ABBREVIATIONS

@	AT	LT	LEFT
AB	ABANDONED	MEG	MATCH EXISTING GRADE
AHJ	AUTHORITIES HAVING JURISDICTION	MH	MANHOLE
APPROX	APPROXIMATE	MTR	METER
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS	NTS	NOT TO SCALE
BC	BACK OF CURB	OC	ON CENTER
BCR	BACK OF CURB RADIUS	OH, OHP	OVERHEAD, OVERHEAD POWER
BM	BENCHMARK	OHU	OVERHEAD UTILITIES
BOT	BOTTOM	PB	PULL BOX
BP	BURIED POWER	PC	POINT OF CURVATURE
BT	BURIED TELEPHONE	PIP	PROTECT IN PLACE
BW	BOTTOM OF WALL	⅊, PL	PROPERTY LINE
C&G	CURB & GUTTER	PP	POWER POLE
CATV, TV	CABLE TELEVISION	PRC	POINT OF REVERSE CURVE
CI	CAST IRON	PT	POINT OF TANGENCY
CIPP	CURED IN PLACE PIPE	PVC	POLYVINYL CHLORIDE PIPE
℄, CL	CENTERLINE	RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE	RIM	RIM OF MANHOLE LID OR GRATE
CO	CLEANOUT	ROW	RIGHT OF WAY
D, DIA	DIAMETER	SF	SQUARE FOOT, SQUARE FEET
DG	DECOMPOSED GRANITE	SP	SPECIAL PROVISIONS
DI	DUCTILE IRON	SS	SANITARY SEWER
DIP	DUCTILE IRON PIPE	SSMH	SANITARY SEWER MANHOLE
DOM	DOMESTIC WATER	ST	STORM DRAIN
DW	DRIVEWAY	STA	STATION
DWG	DRAWING	STCB	STORM CATCH BASIN
EG	EXISTING GRADE	STCI	STORM CURB INLET
ELEC, E	ELECTRIC	STD	STANDARD
EL, ELEV	ELEVATION	STMH	STORM MANHOLE
EOP, EP	EDGE OF PAVEMENT	STYD	STORM YARD DRAIN
ESCP	EROSION AND SEDIMENT CONTROL PLAN	SW	SIDEWALK
EX	EXISTING	SWPPP	STORMWATER POLLUTION PREVENTION PLAN
FC	FACE OF CURB	SY	SQUARE YARD
FG	FINISHED GRADE	T, TEL	TELEPHONE
FH, HYD	FIRE HYDRANT	TA	TOP OF ASPHALT
FL	FLOW LINE	TBC	TOP BACK OF CURB
FT	FOOT, FEET	TC	TOP OF CONCRETE
G	GAS	TEMP	TEMPORARY
GM	GAS METER	TRANS	TRANSITION
GV	GAS VALVE	TW	TOP OF WALL
GW	GUY WIRE	TYP	TYPICAL
HP	HIGH PRESSURE	VCP	VITRIFIED CLAY PIPE
IE	INVERT ELEVATION	WM	WATER MAIN
INT	INTERSECTION	WV	WATER VALVE
IRR	IRRIGATION	W/	WITH
L	LENGTH	Δ	DELTA
LF	LINEAL FOOT, LINEAR FEET		
LS	LANDSCAPING		

NORTH

1 C001 VICINITY MAP
NOT TO SCALE

PROJECT TEAM

OWNER
HOMES FOR GOOD HOUSING AGENCY
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EUGENE, OR 97401

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STUDIO.E ARCHITECTURE, PC
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TBD

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GAS COMPANY
NW NATURAL
CONTACT: JEREMY ALDRIDGE
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LEGEND

- ASPHALT
- CONCRETE
- HEAVY DUTY CONCRETE
- REINFORCED CONCRETE
- GRAVEL
- LANDSCAPE
- LANDSCAPE
- WATER MAIN
- FIRE SERVICE
- DOMESTIC WATER SERVICE
- STORM DRAIN
- SANITARY SEWER
- BURIED POWER
- OVERHEAD POWER
- BURIED TELEPHONE
- BURIED GAS
- BURIED FIBER OPTIC
- FENCE - CHAINLINK
- FENCE - WOODEN
- FENCE - BARBED WIRE
- BUILDING
- BUILDING ROOF OVERHANG
- VERTICAL CURB
- CURB AND GUTTER
- CURB AND GUTTER - CATCH
- CURB AND GUTTER - SPILL
- VEGETATION EXTENTS
- PROPERTY LINE - SUBJECT
- PROPERTY LINE - ADJACENT
- EASEMENT
- CONTROL POINT
- FOUND PROPERTY CORNER AS NOTED
- FIRE HYDRANT/ CONTROL POINT HYDRANT
- WATER VALVE
- WATER SHUTOFF
- WATER WELL
- STORM DRAIN MANHOLE
- STORM DRAIN INLET STRUCTURE
- STORM DRAIN CURB INLET
- STORM DRAIN OUTLET STRUCTURE
- STORM DRAIN ROOF DOWNSPOUT
- STORM DRAIN CLEANOUT
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEANOUT
- UTILITY POLE
- GUY WIRE
- LIGHT POLE (ONE LIGHT AND DIRECTION)
- LIGHT POLE
- TRANSFORMER
- POWER METER OR POWER HANDHOLE
- GAS METER
- TELEPHONE PEDESTAL
- IRRIGATION CONTROL VALVE
- POLE SIGN AND DOUBLE POLE SIGN
- BOLLARD (OR AS NOTED)
- PARKING STALL COUNT
- DECIDUOUS TREE
- CONIFEROUS TREE
- BUSH

PROJECT INFORMATION

TPN 2003283304
ADDRESS: 925 W MAIN ST, COTTAGE GROVE, OR
PARCEL AREA: 1.54 AC
ZONING: R2 - MULTI-FAMILY RESIDENTIAL
TWN 20S, RGE 3W, SEC 28

GENERAL NOTES

1. ALL WORK, MATERIALS AND DETAILS PERTAINING TO CONSTRUCTION SHALL BE IN COMPLETE ACCORDANCE WITH THE OREGON DEPARTMENT OF TRANSPORTATION (ODOT) STANDARD SPECIFICATIONS AND ALL OTHER GOVERNING AGENCIES' STANDARDS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR STORM WATER QUALITY DURING CONSTRUCTION. CONTRACTOR SHALL OBTAIN AND COMPLY WITH ALL CURRENT REQUIREMENTS OF THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES), AND LOCAL MS4 REQUIREMENTS WHERE APPLICABLE. THE CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION AND MAINTENANCE OF A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) THROUGHOUT THE DURATION OF THE PROJECT.
3. THE CONTRACTOR SHALL PROTECT ADJACENT PROPERTIES, PUBLIC AND PRIVATE, AT ALL TIMES DURING CONSTRUCTION.
4. THE CONTRACTOR SHALL CONTROL DUST IN ACCORDANCE WITH REGULATIONS OF LOCAL AIR POLLUTION CONTROL AUTHORITY.
5. CONTRACTOR TO PROTECT ALL EXISTING UTILITIES, SIGNS AND EXISTING STRUCTURES. THE CONTRACTOR IS RESPONSIBLE TO REPAIR BACK TO ORIGINAL OR BETTER CONDITION IF DAMAGE HAS OCCURRED DURING CONSTRUCTION.
6. CONTRACTOR SHALL REVIEW EXISTING CONDITIONS AND COORDINATE WITH OWNER, CITY OF COTTAGE GROVE AND ENGINEER / ARCHITECT PRIOR TO DEMOLITION ACTIVITIES.
7. TRAFFIC, BOTH VEHICULAR AND PEDESTRIAN SHALL BE PROTECTED BY EFFECTIVE BARRICADES AND SIGNS IN ACCORDANCE WITH MUTCD GUIDANCE. EFFECTIVE LIGHTING OF OBSTRUCTIONS SHALL BE PROVIDED AT NIGHT.
8. OWNER WILL SECURE ALL NECESSARY UTILITY PERMITS REQUIRED FOR THE COMPLETION OF THE PROJECT. CONTRACTOR SHALL PERFORM ALL WORK IN STRICT ACCORDANCE WITH PERMIT REQUIREMENTS.
9. UNLESS OTHERWISE INDICATED, ALL CONSTRUCTION STAKING SHALL BE PERFORMED UNDER THE RESPONSIBLE CHARGE OF AN OREGON LICENSED LAND SURVEYOR.
10. THE CONTRACTOR SHALL MAINTAIN ONE COMPLETE SET OF APPROVED DRAWINGS ON THE CONSTRUCTION SITE AT ALL TIMES. ANY APPROVED DEVIATIONS IN CONSTRUCTION FROM THE APPROVED DRAWINGS SHALL BE NOTED ON THIS SET. THE LOCATION AND DEPTH OF ALL UTILITIES ENCOUNTERED SHALL BE RECORDED AND KEPT UP TO DATE AT ALL TIMES AND AVAILABLE FOR INSPECTION BY THE OWNER'S REPRESENTATIVE UPON REQUEST. FAILURE TO COMPLY MAY RESULT IN DELAY IN PAYMENT AND/OR FINAL ACCEPTANCE OF THE PROJECT.
11. UPON COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A CLEAN SET OF FIELD DRAWINGS CONTAINING ALL AS-BUILT INFORMATION TO THE ENGINEER.
12. IF WITHIN ONE YEAR OF THE FINAL ACCEPTANCE BY THE OWNER, ANY WORK IS FOUND TO BE DEFECTIVE OR NOT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND/OR DRAWINGS, AND UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER, THE CONTRACTOR SHALL CORRECT ANY WORK BEGINNING WITHIN SEVEN (7) CALENDAR DAYS OF RECEIPT OF NOTICE. SHOULD THE CONTRACTOR FAIL TO RESPOND TO THE WRITTEN NOTICE, THE OWNER MAY CORRECT THE WORK AT THE CONTRACTOR'S EXPENSE.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPORTING AND/OR EXPORTING ALL MATERIAL AS REQUIRED TO PROPERLY GRADE THIS SITE TO THE FINISHED ELEVATIONS SHOWN HEREON AS WELL AS THE LEGAL DISPOSAL OF WASTE IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS.
14. CONTRACTOR IS RESPONSIBLE TO COORDINATE ALL SITE WORK WITH ALL OTHER TRADES.
15. SAFETY - NEITHER THE OWNER NOR THE ENGINEER WILL BE RESPONSIBLE FOR COMPLIANCE WITH SAFETY MEASURES OR REGULATIONS. THE CONTRACTOR SHALL DESIGN, CONSTRUCT, AND MAINTAIN ALL SAFETY DEVICES, AND SHALL BE SOLELY RESPONSIBLE FOR CONFORMING TO ALL LOCAL, STATE AND FEDERAL SAFETY AND HEALTH STANDARDS, LAWS, AND REGULATIONS.
16. THE CONTRACTOR IS RESPONSIBLE TO CALL 1-800-424-5555 (OR 811) AT LEAST 2 WORKING DAYS PRIOR TO ANY EARTH DISTURBING ACTIVITIES OR UTILITY EXCAVATIONS.

SHOP AND FABRICATION NOTES

1. THE CONTRACTOR SHALL PREPARE AND SUBMIT FABRICATION DRAWINGS, DESIGN MIX INFORMATION, MATERIAL TESTING COMPLIANCE DATA, AND ANY OTHER PERTINENT DATA TO THE ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT OF MATERIALS. FOLLOWING REVIEW, THE CONTRACTOR SHALL RESUBMIT COPIES OF ANY DRAWINGS WHICH REQUIRE REVISION OR CORRECTIONS.
2. ANY REVIEW BY THE ENGINEER WILL NOT RELIEVE THE CONTRACTOR FOR RESPONSIBILITY FOR ERRORS OR OMISSIONS, OR SCHEDULE REQUIREMENTS. THE CONTRACTOR SHALL REMAIN SOLELY RESPONSIBLE FOR FULL AND COMPLETE PERFORMANCE IN ACCORDANCE WITH THE TERMS, CONDITIONS, PROVISIONS, DRAWINGS, AND SPECIFICATIONS.

ACCESS NOTES

1. CONTRACTOR SHALL COORDINATE ACCESS, STAGING AND STOCKPILE LOCATIONS WITH OWNER.
2. CONTRACTOR SHALL RESTORE DISTURBED AREAS TO PRE-CONSTRUCTION OR BETTER CONDITIONS.

EXISTING UTILITY NOTES

1. EXISTING UNDERGROUND INSTALLATIONS AND PUBLIC UTILITIES SHOWN ARE APPROXIMATED ACCORDING TO THE BEST INFORMATION AVAILABLE TO THE ENGINEER AND DEPICTED ON THESE PLANS TO A LEVEL OF QUALITY IN ACCORDANCE WITH ASCE 38-02.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR LOCATING AND VERIFYING MATERIAL TYPES OF ALL EXISTING UTILITY INSTALLATIONS ABOVE AND BELOW GROUND IN ADVANCE OF THE PROJECT BY CONTACTING THEIR RESPECTIVE OWNERS. ALL COSTS RELATED TO LOCATING EXISTING UTILITIES ARE INCIDENTAL AND SHALL NOT BE PAID SEPARATELY. NOT ALL UTILITIES ARE IDENTIFIED ON THE PLANS. NOTIFY ENGINEER OF POTENTIAL CONFLICTS.
3. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE CITY OF COTTAGE GROVE A MINIMUM OF 5 BUSINESS DAYS PRIOR TO THE START OF CONSTRUCTION.

SHEET INDEX	
C001	GENERAL NOTES AND LEGEND
C100	SITE PLAN
C200	DETAILS

PRELIMINARY
NOT FOR CONSTRUCTION

Cushing Terrell.
cushingterrell.com
800.757.9522

RIVERVIEW TERRACE GENERATOR
925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

REGISTERED PROFESSIONAL ENGINEER
103630PE
OREGON
NICOLE E. MECUM
11/21/2025
EXPIRATION DATE: 12/31/2026

100% SET 11/21/2025
JOB NUMBER: 20250193

SHEET TITLE
GENERAL NOTES AND LEGEND

SHEET NUMBER
C001

CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL REFER TO BUILDING PLANS FOR LOCATION AND DIMENSIONS OF SLOPED PAVING, EXIT PORCHES, TRUCK DOCKS, BUILDING DIMENSIONS, BUILDING ENTRANCE LOCATIONS, TOTAL NUMBER, LOCATIONS AND SIZES OF ROOF DOWNSPOUTS.
2. ALL TRAFFIC CONTROL SIGNS SHALL BE FABRICATED AS SHOWN IN THE NATIONAL MANUAL ON UNIFORM CONTROL DEVICES FOR STREETS AND HIGHWAYS EXCEPT AS NOTED ON THE PLANS.
3. ALL CURB RADII SHOWN ARE TO FACE OF CURB.
4. ALL PAVING DIMENSIONS ARE TO FACE OF CURB, WHERE APPLICABLE, UNLESS OTHERWISE NOTED.
5. ALL COORDINATES SHOWN ARE TO FACE OF CURB OR OUTSIDE OF WALL.
6. THE CONTRACTOR SHALL MATCH EXISTING PAVEMENT IN GRADE AND ALIGNMENT.
7. THE CONTRACTOR SHALL MATCH EXISTING CURB AND GUTTER IN GRADE, SIZE, TYPE AND ALIGNMENT AT ADJACENT ROADWAYS, UNLESS OTHERWISE NOTED.
8. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRS OF DAMAGE TO ANY EXISTING IMPROVEMENTS DURING CONSTRUCTION, SUCH AS, BUT NOT LIMITED TO, DRAINAGE, UTILITIES, PAVEMENT, STRIPING, CURB, ETC. REPAIRS SHALL BE EQUAL TO OR BETTER THAN EXISTING CONDITIONS.
9. ALL WORK ON THIS PLAN SHALL BE DONE IN STRICT ACCORDANCE WITH THE PROJECT SPECIFICATIONS.
10. ALL EXISTING CONDITIONS AND UTILITY LOCATIONS SHOWN ON THIS PLAN ARE APPROXIMATE BASED ON PRELIMINARY FINDINGS AND SCHEMATIC IN NATURE. THE CONTRACTOR MUST FIELD VERIFY ALL EXISTING CONDITIONS AND UTILITIES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES. PRECISE LOCATIONS AND EQUIPMENT SIZING ARE SUBJECT TO CHANGE.

KEYNOTES

1. PROPOSED CONCRETE PAD AND GENERATOR, SEE STRUCTURAL PLANS ON SHEET S1 AND GENERATOR PLANS ON SHEET A102 FOR DETAILS.
2. SAWCUT EXISTING ASPHALT CONCRETE, SEE ODOT DETAIL ON SHEET C200.
3. REMOVE AND REPLACE EXISTING CONCRETE SIDEWALK PER DETAIL 2/C200, SAWCUT AT NEAREST APPROPRIATE JOINT.
4. PROPOSED BURIED POWER LINE.
5. REMOVE AND REPLACE EXISTING LANDSCAPE TO ORIGINAL CONDITION.
6. EXISTING TRANSFORMER AND CONCRETE PAD, PROTECT THROUGHOUT CONSTRUCTION.
7. CONNECT PROPOSED GAS SERVICE TO EXISTING 2" GAS MAIN, COORDINATE WITH NORTHWEST NATURAL GAS.
8. SEE ELECTRICAL PLAN ON SHEET A201 FOR CONTINUATION.
9. PROPOSED GAS METER, COORDINATE WITH NORTHWEST NATURAL GAS.
10. REMOVE AND REPLACE CONCRETE CURB AS NEEDED.
11. EXISTING TREE, PROTECT THROUGHOUT CONSTRUCTION.
12. EXISTING LIGHT POLE, PROTECT THROUGHOUT CONSTRUCTION.
13. APPROXIMATE LOCATION OF PROPOSED ENCLOSURE, SEE ARCHITECTURE PLANS FOR DETAILS.

1 C100 SITE PLAN

0 10 20 40

SCALE: 1" = 20'

NORTH

SURVEY NOTE:

EXISTING SURVEY FEATURES, BOUNDARY AND TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAVE BEEN PREPARTED BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, CUSHING TERRELL CAN NOT BE HELD RESPONSIBLE FOR THE ACCURACY OF DATA AND INFORMATION PROVIDED BY OTHERS, OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

PRELIMINARY
NOT FOR CONSTRUCTION

Cushing Terrell
cushingterrell.com
800.757.9522

RIVERVIEW TERRACE GENERATOR
925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

REGISTERED PROFESSIONAL ENGINEER
OREGON
NICOLE E. MEDUM
EXPIRATION DATE: 12/31/2026

100% SET	11/21/2025
JOB NUMBER:	20250193

SHEET TITLE

SITE PLAN

SHEET NUMBER

C100

10/21/2025 9:25:55 AM

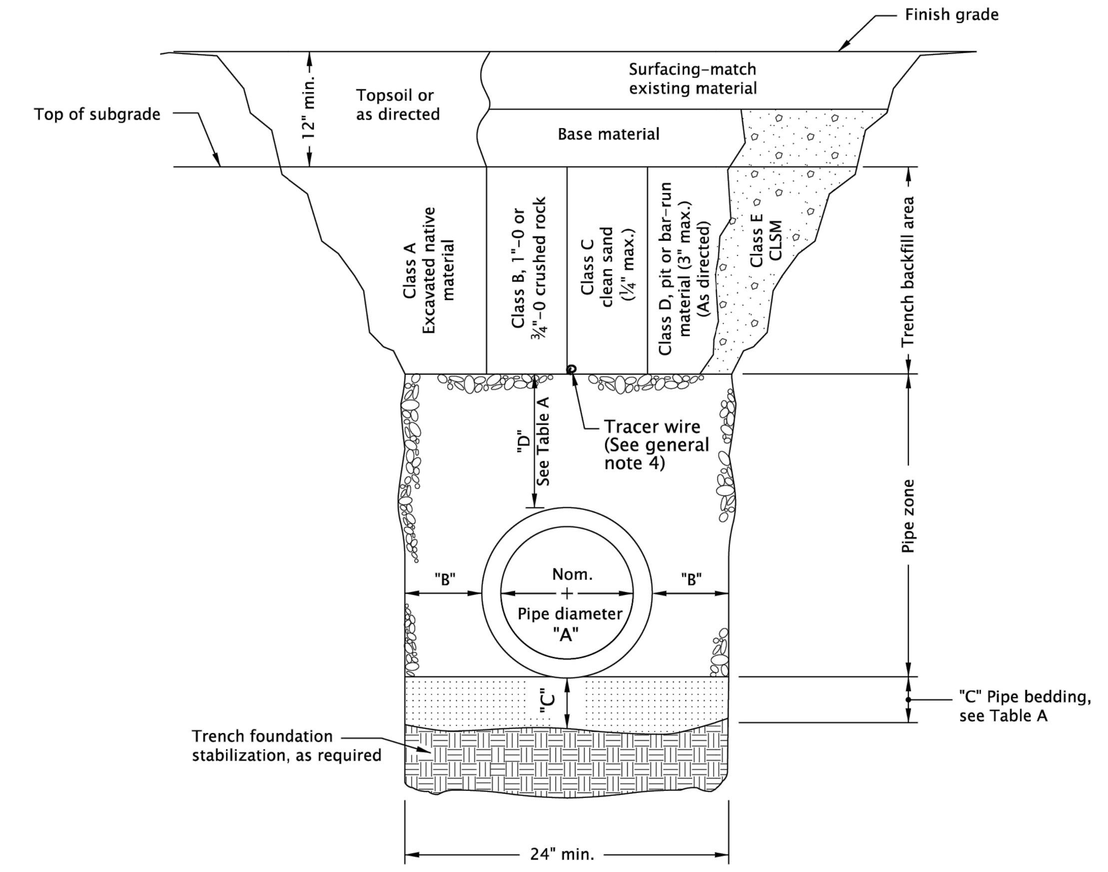
rd300.dgn 20-JUL-2020

RD300

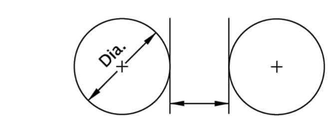
TABLE A

"A" (in)	"B" (in)	"C" (in)	"D" (in)
4	10	4	8
6	10	4	8
8	10	6	10
10	10	6	10
12	12	6	10
15	12	6	10
18	16	6	12
21	16	6	12
24	18	6	12
30	18	6	12
36	24	6	14
42	24	6	14
48	24	6	14
54	24	6	14
60	24	6	14
66	24	6	14
72	24	6	14

For pipes over 72" diameter, see general note 3.



MULTIPLE INSTALLATIONS



DIAMETER	MIN. SPACE BETWEEN PIPES
Up to 48"	24"
48" to 72"	One half (½) dia. of pipe

GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. Surfacing of paved areas shall comply with street cut Std. Dwg. RD302.
2. For pipe installation in embankment areas where the trench method will not be used and the pipe is ≥ 36" diameter, increase dimension "B" to nominal pipe diameter.
3. Pipes over 72" diameter are structures, and are not applicable to this drawing.
4. See Std. Dwg. RD336 for tracer wire details (When required).

CALC. BOOK NO. N/A — SDR DATE 14-JUL-2014

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

TRENCH BACKFILL, BEDDING, PIPE ZONE AND MULTIPLE INSTALLATIONS

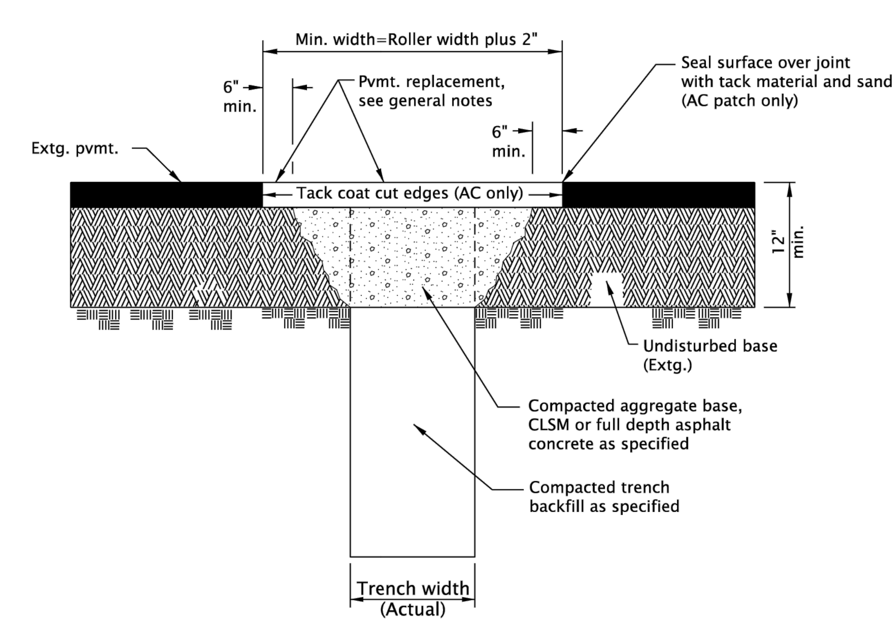
2021

DATE	REVISION DESCRIPTION

Effective Date: June 1, 2022 - November 30, 2022 RD300

1 / C200 TRENCHING DETAIL

rd302.dgn 20-JUL-2020



GENERAL NOTES FOR ALL DETAILS ON THIS SHEET:

1. All existing AC or PCC pavement shall be sawcut prior to repaving.
2. Concrete pavement shall be replaced with concrete to a minimum thickness of 8" or to the thickness of removed pavement, whichever is greater.
3. For joining new concrete to existing concrete, see contract plans for specific details.
4. Place AC mix minimum thkn. of 6" or the thkn. of the removed pavement, whichever is greater. Compact as specified.

CALC. BOOK NO. N/A — SDR DATE 20-JUL-2020

NOTE: All material and workmanship shall be in accordance with the current Oregon Standard Specifications

The selection and use of this Standard Drawing, while designed in accordance with generally accepted engineering principles and practices, is the sole responsibility of the user and should not be used without consulting a Registered Professional Engineer.

