND EACH SEPARATELY DERIVED SYSTEM NEUTRAL TO NEAREST EFFECTIVELY GROUNDED BUILDING STRUCTURAL STEEL MEMBER OR SEPARATE GROUNDING ELECTRODE.

D. BOND TOGETHER SYSTEM NEUTRALS, SERVICE EQUIPMENT ENCLOSURES, EXPOSED NON-CURRENT-CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT, METAL RACEWAYS, GROUND CONDUCTOR IN RACEWAYS AND CABLES, RECEPTACLE GROUND CONNECTIONS, AND METAL PIPING SYSTEMS.

F. SHIELDED INSTRUMENTATION CABLES:

1. GROUND SHIELD TO GROUND BUS AT POWER SUPPLY FOR ANALOG SIGNAL.
2. EXPOSE SHIELDED MINIMUM 1 INCH AT TERMINATION TO FILED INSTRUMENT AND APPLY HEAT SHRINK TUBE.
3. DO NOT GROUND INSTRUMENTATION CABLE SHIELD AT MORE THAN ONE POINT.

G. EQUIPMENT GROUNDING CONDUCTORS: PROVIDE IN ALL CONDUITS CONTAINING POWER CONDUCTORS AND CONTROL CIRCUITS ABOVE 50 VOLTS.

H. GROUND RODS: INSTALL FULL LENGTH WITH CONDUCTOR CONNECTION AT UPPER END.

3.19 AUTOMATIC TRANSFER SWITCH

A. INSTALLATION:

1. PROVIDE WORKSPACE AND CLEARANCES REQUIRED BY NFPA 70.
2. SET FIELD-ADJUSTABLE INTERVALS AND DELAYS, RELAYS, AND ENGINE EXERCISER CLOCK.
3. COMPLY WITH NECA 1.
4. MATCH TYPE AND NUMBER OF CABLES AND CONDUCTORS TO GENERATOR SETS, CONTROL, AND COMMUNICATION REQUIREMENTS OF TRANSFER SWITCHES AS RECOMMENDED BY MANUFACTURER. INCREASE RACEWAY SIZES AT NO ADDITIONAL COST TO OWNER IF NECESSARY TO ACCOMMODATE REQUIRED WIRING.
5. ENGAGE FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO ADMINISTER AND PERFORM TESTS AND INSPECTIONS ON COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS.

B. TESTS AND INSPECTIONS:

1. VISUAL AND MECHANICAL INSPECTION:
   a. INSPECT PHYSICAL AND MECHANICAL CONDITION.
   b. INSPECT ANCHORAGE, ALIGNMENT, GROUNDING, AND REQUIRED CLEARANCES.
   c. VERIFY THAT THE UNIT IS CLEAN.
   d. VERIFY APPROPRIATE LUBRICATION ON MOVING CURRENT-CARRYING PARTS AND ON MOVING AND SLIDING SURFACES.
   e. VERIFY THAT MANUAL TRANSFER WARNINGS ARE ATTACHED AND VISIBLE.
   f. VERIFY TIGHTNESS OF ALL CONTROL CONNECTIONS.
   g. PERFORM MANUAL TRANSFER OPERATION.
   h. VERIFY POSITIVE MECHANICAL INTERLOCKING BETWEEN NORMAL AND ALTERNATE SOURCES.
   i. VERIFY SETTINGS AND OPERATION OF CONTROL DEVICES.
   j. CALIBRATE AND SET ALL RELAYS AND TIMERS.
   k. VERIFY PHASE ROTATION, PHASING, AND SYNCHRONIZED OPERATION.
   l. PERFORM AUTOMATIC TRANSFER TESTS.
   m. VERIFY CORRECT OPERATION AND TIMING OF THE FOLLOWING FUNCTIONS:
      m.a. NORMAL SOURCE VOLTAGE-SENSING AND FREQUENCY-SENSING RELAYS.
      m.b. ENGINE START SEQUENCE.
      m.c. TIME DELAY ON TRANSFER.
      m.d. ALTERNATIVE SOURCE VOLTAGE-SENSING AND FREQUENCY-SENSING RELAYS.
      m.e. AUTOMATIC TRANSFER OPERATION.
      m.f. INTERLOCKS AND LIMIT SWITCH FUNCTION.
      m.g. TIME DELAY AND RETRANSFER ON NORMAL POWER RESTORATION.
      m.h. ENGINE COOL-DOWN AND SHUTDOWN FEATURE.
   n. COORDINATE TESTS WITH TESTS OF GENERATOR AND RUN THEM CONCURRENTLY.
   o. TRANSFER SWITCHES WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
   p. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.

3.20 GENERATOR

A. INSTALLATION:

1. COMPLY WITH PACKAGED ENGINE GENERATOR MANUFACTURERS' WRITTEN INSTALLATION AND ALIGNMENT INSTRUCTIONS AND WITH NFPA 110.
2. EQUIPMENT MOUNTING:
   a. INSTALL PACKAGED ENGINE GENERATORS ON CAST-IN-PLACE CONCRETE EQUIPMENT BASES.
   b. COORDINATE SIZE AND LOCATION OF CONCRETE BASES FOR PACKAGED ENGINE GENERATORS. CAST ANCHOR-BOLT INSERTS INTO BASES.
   c. INSTALL PACKAGED ENGINE GENERATOR WITH ELASTOMERIC ISOLATOR PADS 4-INCH (100 MM) HIGH CONCRETE BASE. SECURE SETS TO ANCHOR BOLTS INSTALLED IN CONCRETE BASES.

B. FIELD TESTS AND INSPECTION:

1. VERIFY PHASE ROTATION.
2. FUNCTIONALLY TEST ENGINE SHUTDOWN FOR LOW OIL PRESSURE, OVERTEMPERATURE, OVERSPEED, AND OTHER PROTECTION FEATURES AS APPLICABLE.
3. VERIFY CORRECT FUNCTIONING OF THE GOVERNOR AND REGULATOR.
4. COLD-START TEST BY INTERRUPTING NORMAL POWER SOURCE WITH TEST LOAD CONSISTING OF CONNECTED BUILDING LOAD TO VERIFY:
   a. TRANSFER SWITCH OPERATION.
   b. AUTOMATIC STARTING OPERATION.
   c. OPERATING ABILITY OF ENGINE-GENERATOR.
   d. OVERCURRENT DEVICES CAPABILITY TO WITHSTAND INRUSH CURRENTS.
5. NFPA 110 ACCEPTANCE TESTS: PERFORM TESTS REQUIRED BY NFPA 110 THAT ARE ADDITIONAL TO THOSE SPECIFIED HERE, INCLUDING, BUT NOT LIMITED TO, SINGLE-STEP FULL-LOAD PICKUP TEST.
6. VERIFY SPECIFIED VOLTAGE, FREQUENCY, AND HARMONIC PERFORMANCE.
7. VERIFY ENGINE-GENERATOR OPERATION WITH ADJUSTABLE FREQUENCY DRIVES AND POWER FACTOR CORRECTION CAPACITORS ENERGIZED AND OPERATING UNDER NORMAL LOAD CONDITIONS.
8. INSPECT AND TEST ALL ENCLOSURE RELATED SYSTEMS FOR PROPER CONDITION AND OPERATION, INCLUDING ENCLOSURE CONDITION AND FINISH, DOOR OPERATION AND SECURING, SPACE HEATING, POWER DISTRIBUTION, VENTILATION SYSTEM, AND LIGHTING SYSTEM.

