WAYNE STATE UNIVERSITY
UNIVERSITY TOWER
UTILITY GENERATOR RELOCATION

WSU PROJECT NO. 507-258173

BIDS - DECEMBER 7, 2015

WAYNE STATE UNIVERSITY

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PBA PROJECT NO: 2015.0132.00

ELECTRICAL DRAWING INDEX

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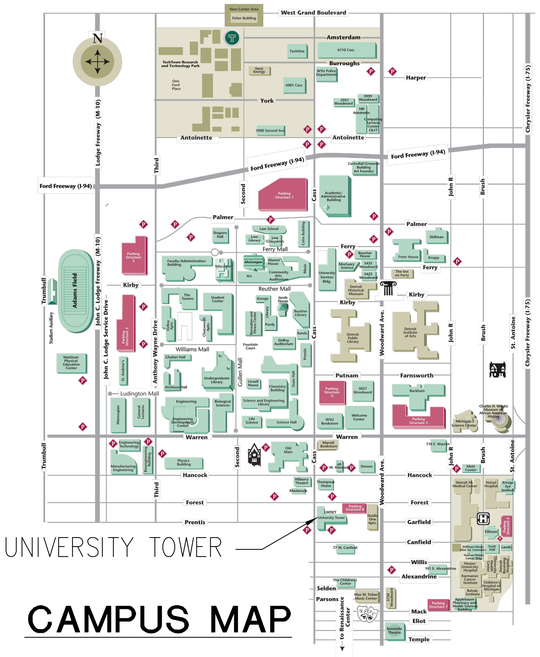


CAMPUS MAP

ELECTRICAL SYMBOL LIST

(NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT)

SYMBOL	DESCRIPTION
FX	FIXTURE TYPE
	LIGHTING FIXTURE
	DIRECT/INDIRECT LIGHTING FIXTURE
	EMERGENCY FIXTURE
FX-NL	NIGHT LIGHTING FIXTURE
	LIGHTING FIXTURE
	EMERGENCY FIXTURE
	WALL MOUNTED LIGHTING FIXTURE
	LIGHTING FIXTURE
	EMERGENCY FIXTURE
	DIRECTIONAL LIGHTING FIXTURE
	PENDANT LIGHTING FIXTURE
	WALL SCONCE
	LIGHTING TRACK
	TRACK LIGHTING FIXTURE
	POLE MOUNTED LIGHTING FIXTURE
	POLE MOUNTED LIGHTING FIXTURE – POST TOP
	BOLLARD LIGHTING FIXTURE
	EMERGENCY LIGHTING UNIT
	EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS (SHADED AREA INDICATES FACE)
	EXIT LIGHTING FIXTURE WITH DIRECTIONAL ARROWS (SHADED AREA INDICATES FACE)
	EXIT LIGHTING FIXTURE – WALL MOUNTED
ELTD	EMERGENCY LOAD TRANSFER DEVICE
S	SINGLE POLE TOGGLE SWITCH
S2	TWO POLE TOGGLE SWITCH
S3	3 WAY TOGGLE SWITCH
S4	4 WAY TOGGLE SWITCH
K	KEY OPERATED SWITCH
K3	3 WAY KEY OPERATED SWITCH
K4	4 WAY KEY OPERATED SWITCH
D	DIMMER SWITCH
D3	3 WAY DIMMER SWITCH
DO	DIMMER OCCUPANCY SENSOR SWITCH
DL	LOW VOLTAGE DIMMER SWITCH
SP	PILOT SWITCH

SYMBOL	DESCRIPTION
TWC	TWO-WAY COMMUNICATION SYSTEM CALL STATION
TWCD	TWO-WAY COMMUNICATION SYSTEM AUTO DIALER
TWCA	TWO-WAY COMMUNICATION SYSTEM ANNUNCIATOR & COMMUNICATION PANEL
TWCP	TWO-WAY COMMUNICATION SYSTEM POWER SUPPLY WITH BATTERY BACK-UP
TWCDP	TWO-WAY COMMUNICATION SYSTEM AUTO DIALER POWER SUPPLY WITH BATTERY BACK-UP
RGP	REMOTE GENERATOR ANNUCIATOR PANEL
ATS	AUTOMATIC TRANSFER SWITCH
UPS	UN-INTERRUPTABLE POWER SUPPLY
CSX	LOW VOLTAGE CONTROL STATION "X" INDICATES TYPE
	SINGLE RECEPTACLE
	DUPLEX RECEPTACLE
	QUAD RECEPTACLE
	ABOVE COUNTER DUPLEX RECEPTACLE (SIMILAR FOR TAMPER RESISTANT, QUADS, EMERGENCY AND GFI RECEPTACLES)
	DUPLEX RECEPTACLE-GROUND FAULT CIRCUIT INTERRUPTER
	DUPLEX EMERGENCY RECEPTACLE
	TAMPER RESISTANT RECEPTACLE
	QUAD TAMPER RESISTANT RECEPTACLE
	ABOVE COUNTER DUPLEX TAMPER RESISTANT RECEPTACLE
	DUPLEX UPS RECEPTACLE
	USB RECEPTACLE
	4 PORT USB CHARGING STATION
	CEILING MOUNTED DUPLEX RECEPTACLE
	POWER POLE
	SPECIAL RECEPTACLE – REFER TO ELECTRICAL STANDARD SCHEDULES
	MULTI-OUTLET RACEWAY
	MULTI-SERVICE DROP SEE ELECTRICAL DETAILS AND DIAGRAMS SHEET "X" INDICATES TYPE
PTX	POKE THRU SERVICE FITTING "X" INDICATES TYPE
FBX	FLOOR BOX SERVICE FITTING "X" INDICATES TYPE
AFX	ACCESS FLOOR SERVICE FITTING "X" INDICATES TYPE
RX	CORD REEL "X" INDICATES TYPE
	DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
	3-WAY DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
	4-WAY DUAL SWITCHING FOR INNER/OUTER LAMPS OF FLUORESCENT LIGHT FIXTURES
ST	DIGITAL TIME SWITCH
SI	ILLUMINATED TOGGLE SWITCH FOR CONTROL OF LIGHTING ON CRITICAL POWER-ILLUMINATED WHEN SWITCH IS IN "OFF" POSITION
SL	LOW VOLTAGE SWITCH
SO	OCCUPANCY SENSOR – REFER TO ELECTRICAL STANDARD SCHEDULES
SO2	OCCUPANCY SENSOR
OS X	OCCUPANCY SENSOR "X" INDICATES TYPE