OREGON STANDARD DRAWINGS

STREET CUT

2021

DATE	REVISION DESCRIPTION

Effective Date: December 1, 2022 - May 31, 2023 RD302

2 / C200 STREET CUT DETAIL

PRELIMINARY
NOT FOR CONSTRUCTION

Cushing Terrell.

cushingterrell.com
800.757.9522

RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

100% SET 11/21/2025

JOB NUMBER: 20250193

SHEET TITLE

DETAILS

SHEET NUMBER

C200

POWER SYMBOLS

SYMBOL	IDENTIFICATION
M	MOTOR CONNECTION
G	GENERATOR CONNECTION
F	FUSED DISCONNECT SWITCH XX/XX/XX = AMP SWITCH/POLES/AMP FUSE
	NON-FUSED DISCONNECT SWITCH XX/XX = AMP SWITCH/POLES
J	JUNCTION BOX; FLOOR/GRADE MOUNTED
J C	JUNCTION BOX; CEILING MOUNTED
J	JUNCTION BOX; WALL MOUNTED
J	JUNCTION BOX WITH WHIP-STYLE CONNECTION TO POWERED FURNITURE; POWER AND/OR DATA
T	TRANSFORMER; BOTTOM OF T DESIGNATES FRONT SIDE
	SWITCHBOARD OR DISTRIBUTION PANEL
	PANELBOARD OR TERMINAL CABINET; SURFACE MOUNTED
	PANELBOARD OR TERMINAL CABINET; FLUSH MOUNTED
	TERMINAL CABINET OR CONTROL PANEL; FLUSH MOUNTED
	TERMINAL CABINET OR CONTROL PANEL; FLUSH MOUNTED
	GROUND BUS BAR
	TRANSFORMER
	AUTOMATIC TRANSFER SWITCH
	MANUAL TRANSFER SWITCH
	DRAWOUT CIRCUIT BREAKER; RATING AS SHOWN ON PLANS
	STATIONARY - CIRCUIT BREAKER; RATING AS SHOWN ON PLANS
	NON-FUSED DISCONNECT; RATING AS SHOWN ON PLANS
	FUSED DISCONNECT; RATING AS SHOWN ON PLANS
	INVERTER
	GROUNDING POINT
M	UTILITY METER
CM	CUSTOMER METER

DESIGNATION SYMBOLS

SYMBOL	IDENTIFICATION
####	FEEDER DESIGNATION TAG
#	SHEET KEYNOTE TAG
XX-#	MECHANICAL EQUIPMENT TAG
XX-#	CONTRACTOR EQUIPMENT TAG
#	REVISION DELTA WITH REVISION NUMBER
$ a.	LETTER INDICATES FIXTURES CONTROL (WHERE SHOWN)
#.	NUMBER INDICATES CIRCUIT NUMBER (WHERE SHOWN)

LIGHTING SYMBOLS

SYMBOL	IDENTIFICATION
	LUMINAIRE; CEILING OR SURFACE MOUNTED
	LUMINAIRE; PENDANT
	LUMINAIRE; WALL MOUNTED
	AREA POLE WITH MOUNTED LUMINAIRE
	AREA POLE WITH MOUNTED LUMINAIRE ON RAISED POLE BASE
	LUMINAIRE ON EMERGENCY POWER
	EXIT SIGN; CEILING MOUNTED; ARROWS AND FACES AS SHOWN ON PLANS
	EXIT SIGN; WALL MOUNTED; ARROWS AND FACES AS SHOWN ON PLANS
	EXIT SIGN WITH DUAL LAMP HEAD
	EMERGENCY FIXTURE; DUAL LAMP HEAD
	LUMINAIRE; STRIP LIGHT
	LUMINAIRE; UNDERCABINET OR TAPE

CONDUIT SYMBOLS

SYMBOL	IDENTIFICATION
	CONDUIT INSTALLED ABOVE FINISHED FLOOR OR GRADE
	CONDUIT INSTALLED BELOW FINISHED FLOOR OR BELOW GRADE
	INDICATES CONDUIT TURNING UP
	INDICATES CONDUIT TURNING DOWN
	CONDUIT STUBBED AND CAPPED
	CONDUIT HOMERUN; ROUTE TO PANELBOARD, CABINET, OR TERMINAL BOARD INDICATED, AND TERMINATE CONDUCTORS TO CIRCUIT OVER CURRENT PROTECTIVE DEVICE
	CONDUIT AND WIRE. HATCH LINES INDICATE QUANTITY OF UNGROUNDED #12 CONDUCTORS, OR CONDUCTOR SIZE AS NOTED ADJACENT TO HATCH LINES. GROUND CONDUCTOR TO BE PROVIDED SIZED IN ACCORDANCE WITH NEC TABLE 250-122. IF NO HATCH LINES ARE SHOWN, 2#12 & 1#12G CONDUCTORS ARE ASSUMED.

NOTIFICATION APPLIANCES

SYMBOL	IDENTIFICATION
CD	VISIBLE ONLY (STROBE) WALL MOUNTED
CD	VISIBLE ONLY (STROBE) CEILING MOUNTED
F H	HORN ONLY AUDIBLE APPLIANCE SOUNDER TO USE TEMPORAL 3 PATTERN WALL MOUNTED
S W	SPEAKER ONLY WALL MOUNTED
CD	HORN/STROBE VISUAL & AUDIBLE APPLIANCE SOUNDER TO USE TEMPORAL 3 PATTERN. WALL MOUNTED
CD W	SPEAKER/STROBE VISUAL & AUDIBLE APPLIANCE WALL MOUNTED
F M	MINI-HORN AUDIBLE APPLIANCE SOUNDER TO USE LOW FREQUENCY OF 520HZ WALL MOUNTED

WIRING DEVICE SYMBOLS

SYMBOL	IDENTIFICATION
	20A, 125V, DUPLEX RECEPTACLE OUTLET +18" AFF TO CENTERLINE OF BOX UNLESS OTHERWISE NOTED
	20A, 125V, DOUBLE DUPLEX RECEPTACLE OUTLET +18" AFF TO CENTERLINE OF BOX UNLESS OTHERWISE NOTED
	SPECIAL PURPOSE RECEPTACLE OUTLET; NEMA CONFIGURATIONS AS SHOWN ON DRAWINGS; 18" AFF TO CENTERLINE OF BOX UNLESS OTHERWISE NOTED
	20A, 125V, SINGLE RECEPTACLE OUTLET; +18" AFF TO CENTERLINE OF BOX UNLESS OTHERWISE NOTED
X	A = ABOVE COUNTER C = CEILING MOUNTED G = GFCI S = SWITCHED RECEPTACLE T = TAMPER PROOF U = WITH (2) USB PORTS W = WEATHERPROOF COVER AND GFCI +#" = INCHES ABOVE FINISH FLOOR TO CENTERLINE OF BOX
	20A, 125V, DUPLEX RECEPTACLE OUTLET; FLOOR RECESSED
	20A, 125V, DUPLEX RECEPTACLE OUTLET; COUNTERTOP POP-UP TYPE.
	20A, 125V, DOUBLE DUPLEX RECEPTACLE OUTLET; FLOOR RECESSED
	2-COMPARTMENT FLOOR BOX W/ (2) GANG POWER / (2) GANG DATA; PROVIDE 1"C. FROM EACH DATA OUTLET TO ACCESSIBLE CEILING SPACE.
C J	COMMERCIAL CORD REEL RECEPTACLE; CEILING MOUNTED
$	SINGLE POLE SWITCH
$ X	3 = THREE WAY SWITCH 4 = FOUR-WAY SWITCH D = DIMMER SWITCH K = KEY OPERATED SWITCH LV = LOW VOLTAGE SWITCH M = MOTOR RATED SWITCH S = OCCUPANCY SENSOR SWITCH T = INTERVAL TIMER V = VACANCY SENSOR SWITCH W = WEATHERPROOF SWITCH
	EPO PUSH BUTTON
PB	PUSH BUTTON
OS	OCCUPANCY LIGHT CONTROL SWITCH; CEILING MOUNTED
	OCCUPANCY LIGHT CONTROL SWITCH; WALL MOUNTED
OS X	C = CORRIDOR PATTERN H = HIGH BAY SENSOR V = VACANCY SENSOR MODE
OS PS	COMBINATION OCCUPANCY SENSOR/PHOTOSENSOR
PS	PHOTOSENSOR; CEILING MOUNTED
PS D	DIMMING PHOTOSENSOR
EV	ELECTRIC VEHICLE CHARGING STATION

TELECOM SYMBOLS

SYMBOL	IDENTIFICATION
	TELEPHONE/DATA OUTLET; PROVIDE 1"C. W/ PULL-STRING TO ACCESSIBLE CEILING SPACE UNLESS OTHERWISE NOTED
X	C = CEILING MOUNTED; BACK BOX ONLY FOR FUTURE WAP UNLESS OTHERWISE NOTED 4 = 4 PORT OUTLET
	TELEPHONE OUTLET; PROVIDE 1"C. W/ PULL-STRING TO ACCESSIBLE CEILING SPACE UNLESS OTHERWISE NOTED
TV	RG-6 COAX OUTLET; PROVIDE 1"C. W/ PULL-STRING TO ACCESSIBLE CEILING SPACE UNLESS OTHERWISE NOTED
	SECURITY CAMERA

ABBREVIATIONS

ABBRV.	IDENTIFICATION	ABBRV.	IDENTIFICATION
A	AMPERES	LCP	LIGHTING CONTROL PANEL
AC	ALTERNATING CURRENT	LED	LIGHT EMITTING DIODE
AIC	AMPS INTERRUPTING CURRENT	LGT	LIGHTING
AFCI	ARC FAULT CIRCUIT INTERRUPTER	MCB	MAIN CIRCUIT BREAKER
AF	FRAME RATING IN AMPERES	MCC	MOTOR CONTROL CENTER
AFF	ABOVE FINISH FLOOR	MDF	MAIN DISTRIBUTION FRAME
AFG	ABOVE FINISHED GRADE	MICRO	MICROWAVE
AWG	AMERICAN WIRE GAUGE	MLO	MAIN LUGS ONLY
AS	SWITCH RATING IN AMPERES	MTS	MANUAL TRANSFER SWITCH
AT	TRIP RATING IN AMPERES	NC	NORMALLY CLOSED
ATS	AUTOMATIC TRANSFER SWITCH	NEC	NATIONAL ELECTRIC CODE
AV	AUDIO VISUAL	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
C	CONDUIT		
CATV	CABLE TELEVISION	NEU	NEUTRAL
CB	CIRCUIT BREAKER	NIC	NOT INCLUDED IN CONTRACT
CCTV	CLOSED CIRCUIT TELEVISION	NO	NORMALLY OPEN
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	NTS	NOT TO SCALE
CFOI	CONTRACTOR FURNISHED, OWNER INSTALLED	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
		P	POLE
CL	CENTERLINE	PH	PHASE
CO	CONDUIT ONLY	PRI	PRIMARY
CONN	CONNECTED	PV	PHOTOVOLTAIC
CT	CURRENT TRANSFORMER	PVC	POLYVINYL CHLORIDE CONDUIT
CU	COPPER	(R)	RELOCATE EXISTING
DC	DIRECT CURRENT	RECPT	RECEPTACLE
DIA	DIAMETER	REFR	REFRIGERATOR
DP	DISTRIBUTION PANEL	(RR)	REMOVE AND REPLACE WITH NEW
(E)	EXISTING TO REMAIN	RSC	RIGID STEEL CONDUIT
ELEV	ELEVATOR	S	SWITCHBOARD
EM	EMERGENCY / STANDBY POWER	SEC	SECONDARY
EMT	ELECTRO METALLIC TUBING	SPD	SURGE PROTECTION DEVICE
EV	ELECTRICAL VEHICLE	TC	TERMINAL CABINET
FA	FIRE ALARM	TEL	TELEPHONE
FACP	FIRE ALARM CONTROL PANEL	TTB	TERMINAL BACKBOARD
G	GROUND	TYP	TYPICAL
GEN	GENERATOR	UC	UNDER COUNTER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	UL	UNDERWRITER LABORATORIES
GND	GROUND	UON	UNLESS OTHERWISE NOTED
HID	HIGH INTENSITY DISCHARGE	V	VOLTAGE
HP	HORSEPOWER	VFD	VARIABLE FREQUENCY DRIVE
HZ	HERTZ	W	WEATHERPROOF
IDF	INTERMEDIATE DISTRIBUTION FRAME	WAP	WIRELESS ACCESS POINT
IG	ISOLATED GROUND	W/	WITH
INV	INVERTER	W/O	WITHOUT
KV	KILOVOLT	(X)	REMOVE EXISTING
KVA	KILOVOLT AMPERE	XFMR	TRANSFORMER
KW	KILOWATT	XP	EXPLOSION PROOF

LEGEND NOTES

A. ALL SYMBOLS MAY NOT BE USED IN THIS PROJECT
B. SYMBOLS DO NOT ALWAYS REPRESENT REAL LIFE DIMENSIONS
C. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION
D. MOUNTING HEIGHTS OF DEVICES SHALL BE AS NOTED IN THE LEGEND FOR THE RESPECTIVE SYMBOL, UON ON FLOOR PLANS OR AS REQUIRED PER ADA REQUIREMENTS.

GENERAL ELECTRICAL NOTES

1. SCOPE OF WORK:
   A. THIS PROJECT IS A REMODEL. THE PLANS AND SPECIFICATIONS INDICATE THE GENERAL INTENT OF THE WORK BASED ON OWNER PROVIDED INFORMATION AND LIMITED FIELD VERIFICATION. CONTRACTOR SHALL VISIT SITE, VERIFY EXISTING CONDITIONS, AND REPORT ANY DISCREPANCIES NOTED TO THE ARCHITECT PRIOR TO SUBMITTING A BID. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISCONNECTION AND RECONNECTION OF ELECTRICAL SYSTEMS NECESSARY TO ACCOMPLISH THE WORK WHETHER OR NOT SPECIFIED AND/OR INDICATED.
   B. DESIGN INTENT IS TO PROVIDE NEW GENERATOR SERVING (2) ELEVATORS, AND ALL POWER, LIGHTING AND HEATING SYSTEM FOR BASEMENT COMMUNITY SPACE.
2. REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE RATED WALLS, FLOORS, CEILINGS, ETC. PROVIDE FIRE RATED PENETRATIONS AT THESE LOCATIONS.
3. FLOOR MOUNTED ELECTRICAL EQUIPMENT SHALL BE INSTALLED ON A 3" HIGH CONCRETE HOUSEKEEPING PAD.
4. VERIFY DEVICE MOUNTING HEIGHT AND ORIENTATION (VERTICAL OR HORIZONTAL) WITH ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS AND ELEVATIONS.
5. DISCONNECT SWITCHES TO BE SIZED AT MINIMUM TO MATCH THE BREAKER SIZE OF THE RESPECTIVE BRANCH CIRCUIT BEING FED.
6. RACEWAY SYSTEMS AND CONDUIT ROUTING SHOWN ON ELECTRICAL DRAWINGS IS DIAGRAMMATIC IN NATURE AND TO SHOW THE DESIGN INTENT OF CONDUIT INFRASTRUCTURE REQUIREMENTS. ACTUAL LOCATION AND ROUTING OF ALL CONDUIT RACEWAYS SHALL BE DETERMINED BY CONTRACTOR TO SUIT FIELD CONDITIONS.
7. CONTRACTOR TO PROVIDE PULL STRINGS IN ALL LOW VOLTAGE SYSTEM CONDUITS AND ALL SPARE CONDUITS.
8. PROVIDE DEDICATED NEUTRAL FOR EACH NEW CIRCUIT. HOME RUN CONDUCTORS MAY BE COMBINED INTO ONE CONDUIT. NO RACEWAY OR CABLE SHALL CONTAIN MORE THAN NINE (9) CURRENT CARRYING CONDUCTORS.
9. BRANCH CIRCUITS TO BE SIZED FOR MAXIMUM 3% VOLTAGE DROP. PROVIDE #10 AWG CONDUCTORS FOR 20 AMPERE, 120V BRANCH CIRCUITS LONGER THAN 75' AND #8 AWG CONDUCTORS FOR 20 AMPERE, 120V BRANCH CIRCUITS LONGER THAN 120'. PROVIDE #10 AWG CONDUCTORS FOR 20 AMPERE, 277V BRANCH CIRCUITS LONGER THAN 200'.
10. PROVIDE DEDICATED NEUTRAL TO EACH BRANCH CIRCUIT PER NEC 210.4.

LIST OF GOVERNING CODES

THIS WORK SHALL CONFORM TO ALL CURRENT AND ADOPTED LOCAL CODES
- 2022 OREGON STRUCTURAL SPECIALTY CODE (OSSC)
- 2023 OREGON PLUMBING SPECIALTY CODE (OPSC)
- 2021 OREGON ENERGY EFFICIENCY SPECIALTY CODE (OEESC)
- 2023 OREGON ELECTRICAL SPECIALTY CODE (OESC)
- 2022 OREGON FIRE CODE (OFC)
- 2019 ASHRAE 90.1

ELECTRICAL SHEET KEY

SHEET NUMBER	DESCRIPTION
E001	LEGEND AND GENERAL NOTES
E002	SCHEDULES AND ONELINE DIAGRAM
E003	SCHEDULES
E100	SITE PLAN
E200	DEMOLITION BASEMENT LEVEL ELECTRICAL
E300	BASEMENT LEVEL ELECTRICAL
E301	BASEMENT LEVEL LIGHTING
E400	DETAILS

REGISTERED PROFESSIONAL ENGINEER
89813PE
OREGON
SEPT 21, 2021
JOHN W. PRIDE
EXPIRES: 12/31/26

COLEBREIT
ENGINEERING
BEND | CORVALLIS
MONTEREY | NAPA | SANTA CRUZ

RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

CD DRAFT SET 11/21/2025

JOB NUMBER: 20250193

SHEET TITLE

LEGEND AND GENERAL NOTES

SHEET NUMBER

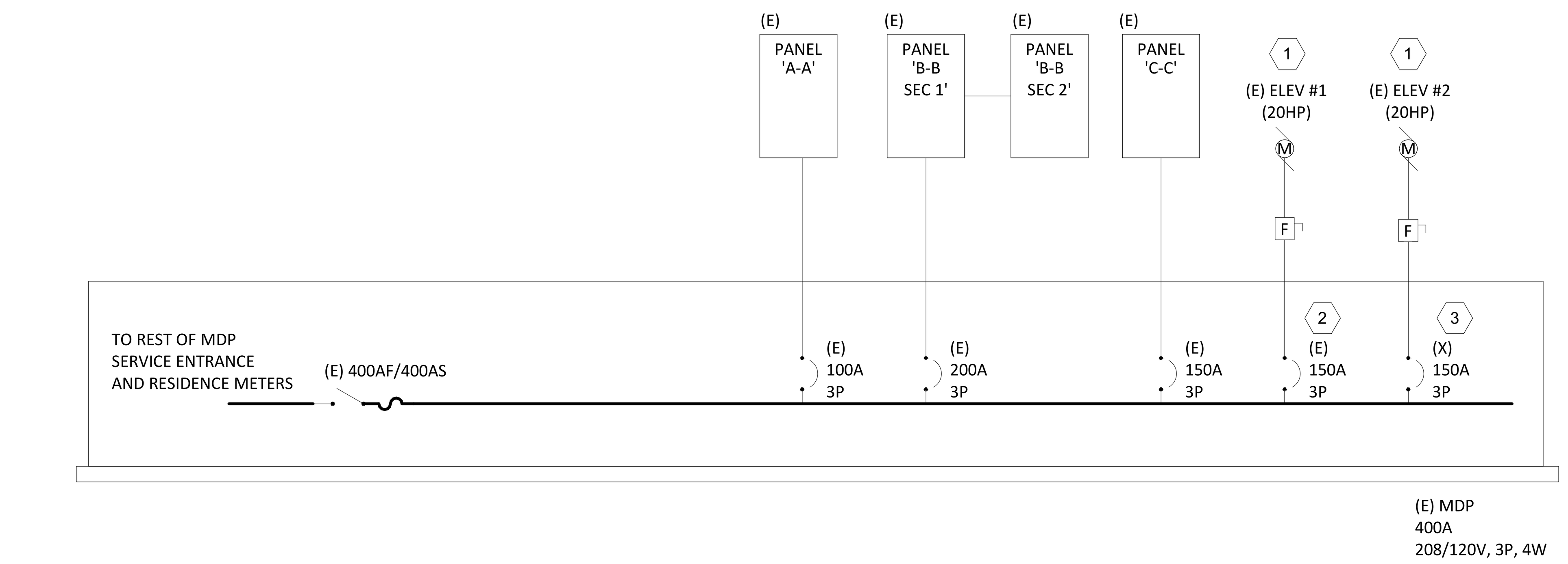
E001

GENERAL SHEET NOTES:

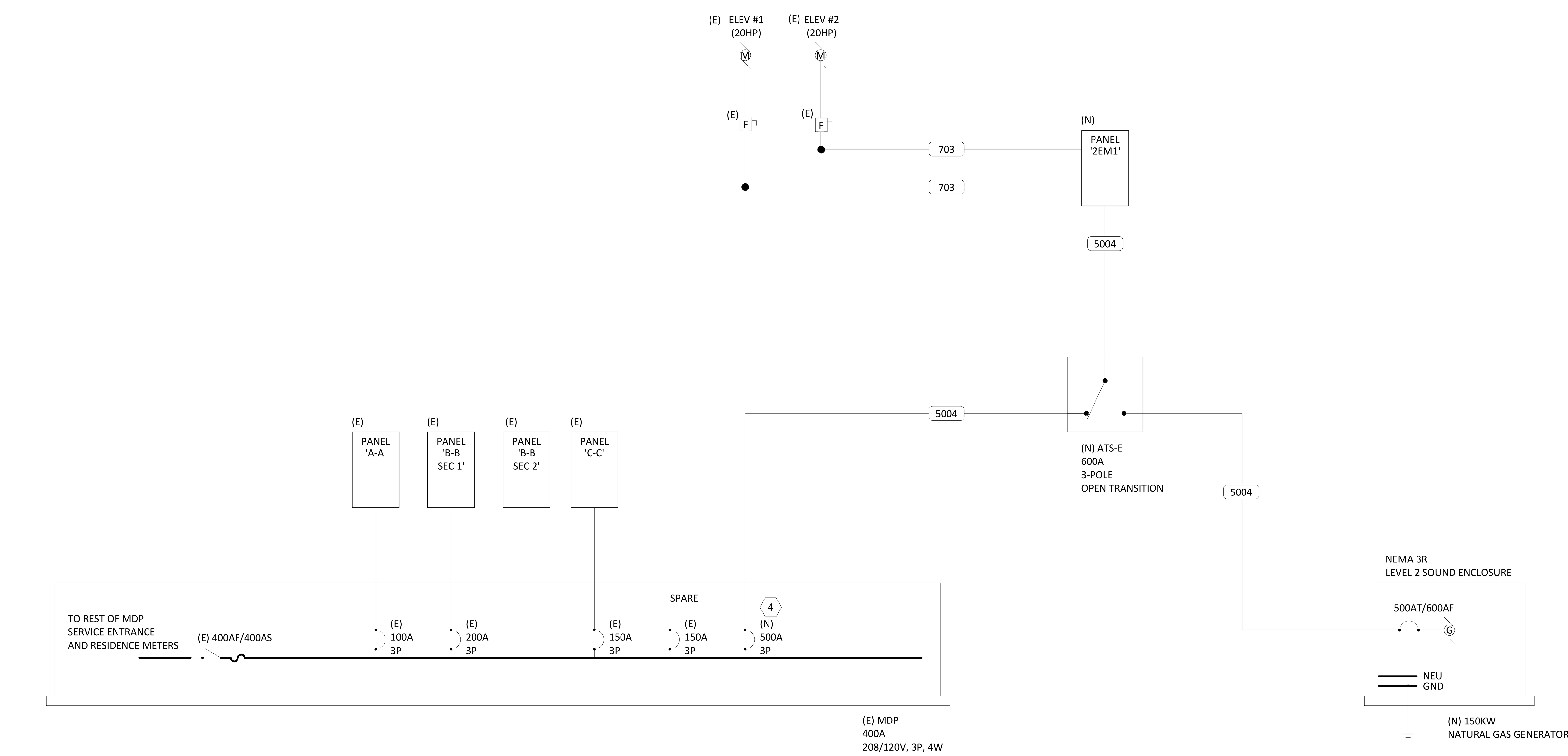
A. PROVIDE LABELS ON ALL ELECTRICAL SERVICE EQUIPMENT INDICATING MAXIMUM AVAILABLE FAULT CURRENT AND DATE OF FAULT CURRENT CALCULATION PER NEC 110.24 AND NEC 110.21.
B. PROVIDE LABELS AND MARKINGS ON ELECTRICAL DISTRIBUTION EQUIPMENT (SWITCHBOARDS, PANELBOARDS, ETC.) INDICATING POTENTIAL ARC FLASH HAZARDS PER NEC 110.16 AND NEC 110.21.
C. ALL EQUIPMENT EXISTING UNLESS NOTED OTHERWISE. EXISTING INFORMATION IS BASED ON SITE VISIT. CONTRACTOR TO FIELD VERIFY EXACT CONDITIONS ON SITE AND REPORT ANY DISCREPANCY TO THE DESIGN TEAM.
D. (E) INDICATES EXISTING EQUIPMENT. (N) INDICATES NEW EQUIPMENT. (X) INDICATES DEMOLISHED EQUIPMENT.

SHEET KEYNOTES

1. EXISTING ELEVATOR TO BE DISCONNECT FROM MDP AND REFED TO NEW PANEL 2EM1. CONTRACTOR TO INTERCEPT WIRING AND EXTEND TO NEW LOCATION. SEE SHEET DETAIL 2 FOR ADDITIONAL INFORMATION
2. EXISTING BREAKER TO BE MARKED AS SPARE
3. EXISTING BREAKER TO BE REMOVED AND REPLACED WITH NEW 500A BREAKER. SEE DETAIL 2 FOR ADDITIONAL INFORMATION.
4. NEW 500A/3P BREAKER TO BE INSTALLED IN SPACE MADE AVAILABLE FROM DEMOLTION OF 150A BREAKER.



1 E002 ONE-LINE DIAGRAM - DEMOLITION
NTS



2 E002 ONE-LINE DIAGRAM - NEW WORK
NTS

REGISTERED PROFESSIONAL ENGINEER
89813PE
OREGON
SEPT 21, 20[illegible]
JOHN W. PRIDE
EXPIRES: 12/31/26

COLEBREIT
ENGINEERING
OREGON | CALIFORNIA

RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

CD DRAFT SET 11/21/2025
JOB NUMBER: 20250193

SHEET TITLE
SCHEDULES AND ONELINE DIAGRAM

SHEET NUMBER
E002

11/21/2025 3:01:16 PM

GENERAL SHEET NOTES:

A. PANEL SCHEDULES ARE FOR EXISTING PANELS EXCEPT FOR PANEL '2EM1'. THERE IS NO ANTICIPATED INCREASE OF OVERALL LOAD, AND NO LOADS BEING ADDED TO EXISTING PANELS.

B. PANEL '2EM1' LOADS ARE ESTIMATED BASED ON THE MAXIMUM ALLOWABLE CONTINUOUS LOAD PER BREAKER RATING (TYPICALLY 80% OF BREAKER RATING FOR CONTINUOUS LOADS PER NEC 210.20(A) AND 215.3), SUPPLEMENTED BY ENGINEERING JUDGMENT AND TYPICAL LOAD CHARACTERISTICS FOR COMPARABLE EQUIPMENT AND SYSTEMS.

'C-C'

LOCATION:
SUPPLY FROM:
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 150 A
BUSSING RATING: 150 A
K.A.I.C. RATING:
FEED-THRU LUGS:

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A (VA)		B (VA)		C (VA)		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
1	SHOP WATER HEATER	--		20	1	0	0					1	20		--	ROOF FAN	2
3	SHOP WATER HEATER	--		20	1			0	0			1	20		--	ROOF FAN	4
5	OFFICE AC	--		20	1					0	0	1	20		--	ROOF FAN	6
7	UNLABELED LOAD	--		20	1	0	0					1	20		--	SUMP PUMP	8
9	UNLABELED LOAD	--		20	1			0	0			1	20		--	SPARE	10
11	(X) WATER HEATER	R	1	50	2					0	0	3	15	1	R	(X) FAN - HEAT SYSTEM	12
13	--	--	--	--	--	0	0					--	--	--	--	--	14
15	(X) HEAT COMM. HALL	R	1	20	3			0	0			--	--	--	--	--	16
17	--	--	--	--	--					0	0	3	30	1	R	(X) HEAT COMM. HALL	18
19	--	--	--	--	--	0	0					--	--	--	--	--	20
21	(X) HEAT COMM. HALL	R	1	50	3			0	0			--	--	--	--	--	22
23	--	--	--	--	--					0	0	2	60		--	UNLABELED LOAD	24
25	--	--	--	--	--	0	0					--	--	--	--	--	26
27	MINI SPLIT	--	1	40	2			0	--			1	--		--	BUSSED PROVISIONS	28
29	--	--	--	--	--					0	--	1	--		--	BUSSED PROVISIONS	30
31	BUSSED PROVISIONS	--		--	1	--	--					1	--		--	BUSSED PROVISIONS	32
33	BUSSED PROVISIONS	--		--	1			--	--			1	--		--	BUSSED PROVISIONS	34
35	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	BUSSED PROVISIONS	36
					Total Load:	0 VA		0 VA		0 VA							
					Total Amps:	0 A		0 A		0 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Receptacle	0 VA	0.00%	0 VA	**TOTAL CONNECTED LOAD:**	**0 VA**
				FEED-THRU LOAD:	**0 VA**
				TOTAL ESTIMATED DEMAND:	**0 VA**
				TOTAL CONNECTED CURRENT:	**0 A**
				TOTAL EST. DEMAND CURRENT:	**0 A**

NOTES:
1. CIRCUIT HAS BEEN RE-FED TO PANEL '2EM1'. DISCONNECT CIRCUIT AT THIS PANEL AND EXTEND CIRCUIT TO NEW PANEL LOCATION. LEAVE BREAKER IN THIS PANEL IN 'OFF' POSITION. LABEL REMAINING BREAKER AS 'SPARE'.