3.21 FIELD QUALITY CONTROL

A. GENERAL:

1. TEST EQUIPMENT SHALL HAVE AN OPERATION ACCURACY EQUAL TO, OR GREATER THAN, REQUIREMENTS ESTABLISHED BY NETA ATS.
2. TEST INSTRUMENT CALIBRATION SHALL BE IN ACCORDANCE WITH NETA ATS.
3. PERFORM INSPECTION AND ELECTRICAL TESTS AFTER EQUIPMENT HAS BEEN INSTALLED.
4. PERFORM TESTS WITH APPARATUS DE-ENERGIZED WHENEVER FEASIBLE.
5. INSPECTION AND ELECTRICAL TESTS ON ENERGIZED EQUIPMENT ARE TO BE:
   a. SCHEDULED WITH ENGINEER PRIOR TO DE-ENERGIZATION.
   b. MINIMIZED TO AVOID EXTENDED PERIOD OF INTERRUPTION TO THE OPERATION OF FACILITY.

B. TESTS AND INSPECTION SHALL ESTABLISH THAT:

1. ELECTRICAL EQUIPMENT IS OPERATIONAL WITHIN INDUSTRY AND MANUFACTURER'S TOLERANCES.
2. INSTALLATION OPERATES PROPERLY.
3. EQUIPMENT IS SUITABLE FOR ENERGIZATION.
4. INSTALLATION CONFORMS TO REQUIREMENTS OF CONTRACT DOCUMENTS AND NFPA 70.

C. PERFORM INSPECTION AND TESTING IN ACCORDANCE WITH NETA ATS, INDUSTRY STANDARDS, AND MANUFACTURER'S RECOMMENDATIONS.

D. ADJUST MECHANISMS AND MOVING PARTS FOR FREE MECHANICAL MOVEMENT.

E. ADJUST ADJUSTABLE RELAYS AND SENSORS TO CORRESPOND TO OPERATING CONDITIONS, OR AS RECOMMENDED BY MANUFACTURER.

F. VERIFY NAMEPLATE DATA FOR CONFORMANCE TO CONTRACT DOCUMENTS.

G. REALIGN EQUIPMENT NO PROPERLY ALIGNED AND CORRECT UNLEVELNESS.

H. PROPERLY ANCHOR ELECTRICAL EQUIPMENT FOUND TO BE INADEQUATELY ANCHORED.

I. TIGHTEN ACCESSIBLE BOLTED CONNECTIONS, INCLUDING WIRING CONNECTIONS, WITH CALIBRATED TORQUE WRENCH TO MANUFACTURER'S RECOMMENDATIONS, OR AS OTHERWISE SPECIFIED.

J. CLEAN CONTAMINATED SURFACES WITH CLEANING SOLVENTS AS RECOMMENDED BY MANUFACTURER.

K. PROVIDE PROPER LUBRICATION OF APPLICABLE MOVING PARTS.

L. INVESTIGATE AND REPAIR OR REPLACE:

1. ELECTRICAL ITEMS THAT FAIL TESTS.
2. ACTIVE COMPONENTS NOT OPERATING IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
3. DAMAGED ELECTRICAL EQUIPMENT.

M. ELECTRICAL ENCLOSURES:

1. REMOVE FOREIGN MATERIAL AND MOISTURE FROM ENCLOSURE INTERIOR.
2. VACUUM AND WIPE CLEAN ENCLOSURE INTERIOR.
3. REMOVE CORROSION FOUND ON METAL SURFACES.
4. REPAIR OR REPLACE, AS DETERMINED BY ENGINEER, DOOR AND PANEL SECTIONS HAVING DAMAGED SURFACES.
5. REPLACE MISSING OR DAMAGED HARDWARE.

N. PROVIDE CERTIFIED TEST REPORT(S) DOCUMENTING THE SUCCESSFUL COMPLETION OF SPECIFIED TESTING. INCLUDE FIELD TEST MEASURING DATA.

O. TEST THE FOLLOWING EQUIPMENT AND MATERIALS:

1. CONDUCTORS: INSULATION AND RESISTANCE, NO. 4 AND LARGER ONLY.
2. GROUNDING ELECTRODES.

P. CONTROLS:

1. TEST CONTROL AND SIGNAL WIRING FOR PROPER TERMINATION AND FUNCTION.
2. TEST LOCAL CONTROL PANELS AND OTHER CONTROL DEVICES FOR PROPER TERMINATIONS, CONFIGURATION AND SETTINGS, AND FUNCTIONS.
3. DEMONSTRATE CONTROL, MONITORING, AND INDICATION FUNCTIONS IN PRESENCE OF OWNER AND ENGINEER.

Q. BALANCE ELECTRICAL LOAD BETWEEN PHASES ON PANELBOARDS AFTER INSTALLATION.

R. VOLTAGE TESTING:

1. WHEN INSTALLATION IS COMPLETE AND FACILITY IS IN OPERATION, CHECK VOLTAGE TO PROJECT.
2. CHECK VOLTAGE AMPLITUDE AND BALANCE BETWEEN PHASES FOR LOADED AND UNLOADED CONDITIONS.

S. EQUIPMENT LINE CURRENT:

1. CHECK LINE CURRENT IN EACH PHASE FOR EACH PIECE OF EQUIPMENT.

END OF SECTION

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OWNER REVIEW SET NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER REGISTERED 7051 STATE OF IDAHO JOHN J. BARRUTIA JR.
5/26/22

NO.	REVISIONS	DATE

NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS
ELECTRICAL SPECIFICATIONS

SCALE: NONE
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET E-6

STRUCTURAL SPECIFICATIONS

PART 1 - GENERAL NOTES

1.1 GENERAL NOTES

A. ALL GENERAL NOTES APPLY, UNLESS NOTED ON DRAWINGS OR SPECIFICATIONS.

B. ORDER OF PRECEDENCE: DRAWINGS GOVERN OVER NOTES, NOTES ON THE INDIVIDUAL DRAWINGS GOVERN OVER THESE GENERAL NOTES. FOUNDATION DETAILS GOVERN OVER TYPICAL DETAILS. REFER TO CONTRACT SPECIFICATIONS FOR INFORMATION IN ADDITION TO THAT CONTAINED IN THESE NOTES AND DRAWINGS. THE DRAWINGS SHALL TAKE PRECEDENCE OVER SPECIFICATIONS F THEY CONTRADICT. ADDENDA, RFI'S AN SKETCHES TAKE PRECEDENCE OVER THESE DRAWINGS.