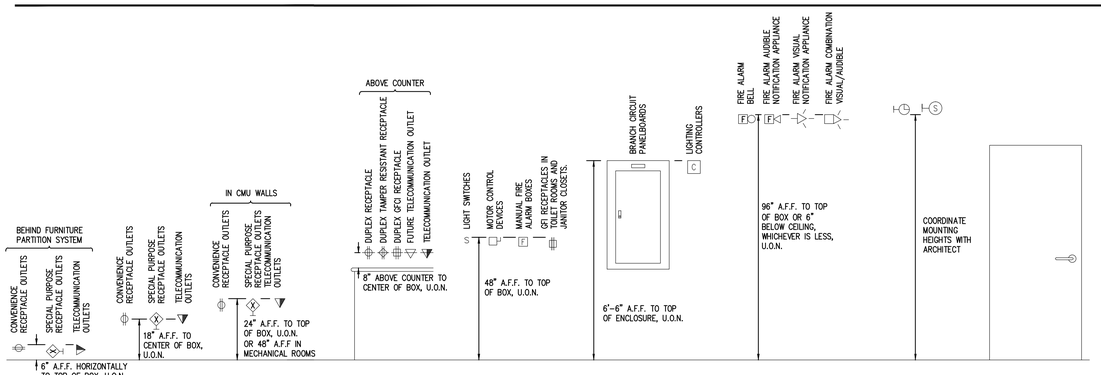
SYMBOL	DESCRIPTION
CP	CONTROL PANEL
	MOTOR
VFC	VARIABLE FREQUENCY CONTROLLER.
	MANUAL CONTROLLER
	MAGNETIC CONTROLLER
	COMBINATION MAGNETIC CONTROLLER
	NON-FUSIBLE DISCONNECT SWITCH
	FUSIBLE DISCONNECT SWITCH
CB	ENCLOSED CIRCUIT BREAKER
	PUSH BUTTON STATION
	JUNCTION BOX
	HARD WIRE POWER CONNECTION
DP	AUTOMATIC DOOR CONTROLLER
PP	AUTOMATIC DOOR PUSH PAD OPERATOR
	GROUND ROD
	GROUND CONNECTION
X	CONDUIT SLEEVE WITH BUSHINGS LENGTH AS REQUIRED "X" INDICATES CONDUIT SIZE
	CONDUIT UP
	CONDUIT DOWN
	EMPTY BOX FOR FUTURE TELECOMMUNICATION OUTLET
	ABOVE COUNTER EMPTY BOX FOR FUTURE TELECOMMUNICATION OUTLET
	EMPTY BOX FOR FUTURE CEILING MOUNTED TELECOMMUNICATION OUTLET
X	TELECOMMUNICATION OUTLET "X" INDICATES TYPE
X	ABOVE COUNTER TELECOMMUNICATION OUTLET "X" INDICATES TYPE
X	TELECOMMUNICATION CEILING MOUNTED OUTLET "X" INDICATES TYPE
	TELECOMMUNICATION BACKBOARD
TGB	TELECOMMUNICATION GROUNDING BUS BAR
TMGB	TELECOMMUNICATION MAIN GROUNDING BUS BAR
IC	INTERCOM OUTLET
S	SPEAKER
S	SPEAKER – WALL MOUNTED
MIC	MICROPHONE
VC	VOLUME CONTROL/STATION SELECTOR
B	SIGNALING BELL
	SINGLE FACE CLOCK – CEILING MOUNTED
	SINGLE FACE CLOCK – WALL MOUNTED
	DOUBLE FACE CLOCK – CEILING MOUNTED
S	DOUBLE FACE COMBINATION CLOCK/SPEAKER CEILING MOUNTED
	DOUBLE FACE CLOCK – WALL MOUNTED
S	DOUBLE FACE COMBINATION CLOCK/SPEAKER WALL MOUNTED
TC	TIME CLOCK
C	CONTACTOR
P	PHOTOCELL
TT	TWIST TIMER

SYMBOL	DESCRIPTION
	SECURITY CAMERA
MD	MOTION DETECTOR
K	SECURITY KEY SWITCH
DC	DOOR CONTACT
KP	KEY PAD
CR	ACCESS CONTROL STATION
DB	DURESS PUSH BUTTON STATION
DE	DELAYED EGRESS
REX	REQUEST TO EXIT STATION
	CIRCUIT BREAKER
	DRAWOUT CIRCUIT BREAKER MANUALLY/ OPERATED
	DRAWOUT CIRCUIT BREAKER ELECTRICALLY/ OPERATED
	SWITCH
	AUTOMATIC OR MANUAL TRANSFER SWITCH
	FUSE
	TRANSFORMER
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER
	LIGHTNING ARRESTOR
X	PANELBOARD "X" INDICATES PANELBOARD NAME
	GROUND
	STRESS CONE TERMINATION
K	SECURITY KEY INTERLOCK
G	ENGINE GENERATOR
M	UTILITY METER
EMU	ELECTRONIC METERING UNIT
A	AMMETER
V	VOLTMETER
AS	AMMETER SWITCH
VS	VOLTMETER SWITCH
SPD	SURGE PROTECTIVE DEVICE
CR	CONTROL RELAY
TDR	TIME DELAY RELAY
	THERMAL OVERLOAD RELAY
	NORMALLY OPEN CONTACTS
	NORMALLY CLOSED CONTACTS
	N.O. PUSH BUTTON SINGLE CIRCUIT
	N.C. PUSH BUTTON SINGLE CIRCUIT
X–X	CABLE VAULT "X–X" INDICATES TYPE
	BRANCH CIRCUIT PANELBOARD
	MOTOR CONTROL CENTER
T	TRANSFORMER
	DISTRIBUTION PANEL
GB	GROUND BUS
PB	PLUG IN BUSWAY
FB	FEEDER BUSWAY

REFER TO ELECTRICAL STANDARD SCHEDULES

SYMBOL	DESCRIPTION
F	MANUAL FIRE ALARM BOX
SD	SMOKE DETECTOR
DD	DUCT SMOKE DETECTOR
RT	REMOTE TEST STATION (FOR DUCT DETECTOR)
TD	THERMAL DETECTOR
BD	PROJECTED BEAM DETECTOR
F	FIRE ALARM BELL
F	FIRE ALARM AUDIBLE NOTIFICATION APPLIANCE
XX	FIRE ALARM VISUAL NOTIFICATION APPLIANCE "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
XX	FIRE ALARM COMBINATION VISUAL/ AUDIBLE "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
XX	FIRE ALARM COMBINATION VISUAL/ AUDIBLE NOTIFICATION APPLIANCE– CEILING MOUNTED "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
XX	FIRE ALARM VISUAL NOTIFICATION APPLIANCE CEILING MOUNTED "XX" INDICATES CANDELA RATING IF NO RATING SHOWN, APPLIANCE IS 15cd
F	FIREFIGHTERS PHONE JACK
FACP	FIRE ALARM CONTROL PANEL
FAA	FIRE ALARM ANNUNCIATOR PANEL
NAC	NOTIFICATION APPLIANCE CIRCUIT EXTENDER PANEL
IM	ADDRESSABLE MONITORING MODULE
CM	ADDRESSABLE CONTROL MODULE
TS	TAMPER SWITCH
FS	FLOW SWITCH
DR	MAGNETIC DOOR RELEASE

STANDARD MOUNTING HEIGHTS



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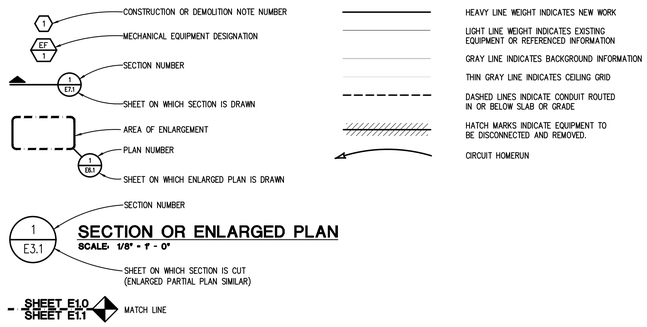
ELECTRICAL ABBREVIATION LIST