'B-B SEC 1'

LOCATION:
SUPPLY FROM:
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 100 A
BUSSING RATING: 100 A
K.A.I.C. RATING:
FEED-THRU LUGS: Yes

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A (VA)		B (VA)		C (VA)		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
1	(X) PANEL RM LIGHTS	L	1	20	1	0	0					1	20		--	LAUNDRY RM LIGHTS	2
3	RMT LIGHTS CENTER	--		20	1			0	0			1	20	1	L	(X) GARBAGE & MECH RM...	4
5	(X) COMM. RM LIGHTS	L	1	20	1					0	0	1	20	1	L	(X) COMM RM & KITCHEN...	6
7	(X) COMM. RM LIGHTS	L	1	20	1	0	0					1	20	1	L	(X) RECEPTION R, OFFICE,...	8
9	(X) COMM. RM LIGHTS	L	1	20	1			0	0			1	20		--	LAUNDRY RM RECEPTS	10
11	(X) COMM. HALL REST RM SW	R	1	20	1					0	0	1	20	1	R	(X) KITCHEN RECEPT	12
13	(X) MECH. RM RECEPT	R	1	20	1	0	0					1	20	1	R	(X) STORE RM LIGHTS &...	14
15	(X) OFFICE RM RECEPT	R	1	20	1			0	0			1	20	1	R	(X) KITCHEN RECEPT	16
17	(X) COMM. RM RECEPT...	R	1	20	1					0	0	1	20	1	R	(X) COMM. HALL RECEPT N.E.	18
19	(X) COMM. HALL RECEPT S.E.	R	1	20	1	0	0					1	20		--	WASHING MACHINE 1ST...	20
21	(X) HEAT GARBAGE RM	--	1	30	2			0	0			1	20		--	WASHING MACHINE 2ND...	22
23	--	--	--	--	--					0	0	1	20		--	WASHING MACHINE 3RD...	24
25	CORRIDOR RECEPT	--		20	1	0	0					1	20		--	WASHING MACHINE 4TH...	26
27	CORRIDOR RECEPT	--		20	1			0	0			1	20		--	WASHING MACHINE 5TH...	28
29	CORRIDOR RECEPT	--		20	1					0	0	1	20	1	R	(X) TV AMPLIFIER	30
					Total Load:	0 VA		0 VA		0 VA							
					Total Amps:	0 A		0 A		0 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Receptacle	0 VA	0.00%	0 VA	**TOTAL CONNECTED LOAD:**	**0 VA**
Lighting	0 VA	0.00%	0 VA	**FEED-THRU LOAD:**	**0 VA**
General	0 VA	0.00%	0 VA	**TOTAL ESTIMATED DEMAND:**	**0 VA**
				TOTAL CONNECTED CURRENT:	**0 A**
				TOTAL EST. DEMAND CURRENT:	**0 A**

NOTES:
1. CIRCUIT HAS BEEN RE-FED TO PANEL '2EM1'. DISCONNECT CIRCUIT AT THIJS PANEL AND EXTEND CIRCUIT TO NEW PANEL LOCATION. LEAVE BREAKER IN THIS PANEL IN 'OFF' POSITION. LABEL REMAINING BREAKER AS 'SPARE'.

'EM'

LOCATION:
SUPPLY FROM:
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 100 A
BUSSING RATING: 100 A
K.A.I.C. RATING:
FEED-THRU LUGS:

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A (VA)		B (VA)		C (VA)		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
1	MAIN BREAKER	--		50	3	0	--					1	--		--	BUSSED PROVISIONS	2
3	--	--	--	--	--			0	--			1	--		--	BUSSED PROVISIONS	4
5	--	--	--	--	--					0	--	1	--		--	BUSSED PROVISIONS	6
7	STAIRWAY LIGHTS EAST	--		20	1	0	0					1	20		--	STAIRWAY LIGHTS WEST	8
9	STAIRWAY LIGHTS EAST	--		20	1			0	0			1	20		--	STAIRWAY LIGHTS WEST	10
11	(X) EMERGENCY LIGHTS...	--	1	20	1					0	0	1	20	1	--	EMERGENCY LTS & EXIT LTS...	12
13	EXIT LIGHTS	--		20	1	0	0					1	20	1	--	EMERGENCY LTS & EXIT LTS...	14
15	EXIT LIGHTS	--		20	1			0	0			1	20	1	--	FIRE ALARM	16
17	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	BUSSED PROVISIONS	18
					Total Load:	0 VA		0 VA		0 VA							
					Total Amps:	0 A		0 A		0 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
				TOTAL CONNECTED LOAD:	**0 VA**
				FEED-THRU LOAD:	**0 VA**
				TOTAL ESTIMATED DEMAND:	**0 VA**
				TOTAL CONNECTED CURRENT:	**0 A**
				TOTAL EST. DEMAND CURRENT:	**0 A**

NOTES:
1. NO WORK ASSOCIATED WITH THIS PANEL UNLESS OTHERWISE NOTED.

'2EM1'

LOCATION:
SUPPLY FROM:
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 500 A
BUSSING RATING: 600 A
K.A.I.C. RATING:
FEED-THRU LUGS: Yes

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A		B		C		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
1	ELEVATOR 1	M		70	3	6,667	1,920					1	20	3	--	PANEL RM LIGHTS	2
3	--	--	--	--	--			6,667	1,920			1	20	3	--	COMM. RM LIGHTS	4
5	--	--	--	--	--					6,667	1,920	1	20	3	--	COMM. RM LIGHTS	6
7	ELEVATOR 2	M		70	3	6,667	1,920					1	20	3	--	COMM. RM LIGHTS	8
9	--	--	--	--	--			6,667	1,920			1	20	3	--	COMM. HALL REST RM SW	10
11	--	--	--	--	--					6,667	1,920	1	20	3	--	MECH. RM RECEPT	12
13	ELEVATOR 1,2 ROOF VENT,...	--	2	20	1	1,080	1,080					1	20	3	--	OFFICE RM RECEPT	14
15	ELEVATOR 1 LIGHTS, PLUG,...	--	2	20	1			1,080	1,080			1	20	3	--	COMM. RM RECEPT HALLWAY	16
17	ELEVATOR 1 PIT LIGHTS,...	--	2	20	1					200	1,080	1	20	3	--	COMM. HALL RECEPT S.E.	18
19	ELEVATOR 1 SUMP PUMP	--	2	20	1	500	1,000					2	30	3	--	HEAT GARBAGE RM	20
21	ELEVATOR 2 MACHINE RM...	--	4	20	1			200	1,000			--	--	--	--	--	22
23	ELEVATOR 2 PIT LIGHTS	--	4	20	1					200	500	1	20	3	--	GARBAGE & MECH RM LIGHTS	24
25	ELEVATOR AIR CONDITIONER	--	4	20	1	1,920	500					1	20	3	--	COMM RM & KITCHEN LIGHTS	26
27	ELEVATOR 1,2 SEISMIC...	--	4	20	1			200	1,080			1	20	3	--	RECEPTION R, OFFICE, REST...	28
29	ELEVATOR 1 INTERCOM	--	4	20	1					200	1,080	1	20	3	--	KITCHEN RECEPT	30
31	ELEVATOR 2 SUMP PUMP	--	4	20	1	500	1,080					1	20	3	--	STORE RM LIGHTS & RECEPT	32
33	ELEVATOR 2 CAB LIGHTS	--	4	20	1			200	1,080			1	20	3	--	KITCHEN RECEPT	34
35	ELEVATOR 1 MECH RM LIGHTS	--	4	20	1					200	1,080	1	20	3	--	COMM. HALL RECEPT N.E.	36
37	ELEVATOR 1 INTERCOM	--	4	20	1	200	500					1	20	3	--	TV AMPLIFIER	38
39	ELEVATOR 1 CAB LIGHTS	--	4	20	1			200	300			1	20		G	GENERATOR BATTERY...	40
41	KITCHEN RANGE	--	4	30	2					0	750	2	20		G	GENERATOR JACKET HEATER	42
43	--	--	--	--	--	0	750					--	--	--	--	--	44
45	COMM. HALL DISHWASHER	--	4	30	1			0	667			3	15	5	--	FAN - HEAT SYSTEM	46
47											667	--	--	--	--	--	48
49							667					--	--	--	--	--	50
51									1,000			3	30	5	--	HEAT COMM. HALL	52
53	WATER HEATER	--	5	50	2					2,000	1,000	--	--	--	--	--	54
55	--	--	--	--	--	2,000	1,000					--	--	--	--	--	56
57	HEAT COMM. HALL	--	5	20	3			1,500	0			1	20		--	SPARE	58
59	--	--	--	--	--					1,500	0	1	20		--	SPARE	60
61	--	--	--	--	--	1,500	0					1	20		--	SPARE	62
63	HEAT COMM. HALL	--	5	50	3			3,300	0			1	20		--	SPARE	64
65	--	--	--	--	--					3,300	0	2	20		--	SPARE	66
67	--	--	--	--	--	3,300	0					--	--	--	--	--	68
69	MINI SPLIT	--	5	20	2			800	0			3	20		--	SPARE	70
71	--	--	--	--	--					800	0	--	--	--	--	--	72
73	SPARE	--		20	1	0	0					--	--	--	--	--	74
75	BUSSED PROVISIONS	--		--	1			--	--			1	--		--	BUSSED PROVISIONS	76
77	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	BUSSED PROVISIONS	78
79	BUSSED PROVISIONS	--		--	1	--	--					1	--		--	BUSSED PROVISIONS	80
81	BUSSED PROVISIONS	--		--	1			--	--			1	--		--	BUSSED PROVISIONS	82
83	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	BUSSED PROVISIONS	84
					Total Load:	34,750 VA		30,860 VA		31,730 VA							
					Total Amps:	291 A		257 A		266 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Motor	40,000 VA	112.50%	45,000 VA	**TOTAL CONNECTED LOAD:**	**97,341 VA**
Spare	55,541 VA	100.00%	55,541 VA	**FEED-THRU LOAD:**	**0 VA**
General	1,800 VA	100.00%	1,800 VA	**TOTAL ESTIMATED DEMAND:**	**102,341 VA**
				TOTAL CONNECTED CURRENT:	**270 A**
				TOTAL EST. DEMAND CURRENT:	**284 A**

NOTES:
1. CIRCUIT RE-FED FROM EXISTING PANEL 'EM'. SEE OTHER PANEL SCHEDULES FOR FURTHER INFORMATION.
2. CIRCUIT RE-FED FROM EXISTING PANEL 'A-A'. SEE OTHER PANEL SCHEDULES FOR FURTHER INFORMATION.
3. CIRCUIT RE-FED FROM EXISTING PANEL 'B-B SEC. 1'. SEE OTHER PANEL SCHEDULES FOR FURTHER INFORMATION.
4. CIRCUIT RE-FED FROM EXISTING PANEL 'B-B SEC. 2'. SEE OTHER PANEL SCHEDULES FOR FURTHER INFORMATION.
5. CIRCUIT RE-FED FROM EXISTING PANEL 'C-C'. SEE OTHER PANEL SCHEDULES FOR FURTHER INFORMATION.

'B-B SEC 2'

LOCATION:
SUPPLY FROM: B-B SEC 1
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 100 A
BUSSING RATING: 100 A
K.A.I.C. RATING:
FEED-THRU LUGS:

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A		B		C		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
31	(X) ELEVATOR 2 MACHINE R...	--	1	20	1	0	0					1	20	1	--	(X) ELEVATOR 2 CAB LIGHTS	32
33	(X) ELEVATOR 2 PIT LIGHTS	--	1	20	1			0	0			1	30	1	G	(X) COMM. HALL...	34
35	LAUNDRY RM HEATER 1ST...	--		20	2					0	0	2	20		--	LAUNDRY RM HEATER 4TH...	36
37	--	--	--	--	--	0	0					--	--	--	--	--	38
39	LAUNDRY RM HEATER 2ND...	--		20	2			0	0			2	20		--	LAUNDRY RM HEATER 3RD...	40
41	--	--	--	--	--					0	0	--	--	--	--	--	42
43	LAUNDRY RM HEATER 5TH...	--		20	2	0	0					2	40		--	DRYER 3RD FLOOR	44
45	--	--	--	--	--			0	0			--	--	--	--	--	46
47	DRYER 1ST FLOOR	--		40	2					0	0	2	40		--	DRYER 1ST FLOOR	48
49	--	--	--	--	--	0	0					--	--	--	--	--	50
51	DRYER 2ND FLOOR	--		40	2			0	0			2	40		--	DRYER 4TH FLOOR	52
53	--	--	--	--	--					0	0	--	--	--	--	--	54
55	KITCHEN RANGE	--		50	2	0	0					2	30	1	R	(X) KITCHEN RANGE	56
57	--	--	--	--	--			0	0			--	--	--	--	--	58
59	(X) ELEVATOR AIR...	--	1	15	2					0	0	1	20	1	--	(X) ELEVATOR 1 MECH RM...	60
61	--	--	--	--	--	0	0					1	20	1	--	(X) ELEVATOR 1 INTERCOM	62
63	(X) ELEVATOR 1,2 SEISMIC...	--	1	20	1			0	0			1	20	1	--	(X) ELEVATOR 1 CAB LIGHTS	64
65	(X) ELEVATOR 1 INTERCOM	--	1	20	1					0	--	1	--		--	BUSSED PROVISIONS	66
67	(X) ELEVATOR 2 SUMP PUMP	--	1	20	1	0	--					1	--		--	BUSSED PROVISIONS	68
69	BUSSED PROVISIONS	--		--	1			--	--			1	--		--	BUSSED PROVISIONS	70
71	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	BUSSED PROVISIONS	72
					Total Load:	0 VA		0 VA		0 VA							
					Total Amps:	0 A		0 A		0 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
Receptacle	0 VA	0.00%	0 VA	**TOTAL CONNECTED LOAD:**	**0 VA**
General	0 VA	0.00%	0 VA	**FEED-THRU LOAD:**	**0 VA**
				TOTAL ESTIMATED DEMAND:	**0 VA**
				TOTAL CONNECTED CURRENT:	**0 A**
				TOTAL EST. DEMAND CURRENT:	**0 A**

NOTES:
1. CIRCUIT HAS BEEN RE-FED TO PANEL '2EM1'. DISCONNECT CIRCUIT AT THIS PANEL AND EXTEND CIRCUIT TO NEW PANEL LOCATION. LEAVE BREAKER IN THIS PANEL IN 'OFF' POSITION. LABEL REMAINING BREAKER AS 'SPARE'.

'A-A'

LOCATION:
SUPPLY FROM:
MOUNTING: Surface
ENCLOSURE: Type 1
VOLTAGE: 208Y/120V, 3Φ, 4W
MAINS RATING: 100 A
BUSSING RATING: 100 A
K.A.I.C. RATING:
FEED-THRU LUGS:

CKT	CIRCUIT DESCRIPTION	LC	NOTE	TRIP (A)	POLE	A		B		C		POLE	TRIP (A)	NOTE	LC	CIRCUIT DESCRIPTION	CKT
1	PEPSI MACHINE	--		20	1	0	0					1	20		--	CORRIDOR LIGHTS EAST	2
3	CORRIDOR LIGHTS WEST	--		20	1			0	0			1	20		--	CORRIDOR LIGHTS EAST	4
5	CORRIDOR LIGHTS WEST	--		20	1					0	0	1	20		--	CORRIDOR LIGHTS EAST	6
7	(X) ELEVATOR 1,2 ROOF VEN...	--	1	20	1	0	0					1	20		--	SPARE	8
9	(X) ELEVATOR 1 LIGHTS, PLU...	--	1	20	1			0	0			1	20		--	CORRIDOR LIGHTS EAST	10
11	CORRIDOR LIGHTS WEST	--		20	1					0	0	1	20		--	CORRIDOR LIGHTS EAST	12
13	CORRIDOR LIGHTS WEST	--		20	1	0	0					1	20		--	CORRIDOR LIGHTS EAST	14
15	CORRIDOR LIGHTS WEST	--		20	1			0	0			1	20		--	CORRIDOR LIGHTS EAST	16
17	(X) ELEVATOR 1 PIT LIGHTS,...	--	1	20	1					0	0	1	20		--	CORRIDOR LIGHTS EAST	18
19	CORRIDOR LIGHTS EAST	--		20	1	0	0					1	20		--	YARD LIGHTS EAST	20
21	OUTSIDE LIGHTS WEST...	--		20	1			0	0			3	50		--	CONTACTOR BELOW PANEL...	22
23	EXIT & EMER LTS FOYER, PE...	--		20	1					0	0	--	--	--	--	--	24
25	SPARE	--		20	1	0	0					--	--	--	--	--	26
27	BUSSED PROVISIONS	--		--	1			--	0			1	20		--	SPARE	28
29	(X) ELEVATOR 1 SUMP PUMP	--	1	20	1					0	0	1	20		--	FLOOR 1-5 PLUGS	30
31	OUTSIDE LIGHTS WEST END ...	--		20	1	0	0					1	20		--	SPARE	32
33	BUSSED PROVISIONS	--		--	1			--	--			1	--		--	BUSSED PROVISIONS	34
35	SPARE	--		20	1					0	--	1	--		--	BUSSED PROVISIONS	36
37	BUSSED PROVISIONS	--		--	1	--	0					1	20		--	OUTSIDE YARD LIGHTS SOUT...	38
39	OUTSIDE YARD LIGHTS NOR...	--		20	1			0	0			1	20		--	OUTSIDE YARD LIGHTS NOR...	40
41	BUSSED PROVISIONS	--		--	1					--	0	1	20		--	SPARE	42
43	BUSSED PROVISIONS	--		--	1	--	0					1	20		--	SPARE	44
45	BUSSED PROVISIONS	--		--	1			--	0			1	20		--	SPARE	46
47	BUSSED PROVISIONS	--		--	1					--	--	1	--		--	NW PARKING LOT 4 POLES	48
					Total Load:	0 VA		0 VA		0 VA							
					Total Amps:	0 A		0 A		0 A							

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
				TOTAL CONNECTED LOAD:	**0 VA**
				FEED-THRU LOAD:	**0 VA**
				TOTAL ESTIMATED DEMAND:	**0 VA**
				TOTAL CONNECTED CURRENT:	**0 A**
				TOTAL EST. DEMAND CURRENT:	**0 A**

NOTES:
1. CIRCUIT HAS BEEN RE-FED TO PANEL '2EM1'. DISCONNECT CIRCUIT AT THIJS PANEL AND EXTEND CIRCUIT TO NEW PANEL LOCATION. LEAVE BREAKER IN THIS PANEL IN 'OFF' POSITION. LABEL REMAINING BREAKER AS 'SPARE'.

REGISTERED PROFESSIONAL ENGINEER
89813PE
OREGON
SEPT 21, 2021
JOHN W. PRIDE
EXPIRES: 12/31/26

COLEBREIT ENGINEERING
OREGON | CALIFORNIA

RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

CD DRAFT SET 11/21/2025

JOB NUMBER: 20250193

SHEET TITLE

SCHEDULES

SHEET NUMBER

E003

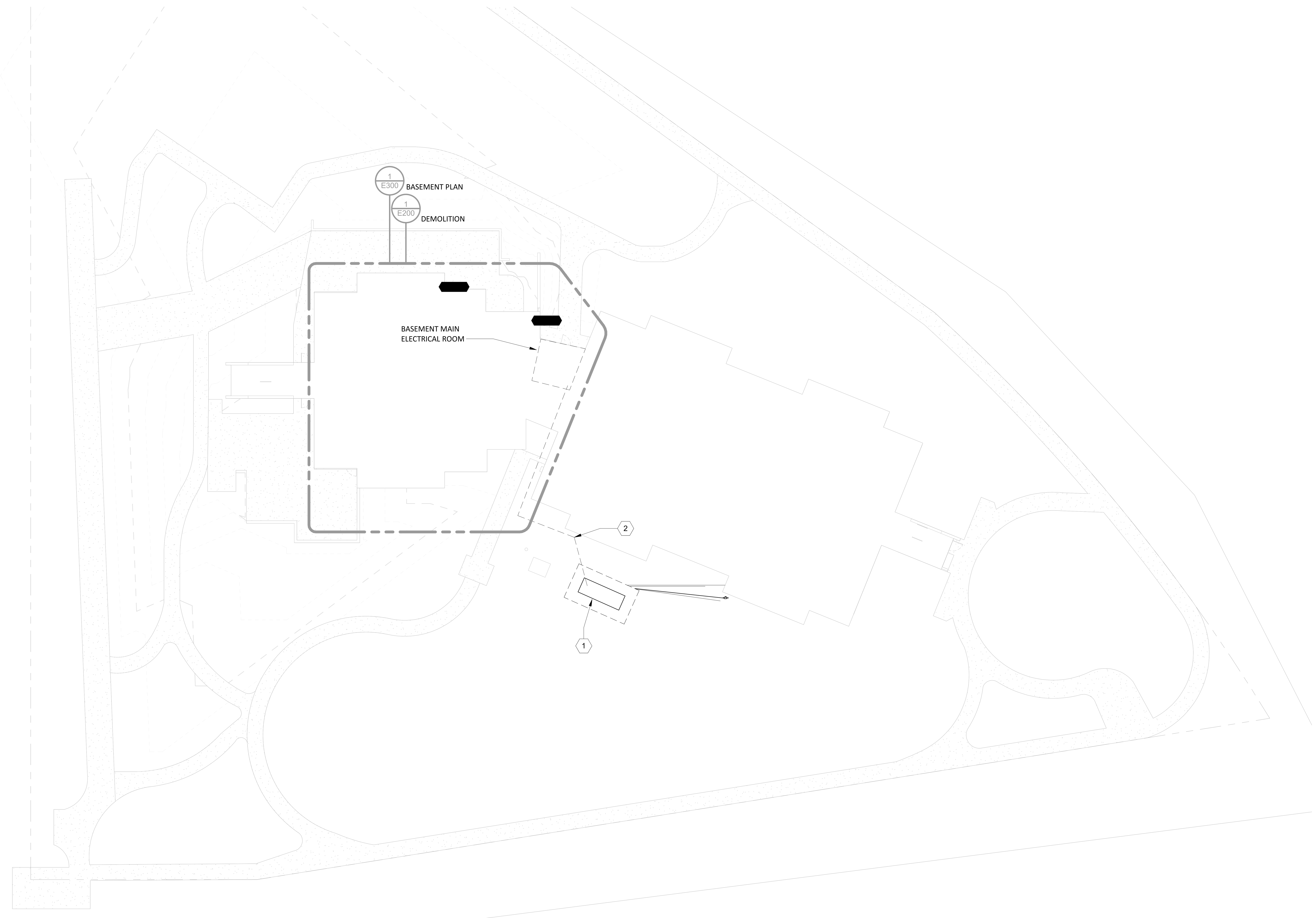
GENERAL SHEET NOTES:

A. COORINATE FINAL TRENCH AND UNDERGROUND PULLBOX LOCATIONS WITH CIVIL AND LANDSCAPE ACHITECT PRIOR TO INSTALLATION. PULLBOXES TO BE LOCATED WITHIN LANDSCAPE AREAS WHEN POSSIBLE. MAINTAIN MINIMUM 36" SEPARATE FOR STORM DRAIN INLETS.

B. PROVIDE DEDICATED NEUTRAL TO EACH BRANCH CIRCUIT.

SHEET KEYNOTES

1. PROVIDE NEW 150KW NATURAL GAS GENERATOR. CONTRACTOR TO PROVIDE ALL NESSESSARY CONNECTIONS PER MANUFACTURER'S REQUIREMENTS. COORDINATE WITH CIVIL AND ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION. SEE DETAIL 1/E400 FOR ADDITIONAL ELECTRICAL INFORMATION.
2. CONTRACTOR TO PROVIDE 2 SETS OF (4 #3/0 CU THWN-2, 1 #3 CU GND., IN 2"C.) TO ATS FROM GENERATOR. SEE SHEET E002 AND DETAIL 2/E400 FOR ADDITIONAL INFORMATION.



1/E100 OVERALL SITE - ELECTRICAL

1/16" = 1'-0"

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925 W. MAIN ST, COTTAGE GROVE, OR

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CD DRAFT SET	11/21/2025
JOB NUMBER:	20250193

SHEET TITLE

SITE PLAN

SHEET NUMBER

E100

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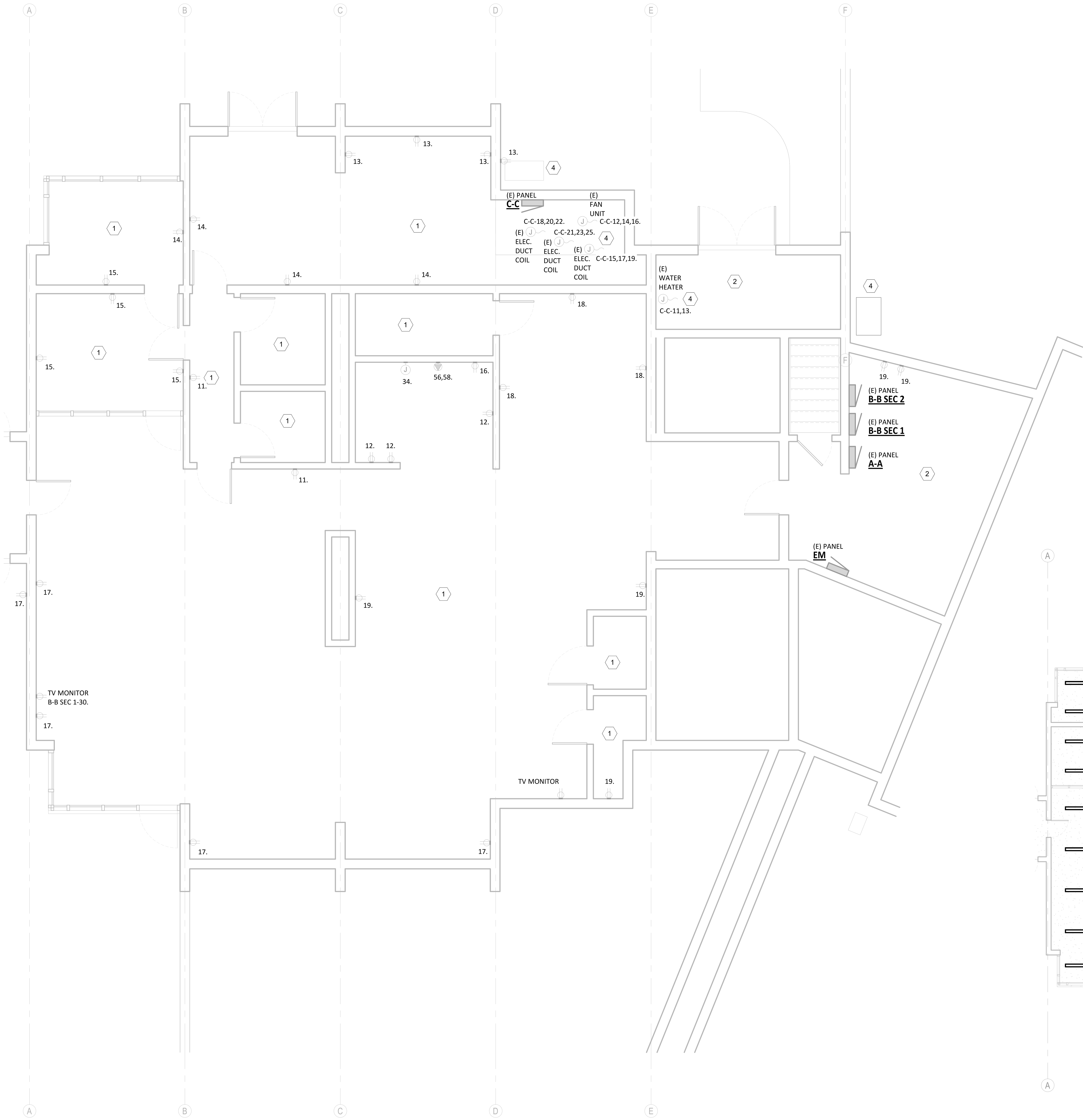


1 E200 BASEMENT LEVEL - ELECTRICAL DEMOLITION

1/4" = 1'-0"

GENERAL SHEET NOTES:

A. DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION PRIOR TO DEMOLITION. NOTES AND GRAPHIC REPRESENTATIONS SHALL NOT LIMIT THE EXTENT OF DEMOLITION REQUIRED. CONTRACTOR SHALL VISIT THE SITE TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND IN ORDER TO AVOID CONFLICTS. CONTRACTOR SHALL PERFORM ALL DEMOLITION REQUIRED TO ACHIEVE THE FINAL DESIGN INTENT AS REQUIRED BY THE CONTRACT DOCUMENTS.