C. NOTIFY ENGINEER OF RECORD OF ANY DISCREPANCIES:
1. BETWEEN PLANS, SPECIFICATIONS AND GOVERNING CODE.
2. BETWEEN DETAILS AND TYPICAL DETAILS.
3. BETWEEN NOTES AND DRAWINGS.

1.2 SCOPE OF WORK

A. THE SEALED STRUCTURAL DRAWINGS AND PROJECT SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE.

B. CONTRACTOR TO INCLUDE IN THE PROPOSAL, ALL REASONABLY FORESEEN ITEMS, ADDRESSING EXISTING CONDITIONS, EQUIPMENT AND MATERIALS TO COMPETE THE PROPOSED SCOPE OF WORK CONTAINED WITHIN THESE DOCUMENTS DURING CONSTRUCTION.

C. OBSERVATION VISITS (SITE VISIT) BY REPRESENTATIVES OF ENGINEER DO NOT INCLUDE INSPECTION OF CONSTRUCTION MEANS AND METHODS. SITE VISITS DURING CONSTRUCTION ARE NOT CONTINUOUS AND DETAILED INSPECTION SERVICES WHICH ARE TO BE PERFORMED BY OTHERS. OBSERVATIONS ARE PREFORMED SOLELY FOR THE PURPOSE OF DETERMINING IF THE CONTRACTOR UNDERSTANDS DESIGN INTENT SHOWN IN THE CONTRACT DRAWINGS. OBSERVATIONS DO NOT GUARANTEE CONTRACTORS PERFORMANCE AND ARE NOT TO BE CONSTRUED AS SUPERVISION OR VERIFICATION OF CONSTRUCTION.

D. THE CONTRACTOR SHALL MAKE AND KEEP CURRENT A SET OF RECORD DRAWINGS SHOWING EXACT DIMENSIONED LOCATIONS OF UNDERGROUND UTILITIES, STUB OUTS, AND CONSTRUCTION CHANGES.

1.3 CODE COMPLIANCE

A. ALL WORK AND MATERIALS SHALL COMPLY WI THE LATEST RULES, CODES, AND REGULATIONS IN THE STATE OF THE PROJECT, INCLUDING, BUT NOT LIMITED TO OCHA, ADOPTED BUILDING CODE AND OTHER STATE AND LOCAL LAWS AND REGULATIONS. CODE COMPLIANCE IS MANDATORY. NOTHING IN THESE DRAWINGS AND SPECIFICATIONS PERMITS WORK NOT CONFORMING TO THESE CODES. WHERE WORK IS SHOWN TO EXCEED MINIMUM CODE REQUIREMENTS, COMPLY WITHE DRAWINGS AND SPECIFICATIONS.

B. ALL PRODUCT SUBMITTALS AND PRODUCT SUBSTITUTIONS ARE TO BE SUPPLIED WITH ICC-ES REPORSTS TO COMPLY WITH CODE REGULATION ACCORDING TO THE ADOPTED BUILDING CODE.

C. SEE SPECIFICATIONS FOR LEED REQUIREMENTS AND GREEN BUILDING PRACTICES REQUIRED FOR THIS PROJECT.

1.4 LICENCE FEES AND PERMITS

A. THE CONTRACTOR SHALL ARRANGE FOR REQUIRED INSPECTIONS AND PAY ALL LICENSE, PERMIT AND INSPECTION FEES, UNLESS DIRECTED OTHERWISE IN SPECIFICATIONS.

1.5 CONDITIONS AT SITE

A. VISIT TO SITE IS REQUIRED FOR ALL BIDDERS PRIOR TO SUBMISSION OF BID. ALL WILL BE HELD TO HAVE FAMILIARIZED THEMSELVES WITH THE DISCERNIBLE CONDITIONS AND NOT EXTRA PAYMENT WILL BE ALLOWED FOR WORK REQUIRED BECAUSE OF THESE CONDITIONS, WHETHER SPECIFICALLY MENTIONED OR NOT.

B. CONTRACTOR TO VERIFY EXISTING STRUCTURE(S) SHOWN IN THE DRAWINGS AND NOTIFY ENGINEER IN WRITING OF ANY DISCREPANCIES.

C. UTILITIES THAT ARE DAMAGED AS A RESULT OF THIS WORK SHALL PROMPTLY BE REPAIRED AT NO EXPENSE TO THE OWNER AND TO COMPLETE SATISFACTION OF THE OWNER.

D. CONTRACTOR TO VERIFY CONSTRUCTION OF BUILDING PAD AND NOTIFY THE GEOTECHNICAL AND STRUCTURAL ENGINEER OF IMPROPER FILL OR BURIED STRUCTURES SUCH AS CESSPOOLS, CISTERNS, FOUNDATIONS, UTILITIES, ETC.

1.6 SAFETY

A. CONTRACTOR TO PROVIDE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AS REQUIRED.

B. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF WORK.

1.7 GUARANTEE

A. GUARANTEE THE INSTALLATION, FREE FROM DEFECTS OF WORKMANSHIP AND MATERIALS, FOR A MINIMUM PERIOD OF ONE YEAR AFTER THE DATE OF CERTIFICATION OF FINAL PAYMENT AND PROMPTLY REMEDY ANY DEFECTS DEVELOPING DURING THIS PERIOD, WITHOUT CHARGE.

1.8 DEFERRED AND SHOP DRAWING SUBMITTALS

A. CONTRACTOR SHALL SUBMIT AN ELECTRONIC PDF FILE OF SHOP DRAWING SUBMITTALS TO THE ENGINEER FOR APPROVAL PRIOR TO ORDERING, FABRICATING, OR INSTALLING. THE REVIEW WILL CONSIST OF GENERAL CONFORMANCE TO THE DESIGN INTENT CONVEYED IN THE CONTRACT DRAWINGS AND REQUIRE A MAXIMUM OF 10 WORKING DAYS FOR REVIEW UPON RECEIPT. NO MODIFICATIONS OR SUBSTITUTIONS OF DRAWINGS AND SPECIFICATIONS WILL BE ACCEPTED V/A SHOP DRAWINGS. SHOP DRAWINGS AND DEFERRED SUBMITTALS (DS) REQUIRED ARE LISTED UNDER EACH MATERIAL IN PART 2.

B. DEFERRED SUBMITTALS REQUIRE ADDITIONAL DESIGN AND SUPPORTING CALCULATIONS WITH AN ENGINEERS SEAL INDICATING THE ENGINEER IS REGISTERED IN THE STATE THAT THE PROJECT OCCURS.