ABBREVIATION	DESCRIPTION
A	AMPERES
AF	AMPERES FRAME (BREAKER RATING)
A.F.F.	ABOVE FINISH FLOOR
AIC	AMPS INTERRUPTING CAPACITY
AL	AUDIENCE LEFT
AR	AUDIENCE RIGHT
AT	AMPERES TRIP (BREAKER SETTING)
ATS	AUTOMATIC TRANSFER SWITCH
AUX	AUXILIARY
BKR	BREAKER
BPS	BOLTED PRESSURE SWITCH
C	CONDUIT
CB	CIRCUIT BREAKER
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
CKT	CIRCUIT
CT	CURRENT TRANSFORMER
DEMO	DEMOLITION
DIM	DIMENSION
DISC	DISCONNECT
DP	DISTRIBUTION PANEL
DS	DOWNSTAGE
DWG	DRAWING
EBU	EMERGENCY BATTERY UNIT
EC	ELECTRICAL CONTRACTOR
ELEC	ELECTRICAL
EM/ EMERG	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
EO	ELECTRICALLY OPERATED
EPO	EMERGENCY POWER OFF
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
FA	FIRE ALARM
FLA	FULL LOAD AMPS
FLR	FLOOR
FOH	FRONT OF HOUSE
FSEC	FOOD SERVICE EQUIPMENT CONTRACTOR
FU	FUSE
G/GRD/EG	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
HOA	HAND–OFF–AUTO
HP	HORSEPOWER
HV	HIGH VOLTAGE
HZ	HERTZ
IG	ISOLATED GROUND
JB	JUNCTION BOX
KV	KILOVOLT
KVA	KILOVOLT – AMPERES
KW	KILOWATT
KWH	KILOWATT – HOURS
LA	LIGHTNING ARRESTOR
LP	LIGHTING PANEL
LDP	LIGHTING DISTRIBUTION PANEL
MAX	MAXIMUM
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MIN	MINIMUM
MISC.	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NF	NON–FUSIBLE
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OC	ON CENTER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
P	POLE
PB	PUSHBUTTON STATION
PH	PHASE
PT	POTENTIAL TRANSFORMER
PDP	POWER DISTRIBUTION PANEL
RECEPT.	RECEPTACLE
RDP	RECEPTACLE DISTRIBUTION PANEL
RP	RECEPTACLE PANEL
RSC	RIGID STEEL CONDUIT
SCHED	SCHEDULE
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TB	TERMINAL BOX
TELECOM	TELECOMMUNICATIONS
TR	TAMPER RESISTANT
TTB	TELEPHONE TERMINAL BACKBOARD
TYP	TYPICAL
U.O.N.	UNLESS OTHERWISE NOTED
US	UPSTAGE
V	VOLTS
W	WIRE
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
(E)	EXISTING
(R)	RELOCATED

STANDARD METHODS OF NOTATION



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PROJECT TITLE
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SHEET TITLE
ELECTRICAL STANDARDS AND DRAWING INDEX

DATE
12/7/15

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SHEET No.
E0.1

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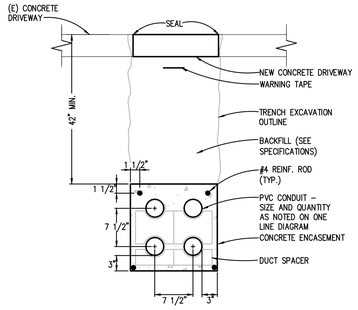

CONCRETE ENCASED DUCT BANK DETAIL

NO SCALE

NOTES:

1. QUANTITY AND CONFIGURATION OF DUCTS SHALL BE AS REQUIRED TO MATCH EXISTING CONDITIONS AND ONE LINE DIAGRAM. PROVIDE CONDUIT TYPES AS SPECIFIED.
2. PROVIDE 3-COMPARTMENT INNERDUCTS WHERE INDICATED ON PLANS.

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.

RACEWAY APPLICATION SCHEDULE

RACEWAY		AC/MC CABLE	ALUMINUM RIGID CONDUIT	ELECTRICAL METALLIC TUBING (EMT)	SURFACE RACEWAY	ELECTRICAL NONMETALLIC TUBING (ENT)	FLEXIBLE METAL CONDUIT (FMC)	GENERAL-USE OPTICAL FIBER/COMMUNICATION CABLE RACEWAY	INTERMEDIATE METAL CONDUIT (IMC)	LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)	LIQUIDTIGHT FLEXIBLE NONMETAL CONDUIT (LFNC)	PLENUM-TYPE OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY	RIGID STEEL CONDUIT	RISER-TYPE OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY	RIGID NONMETALLIC CONDUIT (RNC) TYPE EPC-40	RIGID NONMETALLIC CONDUIT (RNC) TYPE EPC-80	HIGH DENSITY POLYETHYLENE (HDPE) SCHEDULE 40	HIGH DENSITY POLYETHYLENE (HDPE) SCHEDULE 80	KEYED NOTES
OUTDOOR	EXPOSED								X				X						
	CONCEALED (ABOVE GROUND)								X				X						
	UNDERGROUND												X		X	X	X	X	
	CONNECTED TO VIBRATING EQUIPMENT									X									EQUIPMENT INCLUDING: TRANSFORMERS, HYDRAULIC PNEUMATIC, ELECTRIC SOLENOID, MOTOR DRIVEN EQUIPMENT
INDOOR	EXPOSED NOT SUBJECT TO PHYSICAL DAMAGE – UNFINISHED SPACES			X															
	EXPOSED NOT SUBJECT TO PHYSICAL DAMAGE – FINISHED SPACES				X														
	EXPOSED SUBJECT TO SEVERE PHYSICAL DAMAGE								X				X						[RIGID STEEL CONDUIT UP TO 10'-0"AFF.] LOCATIONS INCLUDE: LOADING LOCKS, CORRIDORS USED FOR TRAFFIC OF MECHANIZED CARTS AND PALLET HANDLING UNITS, MECHANICAL ROOMS
	CONCEALED IN CEILINGS, INTERIOR WALL AND PARTITIONS	X		X															NOT TO EXCEED 6'-0" IN CEILING SPACE
	CONNECTED TO VIBRATING EQUIPMENT						X			X									EQUIPMENT INCLUDING: TRANSFORMERS, HYDRAULIC PNEUMATIC, ELECTRIC SOLENOID, MOTOR DRIVEN EQUIPMENT USE LFMC IN DAMP/WET LOCATIONS
	DAMP AND WET LOCATIONS								X				X						
	BELOW SLAB IN GRADE														X	X			PROVIDE RIGID STEEL ELBOWS WHERE CONDUIT PENETRATES SLAB. CONDUIT INSTALLED 6" BELOW BOTTOM OF SLAB
	EMBEDDED IN CONCRETE ABOVE GRADE												X		X	X			
	OPTICAL FIBER OR COMMUNICATIONS CABLE IN SPACES USED FOR ENVIRONMENTAL AIR			X								X							
	CONCEALED GENERAL PURPOSE DISTRIBUTION OF OPTICAL FIBER OR COMMUNICATION CABLE			X			X					X		X					

GENERAL NOTES:

1. "X" INDICATES ACCEPTABLE SELECTION.
2. REFER TO "CONDUCTORS AND CABLES" SPECIFICATION FOR APPLICATION LIMITATIONS OF AC/MC CABLE.

FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE - GENERAL PURPOSE

	OVERCURRENT DEVICE RATING (AMPERES)	WIRE SIZE (AWG OR KCMIL)		COPPER CONDUCTORS CONDUIT SIZE			
		PHASE & NEUTRAL	GROUND	SINGLE PHASE 2 WIRE+G (1PH, 1N, 1G)	SINGLE PHASE 3 WIRE+G (2PH, 1N, 1G)	THREE PHASE 3 WIRE+G (3PH, 1G)	THREE PHASE & NEUTRAL 4 WIRE+G (3PH, 1N, 1G)
	15–20	12	12	3/4"	3/4"	3/4"	3/4"
	25–30	10	10	3/4"	3/4"	3/4"	3/4"
	35–40	8	10	3/4"	3/4"	3/4"	3/4"
*	45–50	8 (6)	10	3/4"	3/4"	3/4"	3/4"
*	60	6 (4)	10	3/4" (1")	3/4" (1")	3/4" (1")	1" (1 1/4")
	70	4	8	1"	1 1/4"	1 1/4"	1 1/4"
*	80	4 (3)	8	1"	1 1/4"	1 1/4"	1 1/4"
*	90–100	3 (2)	8	1 1/4"	1 1/4"	1 1/4"	1 1/4"
*	110	2 (1)	6	–	1 1/4"	1 1/4"	1 1/4" (1 1/2")
*	125	1 (1/0)	6	–	1 1/4" (1 1/2")	1 1/4" (1 1/2")	1 1/2"
	150	1/0	6	–	1 1/2"	1 1/2"	1 1/2"
	175	2/0	6	–	2"	2"	2"
	200	3/0	6	–	2"	2"	2 1/2"
	225	4/0	4	–	2"	2"	2 1/2"
	250	250	4	–	2 1/2"	2 1/2"	2 1/2"
	300	350	4	–	2 1/2"	2 1/2"	3"
	350	500	3	–	3"	3"	3"
	400	500	3	–	3"	3"	3"
	450	2–4/0	2–2	–	2–2"	2–2"	2–2 1/2"
	500	2–250	2–2	–	2–2 1/2"	2–2 1/2"	2–2 1/2"
	600	2–350	2–1	–	2–2 1/2"	2–2 1/2"	2–3"
	700	2–500	2–1/0	–	2–3"	2–3"	2–3"
	800	2–500	2–1/0	–	2–3"	2–3"	2–3 1/2"
	1000	3–400	3–2/0	–	3–3"	3–3"	3–3"
	1200	3–600	3–3/0	–	3–3 1/2"	3–3 1/2"	3–3 1/2"
	1600	4–600	4–4/0	–	4–3 1/2"	4–3 1/2"	4–3 1/2"
	2000	5–600	5–250	–	5–3 1/2"	5–3 1/2"	5–3 1/2"

* = SEE NOTE 4

NOTES:

1. CONTRACTOR TO SIZE FEEDERS AND BRANCH CIRCUITS BASED ON THIS SCHEDULE AND OVER CURRENT DEVICE SIZE, UNLESS NOTED OTHERWISE.
2. CONTRACTOR MAY COMBINE 20A CIRCUITS AS NOTED IN SPECIFICATION.
3. CONDUCTORS ARE BASED ON THHN/THWN UP TO AND INCLUDING #4/0. LARGER THAN #4/0 ARE BASED ON TYPE XHHW.
4. CONDUCTORS ARE BASED ON 90°C, 600V. INSULATED COPPER WIRE APPLIED AT 75°C FOR TERMINATION RATED 60/75°C OR 75°C. FOR TERMINATION RATED AT 60°C, USE CONDUCTORS AND CONDUIT SIZES INDICATED IN PARENTHESES.
5. CONDUIT SIZES ARE VALID FOR EMT OR RGS. CONDUIT SIZES SHALL BE ADJUSTED AS REQUIRED FOR OTHER TYPES OF CONDUIT.
6. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR AND PROVIDE REQUIRED WIRE SIZES TO ACCOMMODATE MECHANICAL EQUIPMENT LUG SIZES.
7. SIZE OF DISCONNECT SWITCH LOCATED AT EQUIPMENT SHALL BE SIZED BASED UPON OVERCURRENT PROTECTION OF THAT DEVICE.
8. OBTAIN APPROVAL FROM ENGINEER PRIOR TO INSTALLING DIFFERENT SIZE/QUANTITY OF CONDUCTORS TO OBTAIN AN EQUIVALENT AMPACITY.
9. SPLICE FROM ALUMINUM TO COPPER PRIOR TO ENTERING EQUIPMENT LISTED FOR USE WITH COPPER CONDUCTORS ONLY OR USE COPPER CONDUCTORS FOR THE ENTIRE LENGTH OF FEEDER.

BRANCH CIRCUIT VOLTAGE DROP WIRING SCHEDULE FOR SINGLE PHASE CIRCUITS

BRANCH CKT RATING (A)	WIRE SIZE (AWG)	MAXIMUM BRANCH CIRCUIT LENGTH (IN FEET)				
		120V	208V	240V	277V	480V
20A	12	83	143	165	191	331
	10	128	222	256	295	511
	8	201	348	402	464	804
	6	313	542	625	721	1250
30A	10	85	148	170	197	341
	8	134	232	268	309	536
	6	208	361	417	481	833
	4	313	542	625	721	1250

NOTES:

1. THE ABOVE TABLE VALUES ARE BASED ON COPPER CONDUCTORS, IN STEEL CONDUIT, WITH A LOAD POWER FACTOR OF 0.85 PER NEC CHAPTER 9, TABLE 9.
2. PROVIDE BRANCH CIRCUIT CONDUCTORS AS INDICATED IN THE TABLE ABOVE FOR ALL LIGHTING AND RECEPTACLE BRANCH CIRCUITS. WHERE BRANCH CIRCUITS SERVE DEDICATED EQUIPMENT, THE CONTRACTOR MAY PERFORM VOLTAGE DROP CALCULATIONS BASED ON ACTUAL EQUIPMENT CONNECTED LOAD AND PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO A MAXIMUM OF 3%.
3. CONDUCTOR SIZES ARE BASED ON MAXIMUM OF 9 CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT.
4. LIMITS FOR CONDUCTOR LENGTHS SHOWN ARE BASED ON A MAXIMUM BRANCH CIRCUIT LOADING OF 64% OF THE BRANCH BREAKER RATING AND A MAXIMUM OF 3 PERCENT VOLTAGE DROP TO COMPLY WITH ASHRAE/IES 90.1 – 1999 AND THE NEC. FOR CIRCUITS LOADED GREATER THAN 64% OF BRANCH BREAKER RATING, THE CONTRACTOR SHALL PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO 3%.