B. DE-ENERGIZE AND SAFE-OFF ALL EQUIPMENT AND ANY WIRING AND/OR EQUIPMENT TO BE MODIFIED PRIOR TO ANY DEMOLITION WORK. CONTRACTOR RESPONSIBLE FOR SAFE-OFF DEMO AS NECESSARY FOR CONSTRUCTION EFFORTS. PROVIDE LOCK-OUT/TAG-OUT PROCEDURES TO PROVIDE SAFE WORKING ENVIRONMENT.

C. UNLESS OTHERWISE INDICATED, EXISTING SERVICES, SYSTEMS AND WIRING SERVICING EXISTING AREAS OUTSIDE OF DEMOLITION AREA SHALL REMAIN OR BE RELOCATED AS REQUIRED TO MAINTAIN OPERATION OF EXISTING SYSTEMS.

D. EXERCISE CARE IN REMOVAL OF DEMOLITION ITEMS AND MODIFICATION OF EXISTING ITEMS. REPAIR, AT NO ADDITIONAL COST TO OWNER, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

E. ALL CONDUIT REMOVED SHALL BE REMOVED IN IT'S ENTIRETY, INCLUDING FITTINGS, MOUNTING DEVICES, MOUNTING HARDWARE, ETC. PROVIDE CONDUIT PLUGS AND BLANKS FOR ALL OPENINGS CREATED BY THE REMOVAL OF CONDUIT. PROVIDE BLANK COVER PLATES FOR ALL OPENED OUTLET BOXES CREATED BY THE REMOVAL OF THE EQUIPMENT AND / OR DEVICES.

F. FEEDERS AND BRANCH CIRCUITS TO BE REMOVED: WIRING, CONDUIT AND SUPPORTS SHALL BE REMOVED TO THE PANEL OF ORIGIN.

G. EXISTING CIRCUITING TO REMAIN SHALL BE REROUTED OR RECONNECTED, AS REQUIRED, WHERE AFFECTED BY NEW WORK IN ORDER TO MAINTAIN CONTINUITY OF CIRCUIT.

H. EQUIPMENT INDICATED TO BE REMOVED SHALL BE TAKEN FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH APPLICABLE LAWS AND ENVIRONMENTAL REGULATIONS.

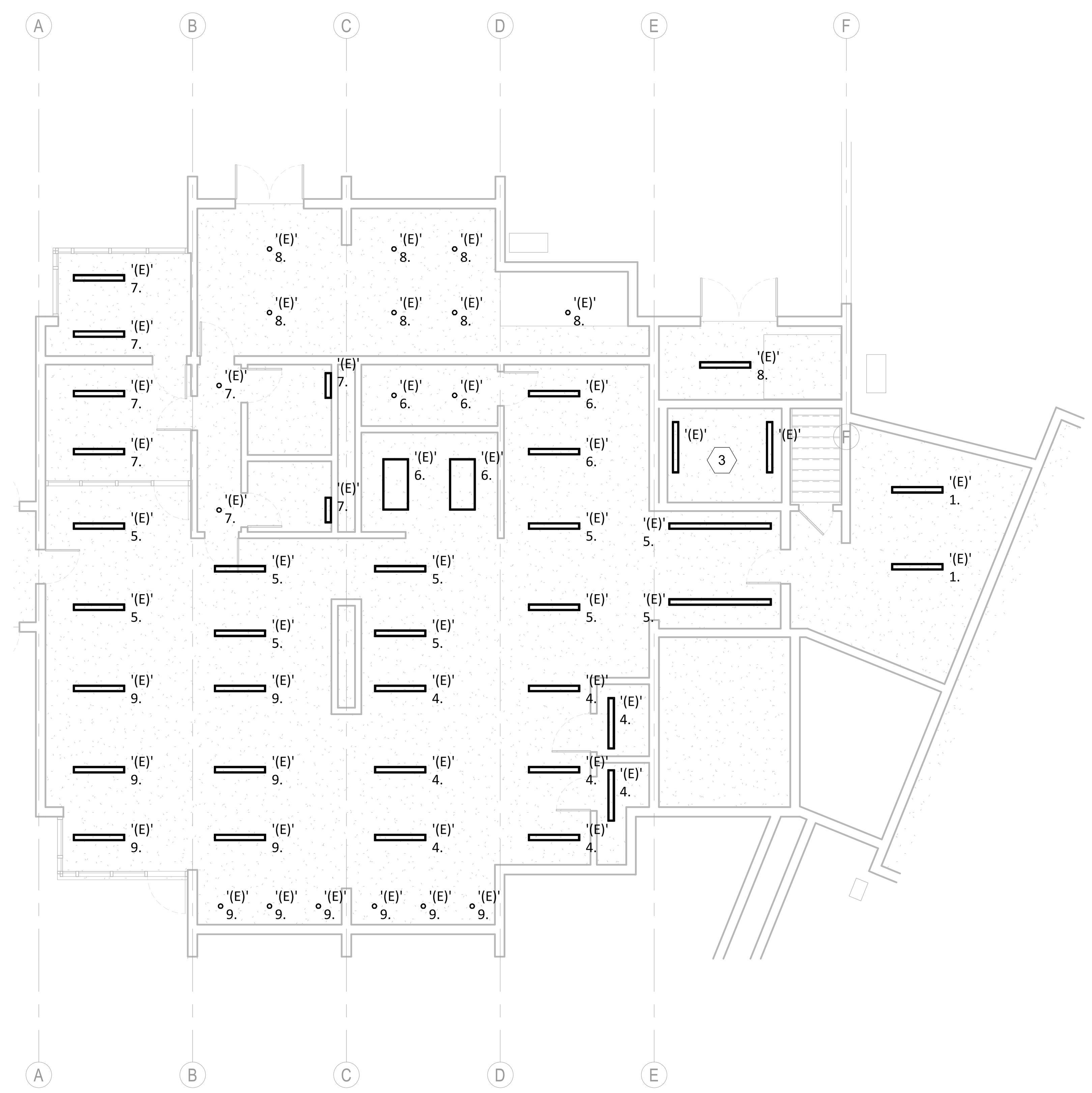
I. ALL WORK AND ALL POWER OUTAGES IN THE EXISTING BUILDING SHALL BE COORDINATED WITH AND SCHEDULED AT TIMES CONVENIENT TO THE OWNER.

J. CIRCUITING ON THIS SHEET IS THE EXISTING CIRCUITING, SHOWN FOR REFERENCE ONLY. UNLESS OTHERWISE NOTED, ALL CIRCUITS SHOWN SHALL BE RE-FED TO PANEL '2EM1'. SEE PANEL SCHEDULES FOR FURTHER INFORMATION.

K. LIGHTING ON THIS SHEET IS CIRCUITED TO PANEL B-B UNLESS OTHERWISE NOTED.

SHEET KEYNOTES

1. ALL EXISTING LIGHTING AND POWER IN THIS SPACE TO BE DISCONNECTED FROM EXISTING PANEL AND REFED TO NEW 2EM1 EMERGENCY PANEL. CONTRACTOR TO INTERCEPT CIRCUITS AND EXTEND TO NEW PANEL.
2. ALL EXISTING LIGHTING AND ELECTRICAL DEVICES IN THIS SPACE TO REMAIN, UNLESS NOTED OTHERWISE.
3. ADDITIONAL LIGHTING IN ELEVATOR PIT CIRCUITED TO PANEL B-B 33. VERIFY FIXTURE COUNT AND CIRCUITING IN FIELD.
4. EXISTING MECHANICAL EQUIPMENT IN THIS AREA TO BE DISCONNECTED FROM EXISTING PANEL AND RECURCUITED TO NEW 2 EM1 EMERGENCY PANEL. CONTRACTOR TO INTERCEPT AND EXTEND WIRE TO NEW PANEL.



2 E200 BASEMENT LEVEL - ELECTRICAL EXISTING RCP

1/8" = 1'-0"

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925 W. MAIN ST, COTTAGE GROVE, OR

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CD DRAFT SET	11/21/2025
JOB NUMBER:	20250193

SHEET TITLE

DEMOLITION BASEMENT LEVEL ELECTRICAL

SHEET NUMBER

E200

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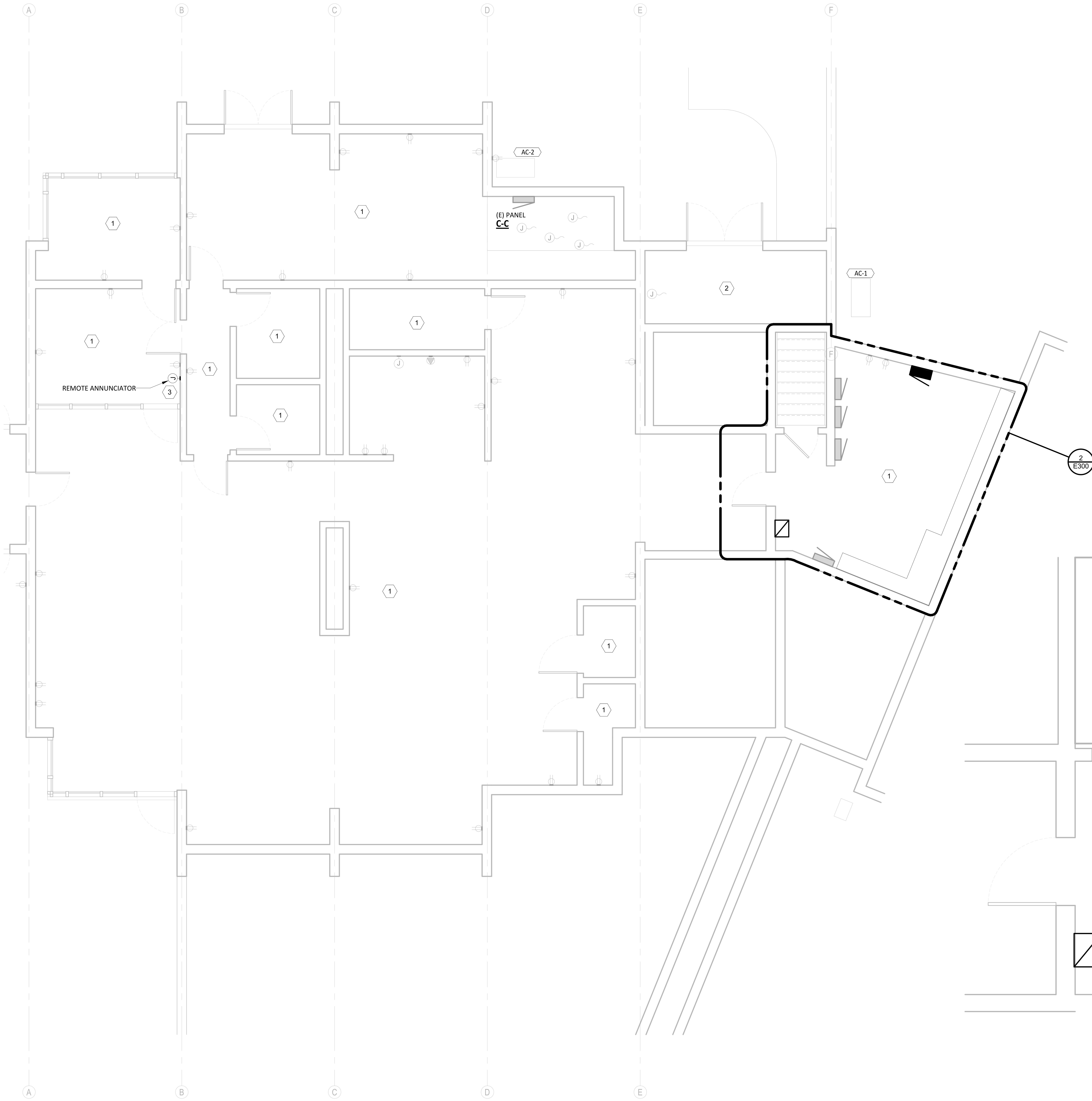
GENERAL SHEET NOTES:

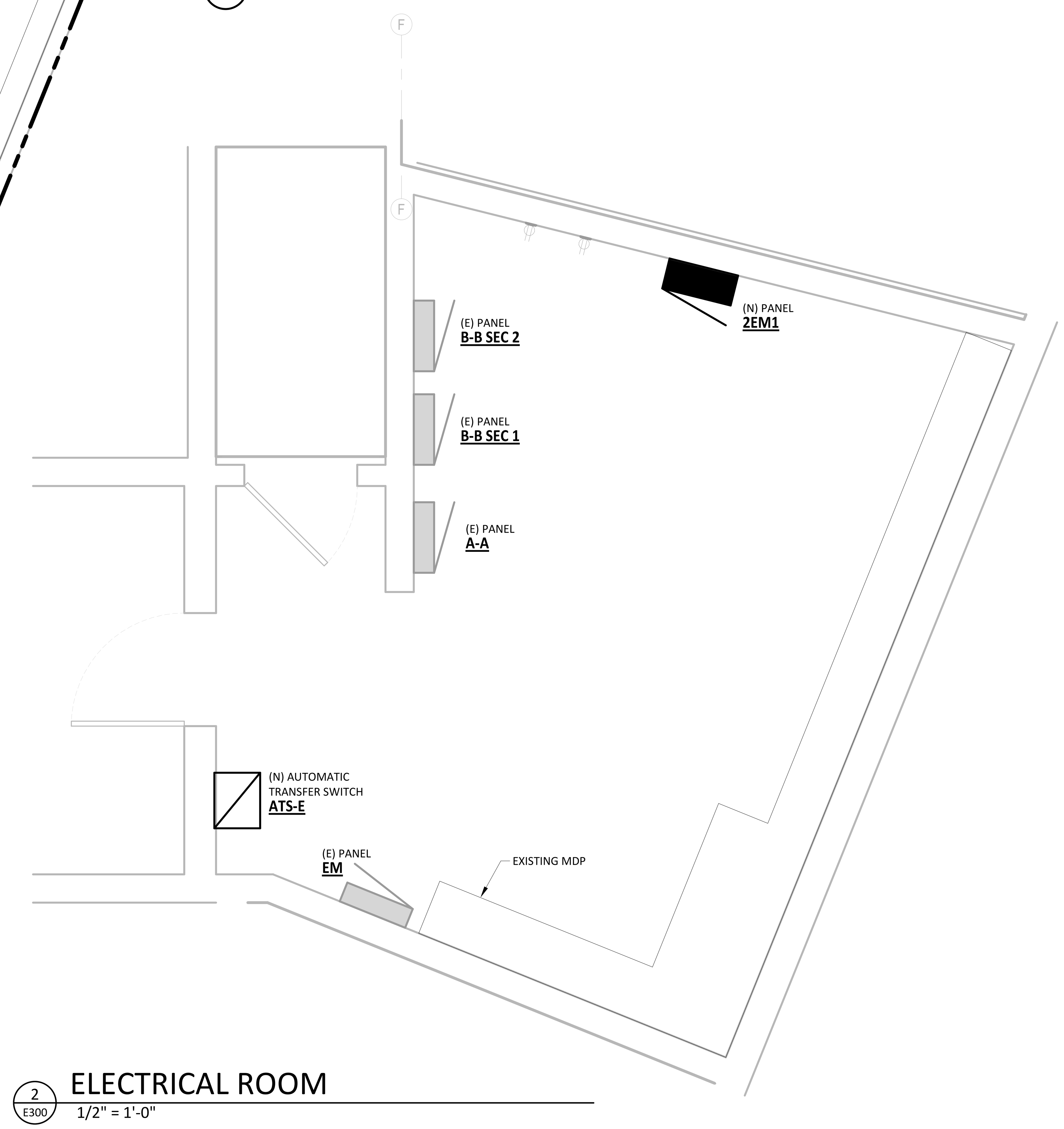
A. PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR EACH PHASE. DO NOT SHARE NEUTRAL.
B. SEE DEMO DRAWINGS FOR EXISTING DEVICE LOCATIONS AND PREVIOUS CIRCUITING.
C. SEE '2EM1' PANEL SCHEDULE FOR NEW CIRCUITING.

SHEET KEYNOTES

1. ALL EXISTING POWER DEVICES IN THIS SPACE TO BE DISCONNECTED AND REFED TO NEW EMERGENCY PANEL 2EM1. CONTRACTOR TO INTERCEPT CIRCUITS AND REFED TO NEW PANEL.
2. ALL EXISTING LIGHTING AND ELECTRICAL DEVICES IN THIS SPACE TO REMAIN, UNLESS NOTED OTHERWISE.
3. NEW ANNUNICIATOR PANEL LOCATION. INSTALL AND CONNECT TO GENERATOR PER MANUFACTURER'S RECOMMENDATIONS. COORDINATE EXACT LOCATION WITH BUILDING OWNER.



1 E300 BASEMENT LEVEL - ELECTRICAL
1/4" = 1'-0"



2 E300 ELECTRICAL ROOM
1/2" = 1'-0"

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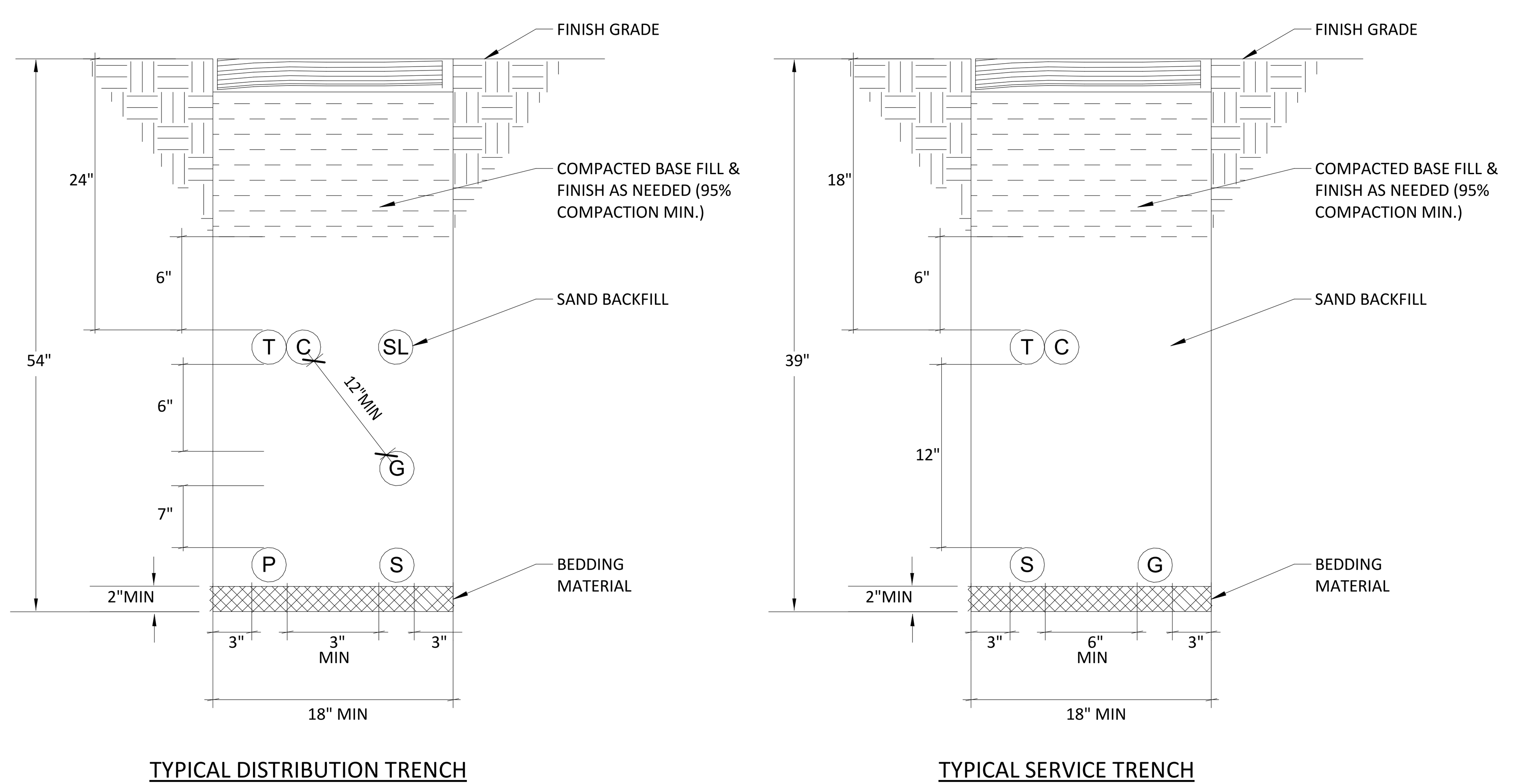
925 W. MAIN ST, COTTAGE GROVE, OR

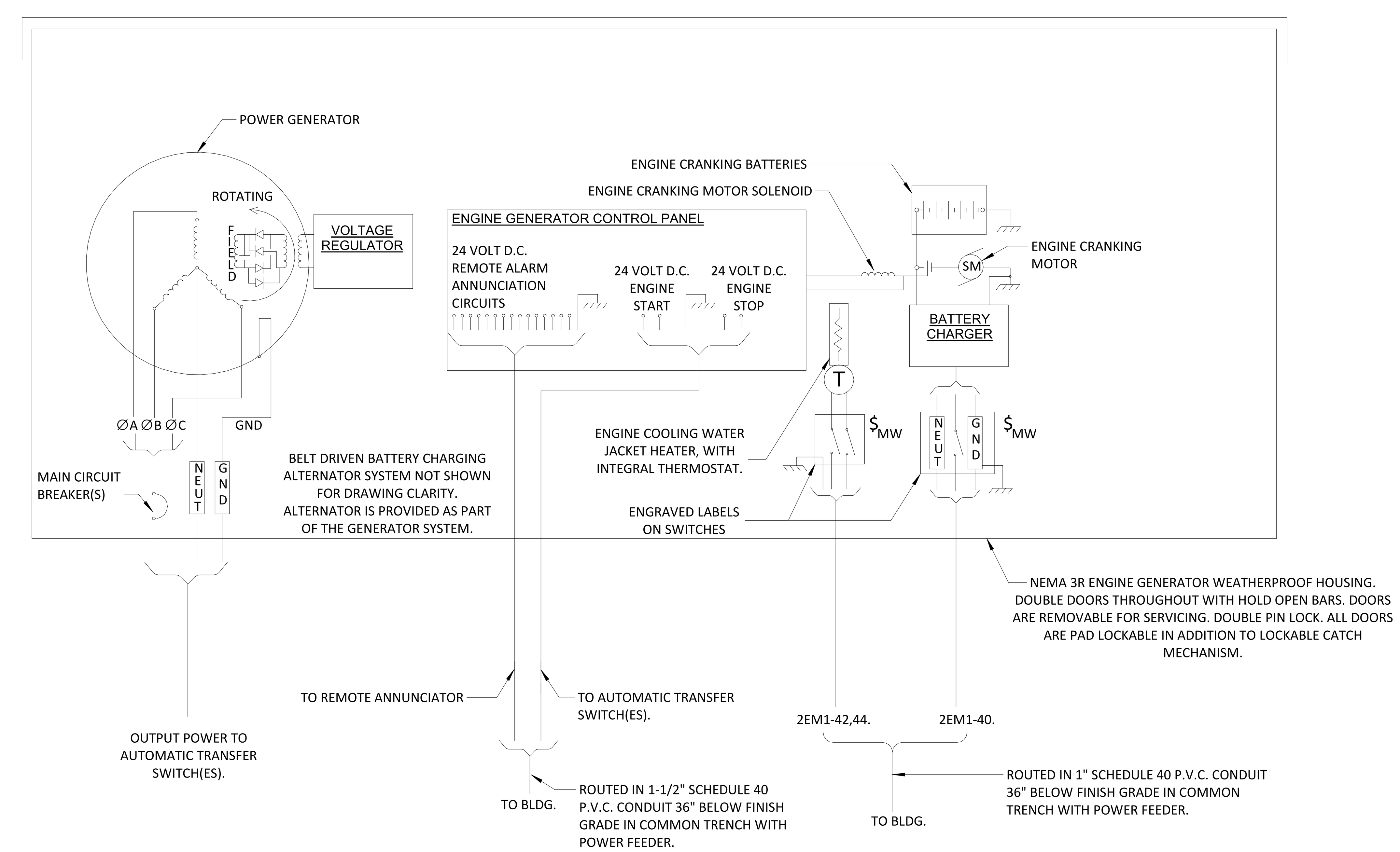
REVISION SCHEDULE

CD DRAFT SET	11/21/2025
JOB NUMBER:	20250193
SHEET TITLE	BASEMENT LEVEL ELECTRICAL
SHEET NUMBER	E300



2 E400 TRENCH DETAIL

NTS



1 E400 GENERATOR DETAIL

NTS

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CD DRAFT SET 11/21/2025

JOB NUMBER: 20250193

SHEET TITLE

DETAILS

SHEET NUMBER

E400

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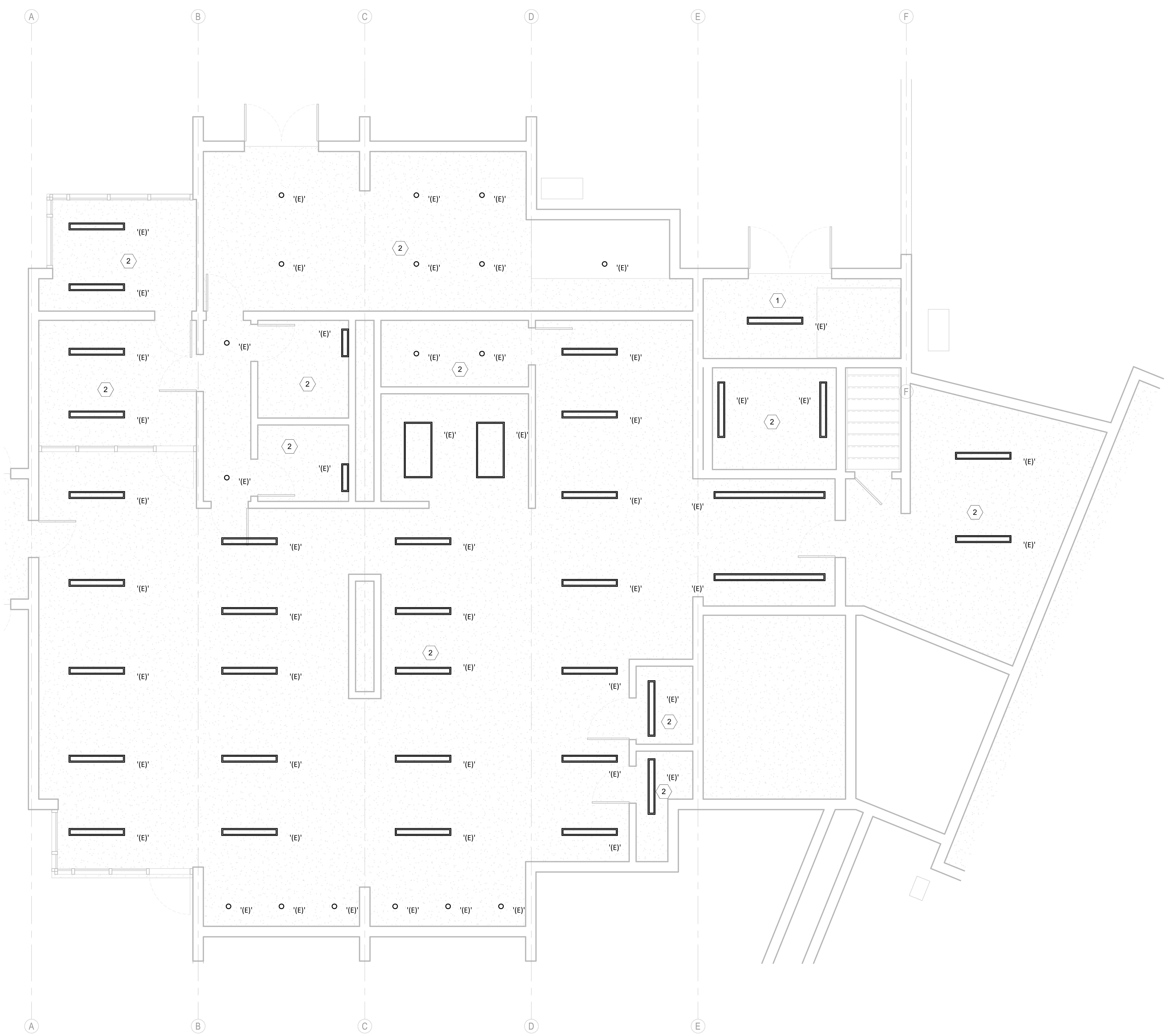

1 E301 BASEMENT LEVEL - ELECTRICAL EXISTING RCP LIGHTING
1/4" = 1'-0"

GENERAL SHEET NOTES:

A. PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR EACH PHASE. DO NOT SHARE NEUTRAL.
B. SEE DEMO DRAWINGS FOR EXISTING DEVICE LOCATIONS AND PREVIOUS CIRCUITING.
C. SEE '2EM1' PANEL SCHEDULE FOR NEW CIRCUITING.