C. CONTACTOR SHALL REVIEW AND STAMP SHOP DRAWINGS PRIOR TO SUBMISSION TO THE ENGINEER. CONTRACTOR SHALL REVIEW FOR COMPLETENESS AND COMPLIANCE WITH CONTRACT DRAWINGS. SHOP DRAWINGS WILL BE REJECTED FOR INCOMPLETENESS, LACK OF COORDINATION WITH OTHER PORTIONS OF CONTRACT DRAWINGS, CALCULATIONS (AS REQUIRED), AND/OR MODIFICATIONS OR SUBSTITUTIONS NOT APPROVED PRIOR TO THE SUBMITTAL.

1.9 WORKMANSHIP

A. ONLY QUALITY WORK WILL BE ACCEPTED. HAZARDOUS OR POOR INSTALLATION PRACTICE WILL BE CAUSE FOR REJECTION OF WORK.

1.10 COORDINATION

A. THE CONSTRUCTION DOCUMENTS DO NO INDICATE THE METHOD OF CONSTRUCTION.

B. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND EXISTING ELEVATIONS SHOWN ON THESE DRAWINGS PRIOR TO CONSTRUCTION. DO NOT SCALE PLANS.

C. CONTRACTOR TO REPORT IN WRITING ANY OMISSIONS AND/OR DISCREPANCIES ON DRAWINGS AND/OR SPECIFICATIONS TO THE ENGINEER PRIOR TO PROCEEDING.

D. REFER TO ELECTRICAL PLANS FOR ADDITIONAL WORK.

1.11 MISC

A. TYPICAL DETAILS AND SCHEDULES INDICATED MAY NOT BE SPECIFICALLY REFERENCED ON THE DRAWINGS. THE CONTRACTOR IS RESPONSIBLE TO DETERMINE WHERE EACH TYPICAL DETAIL OR SCHEDULE APPLIES. IF LOCATIONS ARE FOUND WHERE NO TYPICAL DETAIL, TYPICAL SCHEDULE, OR SPECIFIC DETAIL APPLIES, NOTIFY THE ENGINEER.

PART 2 - MATERIALS AND DESIGN CRITERIA

2.1 DESIGN LOADING CRITERIA

A. APPLICABLE BUILDING CODES
1. 2018 INTERNATIONAL BUILDING CODE (IBC): REFERENCED IN DRAWINGS AS "ADOPTED BUILDING CODE".
2. ASCE 7-16 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

B. RISK CATEGORY: III

C. DEAD LOADS: SELF WEIGHT OF THE STRUCTURE AND EQUIPMENT.

D. SNOW LOAD DATA
1. SNOW IMPORTANCE FACTOR = 1.1
2. THERMAL FACTOR = 1.1
3. SNOW EXPOSURE FACTOR, Ce = 1.0
4. GROUND SNOW LOAD: Pg = 130 PSF
5. DRIFTING, SLIDING AND UNBALANCED SNOW LOADS: IN ACCORDANCE WITH ASCE 7.

E. WIND LOAD DATA
1. WIND EXPOSURE CATEGORY = B
2. ULTIMATE DESIGN WIND SPEED: Vult = 120 MPH, 3 SECOND GUST
3. NOMINAL DESIGN WIND SPEED: Vasd = 93 MPH, 3 SECOND GUST

F. EARTHQUAKE DESIGN DATA
1. COMPONENT IMPORTANCE FACTOR = 1.5
2. SEISMIC DESIGN CATEGORY = C
3. SITE CLASS = C
4. SPECTRAL RESPONSE ACCELERATION:
   a. SHORT PERIOD, Ss = 0.428g
   b. 1 SECOND PERIOD, S1 = 0.133g
5. DESIGN SPECTRAL RESPONSE ACCELERATION:
   a. SHORT PERIOD, Sds = 0.343g
   b. 1 SECOND PERIOD, Sd1 = 0.148g
6. ANALYSIS PROCEDURE USED = SEISMIC DESIGN FOR NON-STRUCTURAL COMPONENTS.

2.2 SOILS AND FOUNDATION

A. CODE COMPLIANCE: THE FOUNDATIONS SHALL CONFORM TO ADOPTED BUILDING CODE CHAPTER FOR "SOILS AND FOUNDATIONS".

B. DESIGN SOIL VALUES: THE STRUCTURAL DESIGN IS BASED ON OWNER-ACCEPTED MINIMUM CODE REQUIREMENTS.
1. SOIL BEARING PRESSURE (DL+LL) = 1550 PSF (ONE THIRD INCREASE FOR WIND AND SEISMIC LOADING MAY BE APPLIED)
2. PASSIVE LATERAL PRESSURE = 250 PCF
3. ACTIVE LATERAL PRESSURE (UN-CONSTRAINED) = 35 PCF
4. AT-REST LATERAL PRESSURE (CONSTRAINED) = 50 PCF
5. COEFFICIENT OF SLIDING FRICTION = 0.35
6. MINIMUM FOOTING EMBEDMENT BELOW LOWEST ADJACENT GRADE = 36"
7. SULFATE EXPOSURE - NOT PROVIDED

C. SITE PREPARATION
1. GROUND SURFACE UNDERLYING ALL FILLS SHALL BE SCARIFIED TO A DEPTH OF 24" MINIMUM TO REMOVE ALL ORGANIC MATTER, THEN RE-COMPACTED TO 95% OF THE MAXIMUM STANDARD PROCTOR DENSITY PER ASTM D698. CONTRACTOR SHALL PREPARE SITE BASED ON THE REQUIREMENT LISTED HEREIN, MINIMUM, UNLESS NOTED OTHERWISE OR UNLESS DETERMINED BY A GEOTECHNICAL ENGINEER HAVING PERFORMED PROPER INVESTIGATION OF THIS SITE. CONTRACTOR SHALL REMOVE ALL ABANDONED UTILITIES, FOOTINGS, AND ALL OTHER BURIED OBJECTS.
2. CONTRACTOR SHALL PROVIDE PROPER DEWATERING OF EXCAVATIONS FROM SURFACE WATER, GROUND WATER SEEPAGE, ETC.
3. EXCAVATION FOR ANY PURPOSE SHALL NOT REDUCE LATERAL SUPPORT FROM ANY EXISTING FOUNDATION OR ADJACENT EXISTING FOUNDATION DETRIMENTAL LATERAL OR VERTICAL MOVEMENT, OR BOTH.
4. ALL EXCAVATIONS SHALL BE PROPERLY BACKFILLED. BACKFILL SHALL BE COMPOSED OF MINUS 3" MATERIAL & MECHANICALLY COMPACTED IN LAYERS, NO GREATER THAN 12" THICK AND COMPACTED TO 98% STANDARD PROCTOR PER ASTM D698 IN A MATTRE THAT DOES NOT DAMAGE THE FOUNDATION, WATERPROOFING, OR DAMP PROOFING MATERIAL. FLOODING WILL NOT BE PERMITTED.
5. CONTRACTOR TO EVALUATE THEIR METHODS OF CONSTRUCTION FOR IMPACTS TO ADJOINING PROPERTIES TO INCLUDE BUT NOT LIMITED TO VIBRATIONS AND SETTLEMENT FROM DRIVEN PILES, WILD-LIFE AND NATURE RESERVES, AND ETC.