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PBA Project No.: 2015.0122

Peter Basso Associates Inc
CONSULTING ENGINEERS

WAYNE STATE UNIVERSITY

PROJECT TITLE
UNIVERSITY TOWER
UTILITY GENERATOR RELOCATION

WSU PROJECT NO. 507-258173

SHEET TITLE
ELECTRICAL STANDARD SCHEDULES AND DETAILS

DATE
12/7/15

ISSUE
BIDS

SHEET No.
E0.2

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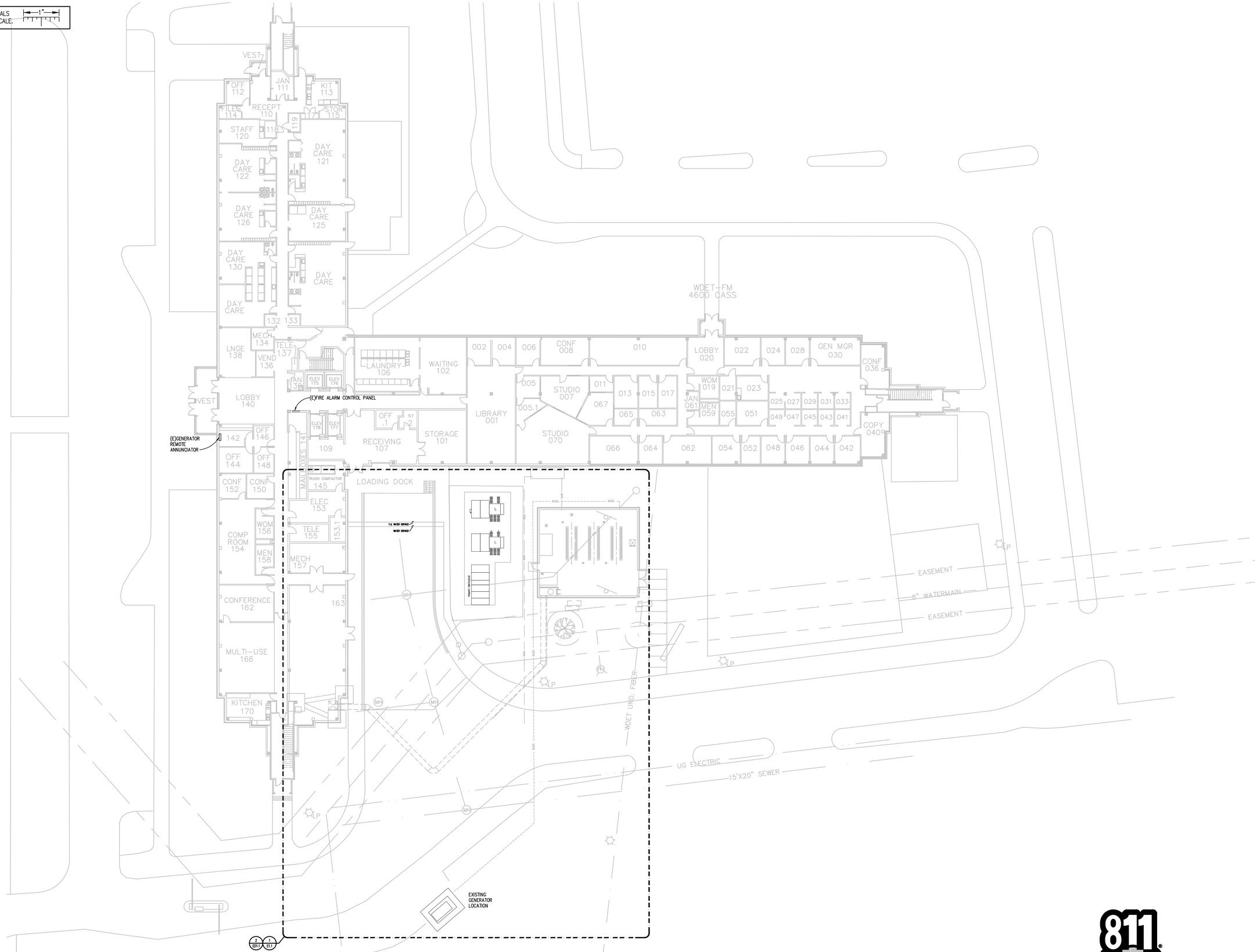
THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.



ELECTRICAL COMPOSITE SITE PLAN

SCALE: 1/16" = 1' - 0"

811 Know what's **below.** **Call** before you dig.

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WSU PROJECT NO. 507-258173

SHEET TITLE
ELECTRICAL COMPOSITE SITE PLAN

DATE
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ISSUE
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E0.3

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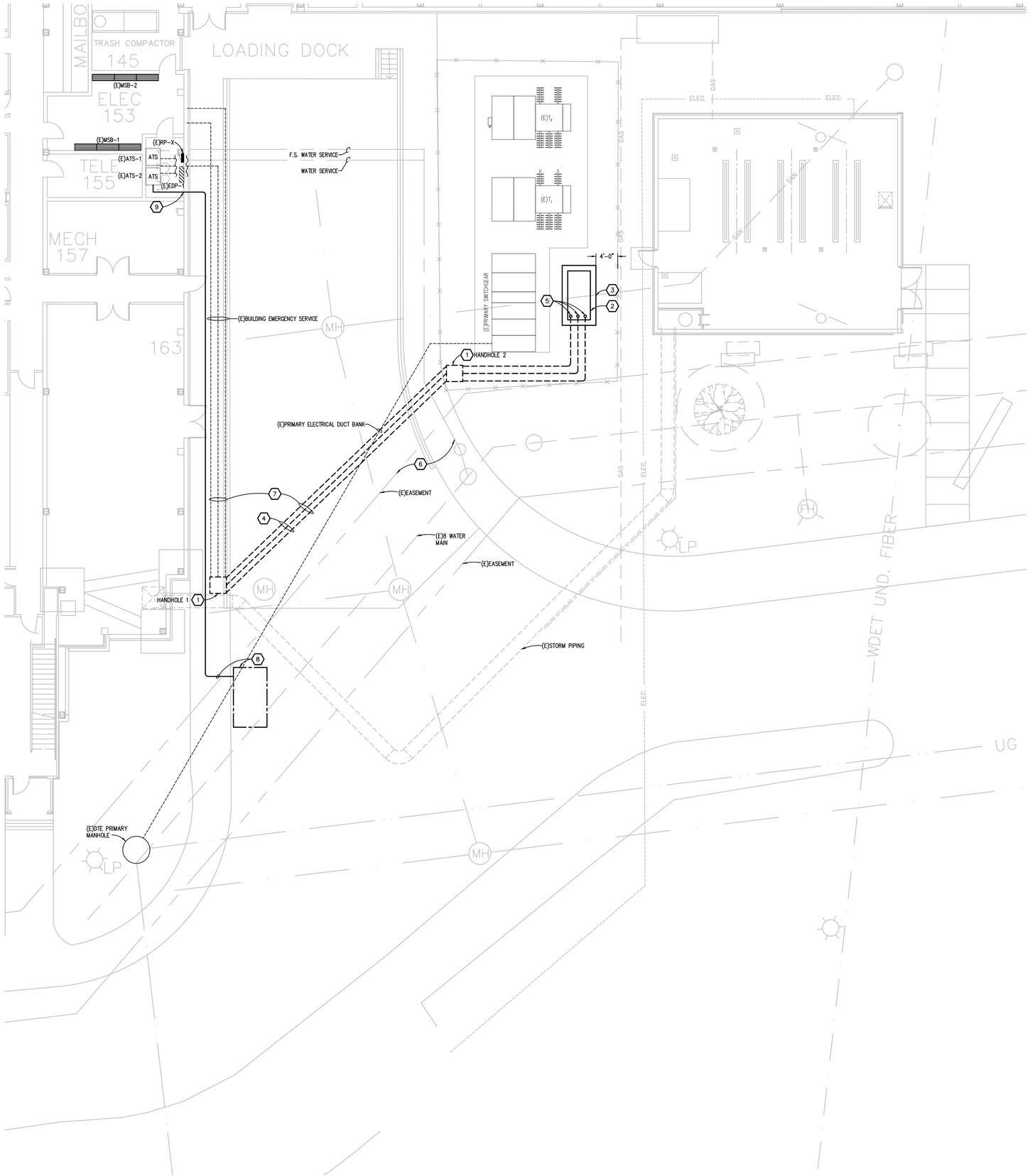

PARTIAL SITE PLAN - NEW WORK
SCALE: 1/16" = 1' - 0"

GENERAL NOTES:

1. THESE NOTES ARE GENERIC GUIDELINES ONLY. ELECTRICAL CONTRACTOR'S PERSONNEL ON SITE SHALL BE THOROUGHLY FAMILIAR WITH THE PUBLISHED SPECIFICATIONS FOR EXACT DESCRIPTIONS OF SCOPE, METHODS, AND MATERIAL.
2. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS, BUT ARE NOT TO BE CONSIDERED FABRICATION DRAWINGS. COORDINATE WITH OTHER TRADES, AND PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS, AND OFFSETS.
3. CONDUCT A SURVEY TO IDENTIFY ALL UNDERGROUND UTILITIES. CALL 811 PRIOR TO EXCAVATION.
4. UTILITIES SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY. COORDINATE EXACT LOCATION OF ALL EXISTING UTILITIES, AND ROUTING OF ALL NEW UNDERGROUND UTILITIES PRIOR TO EXCAVATION.
5. DEWATER TRENCHES PRIOR TO INSTALLATION OF CONDUITS. PROVIDE WATER TIGHT FITTINGS ON ALL UNDERGROUND CONDUITS.
6. COORDINATE DEMOLITION WORK, AND ELECTRICAL AND TELEPHONE SERVICES TO THE SITE, WITH THE RESPECTIVE LOCAL UTILITY COMPANY REPRESENTATIVES PRIOR TO COMMENCEMENT OF WORK. INCLUDE ALL ASSOCIATED COST/FEES BY THE UTILITY COMPANIES IN THE BID PRICE.
7. INSTALL UNDERGROUND CONDUITS 42" BELOW FINISHED GRADE, MINIMUM, UNLESS NOTED OTHERWISE.
8. COORDINATE SERVICE SHUT-DOWNS WITH ALL TRADES INVOLVED ON SITE AND OBTAIN WRITTEN AUTHORIZATION FROM OWNER 72 HOURS PRIOR TO ANY ELECTRICAL AND/OR TELEPHONE SHUT-DOWN.
9. REMOVE ALL DE-ENERGIZED CONDUCTORS FROM SITE AT COMPLETION OF THE PROJECT.
10. OUTDOOR LIGHTING BRANCH CIRCUIT WIRING SHALL BE MINIMUM #8 AWG CONDUCTORS (XHHW), IN MINIMUM 1" DIA. CONDUIT, UNLESS NOTED OTHERWISE.
11. SPARE CONDUITS SHALL INCLUDE PULL STRING AND SHALL BE TERMINATED WITH A CAP.
12. EXCAVATE THE ENTIRE LENGTH OF TRENCH TO PROPERLY SET DUCT ELEVATIONS.

(#) CONSTRUCTION KEY NOTES:

1. 36"x36" POLYMER MANHOLE SIMILAR TO QUAZITE HUBBELL. REFER TO SPECIFICATIONS 260543.
2. RELOCATED DIESEL GENERATOR. CONTRACTOR SHALL CLEAN, REMOVE RUST, PRIME AND PAINT GENERATOR ENCLOSURE. COORDINATE ORIGINAL COLOR WITH GENERATOR MANUFACTURER KOHLER. PROVIDE A FOUR HOUR LOAD BANK TEST PER MANUFACTURER RECOMMENDATION. INCLUDE FUEL FOR LOAD BANK TEST, OWNER WILL PROVIDE CONTRACTOR WITH FULL TANK. CONTRACTOR TO HAND OVER GENERATOR WITH FULL TANK.
3. CONCRETE PAD FOR EMERGENCY GENERATOR. COORDINATE CONCRETE PAD REQUIREMENTS WITH EXISTING GENERATOR MANUFACTURER. EXISTING GENERATOR MANUFACTURER IS KOHLER.
4. BASE: INSTALL NEW POWER AND CONTROL CONDUITS BY OPEN CUT TRENCH. PROVIDE TEMPORARY STEEL PLATES AS REQUIRED TO KEEP DRIVEWAY OPERATIONAL DURING CONSTRUCTION. INCLUDE WORK RELATED TO CURB, SIDEWALK, AND RAIL TO ACCOMMODATE NEW CONDUITS. RESTORE CURB, SIDEWALK, RAIL AND DRIVEWAY TO ORIGINAL CONDITION.

   ALTERNATE: INSTALL NEW POWER AND CONTROL CONDUITS BY DIRECTIONAL BORE.
5. CONDUIT STUB UP INSIDE GENERATOR. COORDINATE LOCATION OF STUB UP WITH EXISTING GENERATOR REQUIREMENTS.
6. PROVIDE GROUND PENETRATION RADAR TO SURVEY EXISTING UNDERGROUND UTILITIES IN ENTIRE AREA AFFECTED BY PROJECT. HAND DIG NEAR EXISTING UTILITIES.
7. BASE: PROVIDE NEW WIRING FOR FEEDER, REMOTE ANNUNCIATOR, BLOCK HEATER, FIRE ALARM AND CONTROLS FROM GENERATOR TO HANDHOLE 1. SPLICE NEW WIRE TO EXISTING WIRING IN HANDHOLE 1.

   ALTERNATE: PROVIDE NEW WIRING FOR FEEDER, REMOTE ANNUNCIATOR, BLOCK HEATER, FIRE ALARM AND CONTROL FROM GENERATOR BACK TO SOURCE.
8. PROPOSED LOCATION FOR TEMPORARY MOBILE GENERATOR RENTAL UNIT AND ROUTING OF TEMPORARY WIRING TO ATS UNITS. KEEP TEMPORARY WIRING AWAY FROM EGRESS DOORS AT BUILDING.
9. REMOVE EXISTING GLASS AND PROVIDE TEMPORARY PLYWOOD FOR ACCESS TO ROUTE CABLES INTO ELECTRICAL ROOM. REPLACE EXISTING GLASS AFTER MOBILE GENERATOR HAS BEEN REMOVED.

Know what's below. Call before you dig.

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Peter Basso Associates Inc
CONSULTING ENGINEERS