SHEET KEYNOTES

1. ALL EXISTING LIGHTING AND ELECTRICAL DEVICES IN THIS SPACE TO REMAIN, UNLESS NOTED OTHERWISE.
2. ALL EXISTING LIGHTING FIXTURES IN THIS SPACE TO BE DISCONNECTED AND REFED TO NEW EMERGENCY PANEL 2EM1. CONTRACTOR TO INTERCEPT CIRCUITS AND REFED TO NEW PANEL. LIGHTING CONTROLS TO REMAIN.

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REVISION SCHEDULE

CD DRAFT SET 11/21/2025

JOB NUMBER: 20250193

SHEET TITLE

BASEMENT LEVEL LIGHTING

SHEET NUMBER

E301

VALVE SYMBOLS

SYMBOL	IDENTIFICATION
	GATE VALVE
	GATE VALVE; VERTICAL ORIENTATION
	SHUT-OFF VALVE
	SHUT-OFF VALVE ON RISER
	BALL VALVE
	GLOBE VALVE
	BUTTERFLY VALVE
	BALANCING VALVE
	CIRCUIT SETTER
	SOLENOID VALVE
	PRESSURE REDUCING VALVE
	TEMPERATURE MIXING VALVE
	TEMPERATURE AND PRESSURE RELIEF VALVE
	ANGLE VALVE
	ANGLE VALVE; VERTICAL ORIENTATION
	PRESSURE REGULATING VALVE
	CHECK VALVE
	WYE STRAINER
	REDUCED PRESSURE ZONE ASSEMBLY
	DOUBLE CHECK ASSEMBLY

OTHER PLUMBING SYMBOLS

SYMBOL	IDENTIFICATION
	HOSE BIBB
	PUMP
	CIRCULATION PUMP
	FLOOR DRAIN
	FLOOR SINK
	TRAP PRIMER W/ ACCESS PANEL
	DOWNSPOUT NOZZLE
	POINT OF CONNECTION
#	SHEET KEYNOTE TAG
	CONTRACTOR EQUIPMENT TAG

PLUMBING SYMBOLS

SYMBOL	IDENTIFICATION
	PIPE CONTINUED
	PIPE UP
	PIPE DROP
	PIPE DROP AT TEE
	PIPE CAP
	PIPE UP OR DOWN THROUGH LEVEL
	PIPE TRANSITION
	90° SWEEP
	ELBOW
	TEE
	45° WYE FITTING
	COMBINATION WYE FITTING
	FLEXIBLE CONNECTION
	PRESSURE/TEMPERATURE PLUG
	UNION
	WATER HAMMER ARRESTOR WITH ACCESS PANEL
	WATER HAMMER ARRESTOR
	GRADE CLEANOUT OR FLOOR CLEANOUT
	WALL CLEANOUT
	THERMOMETER
P	PRESSURE GAUGE
T	TEMPERATURE GAUGE

PIPE SYSTEMS - PLUMBING

DOMESTIC COLD WATER	CW
DOMESTIC HOT WATER	HW
DOMESTIC HOT WATER RETURN	HWR
GREASE WASTE	GW
PROPANE	LPG
OVERFLOW	OD
RAIN WATER LEADER	RWL
VENT	V
SANITARY WASTE	W
GAS	G
TRAP PRIMER	TP
PIPING BELOW GRADE	INSERT ABBRV. HERE

ABBREVIATIONS

ABBRV.	IDENTIFICATION	ABBRV.	IDENTIFICATION
ø	DIAMETER	LBS	POUNDS
&	AND	LRA	LOCKED ROTOR AMPS
°F	DEGREES FAHRENHEIT	LVG	LEAVING
AFF	ABOVE FINISH FLOOR	LWT	LEAVING WATER TEMPERATURE
AGGR	AGGREGATE	MAX	MAXIMUM
AP	ACCESS PANEL	MBH	1000 BTU PER HOUR
ARCH	ARCHITECT/ARCHITECTURAL	MCA	MINIMUM CURRENT AMPACITY
APPROX	APPROXIMATE	MECH	MECHANICAL
BHP	BRAKE HORSEPOWER	MFR	MANUFACTURER
BLDG	BUILDING	MIN	MINIMUM
BTU	BRITISH THERMAL UNITS	MOCP	MAXIMUM OVERCURRENT PROTECTION
CA	COMPRESSED AIR	MV	MEDICAL VACUUM
CD	CONDENSATE DRAIN	(N)	NEW
CFH	CUBIC FEET PER HOUR	NC	NORMALLY CLOSED
CIRC	CIRCULATING	NIC	NOT IN CONTRACT
COND	CONDENSATE	NO	NORMALLY OPEN
CONN	CONNECTION	NTS	NOT TO SCALE
CONT	CONTINUED	OC	ON CENTER
COORD	COORDINATE	OCC	OCCUPANCY
CONST	CONSTRUCTION	OD	OVERFLOW DRAIN
CW	COLD WATER (DOMESTIC)	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
DN	DOWN		
DSP	DRY STAND PIPE	PD	PRESSURE DROP
DSPKR	DRY SPRINKLER	PH	PHASE
DWGS	DRAWINGS	P/N	PART NUMBER
(E)	EXISTING TO REMAIN	PRV	PRESSURE REDUCING VALVE
EFF	EFFICIENCY	POC	POINT OF CONNECTION
ETC	ETCETERA	PSI	POUNDS PER SQUARE INCH
ELEC	ELECTRICAL	QTY	QUANTITY
ELEV	ELEVATION	(R)	RELOCATE EXISTING
EMBT	EMBEDMENT	REQD	REQUIRED
EQUIP	EQUIPMENT	RM	ROOM
EWT	ENTERING WATER TEMPERATURE	RPM	REVOLUTIONS PER MINUTE
EXT	EXTERIOR	RPZA	REDUCED PRESSURE ZONE ASSEMBLY
F	FIRE WATER	RV	RELIEF VALVE
FC	FLEXIBLE CONNECTION	SCFM	STANDARD CUBIC FEET PER MINUTE
FCO	FLOOR CLEANOUT	SD	STORM DRAIN
FFE	FINISHED FLOOR ELEVATION	SM	SHEETMETAL
FLA	FULL-LOAD AMPERES	SOV	SHUT-OFF VALVE
FLR	FLOOR	SPEC	SPECIFICATION
FPM	FEET PER MINUTE	SPKR	SPRINKLER
FT	FEET	SPKR(D)	DELUGE SPRINKLER
FT HD	FEET HEAD	SQ	SQUARE
G	GAS	STD	STANDARD
GA	GAUGE	TDH	TOTAL DYNAMIC HEAD
GALV	GALVINIZED	TEMP	TEMPERATURE
GCO	GRADE CLEANOUT	TP	TRAP PRIMER LINE
GPM	GALLONS PER MINUTE	TW	TEMPERED WATER
GPR	GAS PRESSURE REGULATOR	TWR	TEMPERED WATER RETURN
GV	GLOBE VALVE	TYP	TYPICAL
GW	GREASE WASTE	UL	UNDERWRITER'S LABORATORIES
HP	HORSEPOWER	UON	UNLESS OTHERWISE NOTED
HR	HOUR	UPC	UNIFORM PLUMBING CODE
HW	HOT WATER	V	VENT
HWR	HOT WATER RETURN	VTR	VENT THROUGH ROOF
HZ	HERTZ	W	WASTE
ID	INSIDE DIAMETER	W/	WITH
IE	INVERT ELEVATION	WC	WATER COLUMN
IN	INCHES	WCO	WALL CLEANOUT
IW	INDUSTRIAL WASTE	WSP	WET STAND PIPE
KW	KILOWATTS	(X)	EXISTING TO BE REMOVED

LEGEND NOTES

A. ALL SYMBOLS MAY NOT BE USED IN THIS PROJECT.
B. SYMBOLS DO NOT ALWAYS REPRESENT REAL LIFE DIMENSIONS.
C. SEE BOOK SPECIFICATIONS FOR ADDITIONAL INFORMATION.
D. SEE PLANS FOR PIPE SIZES.

(OR) GENERAL PLUMBING NOTES

1. **SCOPE OF WORK:** THIS PROJECT IS A **REMODEL**. THE PLANS AND SPECIFICATIONS INDICATE THE GENERAL EXTENT OF THE WORK BASED ON OWNER PROVIDED INFORMATION AND LIMITED FIELD VERIFCATION. CONTRACTOR SHALL VISIT SITE, VERIFY EXISTING CONDITIONS, AND REPORT ANY DISCREPANCIES NOTED TO THE ARCHITECT PRIOR TO SUBMITTING A BID. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISCONNECTION AND RECONNECTION OF MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEMS NECESSARY TO ACCOMPLISH THE WORK WHETHER OR NOT SPECIFIED AND/OR INDICATED.
2. TEMPORARILY CAP ANY (E) SERVICES THAT WILL REMAIN UNTIL CONNECTION TO NEW CAN BE MADE
3. PLUMBING CONTRACTOR SHALL NOTIFY GENERAL CONTRACTOR TO REPAIR WALL, FLOOR AND CEILING SURFACES AS REQUIRED DUE TO DEMOLITION OR INSTALLATION WORK.
4. SAWCUT AS REQUIRED FOR NEW WORK. COORDINATE WITH ARCHITECTURAL.
5. REMOVE ALL ABANDONED PIPING, WIRING, EQUIPMENT AND FIXTURES.
6. ALL CONTROL WIRING SHALL BE IN CONDUIT. CONDUIT SHALL BE PROVIDED AND INSTALLED BY THE MECHANICAL CONTRACTOR. PROVIDE AND INSTALL RIGID CONDUIT IN AREAS EXPOSED TO THE ELEMENTS.
7. SUPPORT PIPES TIGHT BELOW STRUCTURE WHEREVER POSSIBLE.
8. COORDINATE WITH OTHERS ON SPACE REQUIRED AND TIME SCHEDULE FOR DELIVERY OF ALL ITEMS.
9. ALL PIPING IS CONCEALED UNLESS OTHERWISE NOTED.
10. ALL PIPING, FIXTURES, EQUIPMENT, ETC SHOWN IS NEW UNLESS OTHERWISE NOTED.
11. SUBSTITUTION REQUESTS TO SPECIFIED MATERIALS AND EQUIPMENT WILL NOT BE CONSIDERED BY THE ENGINEER UNTIL THE PROJECT HAS BEEN AWARDED TO A CONTRACTOR. BRAND NAMES AND MODEL NUMBERS ARE USED IN THE CONTRACT DOCUMENTS TO ESTABLISH A LEVEL OF QUALITY AND REQUIRED FUNCTIONALITY. THE ENGINEER SHALL BE THE SOLE JUDGE AS TO WHETHER PROPOSED SUBSTITUTIONS ARE EQUIVALENT TO SPECIFIED ITEMS. THE PROPOSER OF A SUBSTITUTE MATERIAL OR ITEM OF EQUIPMENT SHALL VERIFY FIT AND FUNCTIONALITY PRIOR TO SUBMISSION FOR APPROVAL AND FURNISH ALL NECESSARY DOCUMENTATION FOR THE ENGINEER'S EVALUATION. THE PROPOSER OF AN APPROVED SUBSTITUTION SHALL BEAR ALL COSTS ASSOCIATED WITH INCORPORATING AN APPROVED SUBSTITUTION INTO THE PROJECT.

LIST OF GOVERNING CODES

THIS WORK SHALL CONFORM TO ALL CURRENT AND ADOPTED LOCAL CODES

- 2022 OREGON STRUCTURAL SPECIALTY CODE (OSSC)
- 2023 OREGON PLUMBING SPECIALTY CODE (OPSC)
- 2025 OREGON ENERGY EFFICIENCY SPECIALTY CODE (OEESC)
- 2023 OREGON ELECTRICAL SPECIALTY CODE (OESC)
- 2022 OREGON FIRE CODE (OFC)
- 2022 OREGON MECHANICAL SPECIALTY CODE (OMSC)

MECHANICAL SHEET KEY

SHEET NUMBER	DESCRIPTION
M001	LEGEND / COVER PAGE
M100	SITE PLAN

REGISTERED PROFESSIONAL ENGINEER
101011PE
OREGON
SEP. 13, 2022
THOMAS KELLY
EXPIRES 06/30/2027

COLEBREIT ENGINEERING
OREGON | CALIFORNIA

RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

CD DRAFT SET 11/21/2025

JOB NUMBER: 20250193

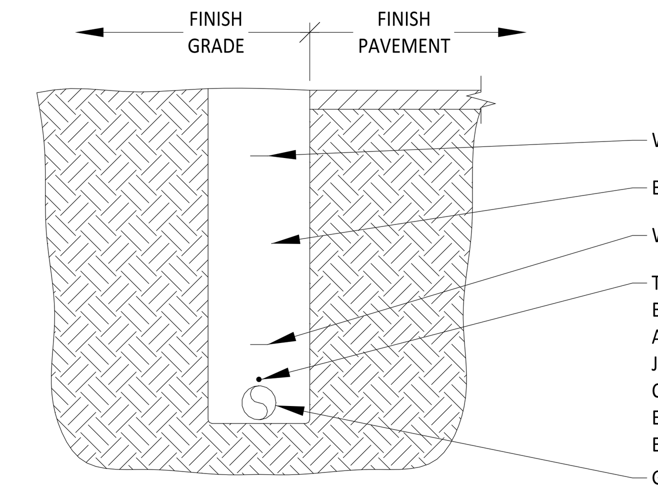
SHEET TITLE

LEGEND / COVER PAGE

SHEET NUMBER

M001

11/21/2025 3:54:47 PM



SPECIFICATIONS:

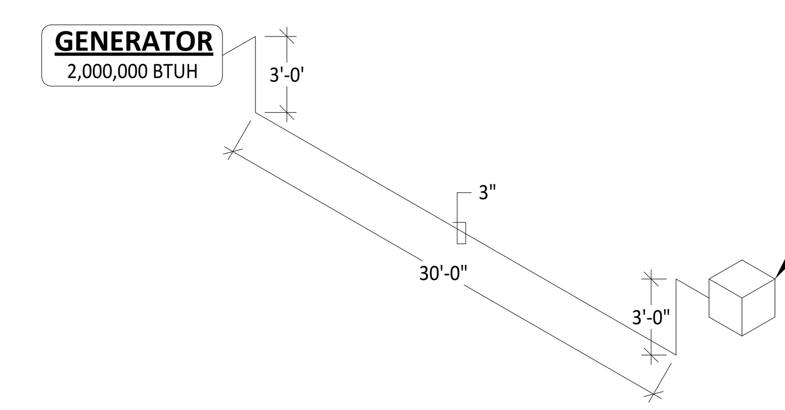
1. GAS PIPING ABOVE GROUND: STANDARD WEIGHT GALVANIZED STEEL PIPE, SCHEDULE 40, ASTM A53 WITH 150# GALVANIZED MALLEABLE IRON FITTINGS AND THREADED JOINTS FOR PIPE 2" AND SMALLER; WELDED JOINTS FOR PIPE 2 1/2" AND LARGER.
2. GAS PIPING BELOW GRADE: POLYETHYLENE SDR11, 110 PSI JOINTS, DRISCOPIPE OR EQUAL, FURNISHED AND INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTALLATION SPECIFICATION. PIPE FUSION WELDER SHALL BE CERTIFIED BY THE MANUFACTURER OF THE PIPE. PLASTIC PILE SHALL HAVE MINIMUM 18" OF COVER AND SHALL NOT BE USED FOR RISERS.
3. GAS PIPE RISERS: METALLIC MATERIAL, DIPPED AND WRAPPED TO 6" ABOVE GRADE. WHEN A METALLIC RISER CONNECTS TO A PLASTIC UNDERGROUND PIPE, THE METALLIC PIPE SHALL EXTEND AT LEAST 30" HORIZONTALLY BEFORE CONNECTING WITH APPROVED TRANSITION TO PLASTIC.
4. ALL GAS PIPING SHALL BE TESTED TO 60 PSIG FOR 1 HOUR WITHOUT DROP IN PRESSURE. EQUIPMENT AND PERSONNEL SHALL BE PROTECTED DURING THIS TEST PRESSURE.

EXCAVATION AND BACKFILL:

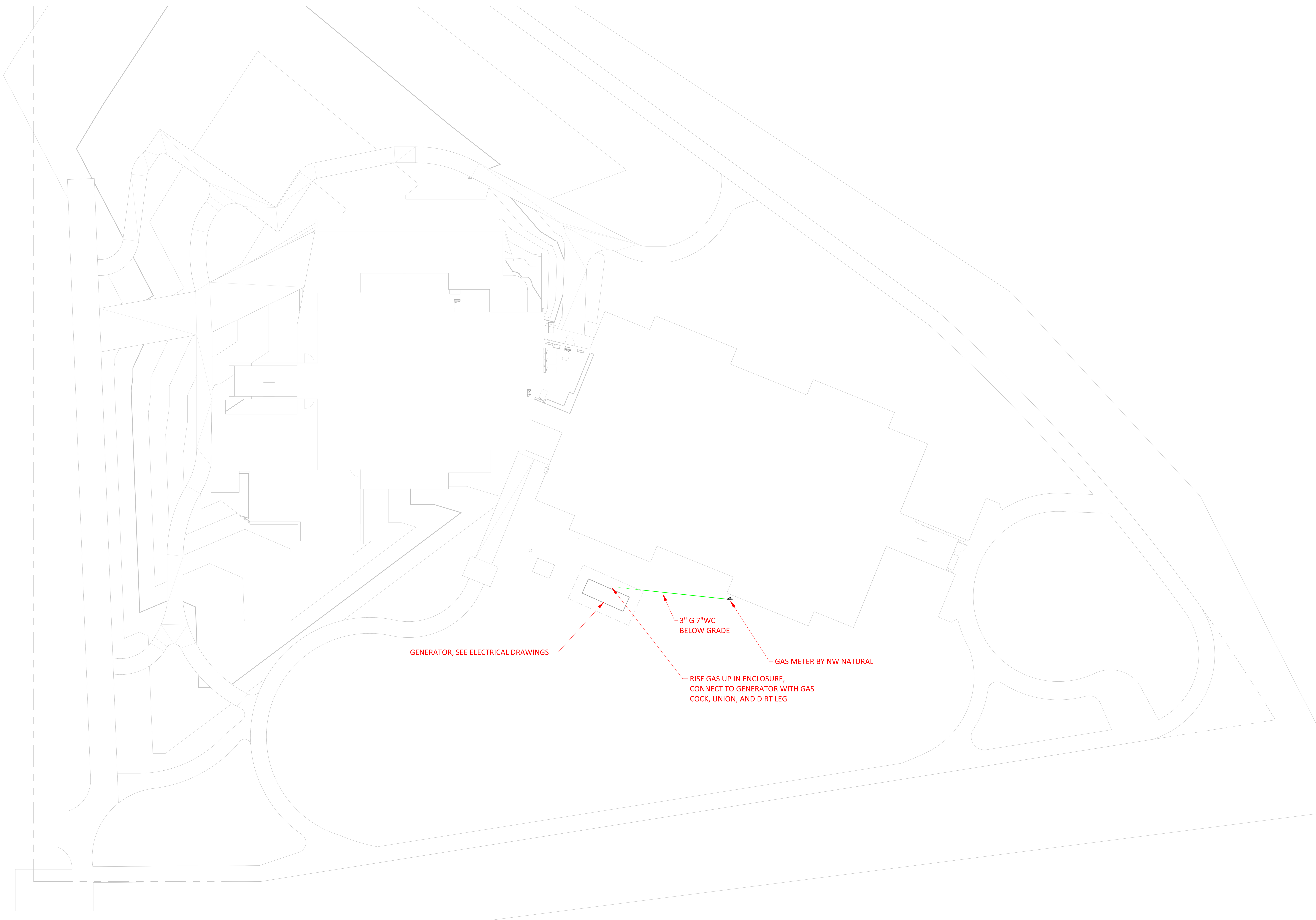
1. PERFORM ALL NECESSARY EXCAVATION AND BACKFILL REQUIRED FOR INSTALLATION OF MECHANICAL WORK. ANY WORK DAMAGED DURING EXCAVATION AND BACKFILLING SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE
2. TRENCHES ARE TO BE EXCAVATED TO NECESSARY DEPTH AND WIDTH. EXCAVATION MATERIAL IS UNCLASSIFIED. WIDTH OF TRENCH ADEQUATE FOR PROPER INSTALLATION OF PIPING.
3. BEDDING SHALL BE ON MINIMUM 6" DEEP LAYER OF SAND PLACED ON LEVELED TRENCH BOTTOM. SAND REMOVED TO NECESSARY DEPTH FOR PIPING BELLS AND COUPLINGS TO MAINTAIN CONTACT OF PIPE ON SAND FOR ENTIRE LENGTH.
4. ALL BACKFILL SHALL BE BANK RUN SAND AND/OR GRAVEL TO 6" ABOVE PIPING UP TO SLAB ON INTERIOR PIPING BELOW SLABS. ALL BACKFILL PLACED IN LAYERS NOT EXCEEDING 8" DEEP AND COMPACTED TO 95% OF MAXIMUM DENSITY AT OPTIMUM MOISTURE CONTENT PER AASHTO STANDARDS.
5. FOLLOWING BACKFILLING, GRADE ALL TRENCHES TO LEVEL OF SURROUNDING SUBGRADE.

1 / M100 **PIPING DETAILS**

NO SCALE



GAS PIPING DIAGRAM



1 / M100 OVERALL SITE

1/16" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
101011PE
OREGON
SEP. 13, 2022
THOMAS KELLY
EXPIRES 06/30/2027

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RIVERVIEW TERRACE GENERATOR

925 W. MAIN ST, COTTAGE GROVE, OR

REVISION SCHEDULE

CD DRAFT SET	11/21/2025
JOB NUMBER:	20250193

SHEET TITLE

SITE PLAN

SHEET NUMBER

M100

Cushing Terrell

10.28.2025

Structural Calculations for

RIVERVIEW TERRACE GENERATOR

STRUCTURAL CALCULATIONS
925 WEST MAIN STREET
COTTAGE GROVE, OREGON 97424

Prepared by:
Noah Demer, EIT

Reviewed by:
Rolf Armstrong, SE

PREPARED FOR

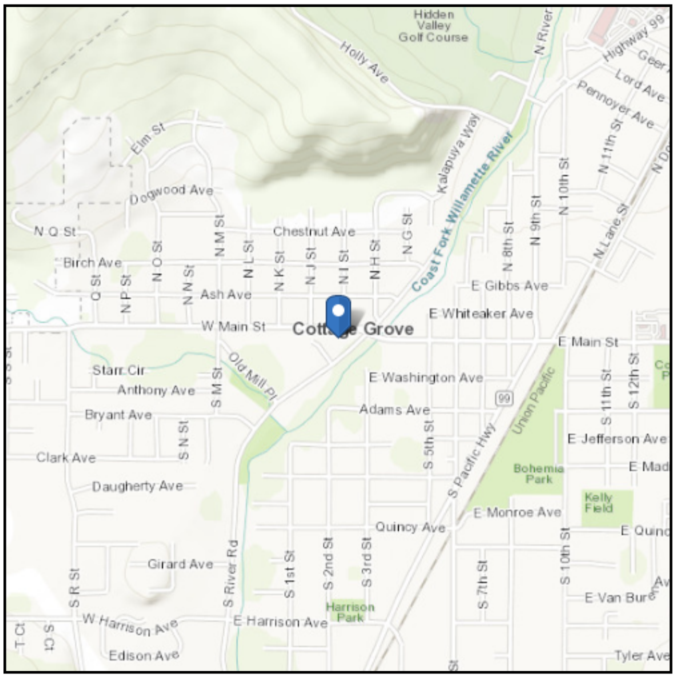
Homes for Good
Teresa Hashagen
925 W. Main St.
Cottage Grove, OR 97424

cushingterrell.com

ASCE Hazards Report

Address:
925 W Main St
Cottage Grove, Oregon
97424

Standard:	ASCE/SEI 7-16	**Latitude:**	43.79734
Risk Category:	II	**Longitude:**	-123.066127
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	644.4206343878639 ft (NAVD 88)



ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	0.668	S_{D1} :	N/A
S_1 :	0.39	T_L :	16
F_a :	1.266	PGA :	0.319
F_v :	N/A	PGA_M :	0.408
S_{MS} :	0.845	F_{PGA} :	1.281
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.563	C_v :	1.134

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Thu Sep 18 2025

Date Source: USGS Seismic Design Maps

CALCULATE SEISMIC FORCE - Nonstructural Elements

IN ACCORDANCE WITH 2021 INTERNATIONAL BUILDING CODE $psf := lb \cdot ft^{-2}$

Step 1 - Determine Seismic Use Group of Bldg. $SUG := IV$ $I_E := 1.5$

Step 2 - Determine SS and S1 from maps $S_s := 0.668$ $S_1 := 0.39$

Step 3 - Determine the Site Class Class D

Assume Site Class D unless established by the building official or a soils engineer

Step 4 - Determine Fa and Fv $F_a := 1.266$ $F_v := 1.5$
(use ICC program, see attached printout)

Step 5 - Determine SMS and SM1 $S_{MS} := F_a \cdot S_s$ $S_{M1} := F_v \cdot S_1$

$S_{MS} = 0.846$ $S_{M1} = 0.585$

Step 6 - Determine SDS and SDI $S_{DS} := \frac{2}{3} \cdot S_{MS}$ $S_{D1} := \frac{2}{3} \cdot S_{M1}$

$S_{DS} = 0.564$ $S_{D1} = 0.39$

Step 7 - Determine Seismic Design Category $SDC := \text{“D”}$ From ASCE 7 Table 11.6-1

$SDC := \text{“D”}$ From ASCE 7 Table 11.6-2

Non-Structural Component Coefficients (ASCE 7 Table 13.6-1):

Mechanical and Electrical Components:

Generators, batteries, inverters, motors, transformers, and other electrical components constructed of high-deformability materials $a_p := 1.0$ $R_p := 2.5$

Weight of Scrubber - $W_p := 3310 \cdot lb$

Total Height of Structure - $h := 6.392 \cdot ft$

Height to Center of Gravity - $z := 2 \cdot ft$

SEISMIC DESIGN IN ACCORDANCE WITH ASCE - 7, Section 13.3.1

$F_{max} := 1.6 \cdot S_{DS} \cdot I_E \cdot W_p = 4479\ lb$ $F_{min} := 0.3 \cdot S_{DS} \cdot I_E \cdot W_p = 840\ lb$

$$F := \frac{0.4 \cdot a_p \cdot S_{DS} \cdot W_p}{\frac{R_p}{I_E}} \cdot \left(1 + 2 \cdot \frac{z}{h}\right) \qquad F = 728\ lb$$

$F_p := \textbf{if}\left(F < F_{min}, F_{min}, F\right)$

$F_p := \textbf{if}\left(F > F_{max}, F_{max}, F\right)$ $F_p = 728\ lb$

USE: MIN TRANSVERSE FORCE = 840 lb

GLOBAL OVERTURNING OF KG150 GENERATOR

$k := 1000. \cdot lb$ $psi := lb \cdot in^{-2}$ $psf := lb \cdot ft^{-2}$ $ksi := 1000 \cdot lb \cdot in^{-2}$ $plf := lb \cdot ft^{-1}$
$ft := 12 \cdot in$

IN ACCORDANCE WITH 2021 INTERNATIONAL BUILDING CODE

Seismic Weight - $E := 840 \cdot lb$

Dry Weight of Unit - $w_d := 3310 \cdot lb$

Operating Weight of Unit - $w_t := 3310 \cdot lb$

$S_{DS} := 0.564$

Unit Areal Footprint - $A_u := (4.4 \cdot ft) \cdot (9.183 \cdot ft) = 40.4\ ft^2$

Unit Height - $h_u := 5.933 \cdot ft$

Overstrength Factor -
$\Omega_0 := 2.5$

Operating Unit C.O.G. - $h_{tcog} := 2 \cdot ft$

Unit Base 'Short' Side Dimension
(Measured from Center-Center of Anchors) - $L_s := 4.15 \cdot ft$

Unit Base 'Long' Side Dimension
(Measured from Center-Center of Anchors) - $L_l := 7.35 \cdot ft$

Overturning Moment including Ω_0 - $M_{ot} := \Omega_0 \cdot E \cdot h_{tcog} = 50400\ lb \cdot in$ **LRFD Load Combination for 100% EL**

Resisting Moment
(Short Side Overturning) - $M_{rs} := (0.9 - 0.2 \cdot S_{DS}) \cdot w_t \cdot L_s \cdot 0.5 = 5407\ lb \cdot ft$ **LRFD Load Combination for 90% DL**

Resisting Moment
(Long Side Overturning) - $M_{rl} := (0.9 - 0.2 \cdot S_{DS}) \cdot w_t \cdot L_l \cdot 0.5 = 9576\ lb \cdot ft$ **LRFD Load Combination for 90% DL**

Tension/Compression Couple
(Short Side Overturning) - $TC_s := (M_{ot} - M_{rs}) \cdot L_s^{-1} = -290.8\ lb$

Tension/Compression Couple
(Long Side Overturning) - $TC_l := (M_{ot} - M_{rl}) \cdot L_l^{-1} = -731.4\ lb$

Proposed Number of Bolts (Long Side) - $n_{bl} := 2$

Proposed Number of Bolts (Short Side) - $n_{bs} := 2$

Total Base Shear - $V := E = 840$ ***lb***

Tension Per Bolt
(Short Side Overturning) - $T_{bs} := -1 \cdot TC_s \cdot {n_{bl}}^{-1} = 145.4$ ***lb***

Tension Per Bolt
(Long Side Overturning) - $T_{bl} := -1 \cdot TC_l \cdot {n_{bs}}^{-1} = 365.7$ ***lb***

Design Tension Per Bolt - $T_b := \max\left(T_{bs}, T_{bl}\right) = 365.7$ ***lb*** **LRFD Tension, Overstrength applied to Overturning Moment**

Shear Per Bolt
(Short Side Overturning) - $V_{bs} := V \cdot \left(2 \cdot n_{bs} + 0 \cdot n_{bl}\right)^{-1} \cdot \Omega_0 = 525$ ***lb***

4 bolts to resist shear

Shear Per Bolt
(Long Side Overturning) - $V_{bl} := V \cdot \left(2 \cdot n_{bl} + 0 \cdot n_{bl}\right)^{-1} \cdot \Omega_0 = 525$ ***lb***

Design Shear Per Bolt - $V_b := \max\left(V_{bs}, V_{bl}\right) = 525$ ***lb*** **LRFD Shear, Overstrength applied**

USE 5/8" HILTI KWIK BOLT TZ2 - SS 304 WITH 3 1/4" NOMINAL embedment depth per ICC-ES ESR-4266. Installed per the requirements of Hilti

REFER TO ATTACHED HILTI PROFIS CALCULATIONS FOR VERIFICATION OF PROPOSED ANCHORAGE

Use: Min (2) 1/2" diam. Hilti KB-TZ2 anchors on each side of of KG150 generator and min 2.5" nominal embedment.