D. SITE CONTROL DURING CONSTRUCTIONS.
1. CONTRACTOR SHALL PROVIDE ADEQUATE SHORING AND CRIBBING AS NEEDED AT ALL EXCAVATIONS, EARTH BANKS, AND EXISTING STRUCTURES.
2. CONTRACTOR SHALL KEEP SOIL WITHIN 2% OF OPTIMUM MOISTURE AT MAXIMUM DENSITY AS DETERMINED BY THE MOISTURE DENSITY CURVE OBTAINED.
3. CONTRACTOR SHALL PROVIDE PROPER SITE DRAINAGE AND DEWATERING OF SITE AND EXCAVATIONS. ALL EXCAVATIONS WITHIN BUILDING PERIMETER SHALL BE PROPERLY BACKFILLED AND COMPACTED TO MEET THE REQUIREMENTS OUTLINED HEREIN, MINIMUM.

E. GEOTECHNICAL INSPECTION
1. THE GEOTECHNICAL ENGINEER SHALL INSPECT AND APPROVE THE SITE PREPARATION AND FOOTING EXCAVATIONS BEFORE CONCRETE OR REINFORCING IS PLACED.
2. THE GEOTECHNICAL ENGINEER SHALL CONDUCT ANY ADDITIONAL INSPECTIONS AS REQUIRED IN THE GEOTECHNICAL REPORT OR PER LOCAL BUILDING DEPARTMENT.

F. SLAB ON GRADE AND FOUNDATION
1. ALL FOUNDATIONS SHALL BEAR ON COMPETENT NATIVE SOIL OR STRUCTURAL COMPACTED FILL AS DESCRIBED HEREIN. ALL SLABS ON GRADES SHALL BEAR ON A 4" THICK DRAINAGE COURSE OR MINUS 3/4" MATERIAL, GRADED FOR COMPACTION, WITH < 10% PASSING THE #200 SIEVE, COMPACTED TO 95% STANDARD PROCTOR PER ASTM D698.

2.3 CONCRETE

A. GENERAL
1. CONCRETE SHALL CONFORM TO ADOPTED BUILDING CODE CHAPTER FOR "CONCRETE" AND ACI 318-14 BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.
2. CONCRETE MIXING OPERATIONS SHALL BE IN ACCORDANCE WITH ASTM C94.
3. 28 DAY CONCRETE STRENGTHS AND W/C RATIOS. SEE DETAILS.

B. CEMENT
1. PORTLAND CEMENT SHALL CONFORM TO ASTM C150 TYPE I OR II.
2. IF SULFATE ARE IN SOIL, PER GEOTECHNICAL REPORT, USE ASTM C150 TYPE V CEMENT WITH MINIMUM CONCRETE STRENGTH OF 4,500 PSI AND MAXIMUM WATER CEMENT RATIO OF 0.45.
3. DO NOT USE CONCRETE OR GROUT CONTAINING CHLORIDES.

C. AGGREGATE
1. NORMAL WEIGHT CONCRETE AGGREGATE SHALL CONFORM TO ASTM C33 AND PROJECT SPECIFICATIONS.
2. PROVIDE 3/4" MAXIMUM AGGREGATE SIZE, UNO.

D. CEMENTITIOUS MATERIALS
1. CEMENTITIOUS MATERIALS SUCH AS FLY ASH, SLAG, SILICA FUME, AND OTHER POZZOLANDS; MAY BE USED AS AN ALTERNATIVE TO PORTLAND CEMENT. THE AMOUNT OF CEMENTITIOUS MATERIALS USED SHALL BE ADEQUATE FOR CONCRETE TO SATISFY THE SPECIFIED REQUIREMENTS FOR STRENGTH W/CM, DURABILITY, AND FINISHABILITY, UNLESS NOTED OTHERWISE BELOW. CEMENTITIOUS MATERIAL SHALL BE IN ACCORDANCE WITH ACI 301-10, SECTION 4.2. IF FLY ASH IS USED, THE MAXIMUM AMOUNT SHALL BE 25% BY WEIGHT OF TOTAL CEMENTITIOUS MATERIALS. CONCRETE EXPOSED TO FREEZE-THAW CYCLES AND WHERE EXPOSURE TO DEICING CHEMICALS IS ANTICIPATED SHALL HAVE CEMENTITIOUS MATERIAL AMOUNTS LIMITED TO ACI 318.

E. ENTRAINED AIR
1. CONCRETE SHALL HAVE 6% (+/- 1.5%) OF ENTRAINED AIR.
2. SPECIFIED AIR ENTRAINMENT PERCENTAGE SHALL BE ACHIEVED AT TIME CONCRETE IS DELIVERED ON SITE.

F. SLUMP
1. SLUMP OF CONCRETE MIXTURE BEFORE ADDING ADMIXTURES SHALL BE 4" (+/-).

G. CONSTRUCTION EXECUTION
1. CONTACTOR TO NOTIFY ENGINEER 48 HOURS PRIOR TO PLACMENT OF CONCRETE.
2. THE TEMPERATURE OF CONCRETE MUST REMAIN ABOVE 50 DEGREES FAHRENHEIT AND IN A MOIST CONDITION FOR 7 DAYS AFTER CONCRETE PLACEMENT; UNLESS OTHERWISE ACCEPTED BY ENGINEER. ADDITIONAL TESTING FOR CONDITIONS LESS THAN 50 DEGREES FAHRENHEIT INCLUDE HAVING HAVING TWO ADDITIONAL CYLINDERS POURED AND FIELD CURED PRIOR TO CONCRETE PLACEMENT.
3. COLD WEATHER PLACEMENT OF CONCRETE SHALL CONFORM TO ACI 318 AND ACI 306R - "GUIDE TO COLD WEATHER CONCRETING"
4. HOT WEATHER PLACEMENT OF CONCRETE SHALL CONFORM TO ACI318 AND ACI 305R - "HOT WEATHER CONCRETING".
5. PROVIDE A 3/4" CHAMFER ON ALL PROJECTED CONCRETE CORNERS OF COLUMNS, BEAMS, AND WALLS; UNLESS NOTED OTHERWISE IN SPECIFICATIONS.
6. CONCRETE CLEAR COVER OVER REINFORCING BARS AND ANCHOR BOLTS SHALL BE IN ACCORDANCE WITH THE ACI.
7. THE MODULUS OF ELASTICITY SHALL BE TESTED IN ACCORDANCE WITH ASTM C469 AND BE EQUAL TO OR GREATER THAN THE VALUE GIVEN BY THE EQUATIONS IN ACI 318 FOR THE SPECIFIED 28 DAY CONCRETE STRENGTH.
8. THE PLACEMENT OF CONCRETE SHALL CONFORM TO ACI STANDARD 304 AND PROJECT SPECIFICATIONS. CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED, LAITANCES REMOVED, AND STANDING WATER REMOVED BEFORE PLACING NEW CONCRETE.
9. ANCHOR BOLTS IN CONCRETE SHALL BE ASTM F1554 - GR 36, UNO.