WAYNE STATE UNIVERSITY

PROJECT TITLE
UNIVERSITY TOWER
UTILITY GENERATOR RELOCATION

WSU PROJECT NO. 507-258173

SHEET TITLE
PARTIAL SITE PLAN - NEW WORK

DATE
12/7/15

ISSUE
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E1.1

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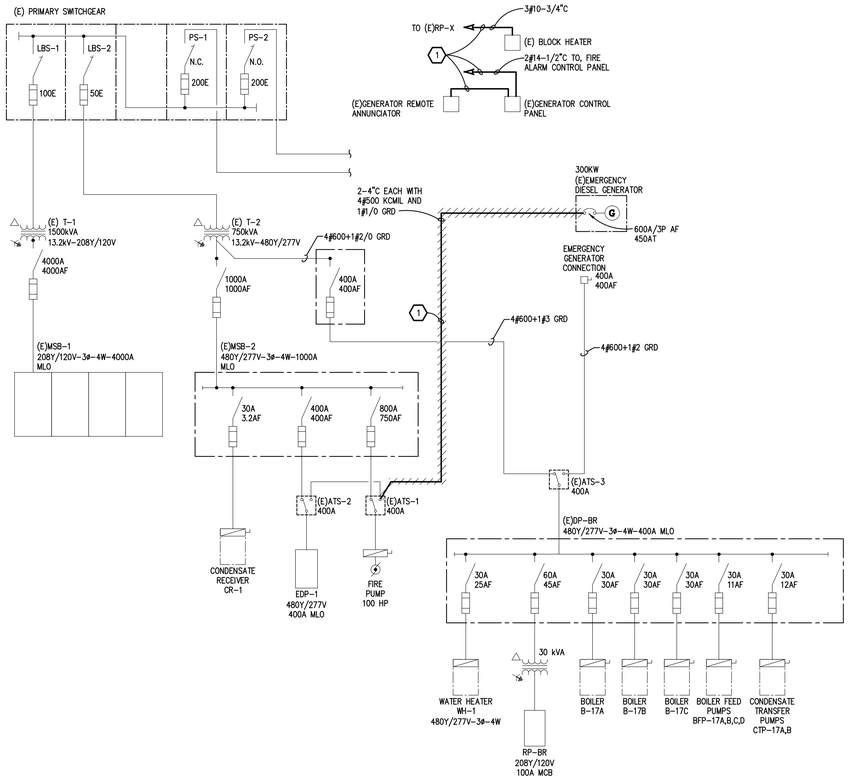
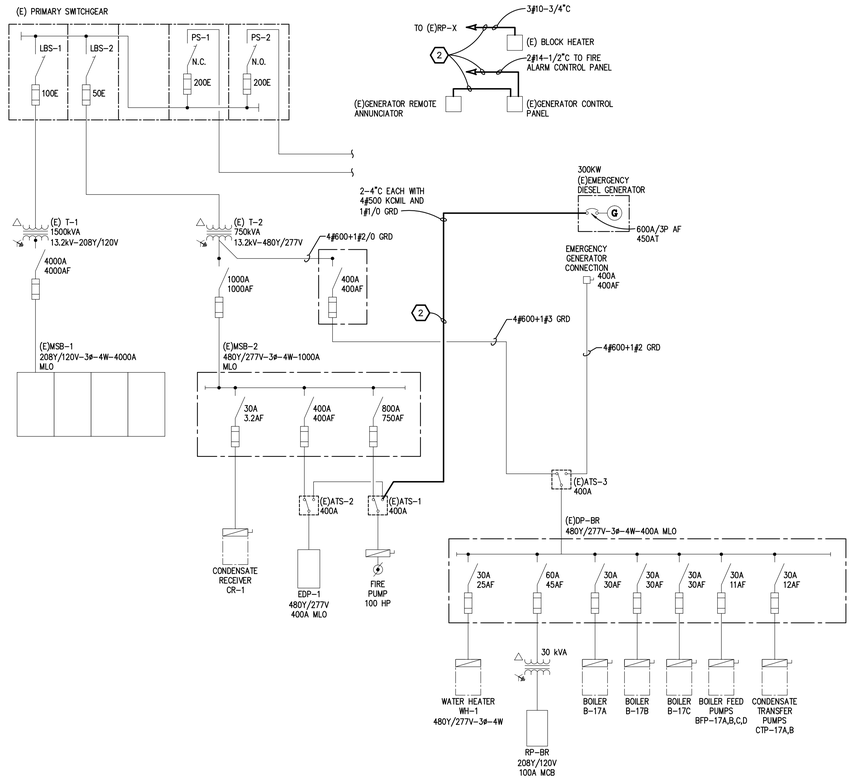


PARTIAL ONE LINE - DEMOLITION

SCALE: 1/8" = 1' - 0"



PARTIAL ONE LINE - NEW WORK

SCALE: 1/8" = 1' - 0"

GENERAL NOTES:

1. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS, BUT ARE NOT TO BE CONSIDERED FABRICATION DRAWINGS. COORDINATE WITH OTHER TRADES, AND PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS, AND OFFSETS.
2. FEEDER AND BRANCH CIRCUIT CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE "FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE-GENERAL PURPOSE" ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
3. TRANSFORMER SECONDARY CONDUCTORS SHALL BE SIZED IN ACCORDANCE WITH THE "TRANSFORMER CIRCUIT SIZING SCHEDULE-GENERAL PURPOSE" ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
4. MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH THE MOTOR CIRCUIT SIZING SCHEDULES ON THE "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS SPECIFICALLY NOTED OTHERWISE.
5. BASIS OF DESIGN IS ..... DISTRIBUTION EQUIPMENT AND ASCO TRANSFER SWITCHES. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT FROM OTHER APPROVED MANUFACTURERS, THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE THE LAYOUT AND CLEARANCE REQUIREMENTS IN ALL SPACES CONTAINING ELECTRICAL EQUIPMENT AND PROVIDE EQUIPMENT MEETING THE SPECIFICATIONS AND ACHIEVING CODE REQUIRED CLEARANCES WITHIN THE SPACE PROVIDED.
6. SELECTIVE COORDINATION (PER NEC ARTICLES 517.30, 700.28 AND 701.27) IS BASED ON ..... DISTRIBUTION EQUIPMENT AND ASCO TRANSFER SWITCHES. ELECTRICAL CONTRACTOR SHALL SUBMIT SELECTIVE COORDINATION STUDY WITH TIME CURRENT CHARACTERISTIC CURVES (AND TABLES FOR TESTED PAIR INSTANTANEOUS COORDINATION) FOR THE EMERGENCY SYSTEMS. ELECTRICAL CONTRACTORS SHALL RECEIVE APPROVED SHOP DRAWINGS BACK FROM ENGINEER OF RECORD PRIOR TO PURCHASING OR INSTALLING ANY ELECTRICAL DISTRIBUTION EQUIPMENT. BREAKERS MUST BE COORDINATED WITH AUTOMATIC TRANSFER SWITCHES 3-CYCLE WITHSTAND RATING. ALTERNATE MANUFACTURERS SHALL MEET SELECTIVE COORDINATION CRITERIA AT NO ADDITIONAL COST TO THE PROJECT.
7. BRANCH CIRCUIT CONDUCTORS, FEEDERS, AND BRANCH CIRCUIT OVERCURRENT PROTECTION ARE SIZED AT 125% OF THE TOTAL CONTINUOUS AND NON CONTINUOUS LOAD FOR LIGHTING AND MOTOR LOADS THAT RUN CONTINUOUSLY FOR THREE HOURS OR MORE (NEC 210.19 A, 210.20 A, AND 215.2 A). DEMAND AND CONNECTED LOADS ARE CALCULATED PER NEC 220.
8. VARIABLE FREQUENCY CONTROLLERS (VFC) PROVIDED BY MECHANICAL TRADES. ELECTRICAL CONTRACTOR SHALL INSTALL VFC, PROVIDE POWER FEEDER FROM DISTRIBUTION EQUIPMENT TO VFC AND PROVIDE POWER FEEDER FROM VFC TO MOTOR. REFER TO SPECIFICATIONS FOR APPLICATION OF VFC POWER CABLE FROM VFC TO MOTOR.

(7) CONSTRUCTION KEY NOTES:

1. REMOVE EXISTING WIRING FOR REMOTE ANNUNCIATOR FEEDER, BLOCK HEATER, FIRE ALARM AND CONTROL FROM GENERATOR BACK TO SOURCE. EXISTING CONDUIT TO REMAIN IN PLACE.
2. PROVIDE NEW WIRING FOR REMOTE ANNUNCIATOR FEEDER, BLOCK HEATER, FIRE ALARM AND CONTROL FROM GENERATOR BACK TO SOURCE. PROVIDE NEW CONDUIT FROM NEW PULL BOX TO NEW GENERATOR LOCATION.