Company:	Cushing Terrell	Page:	1
Address:		Specifier:	NED
Phone I Fax:	|	E-Mail:	
Design:	generator anchorage - 2 anchors per side	Date:	9/18/2025
Fastening point:			

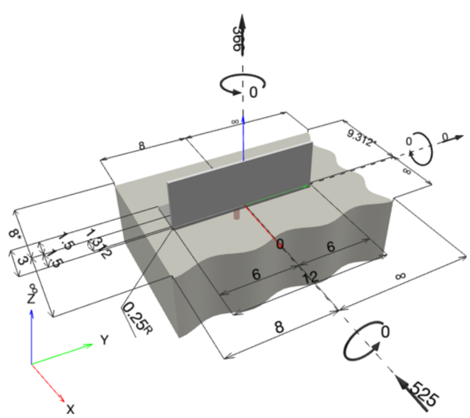
Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ2 - SS 304 1/2 (2) hnom1**
Item number:	2210260 KB-TZ2 1/2x3 3/4 SS304
Specification text:	Hilti ∅ 1/2 in Kwik Bolt TZ2 - SS 304 with 2.5 in nominal embedment depth per ICC-ES ESR-4266 , Hammer drill bit installation per MPII,
Effective embedment depth:	$h_{ef,act}$ = 2.000 in., h_{nom} = 2.500 in.
Material:	AISI 304
Evaluation Service Report:	ESR-4266
Issued I Valid:	10/1/2024 | 12/1/2025
Proof:	Design Method ACI 318-14 / Mech
Shear edge breakout verification:	Row closest to edge (Case 3 only from ACI 318-14 Fig. R.17.5.2.1b)
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate[R] :	l_x x l_y x t = 3.000 in. x 12.000 in. x 0.250 in.; (Recommended plate thickness: not calculated)
Profile:	Rectangular plates and bars (AISC), 12 - 1/4; (L x W x T) = 12.000 in. x 0.250 in.
Base material:	cracked concrete, 4000, f_c' = 4,000 psi; h = 6.000 in.
Installation:	**Hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

[R] - The anchor calculation is based on a rigid anchor plate assumption.

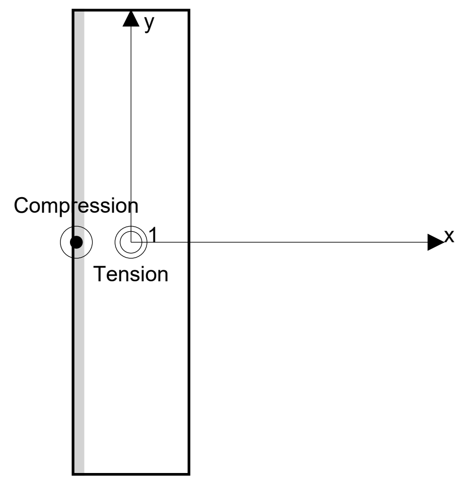
Geometry [in.] & Loading [lb, in.lb]



1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 366; V_x = -525; V_y = 0; M_x = 0; M_y = 0; M_z = 0;	yes	48

2 Load case/Resulting anchor forces



Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	706	525	-525	0

Max. concrete compressive strain: 0.05 [‰]
Max. concrete compressive stress: 221 [psi]
Resulting tension force in (x/y)=(-0.000/-0.000): 706 [lb]
Resulting compression force in (x/y)=(-1.414/-0.000): 340 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi N_n$	Status
Steel Strength*	706	8,906	8	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	706	1,483	48	OK

* highest loaded anchor **anchor group (anchors in tension)

3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-4266

$\phi\ N_{sa} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.10	120,404

Calculations

N_{sa} [lb]
11,875

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
11,875	0.750	8,906	706

3.2 Concrete Breakout Failure

$N_{cb} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ ACI 318-14 Eq. (17.4.2.1a)

$\phi\ N_{cb} \geq N_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = \mathrm{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
2.000	8.000	1.000	5.500	17	1.000	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	3,041

Results

N_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ N_{cb}$ [lb]	N_{ua} [lb]
3,041	0.650	0.750	1.000	1,483	706

Company:	Cushing Terrell	Page:	4
Address:		Specifier:	NED
Phone I Fax:	|	E-Mail:	
Design:	generator anchorage - 2 anchors per side	Date:	9/18/2025
Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	525	5,426	10	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	525	2,129	25	OK
Concrete edge failure in direction x-**	525	3,470	16	OK

* highest loaded anchor **anchor group (relevant anchors)
When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

4.1 Steel Strength

$V_{sa,eq}$ = ESR value	refer to ICC-ES ESR-4266
$\phi\ V_{steel} \geq V_{ua}$	ACI 318-14 Table 17.3.1.1

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]	$\alpha_{V,seis}$
0.10	120,404	1.000

Calculations

$V_{sa,eq}$ [lb]
8,348

Results

$V_{sa,eq}$ [lb]	ϕ_{steel}	$\phi\ V_{sa,eq}$ [lb]	V_{ua} [lb]
8,348	0.650	5,426	525

Company:	Cushing Terrell	Page:	5
Address:		Specifier:	NED
Phone I Fax:	|	E-Mail:	
Design:	generator anchorage - 2 anchors per side	Date:	9/18/2025
Fastening point:			

4.2 Pryout Strength

$V_{cp} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ed,N} \ \psi_{c,N} \ \psi_{cp,N} \ N_b \right]$ ACI 318-14 Eq. (17.5.3.1a)

$\phi \ V_{cp} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Nc} see ACI 318-14, Section 17.4.2.1, Fig. R 17.4.2.1(b)

$A_{Nc0} = 9 \ h_{ef}^2$ ACI 318-14 Eq. (17.4.2.1c)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.5b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-14 Eq. (17.4.2.7b)

$N_b = k_c \ \lambda_a \ \sqrt{f'_c} \ h_{ef}^{1.5}$ ACI 318-14 Eq. (17.4.2.2a)

Variables

k_{cp}	h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
1	2.000	8.000	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
5.500	17	1.000	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	3,041

Results

V_{cp} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi \ V_{cp}$ [lb]	V_{ua} [lb]
3,041	0.700	1.000	1.000	2,129	525

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Phone I Fax:	|	E-Mail:	
Design:	generator anchorage - 2 anchors per side	Date:	9/18/2025
Fastening point:			

4.3 Concrete edge failure in direction x-

$V_{cb} = \left(\frac{A_{Vc}}{A_{Vc0}}\right) \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ \psi_{parallel,V}\ V_b$ ACI 318-14 Eq. (17.5.2.1a)

$\phi\ V_{cb} \geq V_{ua}$ ACI 318-14 Table 17.3.1.1

A_{Vc} see ACI 318-14, Section 17.5.2.1, Fig. R 17.5.2.1(b)*

$A_{Vc0} = 4.5\ c_{a1}^2$ ACI 318-14 Eq. (17.5.2.1c)

$\psi_{ed,V} = 0.7 + 0.3\left(\frac{c_{a2}}{1.5c_{a1}}\right) \leq 1.0$ ACI 318-14 Eq. (17.5.2.6b)

$\psi_{h,V} = \sqrt{\frac{1.5c_{a1}}{h_a}} \geq 1.0$ ACI 318-14 Eq. (17.5.2.8)

$V_b = \left(7\left(\frac{l_e}{d_a}\right)^{0.2} \sqrt{d_a}\right) \lambda_a \sqrt{f'_c}\ c_{a1}^{1.5}$ ACI 318-14 Eq. (17.5.2.2a)

Variables

c_{a1} [in.]	c_{a2} [in.]	$\psi_{c,V}$	h_a [in.]	l_e [in.]
8.000	8.000	1.000	6.000	2.000

λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$
1.000	0.500	4,000	1.000

Calculations

A_{Vc} [in.^{2}]	A_{Vc0} [in.^{2}]	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
120.00	288.00	0.900	1.414	9,347

Results

V_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	$\phi\ V_{cb}$ [lb]	V_{ua} [lb]
4,957	0.700	1.000	1.000	3,470	525

*Anchor row defined by: Anchor 1; Case 3 controls

When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

5 Combined tension and shear loads

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.476	0.247	5/3	39	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (EN1992-4, AS5216, etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with FEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://viewer.joomag.com/profis-design-guide-us-en-summer-2021/0841849001625154758?short&/
- An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-14, Chapter 17, Section 17.2.3.4.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.2.3.4.3 (b), Section 17.2.3.4.3 (c), or Section 17.2.3.4.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.2.3.5.3 (a), Section 17.2.3.5.3 (b), or Section 17.2.3.5.3 (c).
- Section 17.2.3.4.3 (b) / Section 17.2.3.5.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.2.3.4.3 (c) / Section 17.2.3.5.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.2.3.4.3 (d) / Section 17.2.3.5.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by ω_0.
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-14, Section 17.8.1.

Fastening meets the design criteria!

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Phone I Fax:	|	E-Mail:	
Design:	generator anchorage - 2 anchors per side	Date:	9/18/2025
Fastening point:			

7 Installation data

Anchor type and diameter: Kwik Bolt TZ2 - SS 304 1/2 (2) hnom1

Item number: 2210260 KB-TZ2 1/2x3 3/4 SS304

Maximum installation torque: 481 in.lb

Hole diameter in the base material: 0.500 in.

Hole depth in the base material: 2.750 in.

Minimum thickness of the base material: 4.000 in.

Profile: Rectangular plates and bars (AISC), 12 - 1/4; (L x W x T) = 12.000 in. x 0.250 in.

Hole diameter in the fixture: d_f = 0.562 in.

Plate thickness (input): 0.250 in.

Recommended plate thickness: not calculated

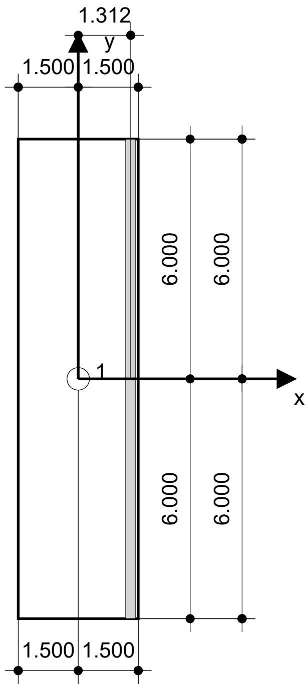
Drilling method: Hammer drilled

Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Hilti ∅ 1/2 in Kwik Bolt TZ2 - SS 304 with 2.5 in nominal embedment depth per ICC-ES ESR-4266 , Hammer drill bit installation per MPII

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Properly sized drill bit	• Manual blow-out pump	• Torque controlled cordless impact tool • Torque wrench • Hammer



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	8.000	-	8.000	-

ICC-ES Evaluation Report

ESR-4266

Reissued December 2023	*This report also contains:*	*For references to other reports.*
Revised April 2025	- **City of LA Supplement**	**See ELC-4266 for *National Building Code of Canada® (NBCC)***
Subject to renewal December 2025	- **FL Supplement w/HVHZ**	

DIVISION: 03 00 00—CONCRETE **Section: 03 16 00—Concrete Anchors** **DIVISION: 05 00 00—METALS** **Section: 05 05 19—Post-Installed Concrete Anchors**	**REPORT HOLDER:** **HILTI, INC.**	**EVALUATION SUBJECT:** **HILTI KWIK BOLT TZ2 CARBON AND STAINLESS STEEL ANCHORS IN CRACKED AND UNCRACKED CONCRETE**	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018 and 2015 *International Building Code® (IBC)*
- 2024, 2021, 2018 and 2015 *International Residential Code® (IRC)*

Main references of this report are for the 2024 IBC and IRC. See Table 10 and Table 11 for applicable sections of the code for previous IBC and IRC editions.

Property evaluated:

Structural

2.0 USES

The Hilti Kwik Bolt TZ2 anchor (KB-TZ2) is used as anchorage to resist static, wind, and seismic (Seismic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

The $^1/_4$-inch-, $^3/_8$-inch- and $^1/_2$-inch diameter (6.4 mm, 9.5 mm and 12.7 mm) carbon steel KB-TZ2 anchors may be installed in the topside of cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a minimum member thickness, $h_{min,deck}$, as noted in Table 9 of this evaluation report and a specified compressive strength, f'_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa)

The $^1/_4$-inch-, $^3/_8$-inch-, $^1/_2$-inch-, $^5/_8$-inch- and $^3/_4$-inch diameter (6.4 mm, 9.5 mm, 12.7 mm, 15.9 mm and 19.1 mm) carbon steel KB-TZ2 anchors may be installed in the soffit of cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a minimum specified compressive strength, f'_c, of 3,000 psi (20.7 MPa).

The anchoring system complies with anchors as described in Section 1901.3 of the IBC. The anchors may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 KB-TZ2:

KB-TZ2 anchors are torque-controlled, mechanical expansion anchors. KB-TZ2 anchors consist of a stud (anchor body), wedge (expansion elements), nut, and washer. The anchor (carbon steel version) is illustrated in Figure 1. The stud is manufactured from carbon steel or AISI Type 304 or Type 316 stainless steel materials. Carbon steel KB-TZ2 anchors have a minimum 5 µm (0.0002 inch) zinc-nickel plating. The expansion elements for the carbon steel KB-TZ2 anchors are fabricated from carbon steel or stainless steel. The expansion elements for the stainless steel KB-TZ2 anchors are fabricated from stainless steel. The hex nut for carbon steel conforms to ASTM A563-04, Grade A, and the hex nut for stainless steel conforms to ASTM F594.

The anchor body is comprised of a high-strength rod threaded at one end and a tapered mandrel at the other end. The tapered mandrel is enclosed by a three-section expansion element. The expansion element movement is restrained by the mandrel taper and by a collar. The anchor is installed in a predrilled hole with a hammer. When torque is applied to the nut of the installed anchor, the mandrel is drawn into the expansion element, which is in turn expanded against the wall of the drilled hole.

3.2 Concrete:

Normal-weight and lightweight concrete must conform to Sections 1903 and 1905 of the IBC.

3.3 Steel Deck Panels:

Steel deck panels must be in accordance with the configuration in Figure 5A, Figure 5B, Figure 5C and Figure 5D and have a minimum base steel thickness of 0.035 inch (0.899 mm, 20 gauge). Steel must comply with ASTM A653/A653M SS Grade 33 and have a minimum yield strength of 33,000 psi (228 MPa).

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: Design strength of anchors complying with the 2024 IBC, as well as Section R301.1.3 of the 2024 IRC must be determined in accordance with ACI 318-19 Chapter 17 and this report.

Design parameters provided in Table 4, Table 5, Table 6 and Table 7 of this report are based on the 2024 IBC (ACI 318-19) unless noted otherwise in Sections 4.1.1 through 4.1.12. The strength design of anchors must comply with ACI 318-19 17.5.1.2, except as required in ACI 318-19 17.10.

Strength reduction factors, ϕ, as given in ACI 318-19 17.5.3 and noted in Table 4, Table 5, Table 6 and Table 7 of this report, must be used for load combinations calculated in accordance with Section 1605.1 of the 2024 IBC and Section 5.3 of ACI 318-19. The value of f'_c used in the calculations must be limited to a maximum of 8,000 psi (55.2 MPa), in accordance with ACI 318-19 17.3.1.

4.1.2 Requirements for Static Steel Strength in Tension: The nominal static steel strength, N_{sa}, of a single anchor in tension must be calculated in accordance with ACI 318-19 17.6.1.2. The resulting N_{sa} values are provided in Table 4 and Table 5 of this report. Strength reduction factors ϕ corresponding to ductile steel elements may be used.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension: The nominal concrete breakout strength of a single anchor or group of anchors in tension, N_{cb} or N_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.6.2 with modifications as described in this section. The basic concrete breakout strength in tension, N_b, must be calculated in accordance with ACI 318-19 17.6.2.2 using the values of h_{ef} and k_{cr} as given in Table 4 and Table 5. The nominal concrete breakout strength in tension in regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.2.5.1 must be calculated with k_{uncr} as given in Table 4 and Table 5 and with $\Psi_{c,N}$ = 1.0.

For carbon steel KB-TZ2 anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 5A, Figure 5B and Figure 5C, calculation of the concrete breakout strength is not required.

4.1.4 Requirements for Static Pullout Strength in Tension: The nominal pullout strength of a single anchor in accordance with ACI 318-19 17.6.3.1 and 17.6.3.2.1 in cracked and uncracked concrete, $N_{p,cr}$ and n_{cr}, $N_{p,uncr}$ and n_{uncr}, respectively, are given in Table 4 and Table 5. For all design cases $\Psi_{c,P}$ = 1.0. In accordance with ACI 318-19 17.6.3 the nominal pullout strength in cracked concrete may be calculated in accordance with the following equation:

$$N_{p,f'_c} = N_{p,cr}\left(\frac{f'_c}{2,500}\right)^{n_{cr}} \quad \text{(lb, psi)} \qquad \text{(Eq-1)}$$

$$N_{p,f'_c} = N_{p,cr}\left(\frac{f'_c}{17.2}\right)^{n_{cr}} \quad \text{(N, MPa)}$$

In regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.3.3 the nominal pullout strength in tension may be calculated in accordance with the following equation:

$$N_{p,f'_c} = N_{p,uncr}\left(\frac{f'_c}{2{,}500}\right)^{n_{uncr}} \quad \text{(lb, psi)} \qquad \text{(Eq-2)}$$

$$N_{p,f'_c} = N_{p,uncr}\left(\frac{f'_c}{17.2}\right)^{n_{uncr}} \quad \text{(N, MPa)}$$

Where values for $N_{p,cr}$ or $N_{p,uncr}$ are not provided in Table 4 or Table 5, the pullout strength in tension need not be evaluated.

The nominal pullout strength in cracked concrete of the carbon steel KB-TZ2 installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 5A, Figure 5B and Figure 5C, is given in Table 8. In accordance with ACI 318-19 17.6.3.2.1 the nominal pullout strength in cracked concrete must be calculated in accordance with Eq-1, whereby the value of $N_{p,deck,cr}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. In regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.3.3 the nominal strength in uncracked concrete must be calculated according to Eq-2, whereby the value of $N_{p,deck,uncr}$ must be substituted for $N_{p,uncr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. The use of stainless steel KB-TZ2 anchors installed in the soffit of concrete on steel deck assemblies is beyond the scope of this report.

4.1.5 Requirements for Static Steel Strength in Shear: The nominal steel strength in shear, V_{sa}, of a single anchor in accordance with ACI 318-19 17.7.1.2 is given in Table 6 and Table 7 of this report and must be used in lieu of the values derived by calculation from ACI 318-19 Eq. 17.7.1.2b. The shear strength $V_{sa,deck}$ of the carbon-steel KB-TZ2 as governed by steel failure of the KB-TZ2 installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 5A, Figure 5B and Figure 5C, is given in Table 8.

4.1.6 Requirements for Static Concrete Breakout Strength in Shear: The nominal concrete breakout strength of a single anchor or group of anchors in shear, V_{cb} or V_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.7.2 with modifications as described in this section. The basic concrete breakout strength, V_b, must be calculated in accordance with ACI 318-19 17.7.2.2.1 based on the values provided in Table 6 and Table 7. The value of ℓ_e used in ACI 318-19 Eq. 17.7.2.2.1a must be taken as no greater than the lesser of h_{ef} or $8d_a$. Anchors installed in light-weight concrete must use the reduction factors provided in ACI 318-19 17.2.4.

For carbon steel KB-TZ2 anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 5A, Figure 5B and Figure 5C, calculation of the concrete breakout strength in shear is not required.

4.1.7 Requirements for Static Concrete Pryout Strength in Shear: The nominal concrete pryout strength of a single anchor or group of anchors, V_{cp} or V_{cpg}, respectively, must be calculated in accordance with ACI 318-19 17.7.3 modified by using the value of k_{cp} provided in Table 6 and Table 7 of this report and the value of N_{cb} or N_{cbg} as calculated in Section 4.1.3 of this report.

For carbon steel KB-TZ2 anchors installed in the soffit of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assemblies, as shown in Figure 5A, Figure 5B and Figure 5C, calculation of the concrete pry-out strength in accordance with ACI 318-19 17.7.3 is not required.

4.1.8 Requirements for Seismic Design:

4.1.8.1 General: For load combinations including seismic, the design must be performed in accordance with ACI 318-19 17.10. Modifications to ACI 318-19 17.10 shall be applied under Section 1905.7 of the 2024 IBC.

The anchors comply with ACI 318-19 2.3, as ductile steel elements and must be designed in accordance with ACI 318-19 17.10.5, 17.10.6, 17.10.7 or 17.10.4. Strength reduction factors, ϕ, are given in Table 4, Table 5, Table 6 and Table 7 of this report. The anchors may be installed in structures assigned to Seismic Design Categories A through F of the IBC.

4.1.8.2 Seismic Tension: The nominal steel strength and nominal concrete breakout strength for anchors in tension must be calculated in accordance with ACI 318-19 17.6.1 and 17.6.2 as described in Sections 4.1.2 and 4.1.3 of this report. In accordance with ACI 318-19 17.6.3.2.1 the appropriate pullout strength in tension for seismic loads, $N_{p,eq}$, described in Table 4 and Table 5 or $N_{p,deck,cr}$ described in Table 8 must be used in lieu of N_p, as applicable. The value of $N_{p,eq}$ or $N_{p,deck,cr}$ may be adjusted by calculation for concrete strength in accordance with Eq-1 and Section 4.1.4 whereby the value of $N_{p,deck,cr}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. If no values for $N_{p,eq}$ or $N_{p,deck,eq}$ are given in Table 4, Table 5, or Table 8, the static design strength values govern.

4.1.8.3 Seismic Shear: The nominal concrete breakout strength and pryout strength in shear must be calculated in accordance with ACI 318-19 17.7.2 and 17.7.3 as described in Sections 4.1.6 and 4.1.7 of this report. In accordance with ACI 318-19 17.7.1.2, the appropriate value for nominal steel strength for seismic loads, $V_{sa,eq}$ described in Table 6 and Table 7 or $V_{sa,deck,eq}$ described in Table 8 must be used in lieu of V_{sa}, as applicable.

4.1.9 Requirements for Interaction of Tensile and Shear Forces: For anchors or groups of anchors that are subject to the effects of combined tension and shear forces, the design must be performed in accordance with ACI 318-19 17.8.

4.1.10 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: In lieu of ACI 318-19 17.9.2 values of s_{min} and c_{min} as given in Table 3 of this report must be used. In lieu of ACI 318-19 17.9.4, minimum member thicknesses h_{min} as given in Tables 3 and 4 of this report must be used. Additional combinations for minimum edge distance, $c_{min,}$ and spacing, $s_{min,}$ may be derived by linear interpolation between the given boundary values as described in Figure 4.

For carbon steel KB-TZ2 anchors installed in the topside of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assemblies, the anchors must be installed in accordance with Table 9 and Figure 5D.

For carbon steel KB-TZ2 anchors installed in the soffit of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assemblies, the anchors must be installed in accordance with Figure 5A, Figure 5B and Figure 5C and shall have an axial spacing along the flute equal to the greater of $3h_{ef}$ or 1.5 times the flute width.

4.1.11 Requirements for Critical Edge Distance: In applications where $c < c_{ac}$ and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength in tension for uncracked concrete, calculated in accordance with ACI 318-19 17.6.2 must be further multiplied by the factor $\Psi_{cp,N}$ as given by Eq-3:

$$\Psi_{cp,N} = \frac{c}{c_{ac}} \qquad \text{(Eq-3)}$$

whereby the factor Ψcp,N need not be taken as less than $\frac{1.5h_{ef}}{c_{ac}}$. For all other cases, $\Psi_{cp,N}$ = 1.0. In lieu of using ACI 318-19 17.9.5 values of c_{ac} must comply with Table 4 or Table 5.

4.1.12 Lightweight Concrete: For the use of anchors in lightweight concrete, the modification factor λ_a equal to 0.8λ is applied to all values of $\sqrt{f'_c}$ affecting N_n and V_n.

For ACI 318-19 (2024 IBC), λ shall be determined in accordance with ACI 318-19.

For anchors installed in the soffit of sand-lightweight concrete-filled steel deck and floor and roof assemblies, further reduction of the pullout values provided in this report is not required.

4.2 Allowable Stress Design (ASD):

4.2.1 General: Design values for use with allowable stress design (working stress design) load combinations calculated in accordance with Section 1605.1 of the 2024 IBC must be established as follows:

$$T_{allowable,ASD} = \frac{\phi N_n}{\alpha}$$

$$V_{allowable,ASD} = \frac{\phi V_n}{\alpha}$$

where:

$T_{allowable,ASD}$ = Allowable tension load (lbf or kN).