H. REINFORCING, EMBEDS, PIPES, WATERSTOPS, AND INSERTS
1. ALL EMBEDS, REINFORCING BARS, ANCHOR BOLTS, WATER STOPS, AND CONCRETE INSERTS MUST BE SECURELY IN PLACE PRIOR TO CONCRETE PLACEMENT.
2. MAT SLABS DO NOT REQUIRED SLEEVES AT LOCATIONS WHERE ELECTRICAL CONDUITS PASS THROUGH UNLESS OTHERWISE NOTED ON ELECTRICAL DRAWINGS OR IN SPECIFICATION.
3. IF SLEEVES ARE USED, THE SLEEVES MUST BE POSITIONED BEFORE CONCRETE IS POURED. CORING OPENINGS THROUGH CONCRETE IS NOT PERMITTED. DO NOT CUT REINFORCING THAT MAY INTERFERE WITH SLEEVES.
4. MAT SLAB SHALL NOT HAVE ELECTRICAL CONDUITS RUNNING CONTINUOUS WITHIN THE SLAB THICKNESS OR DIRECTLY BELOW THE SLAB.
5. NO ELECTRICAL CONDUIT TO BE INSTALLED PARALLEL IN SLAB WITHOUT APPROVAL OF STRUCTURAL ENGINEER.

I. SUBMITTALS AND SHOP DRAWINGS
1. CONCRETE MIX DESIGN: SHALL BE FULLY DOCUMENTED AND REVIEWED BY QUALIFIED TESTING LABORATORY AND WET STAMPED BY A LICENSED ENGINEER. THE SUBMITTED MIX TEST DATA SHALL BE IN ACCORDANCE WITH ACI 318.
2. CONCRETE JOINT PLACEMENT: THE PROPOSED LOCATIONS OF CONCRETE JOINTS MUST BE SUBMITTED TO THE STRUCTURAL ENGINEER BEFORE POURING OF CONCRETE. PLACE JOINTS AT LOCATIONS TO MINIMIZE CONCRETE CRACKING AND OTHER EFFECTS FOR CURING AND SHRINKAGE. JOINT LOCATIONS SHOWN ON DRAWINGS ARE A MINIMUM.

J. QUALITY ASSURANCE
1. TESTING AGENCY QUALIFICATIONS: AN INDEPENDENT AGENCY, ACCEPTABLE TO OWNER AND AUTHORITIES HAVING JURISDICTION, QUALIFIED ACCORDING TO ASTM C1077 AND ASTM E329 FOR TESTING INDICATED. PERSONNEL PERFORMING LABORATORY TESTS SHALL BE ACI-CERTIFIED CONCRETE STRENGTH TESTING TECHNICIAN AND CONCRETE LABORATORY TESTING TECHNICIAN - GRADE I. TESTING AGENCY LABORATORY SUPERVISOR SHALL BE AN ACI-CERTIFIED CONCRETE LABORATORY TESTING TECHNICIAN - GRADE II.
2. SOURCE LIMITATIONS: OBTAIN EACH TYPE OR CLASS OF CEMENTITIOUS MATERIAL OF THE SAME BRAND FROM THE SAME MANUFACTURER'S PLANT, OBTAIN AGGREGATE FROM SINGLE SOURCE, AND OBTAIN ADMIXTURES FROM SINGLE MANUFACTURER.
3. ACI PUBLICATIONS: COMPLY WITH THE FOLLOWING UNLESS MODIFIED BY REQUIREMENTS IN THE CONTRACT DOCUMENTS:
   a. ACI 301 "SPECIFICATION FOR STRUCTURAL CONCRETE", SECTION THROUGH 5.
   b. ACI 117 "SPECIFICATIONS FOR TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS".
   c. ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".
4. COMPLY WITH THE CONCRETE REINFORCING INSTITUTE "MANUAL OF STANDARDS PRACTICE".

2.4 REINFORCING STEEL BAR

A. GENERAL: REINFORCING STEEL SHALL BE PLACED IN ACCORDANCE WITH THE CONCRETE SPECIFICATIONS.
B. REINFORCING STEEL: DEFORMED BARS SHALL BE ASTM A615 - GRADE 60.
C. CONSTRUCTION EXECUTION
1. FOR REINFORCING PLACEMENT, LAP LENGTH, AND ADDITIONAL INFORMATION SEE CONCRETE TYPICAL DETAIL SHEET.
2. FIELD BENDING OR STRAIGHTENING OF BARS SIZE 3 THROUGH 5 MAY BE FIELD BEND COLD THE FIRST TIME. OTHER BARS REQUIRE PREHEATING. DO NOT TWIST BARS.
3. BARS SHALL NOT BE WELDED.
D. SUBMITTALS AND SHOP DRAWINGS
1. REINFORCING STEEL SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL.
2. PLACING DRAWINGS THAT DETAIL FABRICATION, BENDING, AND PLACEMENT. INCLUDE BAR SIZES, LENGTHS, MATERIAL, GRADE, BAR SCHEDULES, STIRRUP SPACING, BENT BAR DIAGRAMS, BAR ARRANGEMENT, SPLICES AND LAPS, MECHANICAL CONNECTIONS, TIE SPACING, HOOP SPACING, AND SUPPORTS FOR CONCRETE REINFORCEMENT.

PART 3 - EXECUTION

3.1 GENERAL NOTES

A. THE METHODS, PROCEDURES, AND SEQUENCE OF CONSTRUCTION ARE THE RESPONSIBILITY OF THE CONTRACTOR.

B. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO MAINTAIN AND ENSURE THE INTEGRITY OF THE STRUCTURE AT ALL STAGES OF CONSTRUCTION.
C. THE CONTRACTOR SHALL EMPLOY A LICENSED STRUCTURAL ENGINEER FOR DESIGN OF TEMPORARY SHORING AND BRACING.
D. THE CONTRACTOR SHALL TAKE THE RESPONSIBILITY TO PROVIDE SUPERVISION OR THE CONSTRUCTION TO INSURE COMPLIANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.
E. PER THE ADOPTED BUILDING CODE SECTION 1704.4, EACH CONTRACTOR RESPONSIBLE FOR THE CONSTRUCTION OF A MAIN WIND-FORCE-RESISTING OR SEISMIC-FORCE-RESISTING SYSTEM, DESIGNATED SEISMIC SYSTEM OR A WIND OR SEISMIC-RESISTING COMPONENT LISTED IN THE STATEMENT OF SPECIAL INSPECTIONS SHALL SUBMIT A WRITTEN STATEMENT OF RESPONSIBILITY TO THE BUILDING OFFICIAL AND THE OWNER PRIOR TO THE COMMENCEMENT OF WORK ON THE SYSTEM OR COMPONENT. THE CONTRACTOR'S STATEMENT OF RESPONSIBILITY SHALL CONTAIN ACKNOWLEDGEMENT OF AWARENESS OF THE SPECIAL REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTION.