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WAYNE STATE UNIVERSITY

PROJECT TITLE
UNIVERSITY TOWER
UTILITY GENERATOR RELOCATION

WSU PROJECT NO. 507-258173

SHEET TITLE
ONE LINE DIAGRAM

DATE
12/7/15

ISSUE
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E5.1

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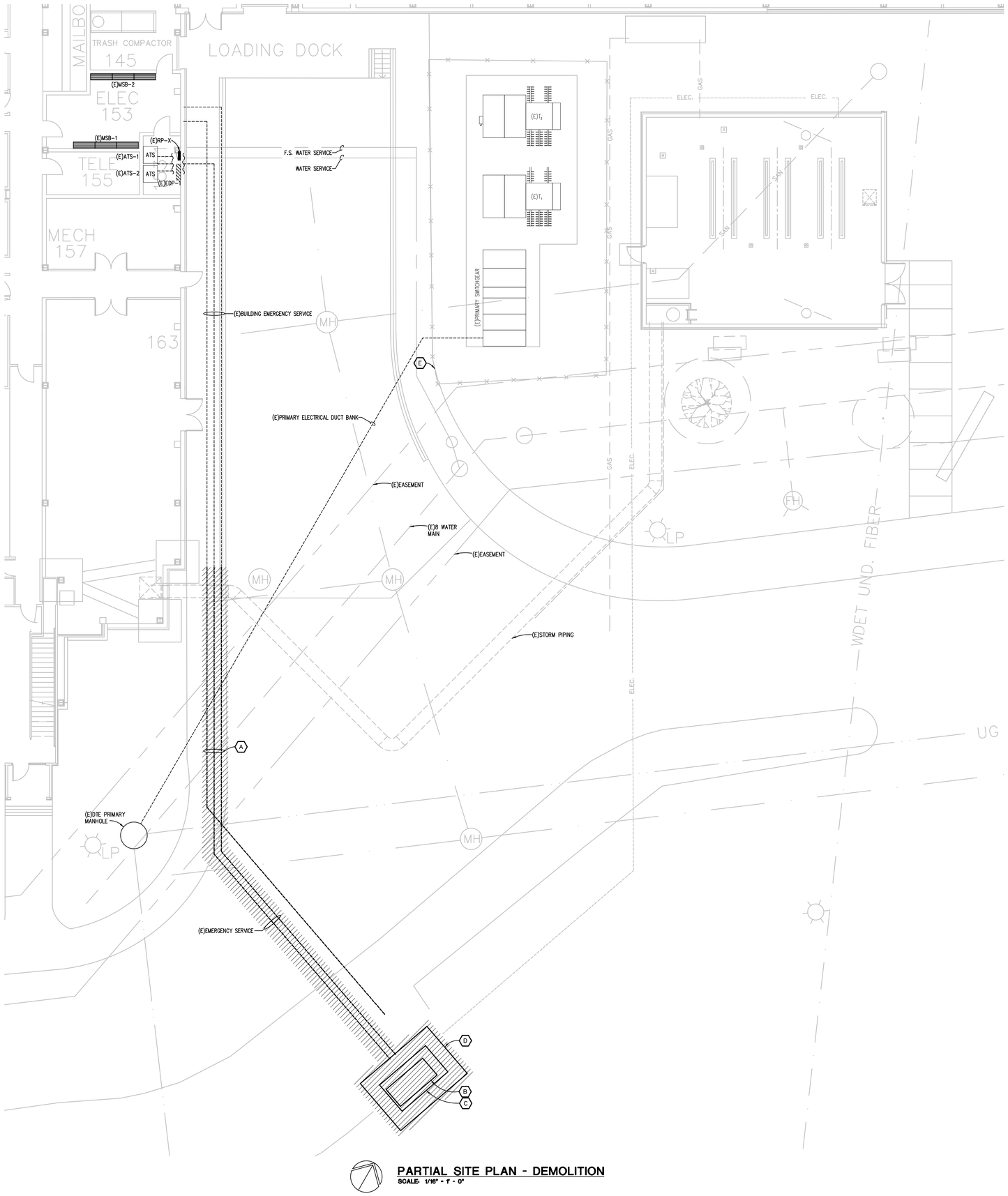

PARTIAL SITE PLAN - DEMOLITION
SCALE: 1/16" = 1' - 0"

GENERAL NOTES:

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4. UTILITIES SHOWN ON THESE DRAWINGS ARE FOR REFERENCE ONLY. COORDINATE EXACT LOCATION OF ALL EXISTING UTILITIES, AND ROUTING OF ALL NEW UNDERGROUND UTILITIES PRIOR TO EXCAVATION.
5. DEWATER TRENCHES PRIOR TO INSTALLATION OF CONDUITS. PROVIDE WATER TIGHT FITTINGS ON ALL UNDERGROUND CONDUITS.
6. COORDINATE DEMOLITION WORK, AND ELECTRICAL AND TELEPHONE SERVICES TO THE SITE, WITH THE RESPECTIVE LOCAL UTILITY COMPANY REPRESENTATIVES PRIOR TO COMMENCEMENT OF WORK. INCLUDE ALL ASSOCIATED COST/FEES BY THE UTILITY COMPANIES IN THE BID PRICE.
7. INSTALL UNDERGROUND CONDUITS 42" BELOW FINISHED GRADE, MINIMUM, UNLESS NOTED OTHERWISE.
8. COORDINATE SERVICE SHUT-DOWNS WITH ALL TRADES INVOLVED ON SITE AND OBTAIN WRITTEN AUTHORIZATION FROM OWNER 72 HOURS PRIOR TO ANY ELECTRICAL AND/OR TELEPHONE SHUT-DOWN.
9. REMOVE ALL DE-ENERGIZED CONDUCTORS FROM SITE AT COMPLETION OF THE PROJECT.
10. OUTDOOR LIGHTING BRANCH CIRCUIT WIRING SHALL BE MINIMUM #8 AWG CONDUCTORS (XHHW), IN MINIMUM 1" DIA. CONDUIT, UNLESS NOTED OTHERWISE.
11. SPARE CONDUITS SHALL INCLUDE PULL STRING AND SHALL BE TERMINATED WITH A CAP.
12. EXCAVATE THE ENTIRE LENGTH OF TRENCH TO PROPERLY SET DUCT ELEVATIONS.

(#) DEMOLITION NOTES:

A. BASE: REMOVE EXISTING WIRING FOR FEEDER, REMOTE ANNUNCIATOR, BLOCK HEATER, FIRE ALARM AND CONTROL FROM GENERATOR BACK TO NEW HANDHOLE. EXISTING CONDUIT TO REMAIN IN PLACE. CUT SECTION OF CONDUIT TO ACCOMMODATE NEW HANDHOLE.

ALTERNATE: REMOVE EXISTING WIRING FOR FEEDER, REMOVE ANNUNCIATOR, BLOCK HEATER, FIRE ALARM AND CONTROL FROM GENERATOR BACK TO SOURCE. EXISTING CONDUIT TO REMAIN IN PLACE. CUT SECTION OF CONDUIT TO ACCOMMODATE NEW HANDHOLE.

B. RELOCATE EXISTING DIESEL GENERATOR, REMOVE DIESEL FUEL PRIOR TO RELOCATING GENERATOR. STORE FUEL AND FILL FUEL TANK AFTER GENERATOR HAS BEEN RELOCATED. PROVIDE MOBILE 300 KW DIESEL GENERATOR RENTAL UNIT, FUEL AND TEMPORARY WIRING CONNECTION TO ATS UNITS DURING RELOCATION OF EXISTING GENERATOR UNIT. PROVIDE CONTROLS WIRING CONNECTION FROM MOBILE GENERATOR TO ATS UNITS FOR AUTO START OF MOBILE GENERATOR.

C. REMOVE CONCRETE PAD FOR EXISTING GENERATOR.

D. REMOVE EXISTING FENCE ENCLOSURE AND RELOCATE FOUNDATIONS.

E. REMOVE AND REPLACE SECTIONS OF EXISTING WOOD FENCE AS REQUIRED TO ACCOMMODATE PROJECT SCOPE.

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SHEET TITLE
PARTIAL SITE PLAN - DEMOLITION

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