$V_{allowable,ASD}$ = Allowable shear load (lbf or kN).

ϕN_n = Lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318-19 Chapter 17 and 2024 IBC Section 1905.7, and Section 4.1 of this report, as applicable (lbf or N).

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318-19 Chapter 17 and 2024 IBC Section 1905.7, and Section 4.1 of this report, as applicable (lbf or N).

α = Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition, α must include all applicable factors to account for nonductile failure modes and required over-strength.

The requirements for member thickness, edge distance and spacing, described in this report, must apply.

4.2.2 Interaction of Tensile and Shear Forces: The interaction must be calculated and consistent with ACI 318-19 17.8 as follows:

For shear loads $V_{applied} \leq 0.2V_{allowable,ASD}$, the full allowable load in tension is permitted.

For tension loads $T_{applied} \leq 0.2T_{allowable,ASD}$, the full allowable load in shear is permitted.

For all other cases:

$$\frac{T_{applied}}{T_{allowable,ASD}} + \frac{V_{applied}}{V_{allowable,ASD}} \leq 1.2 \qquad \text{(Eq-4)}$$

4.2.3 Installation:

Installation parameters are provided in Table 1 and Figure 2, Figure 5A, Figure 5B, Figure 5C and Figure 5D. Anchor locations must comply with this report and plans and specifications approved by the code official. The Hilti KB-TZ2 must be installed in accordance with manufacturer's published instructions and this report. In case of conflict, this report governs. Anchors must be installed in holes drilled into the concrete using carbide-tipped masonry drill bits complying with ANSI B212.15-1994, using the Hilti SafeSet System™ with Hilti TE-YD or TE-CD Hollow Drill Bits complying with ANSI B212.15-1994 with a Hilti vacuum in accordance with Figure 6 and Figure 7, or using Hilti SPX-T core bits in accordance with Figure 7. The Hollow Drill Bits are not permitted for use with the $^1/_4$-inch and $^3/_8$-inch diameter KB-TZ2 anchors. The Hilti SPX-T core bits are not permitted for use with the $^1/_4$-inch and 1-inch diameter KB-TZ2 anchors. The minimum drilled hole depth, h_0, is given in Table 1. If dust and debris is removed from the drilled hole with the Hilti TE-YD or TE-CD Hollow Drill Bits, the DRS attachment system, or compressed air or a manual pump, h_{nom} is achieved at the specified value of h_0 noted in Table 1. The anchor must be hammered into the predrilled hole until h_{nom} is achieved. The nut must be tightened against the washer until the torque values specified in Table 1 are achieved, or the anchors may be installed using the appropriate Hilti Impact Wrench and corresponding Hilti AT Module in accordance with Figure 7. The Hilti AT Tool system is not permitted for use with the $^1/_4$-inch and 1-inch diameter KB-TZ2 anchors. For installation in the soffit of concrete on steel deck assemblies, the hole diameter in the steel deck must not exceed the diameter of the hole in the concrete by more than $^1/_8$ inch (3.2 mm). For member thickness and edge distance restrictions for installations into the soffit of concrete on steel deck assemblies, Figure 5A, Figure 5B and Figure 5C.

4.3 Special Inspection:

Periodic special inspection is required in accordance with Section 1705.1.1 and Table 1705.3 of the 2024 IBC, as applicable. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, anchor spacing, edge distances, concrete member thickness, tightening torque, hole dimensions, anchor embedment and adherence to the manufacturer's printed installation instructions. The special inspector must be present as often as required in accordance with the "statement of special inspection." Under the IBC, additional requirements as set forth in Sections 1705, 1706 and 1707 must be observed, where applicable.

5.0 CONDITIONS OF USE:

The Hilti KB-TZ2 anchors described in this report comply with the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Anchor sizes, dimensions, minimum embedment depths and other installation parameters as set forth in this report.

5.2 The anchors must be installed in accordance with the manufacturer's published instructions and this report. In case of conflict, this report governs.

5.3 Anchors must be limited to use in cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa), and cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a specified compressive strength, f'_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa).

5.4 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.1 MPa).

5.5 The concrete shall have attained its minimum design strength prior to installation of the anchors.

5.6 Strength design values must be established in accordance with Section 4.1 of this report.

5.7 Allowable design values are established in accordance with Section 4.2.

5.8 Anchor spacing and edge distance as well as minimum member thickness must comply with Tables 3 and 9, and Figure 5A, Figure 5B, Figure 5C and Figure 5D.

5.9 Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.10 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of expansion anchors subjected to fatigue or shock loading is unavailable at this time, the use of these anchors under such conditions is beyond the scope of this report.

5.11 Anchors may be installed in regions of concrete where cracking has occurred or where analysis indicates cracking may occur ($f_t > f_r$), subject to the conditions of this report.

5.12 Anchors may be used to resist short-term loading due to wind or seismic forces in locations designated as Seismic Design Categories A through F of the IBC, subject to the conditions of this report.

5.13 Where not otherwise prohibited in the code, KB-TZ2 anchors are permitted for use with fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:

- Anchors are used to resist wind or seismic forces only.
- Anchors that support a fire-resistance-rated envelope or a fire-resistance-rated membrane are protected by approved fire-resistance-rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.

5.14 Use of zinc-coated carbon steel anchors is limited to dry, interior locations.

5.15 Use of anchors made of stainless steel as specified in this report are permitted for exterior exposure and damp environments.

5.16 Use of anchors made of stainless steel as specified in this report are permitted for contact with preservative-treated and fire-retardant-treated wood.

5.17 Anchors are manufactured by Hilti AG under an approved quality-control program with inspections by ICC-ES.

5.18 Special inspection must be provided in accordance with Section 4.4.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements AC193 (24a), published April 2025, which incorporates requirements in ACI 355.2-19 and ACI 355.2-07 for use in cracked and uncracked concrete.

6.2 Quality-control documentation.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4266) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, the anchors are identified by packaging labeled with the manufacturer's name (Hilti, Inc.) and contact information, anchor name, anchor size, and evaluation report number (ESR-4266). The anchors have the letters KB-TZ2 embossed on the anchor stud and a notch or notches embossed into the anchor head. The letters and notches are visible after installation for verification as depicted in Figure 3 of this report. The number of notches indicate material type. The letter system indicating length embossed on the head of the anchor is described in Table 2.

7.3 The report holder's contact information is the following:

HILTI, INC.
7250 DALLAS PARKWAY, SUITE 1000
PLANO, TEXAS 75024
(918) 872-8000
www.hilti.com

TABLE 1—SETTING INFORMATION

Setting information	Sym.	Units	Nominal anchor diameter (in.)															
			1/4	3/8			1/2				5/8			3/4			1	
Nominal bit diameter	d_o	In.	1/4	3/8			1/2				5/8			3/4			1	
Effective min. embedment	h_{ef}	In. (mm)	1-1/2 (38)	1-1/2 (38)	2 (51)	2-1/2 (64)	1-1/2[1] (38)	2 (51)	2-1/2 (64)	3-1/4 (83)	2-3/4 (70)	3-1/4 (83)	4 (102)	3-1/4 (83)	3-3/4 (95)	4-3/4 (121)	4 (102)	5-3/4 (146)
Nominal embedment	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)	2-1/2 (64)	3 (76)	2[1] (51)	2-1/2 (64)	3 (76)	3-3/4 (95)	3-1/4 (83)	3-3/4 (95)	4-1/2 (114)	4 (102)	4-1/2 (114)	5-1/2 (140)	4-5/8 (117)	6-3/8 (162)
Min. hole depth	h_o	In. (mm)	2 (51)	2 (51)	2-3/4 (70)	3-1/4 (83)	2-1/4[1] (57)	2-3/4 (70)	3-1/4 (83)	4-1/4 (108)	3-3/4 (95)	4-1/4 (108)	4-3/4 (121)	4-1/4 (108)	4-3/4 (121)	5-3/4 (146)	5 (127)	6-3/4 (171)
Installation torque Carbon steel[1]	T_{inst}	ft-lb (Nm)	4 (5)	30 (41)			50 (68)				40 (54)			110 (149)			185 (251)	
Installation torque Stainless steel[1]	T_{inst}	ft-lb (Nm)	6 (8)	30 (41)			40 (54)				60 (81)			125 (169)			185 (251)	
Fixture hole diameter	d_h	In. (mm)	5/16 (7.9)	7/16 (11.1)			9/16 (14.3)				11/16 (17.5)			13/16 (20.6)			1-1/8 (28.6)	

[1] Design information for h_{ef} = 1-1/2 is only applicable to carbon steel (CS) KB-TZ2 bolts.

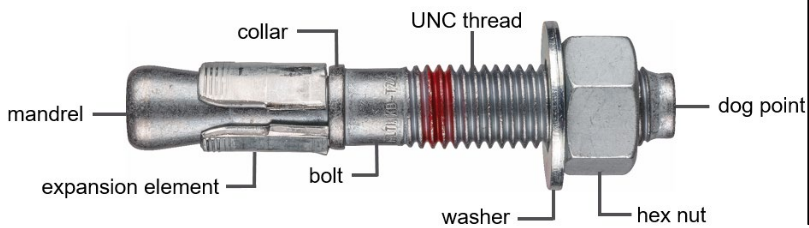


FIGURE 1—HILTI CARBON STEEL KWIK BOLT TZ (KB-TZ2)

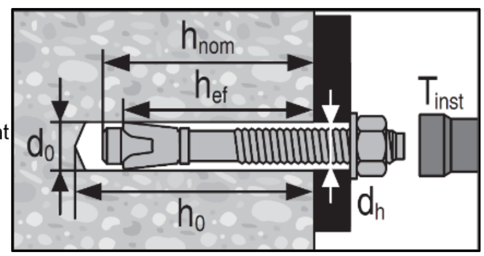


FIGURE 2—HILTI KB-TZ2 INSTALLED

TABLE 2—LENGTH IDENTIFICATION SYSTEM (CARBON STEEL AND STAINLESS STEEL ANCHORS)

Length ID marking on bolt head		A	B	C	D	E[1]	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Length of anchor, ℓ_{anch} (inches)	From	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	11	12	13	14	15
	Up to but not including	2	2½	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10	11	12	13	14	15	16

For **SI:** 1 inch = 25.4 mm.

[1] $^3/_8$ diameter anchors with length of $3^1/_2$ are identified with an ohm (Ω) ID marking on the bolt head.

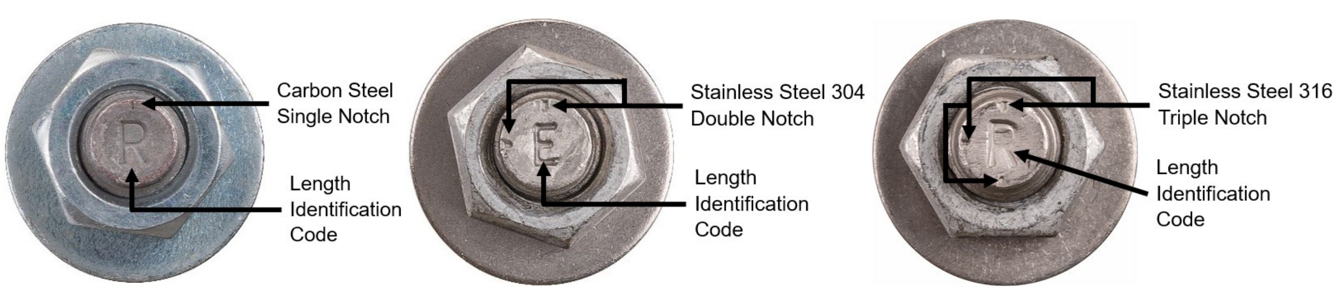


FIGURE 3—BOLT HEAD WITH LENGTH IDENTIFICATION CODE AND KB-TZ2 HEAD NOTCH EMBOSSMENT

TABLE 3—MINIMUM EDGE DISTANCE, SPACING AND CONCRETE THICKNESS FOR KB-TZ2

Setting information	Symbol	Units	Nominal anchor dia. (in.)															
			1/4	3/8			1/2				5/8			3/4			1	
Effective min. embedment	h_{ef}	in.	1-1/2	1-1/2	2	2-1/2	1-1/2	2	2-1/2	3-1/4	2-3/4	3-1/4	4	3-1/4	3-3/4	4-3/4	4	5-3/4
		(mm)	(38)	(38)	(51)	(64)	(38)	(51)	(64)	(83)	(70)	(83)	(102)	(83)	(95)	(121)	(102)	(146)
Min. member thickness	h_{min}	in.	3-1/4	3-1/4	4	5	3-1/2	4	5	5-1/2	5	5-1/2	6	5-1/2	6	8	8	10
		(mm)	(83)	(83)	(102)	(127)	(89)	(102)	(127)	(140)	(127)	(140)	(152)	(140)	(152)	(203)	(203)	(254)
Carbon Steel																		
Min. edge distance	c_{min}	in.	1-1/2	5	2-1/2	2-1/2	8	2-3/4	2-3/4	2-1/4	4-1/2	3-1/2	2-3/4	5	4	3-1/2	8	3
		(mm)	(38)	(127)	(64)	(64)	(203)	(70)	(70)	(57)	(114)	(89)	(70)	(127)	(102)	(89)	(203)	(76)
	for $s \geq$	in.	1-1/2	8	6	5	12	5-1/2	9-3/4	5-1/4	6-1/2	5-1/2	7-1/4	10	5-3/4	5-1/2	8	6-3/4
		(mm)	(38)	(203)	(152)	(127)	(305)	(140)	(248)	(133)	(165)	(140)	(184)	(254)	(146)	(140)	(203)	(171)
Min. anchor spacing	s_{min}	in.	1-1/2	5	2-1/4	2	12	3-1/2	3	2	4-1/2	2-3/4	2-1/4	4-1/2	3-3/4	3-3/4	8	4-3/4
		(mm)	(38)	(127)	(57)	(51)	(305)	(89)	(76)	(51)	(114)	(70)	(57)	(114)	(95)	(95)	(203)	(121)
	for $c \geq$	In.	1-1/2	8	3-1/2	4	8	10	8	4-3/4	5-1/2	7	4-1/4	6	7-1/4	4-3/4	8	3-3/4
		(mm)	(38)	(203)	(89)	(102)	(203)	(254)	(203)	(121)	(140)	(178)	(108)	(152)	(184)	(121)	(203)	(95)
Stainless Steel																		
Min. edge distance	c_{min}	in.	1-1/2	5	2-1/2	2-1/2		2-3/4	2-1/2	2-1/4	4	3-1/4	2-1/4	5	4	3-3/4	3-3/4	3
		(mm)	(38)	(127)	(64)	(64)		(70)	(64)	(57)	(102)	(83)	(57)	(127)	(102)	(95)	(95)	(76)
	for $s \geq$	in.	1-1/2	8	5	5		5-1/2	4-1/2	5-1/4	7	5-1/2	7	11	7-1/2	5-3/4	10	6-3/4
		(mm)	(38)	(203)	(127)	(127)		(140)	(114)	(133)	(178)	(140)	(178)	(279)	(191)	(146)	(254)	(171)
Min. anchor spacing	s_{min}	in.	1-1/2	5	2-1/4	2-1/4		2-3/4	2-1/2	2	5-1/2	2-3/4	3	5	4	4	5	4-3/4
		(mm)	(38)	(127)	(57)	(57)		(70)	(64)	(51)	(140)	(70)	(76)	(127)	(102)	(102)	(127)	(121)
	for $c \geq$	In.	1-1/2	8	4	3-1/2		4-1/8	4-1/2	4-1/2	5-1/2	4	4-1/4	8	6	5-1/4	4-1/4	3-3/4
		(mm)	(38)	(203)	(102)	(89)		(105)	(114)	(114)	(140)	(102)	(108)	(203)	(152)	(133)	(108)	(95)

For **SI:** 1 inch = 25.4 mm

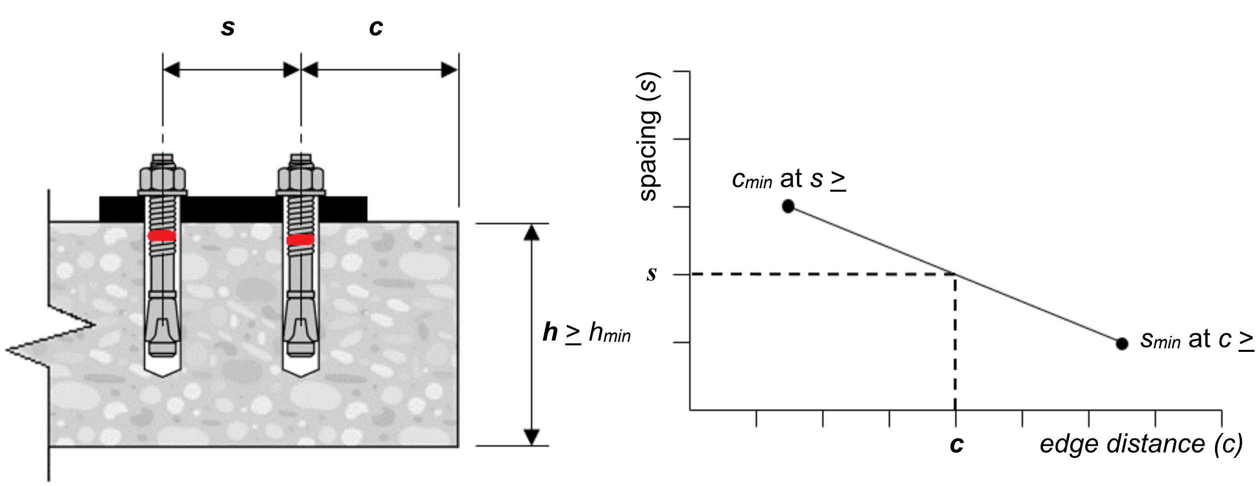


FIGURE 4—INTERPOLATION OF MINIMUM EDGE DISTANCE AND ANCHOR SPACING

TABLE 4—HILTI CARBON STEEL KB-TZ2 DESIGN INFORMATION FOR HAMMER AND CORE DRILLED INSTALLATIONS, TENSION[7]

Design parameter	Symbol	Units	Nominal anchor diameter (in)															
			$^1/_4$	$^3/_8$			$^1/_2$				$^5/_8$			$^3/_4$			1	
Effective min. embedment[1]	h_{ef}	in. (mm)	1-1/2 (38)	1-1/2 (38)	2 (51)	2-1/2 (64)	1-1/2 (38)	2 (51)	2-1/2 (64)	3-1/4 (83)	2-3/4 (70)	3-1/4 (83)	4 (102)	3-1/4 (83)	3-3/4 (95)	4-3/4 (121)	4 (102)	5-3/4 (146)
Tension, steel failure modes																		
Strength reduction factor for steel in tension[2,3]	$\Phi_{sa,N}$	-	0.75	0.75			0.75				0.75			0.75			0.75	
Min. specified yield strength	f_y	lb/in² (N/mm²)	100,900 (696)	100,900 (696)			96,300 (664)				87,000 (600)			84,700 (584)			75,000 (517)	
Min. specified ult. strength	f_{uta}	lb/in² (N/mm²)	122,400 (844)	126,200 (870)			114,000 (786)				106,700 (736)			105,900 (730)			88,000 (607)	
Effective tensile stress area	$A_{se,N}$	In² (mm²)	0.024 (15.4)	0.051 (33.2)			0.099 (63.6)				0.164 (106.0)			0.239 (154.4)			0.470 (303.2)	
Steel strength in tension	N_{sa}	lb (kN)	2,920 (13.0)	6,490 (28.9)			11,240 (50.0)				17,535 (78.0)			25,335 (112.7)			41,365 (184.1)	
Tension, concrete failure modes																		
Anchor category	-	-	3	1			1				1			1			1	
Strength reduction factor for concrete and pullout failure in tension[3,]	$\Phi_{c,N,}$ $\Phi_{p,N}$	-	0.45	0.65			0.65				0.65			0.65			0.65	
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24			27		24		24			27	27[6]	24	27	24
Effectiveness factor for cracked concrete	k_{cr}	-	17	21		17	24	21		17	21		17	21			21	
Modification factor for anchor resistance, tension, uncracked concrete[4]	$\Psi_{c,N}$	-	1.0	1.0			1.0				1.0			1.0			1.0	
Critical edge distance	c_{ac}	in. (mm)	4 (102)	5 (127)	4-3/8 (111)	5-1/2 (140)	8 (203)	5-1/2 (140)	6-3/4 (171)	10 (254)	10 (254)	11-1/2 (292)	8-3/4 (222)	12 (305)	10 (254)	9 (229)	11 (279)	16 (406)
Pullout strength uncracked conc.[5]	$N_{p,uncr}$	lb (kN)	2,100 (9.3)	N/A	N/A	4,180 (18.6)	N/A	N/A	N/A	N/A	5,380 (23.9)	N/A	8,995 (40.0)	N/A	N/A	N/A	N/A	N/A
Pullout strength cracked conc.[5]	$N_{p,cr}$	lb (kN)	625 (2.8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8,835 (39.3)	N/A	11,810 (52.6)
Pullout strength seismic[5]	$N_{p,eq}$	lb (kN)	625 (2.8)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8,700 (38.7)	N/A	11,810 (52.6)
Normalization factor, uncracked concrete	n_{uncr}	-	0.20	0.22	0.24	0.35	0.50	0.42	0.29	0.35	0.50	0.48	0.50	0.35	0.31	0.39	N/A	0.38
Normalization factor, cracked concrete, seismic	n_{cr}	-	0.39	0.50	0.46	0.28	0.47	0.50	0.48	0.40	0.50	0.47	0.50	0.36	0.42	0.29	N/A	0.50
Tension, axial stiffness																		
Axial stiffness in service load range	β_{uncr}	lb/in.	322,360	131,570			158,585				290,360			412,335			199,845	
	β_{cr}	lb/in.	31,035	91,335			113,515				167,365			62,180			122,400	

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa. For pound-inch units: 1 mm = 0.03937 inches.

[1] Figure 2 of this report illustrates the installation parameters.
[2] The KB-TZ2 is considered a ductile steel element in accordance with ACI 318-19 2.3.
[3] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 are met. The strength reduction factors are applicable with supplementary reinforcement is not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.
[4] For all design cases, $\Psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.
[5] For all design cases, $\Psi_{c,P}$ = 1.0. Tabular value for pullout strength is for a concrete compressive strength of 2,500 psi (17.2 MPa). Pullout strength for concrete compressive strength greater than 2,500 psi (17.2 MPa) may be increased by multiplying the tabular pullout strength by $(f'c / 2{,}500)^n$ for psi, or $(f'c / 17.2)^n$ for MPa, where n is given as n_{uncr} for uncracked concrete and n_{cr} for cracked concrete and seismic. NA (not applicable) denotes that pullout strength does not need to be considered for design.
[6] For core drill installations, k_{uncr} = 24 for $^3/_4$-inch diameter anchors installed at $3^3/_4$ inches (95 mm) effective embedment.
[7] $^1/_4$-inch and 1-inch diameter anchors are not permitted for core drilling installations.

TABLE 5—HILTI STAINLESS STEEL KB-TZ2 DESIGN INFORMATION FOR HAMMER AND CORE DRILLED INSTALLATIONS,TENSION[8]

Design parameter	Symbol	Units	Nominal anchor diameter (in)														
			$^1/_4$	$^3/_8$			$^1/_2$			$^5/_8$			$^3/_4$			1	
Effective min. embedment[1]	h_{ef}	in. (mm)	1-1/2 (38)	1-1/2 (38)	2 (51)	2-1/2 (64)	2 (51)	2-1/2 (64)	3-1/4 (83)	2-3/4 (70)	3-1/4 (83)	4 (102)	3-1/4 (83)	3-3/4 (95)	4-3/4 (121)	4 (102)	5-3/4 (146)
Tension, steel failure modes																	
Strength reduction factor for steel in tension[2,3]	$\Phi_{sa,N}$	-	0.75	0.75			0.75			0.75			0.75			0.75	
Min. specified yield strength	f_y	lb/in² (N/mm²)	100,900 (696)	96,300 (664)			96,300 (664)			91,600 (632)			84,100 (580)			65,000 (448)	
Min. specified ult. strength	f_{uta}	lb/in² (N/mm²)	122,400 (844)	120,100 (828)			120,400 (830)			114,600 (790)			100,500 (693)			99,900 (689)	
Effective tensile stress area	$A_{se,N}$	In² (mm²)	0.024 (15.4)	0.051 (33.2)			0.099 (63.6)			0.164 (106.0)			0.239 (154.4)			0.470 (303.2)	
Steel strength in tension	N_{sa}	lb (kN)	2,920 (13.0)	6,180 (27.5)			11,870 (52.8)			18,835 (83.8)			24,045 (107.0)			46,955 (208.9)	
Tension, concrete failure modes																	
Anchor category	-	-	3	1			1			1			1			1	
Strength reduction factor for concrete and pullout failure in tension, (Condition B – supplementary reinforcement not present)[3]	$\Phi_{c,N}$, $\Phi_{p,N}$	-	0.45	0.65			0.65			0.65			0.65			0.65	
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24			24			24			24	27[6]	24	27	
Effectiveness factor for cracked concrete	k_{cr}	-	17	21		17	17	21	17	21		17	21	21[6]	21	24	21
Modification factor for anchor resistance, tension, uncracked concrete[4]	$\Psi_{c,N}$	-	1.0	1.0			1.0			1.0			1.0			1.0	
Critical edge distance	c_{ac}	in. (mm)	4 (102)	4-1/2 (114)	5-1/2 (140)	4-1/8 (105)	5-1/2 (140)	6-1/4 (159)	7-1/2 (191)	10 (254)	6-1/2 (165)	8-3/4 (222)	12 (305)	10 (254)	10 (254)	11 (279)	15-1/2 (394)
Pullout strength uncracked concrete[5]	$N_{p,uncr}$	lb (kN)	1,570 (7.0)	N/A	N/A	4,185 (18.6)	3,380 (15.0)	4,010 (17.8)	5,500 (24.5)	4,085 (18.2)	6,015 (26.8)	8,050 (35.8)	N/A	N/A	N/A	N/A	N/A
Pullout strength cracked concrete[5]	$N_{p,cr}$	lb (kN)	670 (3.0)	N/A	N/A	N/A	N/A	N/A	N/A[7]	N/A	N/A	N/A	N/A	N/A	8,795 (39.1)	N/A	N/A
Pullout strength seismic[5]	$N_{p,eq}$	lb (kN)	670 (3.0)	N/A	N/A	N/A	N/A	N/A	N/A[7]	N/A	N/A	N/A	N/A	N/A	8,795 (39.1)	N/A	N/A
Normalization factor, uncracked concrete	n_{uncr}	-	0.39	N/A	N/A	0.37	0.46	0.50	0.50	0.50	0.42	0.47	N/A	N/A	0.30	N/A	N/A
Normalization factor, cracked concrete, seismic	n_{cr}	-	0.50	N/A	N/A	N/A	N/A	N/A	0.50	N/A	N/A	N/A	N/A	N/A	0.50	N/A	N/A
Tension, axial stiffness																	
Axial stiffness in service load range	β_{uncr}	lb/in.	166,490	175,800			137,145			153,925			342,680			105,970	
	β_{cr}	lb/in.	33,805	79,860			97,985			69,625			75,715			117,630	

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa For pound-inch units: 1 mm = 0.03937 inches.

[1] Figure 2 of this report illustrates the installation parameters.
[2] The KB-TZ2 is considered a ductile steel element in accordance with ACI 318-19 2.3.
[3] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 are met. The strength reduction factors are applicable with supplementary reinforcement is not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.
[4] For all design cases, $\Psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.
[5] For all design cases, $\Psi_{c,P}$ = 1.0. Tabular value for pullout strength is for a concrete compressive strength of 2,500 psi (17.2 MPa). Pullout strength for concrete compressive strength greater than 2,500 psi (17.2 MPa) may be increased by multiplying the tabular pullout strength by $(f'c / 2,500)^n$ for psi, or $(f'c / 17.2)^n$ for MPa, where n is given as n_{uncr} for uncracked concrete and n_{cr} for cracked concrete.NA (not applicable) denotes that pullout strength does not need to be considered for design.
[6] For core drill installations, k_{uncr} = 24 and k_{cr} = 17 for $^3/_4$-inch diameter anchors installed at 3$^3/_4$ inches (95 mm) effective embedment.
[7] For core drill installations, $N_{p,cr}$ = 4245 lb (18.9 kN) and $N_{p,eq}$ = 4245lb (18.9 kN) for $^1/_2$-inch diameter anchors installed at 3$^1/_4$ inches (83 mm) effective embedment.
[8] $^1/_4$-inch and 1-inch diameter anchors are not permitted for core drilling installations.