3.2 DEMOLITION

A. THE CONTRACTOR MAY REMOVE EXISTING CONSTRUCTION AND REPLACE WITH THE APPROVAL OF THE LOCAL BUILDING DEPARTMENT AND STRUCTURAL ENGINEER.

B. THE EXTENT OF THE DEMOLITION MAY OR MAY NOT BE SHOWN IN THESE CONSTRUCTION DOCUMENTS. THE CONSULTANTS SHALL NOT BE BACK CHARGED OR RESPONSIBLE FOR SHOWING OR NOT SHOWING THE ENTIRE EXTENT OR DEMOLITION.

C. THE CONTRACTOR SHALL TAKE THE RESPONSIBILITY TO INSURE THE REMOVAL OF THE EXISTING STRUCTURE AND PROVIDE THE STRUCTURAL ENGINEER WITH METHODS, PROCEDURES AND SEQUENCE PLAN.

3.3 SPECIAL INSPECTIONS AND STRUCTURAL OBSERVATIONS

A. CONTRACTOR IS RESPONSIBLE FOR NOTIFYING THE APPROPRIATE BUILDING OFFICIAL, REGISTERED SPECIAL INSPECTOR, AND/OR REGISTERED LICENSED ENGINEER FOR ALL SPECIAL INSPECTIONS OR TESTING REQUIRED IN THIS SECTION.

B. CONTRACTOR SHALL SUBMIT ALL SPECIAL INSPECTION REPORTS TO STRUCTURAL ENGINEER OF RECORD WITHIN 14 DAYS OF EACH REPORT BEING COMPLETE.

C. AN APPROVED AGENCY AS SET FORTH IN ADOPTED BUILDING CODE SECTION 1703 WITH THE APPROVAL OF THE BUILDING OFFICIAL MAY PERFORM SPECIAL INSPECTIONS.

D. PER THE ADOPTED BUILDING CODE SECTION 1704.6, A STRUCTURAL OBSERVATION IS NOT REQUIRED TO BE PERFORMED BY A REGISTERED DESIGN PROFESSIONAL.

E. WHERE SPECIAL INSPECTION OR TESTING IS REQUIRED BY ADOPTED BUILDING CODE SECTION 1704 AND 1705 (SPECIAL INSPECTIONS), 1705.12 (SPECIAL INSPECTIONS FOR SEISMIC RESISTANCE), OR 1705.13 (STRUCTURAL TESTING FOR SEISMIC RESISTANCE), THE REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE IS REQUIRED TO PREPARE A STATEMENT OF SPECIAL INSPECTIONS DESCRIBED IN THE FOLLOWING (ALL TABLES REFERENCED ARE FROM THE ADOPTED BUILDING CODE, UNO):
1. SOILS: REFER TO TABLE 1705.6
   a. EXISTING SITE SOIL CONDITIONS
   b. FILL PLACEMENT
   c. LOAD-BEARING REQUIREMENTS
2. CONCRETE: CONCRETE IS DESIGNED BASED ON A 28-DAY COMPRESSIVE STRENGTH, fc = 2500 PSI, THEREFORE SPECIAL INSPECTIONS ARE NOT REQUIRED PER ADOPTED BUILDING CODE.

LEGEND

- SECTION REFERENCE (1 / G-1)
- GENERAL VIEW REFERENCE (1 / G-1)
- REVISION (1)
- NEW CONSTRUCTION
- ELEMENT BEYOND/OPTIONAL
- CONCRETE
- EARTH

ABBREVIATIONS

ACI	AMERICAN CONCRETE INSTITUTE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
CLR	CLEAR
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
DIA	DIAMETER
DWG	DRAWING
EL	SEISMIC LOAD
ELEC	ELECTRIC OR ELECTRICAL
ELEV	ELEVATION
ENGR	ENGINEER
EOR	ENGINEER OF RECORD
EQ	EQUAL
EXIST	EXISTING
EXT	EXTERIOR
FG	FINISH GRADE
FTG	FOOTING
GA	GAGE OR GAUGE
GC	GENERAL CONTRACTOR
GEN	GENERAL (NOTES)
IBC	INTERNATIONAL BUILDING CODE
INT	INTERIOR
MANUF	MANUFACTURER
N	NORTH
NO OR #	NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
RAD	RADIUS
REINF	REINFORCE
REQ'D	REQUIRED
SIM	SIMILAR
SOG	SLAB ON GRADE
SPECS	SPECIFICATIONS
SQ	SQUARE
STD	STANDARD
STRUCT	STRUCTURAL
SYM	SYMMETRICAL
T&B	TOP AND BOTTOM
THRU	THROUGH
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TRANS	TRANSVERSE
TYP	TYPICAL
UN	UNLESS NOTED
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
WL	WIND LOAD
WT	WEIGHT

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Project21KET01

OWNER REVIEW SET NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER LICENSED 17641 STATE OF IDAHO DANIEL J. FRIESEN
5/26/22