TABLE 6—HILTI CARBON STEEL KB-TZ2 DESIGN INFORMATION FOR HAMMER AND CORE DRILLED INSTALLATIONS, SHEAR[4]

Design parameter	Symbol	Units	Nominal anchor diameter (in)															
			1/4	3/8			1/2				5/8			3/4			1	
Anchor O.D.	d_a	in.	0.250	0.375			0.500				0.625			0.750			1.00	
		(mm)	(6.4)	(9.5)			(12.7)				(15.9)			(19.1)			(25.4)	
Effective min. embedment [1]	h_{ef}	in.	1-1/2	1-1/2	2	2-1/2	1-1/2	2	2-1/2	3-1/4	2-3/4	3-1/4	4	3-1/4	3-3/4	4-3/4	4	5-3/4
		(mm)	(38)	(38)	(51)	(64)	(38)	(51)	(64)	(83)	(70)	(83)	(102)	(83)	(95)	(121)	(102)	(146)
Shear, steel failure modes																		
Strength reduction factor for steel in shear [2,3]	$\Phi_{sa,V}$	-	0.65	0.65			0.65				0.65			0.65			0.65	
Steel strength in shear	V_{sa}	lb	1,345	3,225	3,385		5,535		6,875		10,255			13,805			18,795	22,825
		(kN)	(6.0)	(14.4)	(15.1)		(24.6)		(30.6)		(45.6)			(61.4)			(83.6)	(101.6)
Steel strength in shear, seismic	$V_{sa,eq}$	lb	1,345	3,225	3,385		5,535		6,875		10,255			13,805			13,805	
		(kN)	(6.0)	(14.4)	(15.1)		(24.6)		(30.6)		(45.6)			(61.4)			(61.4)	
Shear, concrete failure modes																		
Strength reduction factor for concrete breakout and pryout failure in shear, (Condition B – supplementary reinforcement not present) [3]	$\Phi_{c,V}$, $\Phi_{p,V}$	-	0.70	0.70			0.70				0.70			0.70			0.70	
Load bearing length of anchor in shear	l_e	in.	1-1/2	1-1/2	2	2-1/2	1-1/2	2	2-1/2	3-1/4	2-3/4	3-1/4	4	3-1/4	3-3/4	4-3/4	4	5-3/4
		(mm)	(38)	(38)	(51)	(64)	(38)	(51)	(64)	(83)	(70)	(83)	(102)	(83)	(95)	(121)	(102)	(146)
Coefficient for pryout strength	k_{cp}	-	1	1	1	2	1	1	2	2	2	2	2	2	2	2	2	2

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa For pound-inch units: 1 mm = 0.03937 inches.

[1] Figure 2 of this report illustrates the installation parameters.
[2] The KB-TZ2 is considered a ductile steel element in accordance with ACI 318-19 2.3.
[3] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 are met. The strength reduction factors are applicable with supplementary reinforcement is not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.
[4] 1/4-inch and 1-inch diameter anchors are not permitted for core drilling installations.

TABLE 7—HILTI STAINLESS STEEL KB-TZ2 DESIGN INFORMATION FOR HAMMER AND CORE DRILLED INSTALLATIONS, SHEAR[4]

Design parameter	Symbol	Units	Nominal anchor diameter														
			1/4	3/8			1/2			5/8			3/4			1	
Anchor O.D.	d_a	in.	0.250	0.375			0.500			0.625			0.750			1.00	
		(mm)	(6.4)	(9.5)			(12.7)			(15.9)			(19.1)			(25.4)	
Effective min. embedment [1]	h_{ef}	in.	1-1/2	1-1/2	2	2-1/2	2	2-1/2	3-1/4	2-3/4	3-1/4	4	3-1/4	3-3/4	4-3/4	4	5-3/4
		(mm)	(38)	(38)	(51)	(64)	(51)	(64)	(83)	(70)	(83)	(102)	(83)	(95)	(121)	(102)	(146)
Shear, steel failure modes																	
Strength reduction factor for steel in shear [2,3]	$\Phi_{sa,V}$	-	0.65	0.65			0.65			0.65			0.65			0.65	
Steel strength in shear	V_{sa}	lb	1,460	4,615	4,885		8,345			12,355			16,560			22,955	31,400
		(kN)	(6.5)	(20.5)	(21.7)		(37.1)			(55.0)			(73.7)			(102.1)	(139.7)
Steel strength in shear, seismic	$V_{sa,eq}$	lb	1,110	4,615	4,885		8,345			12,355			13,470			13,470	
		(kN)	(4.9)	(20.5)	(21.7)		(37.1)			(55.0)			(59.9)			(59.9)	
Shear, concrete failure modes																	
Strength reduction factor for concrete breakout and pryout failure in shear, (Condition B–supplementary reinforcement not present) [3]	$\Phi_{c,V}$, $\Phi_{p,V}$	-	0.7	0.7			0.7			0.7			0.7			0.7	
Load bearing length of anchor in shear	l_e	in.	1-1/2	1-1/2	2	2-1/2	2	2-1/2	3-1/4	2-3/4	3-1/4	4	3-1/4	3-3/4	4-3/4	4	5-3/4
		(mm)	(38)	(38)	(51)	(64)	(51)	(64)	(83)	(70)	(83)	(102)	(83)	(95)	(121)	(102)	(146)
Coefficient for pryout strength	k_{cp}	-	1	1	1	2	1	2	2	2	2	2	2	2	2	2	2

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa For pound-inch units: 1 mm = 0.03937 inches.

[1] Figure 2 of this report illustrates the installation parameters.
[2] The KB-TZ2 is considered a ductile steel element in accordance with ACI 318-19 2.3.
[3] The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3 are met. The strength reduction factors are applicable with supplementary reinforcement is not present. Greater strength reduction factors may be used in areas where supplementary reinforcement can be verified.
[4] 1/4-inch and 1-inch diameter anchors are not permitted for core drilling installations.

TABLE 8—HILTI KB-TZ2 CARBON STEEL ANCHORS TENSION AND SHEAR DESIGN DATA FOR INSTALLATION IN THE SOFFIT OF 3000 PSI, LIGHTWEIGHT CONCRETE-FILLED PROFILE STEEL DECK ASSEMBLIES FOR HAMMER AND CORE DRILLED INSTALLATIONS [1,2,3]

Design parameter	Symbol	Units	Anchor Diameter											
			1/4	3/8			1/2				5/8		3/4	
Effective min. embedment [1]	h_{ef}	in.	1-1/2	1-1/2	2	2-1/2	1-1/2	2	2-1/2	3-1/4	2-3/4	4	3-1/4	3-3/4[9]
Minimum hole depth	h_o	in.	2	2	2-3/4	3-1/4	2-1/4	2-3/4	3-1/4	4-1/4	3-3/4	4-3/4	4-1/4	4-3/4
Loads According to Figure 5A														
Minimum concrete thickness over upper flute [4]	$h_{min,deck}$	in.	2-1/2	2-1/2			2-1/2				2-1/2		2-1/2	3-1/4
Pullout strength, uncracked concrete [5,6]	$N_{p,deck,uncr}$	lb	1,725	1,855	2,625	2,995	1,855	2,750	3,745	4,715	4,415	5,815	3,800	4,795
Pullout strength, cracked concrete [5,6]	$N_{p,deck,cr}$	lb	515	1,625	2,295	2,405	1,650	2,135	3,275	3,340	3,930	4,395	3,325	3,730
Pullout strength, seismic [5,7]	$N_{p,deck,eq}$	lb	515	1,625	2,295	2,405	1,650	2,135	3,275	3,340	3,930	4,395	3,325	3,730
Steel strength in shear [8]	$V_{sa,deck}$	lb	1,630	1,355	2,120	2,120	1,790	2,260	3,555	4,345	3,815	6,150	4,085	7,865
Steel strength in shear, seismic [7]	$V_{sa,deck,eq}$	lb	1,630	1,355	2,120	2,120	1,790	2,260	3,555	4,345	3,815	6,150	4,085	7,865
Loads According to Figure 5B														
Minimum concrete thickness over upper flute [4]	$h_{min,deck}$	in.	2-1/2	2-1/2			2-1/2				2-1/2		2-1/2	3-1/4
Pullout strength, uncracked concrete [5,6]	$N_{p,deck,uncr}$	lb	1,725	1,855	2,625	2,995	1,855	2,750	3,745	4,715	4,415	5,815	3,800	4,795
Pullout strength, cracked concrete [5,6]	$N_{p,deck,cr}$	lb	515	1,625	2,295	2,405	1,650	2,135	3,275	3,340	3,930	4,395	3,325	3,730
Pullout strength, seismic [5,7]	$N_{p,deck,eq}$	lb	515	1,625	2,295	2,405	1,650	2,135	3,275	3,340	3,930	4,395	3,325	3,730
Steel strength in shear [8]	$V_{sa,deck}$	lb	1,630	1,355	2,120	2,120	1,790	2,260	3,285	4,235	3,815	4,650	4,085	7,865
Steel strength in shear, seismic [7]	$V_{sa,deck,eq}$	lb	1,630	1,355	2,120	2,120	1,790	2,260	3,285	4,235	3,815	4,650	4,085	7,865
Loads According to Figure 5C														
Minimum concrete thickness over upper flute [4]	$h_{min,deck}$	in.	2-1/4	2-1/4		N/A	2-1/4		N/A	3-1/4	3-1/4	N/A	N/A	N/A
Pullout strength, uncracked concrete [5,6]	$N_{p,deck,uncr}$	lb	1,380	990	2,485	N/A	1,815	1,900	N/A	2,665	2,960	N/A	N/A	N/A
Pullout strength, cracked concrete [5,6]	$N_{p,deck,cr}$	lb	410	870	2,130	N/A	1,480	1,480	N/A	1,890	2,635	N/A	N/A	N/A
Pullout strength, seismic [5,7]	$N_{p,deck,eq}$	lb	410	870	2,130	N/A	1,480	1,480	N/A	1,890	2,635	N/A	N/A	N/A
Steel strength in shear [8]	$V_{sa,deck}$	lb	1,125	2,370	2,505	N/A	2,680	3,175	N/A	3,465	4,085	N/A	N/A	N/A
Steel strength in shear, seismic [7]	$V_{sa,deck,eq}$	lb	1,125	2,370	2,505	N/A	2,680	3,175	N/A	3,465	4,085	N/A	N/A	N/A

[1] Installations must comply with Section 4.1.9 and Section 4.3 and Figure 5A, Figure 5B and Figure 5C of this report.
[2] The values for $\phi_{p,N}$ in tension can be found in Table 4 of this report. The values for $\phi_{sa,V}$ in shear can be found in Table 6 of this report.
[3] Evaluation of concrete breakout capacity in accordance with ACI 318-19 17.6.2 is not required for anchors installed in the deck soffit.
[4] Minimum concrete thickness refers to concrete thickness above upper flute. See Figures 5A to 5C.
[5] Characteristic pullout resistance for concrete compressive strengths greater than 3,000 psi (20.7 MPa) may be increased by multiplying the value in the table by $(f'_c / 3000)^n$ for psi or $(f'_c / 20.7)^n$ for MPa. See Table 4 for normalization factor.
[6] The values listed must be used in accordance with Section 4.1.4 of this report.
[7] The values listed must be used in accordance with Sections 4.1.4 and 4.1.8 of this report.
[8] The values listed must be used in accordance with Section 4.1.5 of this report.
[9] For core drill installations, with $^3/_4$-inch diameter anchors installed at $3^3/_4$ inches (95 mm) effective embedment, apply a reduction factor of 0.89 to the design tension strength of anchors installed in uncracked concrete.

TABLE 9—HILTI KB-TZ2 CARBON STEEL ANCHORS SETTING INFORMATION FOR INSTALLATION ON THE TOP OF CONCRETE-FILLED PROFILE STEEL DECK ASSEMBLIES ACCORDING TO FIGURE 5D [1,2,3]

Design Information	Symbol	Units	Nominal anchor diameter (in.)							
			1/4	3/8			1/2			
Effective Embedment Depth	h_{ef}	in. (mm)	1-1/2 (38)	1-1/2 (38)	2 (51)		1-1/2 (38)		2 (51)	
Nominal Embedment Depth	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)	2-1/2 (64)		2 (51)		2-1/2 (64)	
Minimum Hole Depth	h_o	in. (mm)	2 (51)	2 (51)	2-1/2 (64)	2-3/4 (70)	2-1/4 (57)		2-3/4 (70)	
Minimum Concrete Thickness[4]	$h_{min,deck}$	in. (mm)	2-1/2 (64)	2-1/2 (64)	2-1/2 (64)	3-1/4 (83)	2-1/2 (64)	3-1/4 (83)	3-1/4 (83)	
Critical Edge Distance	$c_{ac,\ deck,\ top}$	in. (mm)	5 (127)	16 (408)	8 (204)	6 (152)	7-1/2 (191)	12 (305)	7-1/2 (191)	
Minimum Edge Distance	$c_{min,\ deck,\ top}$	in. (mm)	3 (76)	16 (408)	8 (204)	6 (152)	7-1/2 (191)	12 (305)	7-1/2 (191)	8 (204)
Minimum Spacing	$s_{min,\ deck,\ top}$	in. (mm)	3 (76)	8 (204)	6 (152)	4 (102)	9 (229)	6 (152)	9 (229)	6 (152)
Required Installation Torque	T_{inst}	ft-lb (Nm)	4 (5)	30 (41)			50 (68)			

[1] Installations must comply with Section 4.1.10 and Section 4.3 and Figure 5D of this report.
[2] Design capacity shall be based on calculations according to values in Tables 4 and 6 of this report.
[3] Applicable for $h_{min,deck} < h_{min,}$ Table 3. For $h_{min,deck} \geq h_{min,}$ Table 3, use setting information in Tables 1 and 3 and critical ede distances in Table 4 of this report.
[4] Minimum concrete thickness refers to concrete thickness above the upper flute. See Figure 5D.

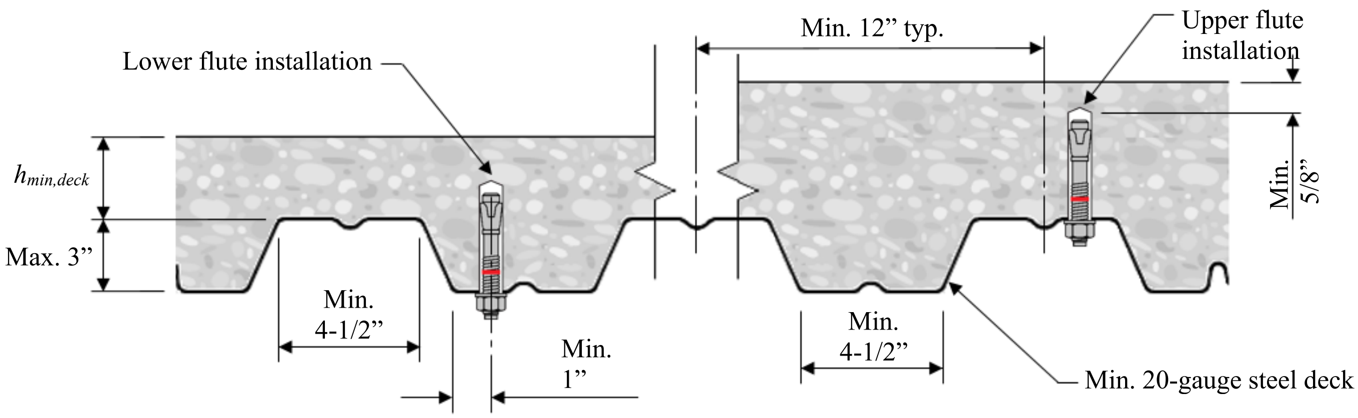


FIGURE 5A—KB-TZ2 IN THE SOFFIT OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES – W DECK

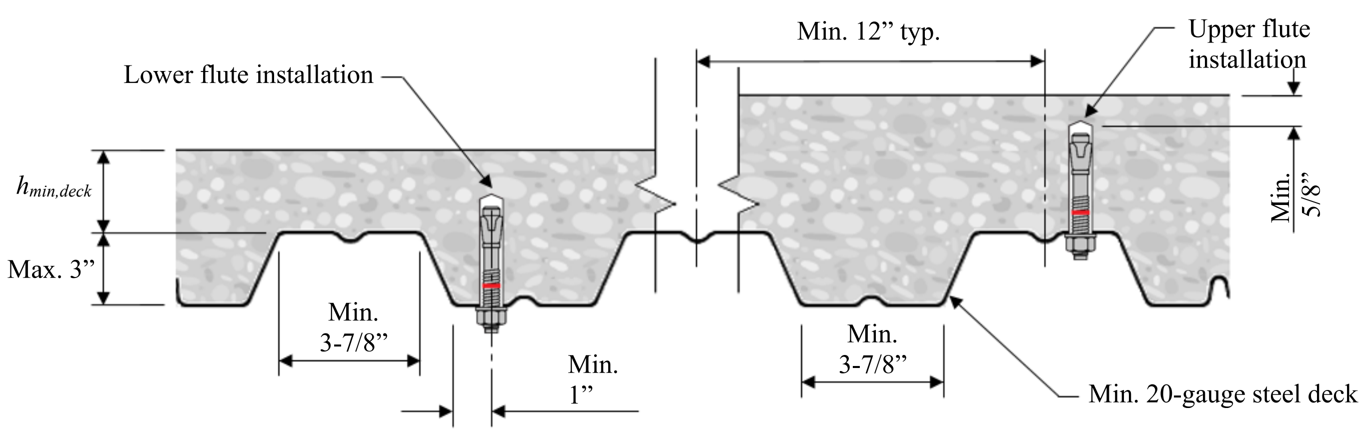


FIGURE 5B—KB-TZ2 IN THE SOFFIT OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES – W DECK

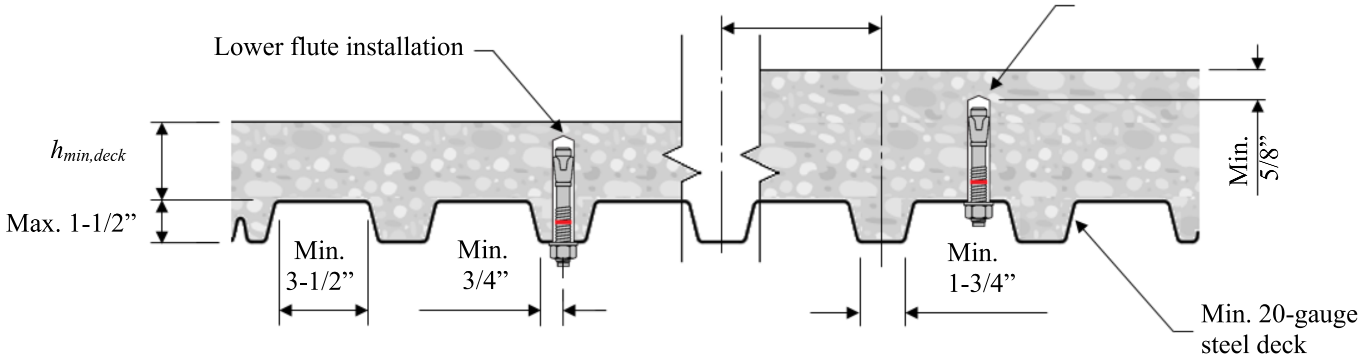


FIGURE 5C—KB-TZ2 IN THE SOFFIT OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES – B DECK

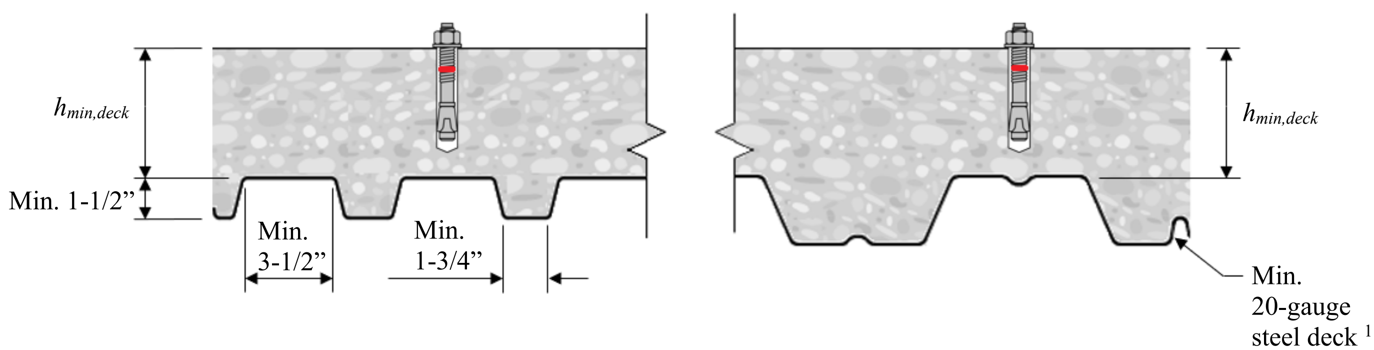


FIGURE 5D—KB-TZ2 IN THE TOP OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES

[1] $1^1/_2$ inches (38 mm) B-deck as a minimum profile size. Other deck profiles meeting the B-deck minimum dimensions are also permitted.

TABLE 10— APPLICABLE SECTIONS OF THE IBC UNDER EACH EDITION OF THE IBC

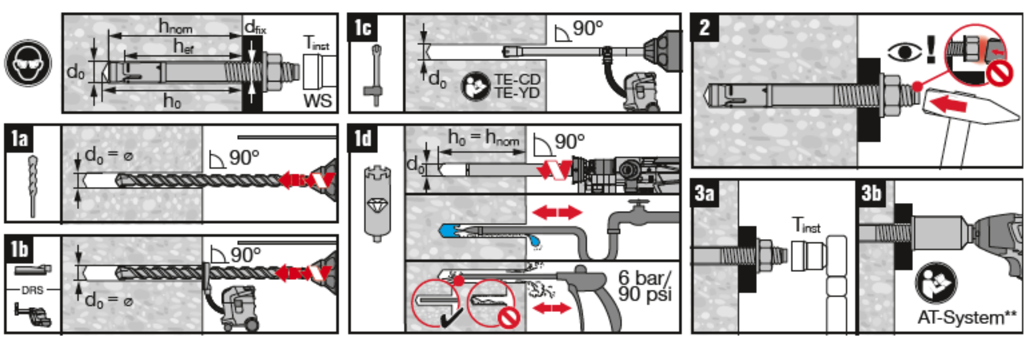
2024 IBC	2021 IBC	2018 IBC	2015 IBC
Section 1605.1		Section 1605.2 or 1605.3	
Section 1705.1.1 and Table 1705.3			
Section 1901.3			
Sections 1903 and 1905			
Section 1905.7	Section 1905.1.8		

TABLE 11— APPLICABLE SECTIONS OF ACI 318 UNDER EACH EDITION OF THE IBC

2024 IBC	2021 IBC	2018 IBC	2015 IBC
ACI 318-19		ACI 318-14	
2.3		2.3	
5.3		5.3	
Chapter 17		Chapter 17	
17.2.4		17.2.6	
17.3.1		17.2.7	
17.5.1.2		17.3.1	
17.5.1.3		17.3.1.1	
17.5.3		17.3.3	
17.6.1		17.4.1	
17.6.1.2		17.4.1.2	
17.6.2		17.4.2	
17.6.2.1		17.4.2.1	
17.6.2.2		17.4.2.2	
17.6.2.5.1(a)		17.4.2.6	
17.6.3		17.4.3	
17.6.3.1		17.4.3.1	
17.6.3.2.1		17.4.3.2	
17.6.3.3		17.4.3.6	
17.7.1		17.5.1	
17.7.1.2		17.5.1.2	
Eq. 17.7.1.2b		Eq. 17.5.1.2b	
17.7.2		17.5.2	
17.7.2.2.1		17.5.2.2	
17.7.3		17.5.3	
17.8		17.6	
17.9.2		17.7.1 and 17.7.3	
17.9.4		17.7.5	
17.9.5		17.7.6	
17.10		17.2.3	
17.10.3		17.2.3.3	
17.10.4, 17.10.5, 17.10.6, 17.10.7		17.2.3.4, 17.2.3.5, 17.2.3.6, 17.2.3.7	

Hilti SafeSet™ System with Hollow Drill Bit	Hilti SafeSet™ System with the Adaptive Torque Tool	Hilti Dust Removal Systems	Core Drill Systems
 Hilti TE-CD or TE-YD Hollow Carbide Drill Bit, with	 Hilti SIW-6AT-A22/SIW-4AT-22/ SIW-6AT-22 Impact Wrench, with	 Hilti Rotary Hammer Drill with DRS (Dust Removal System) Module, or	 Handheld Hilti DD 30 Core Drill, with
 Hilti Vacuum (per section 4.3)	 Hilti SI-AT-A22/SI-AT-22 Adaptive Torque Module	 Hilti TE DRS-D Dust Removal System with Hilti Vacuum	 SPX-T Hilti Core Bits (per Section 4.3)

FIGURE 6—HILTI SYSTEM COMPONENTS



Symbol	Symbol Description	Units	Anchor Diameter [inch] ¼	⅜	½	⅝	¾	1
HDB	Hollow Drill Bit	–	–	–	✔	✔	✔	✔
DRS	Dust Removal Systems	–	✔	✔	✔	✔	✔	✔
AT-System	SIW 6AT-A22 + SI AT-A22	–	–	✔	✔	✔	–	–
	SIW 4AT-22 + SI-AT-22	–	–	✔	✔	✔	–	–
	SIW 6AT-22 + SI-AT-22	–	–	–	✔	✔	✔	–
	Diamond Core Bit	–	–	✔	✔	✔	✔	–
d_0	Drill Bit Diameter	[inch]	¼	⅜	½	⅝	¾	1

FIGURE 7—INSTALLATION INSTRUCTIONS

ICC-ES Evaluation Report

ESR-4266 City of LA Supplement

Reissued December 2023

Revised April 2025

This report is subject to renewal December 2025.

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI KWIK BOLT TZ2 CARBON AND STAINLESS STEEL ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-4266, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2023 *City of Los Angeles Building Code* (LABC)
- 2023 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-4266, comply with LABC Chapter 19, and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-4266.
- The design, installation, conditions of use and identification of the Kwik Bolt TZ2 (KB-TZ2) anchors are in accordance with the 2021 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-4266.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, and City of Los Angeles Information Bulletin P/BC 2020-092, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The allowable and strength design values listed in the evaluation report and tables are for the connection of the anchors to concrete. The connection between the anchors and the connected members shall be checked for capacity (which may govern).
- For use in wall anchorage assemblies to flexible diaphragm applications, anchors shall be designed per the requirements of City of Los Angeles Information Bulletin P/BC 2023-071.

This supplement expires concurrently with the evaluation report, reissued December 2023 and revised April 2025.

ICC-ES Evaluation Report

ESR-4266 FL Supplement w/HVHZ

Reissued December 2023

Revised April 2025

This report is subject to renewal December 2025.

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DIVISION: 03 00 00—CONCRETE
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REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI KWIK BOLT TZ2 CARBON AND STAINLESS STEEL ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-4266, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-4266, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in the ICC-ES evaluation report ESR-4266 for the 2021 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the Kwik Bolt TZ2 (KB-TZ2) carbon and stainless steel anchors in cracked and uncracked concrete have also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*, with the following conditions:

a) For anchorage of wood members, the connection subject to uplift must be designed for no less than 700 pounds (3114 N).

b) For connection to aluminum members, all expansion anchors must be installed no less than 3 inches from the edge of concrete slab and/or footings. All expansion anchors shall develop an ultimate withdrawal resisting force equal to four times the imposed load, with no stress increase for duration of load.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued December 2023 and revised April 2025.