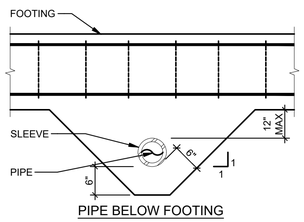
NO.	REVISIONS	DATE

NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS

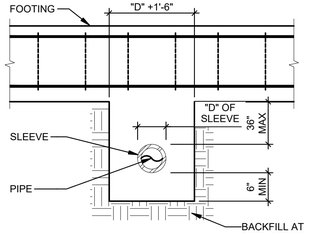
STRUCTURAL LEGEND AND SPECIFICATIONS

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

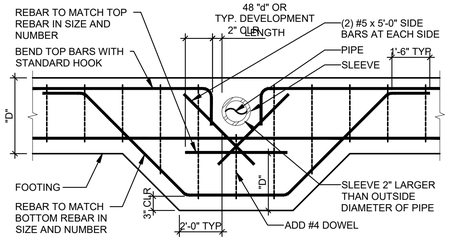
SHEET
S-1



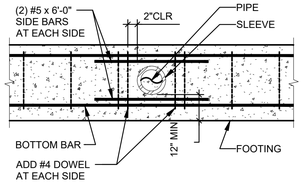
PIPE BELOW FOOTING



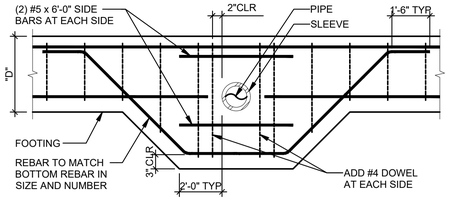
PIPE BELOW BOTTOM



PIPE AT TOP REBAR



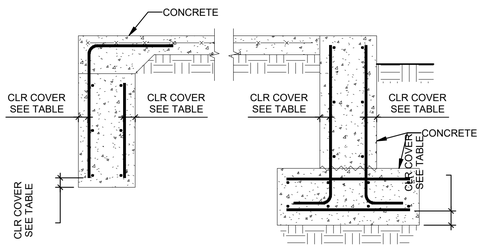
PIPE BETWEEN TOP AND BOTTOM REBAR



PIPE AT BOTTOM REBAR

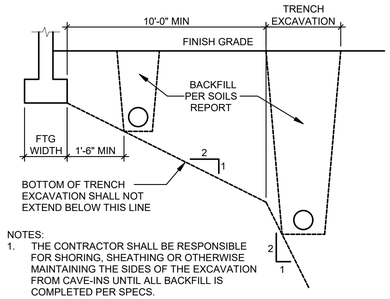
NOTES:
1. "D" = DENOTES DEPTH OF FOOTING OR GRADE BEAM.
2. "d" = DENOTES DIAMETER OF BAR.
3. SLEEVE INSIDE DIAMETER 2" LARGER THAN PIPE OUTSIDE DIAMETER OR BELL OUTSIDE DIAMETER.
4. SEAL VOID BETWEEN PIPE AND SLEEVE WITH ELASTIC WATERPROOF MATERIAL, TYP
5. FOR PIPES 3'-0" OR LESS BELOW FOOTING PROVIDE SLEEVE AND CONCRETE AS SHOWN. MORE THAN 3'-0" COMPACT BACKFILL OVER PIPE TO 90% AS APPROVED BY SOILS ENGINEER OR USE STEPPED FOOTING BELOW PIPE.

1 PIPES PERPENDICULAR TO TURNDOWN FOOTINGS
SCALE: NTS



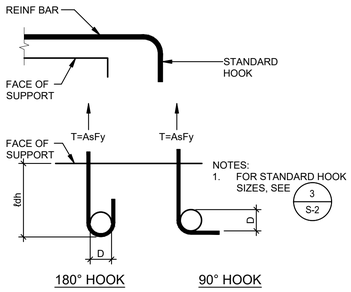
REINFORCEMENT CLEAR COVERAGE REQUIREMENTS AT EXTERIOR CONCRETE	
CONDITION	CLEAR COVER
CONCRETE CAST AGAINST EARTH	3"
CONCRETE CAST AGAINST FORM AND LEFT EXPOSED TO EARTH OR WEATHER:	
#5 BAR AND SMALLER	1 1/2"
#6 BAR AND LARGER	2"

6 MINIMUM EXTERIOR CONCRETE COVER OVER REINFORCING
SCALE: NTS



NOTES:
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING, SHEATHING OR OTHERWISE MAINTAINING THE SIDES OF THE EXCAVATION FROM CAVE-INS UNTIL ALL BACKFILL IS COMPLETED PER SPECS.

2 EXCAVATIONS PARALLEL TO FOOTING
SCALE: NTS

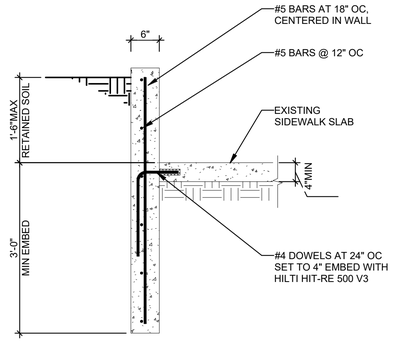


180° HOOK 90° HOOK

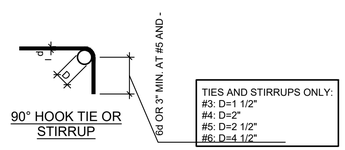
MIN TENSION EMBED LENGTHS, (ℓdh), FOR STANDARD END HOOKS ON GRADE 60 BARS			
GENERAL USE (NON-SEISMIC)			
BAR SIZE	NORMAL WEIGHT CONCRETE, f'c (psi)		
	3,000	4,000	5,000
#3	6"	6"	6"
#4	8"	7"	6"
#5	10"	9"	8"
#6	12"	10"	9"
#7	14"	12"	11"
#8	16"	14"	12"

NOTES:
1. SIDE COVER > 2 1/2 INCHES.
2. END COVER 90° HOOKS > 2 INCHES.
3. FOR SIDE COVER < 2 1/2 INCHES AND END COVER < 2", MULTIPLY THE TABULATED VALUES BY 1.43.

4 EMBEDMENT LENGTHS FOR HOOKED BARS
SCALE: NTS

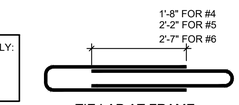


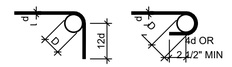
7 RETAINING WALL AT EXISTING SIDEWALK DETAIL
SCALE: NTS



NOTES:
1. ALL BENDS SHALL BE MADE COLD.

D=6d FOR #3 TO #8

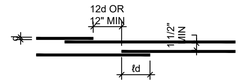




3 STANDARD HOOK AND TIE DETAILS
SCALE: NTS

NOTES:
1. LAP SPLICE LENGTH VALUES ARE BASED ON ACI 318 CHAPTER 12, GRADE 60 REINFORCING BARS AND NORMAL WEIGHT CONCRETE.
2. db = NOMINAL DIAMETER OF A BAR.
3. SMALLER BAR LAP LENGTH MAY BE USED WHEN SPLICING DIFFERENT SIZE BARS.
4. NON CONTACT LAP SPLICED BARS SHALL NOT BE PLACED TRANSVERSELY FURTHER APART THAN 1/5 OF THE REQUIRED LAP SPLICE LENGTH NOR 6 INCHES.
5. FOR LIGHTWEIGHT AGGREGATE CONCRETE, MULTIPLY THE LAP SPLICE LENGTH VALUES BY 1.3.

REBAR LAP LENGTHS AND DEVELOPMENT LENGTHS (INCHES)							
f'c PSI	#3	#4	#5	#6	#7	#8
3,000	17"	22"	28"	33"	48"	55"
4,000	15"	19"	24"	29"	42"	48"
5,000	13"	17"	22"	26"	37"	43"



WALL OR SLAB REINF SPLICE DETAIL

5 REINFORCED BAR LAP LENGTH SCHEDULE
SCALE: NTS

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PROFESSIONAL ENGINEER LICENSED 17641 STATE OF IDAHO DANIEL J. FRIESEN
5/26/22

NO.	REVISIONS	DATE

NORTHWOOD WELL PUMPHOUSE
STANDBY POWER MODIFICATIONS
STRUCTURAL DETAILS

SCALE: AS NOTED
DATE: 5/26/22
DRAWN BY: MAP
CHECKED BY: JJB

SHEET
S-2