

# ELECTRICAL SPECIFICATIONS

## 1. SCOPE

THE SCOPE OF THE WORK COVERED HEREIN CONSISTS OF FURNISHING ALL LABOR, MATERIALS, NECESSARY EQUIPMENT, AND SERVICES TO COMPLETE THE ELECTRICAL WORK AND RELATED WORK IN FULL ACCORDANCE WITH PLANS AS INDICATED ON THE DRAWINGS, AS SPECIFIED HEREIN OR BOTH AND SUBJECT TO THE TERMS AND CONDITIONS OF THE CONTRACT.

ALL ITEMS NOTED HEREIN, SHOWN BY THE ELECTRICAL PLANS, OR REASONABLY TO BE INTERPRETED FROM THE PLANS NECESSARY TO COMPLETE THE ELECTRICAL SYSTEM SHALL BE PROVIDED AND INSTALLED UNDER THE WORK OF THIS SECTION, WHETHER SOME ARE SPECIFICALLY MENTIONED HEREIN OR NOT.

## 2. CODES, RULES, PERMITS, AND FEES

ELECTRICAL CONTRACTOR IS RESPONSIBLE TO INSURE THAT ALL WORK, BOTH OLD AND NEW, COMPLIES WITH THE LATEST NEC AND APPLICABLE LOCAL AND STATE CODES AND ORDINANCES.

## 3. DRAWINGS

DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. DRAWINGS ARE NOT TO BE SCALED. THE CIVIL SITE PLAN DRAWINGS AND DETAILS SHALL BE EXAMINED FOR EXACT LOCATION OF FIXTURES AND EQUIPMENT. ANY CONFLICT SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

## 4. SHOP DRAWINGS

THE SUBCONTRACTOR SHALL SUBMIT TO THE ENGINEER, SIX (6) COPIES FOR APPROVAL OF DETAILED SHOP DRAWINGS OF ALL EQUIPMENT AND ALL MATERIALS REQUIRED TO COMPLETE THE PROJECT.

MATERIALS OR PRODUCTS IDENTIFIED HEREIN AND/OR INDICATED ON DRAWINGS BY TRADE NAME, MANUFACTURER'S NAME OR CATALOG NUMBER SHALL BE PROVIDED AS SPECIFIED. SUBSTITUTE ITEMS SHALL BE CLEARLY IDENTIFIED AS SUCH, AND THE REASON FOR SUBSTITUTION SHALL BE PROVIDED.

## 5. COOPERATION WITH OTHER TRADES

THE ELECTRICAL CONTRACTOR SHALL FULLY COOPERATE WITH THE OTHER TRADES, AND SHALL FURNISH OTHER CONTRACTORS, WITH COPIES TO THE ENGINEER, ANY INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH THE LEAST POSSIBLE INTERFERENCE OR DELAY. COORDINATE ALL CONDUIT RUNS AND EQUIPMENT WITH OTHER TRADES. VERIFY NAMEPLATE ELECTRICAL DATA OF ACTUAL EQUIPMENT FURNISHED BY OTHERS BEFORE BEGINNING INSTALLATION.

## 6. CUTTING, PATCHING, AND FINISHING

THE ELECTRICAL CONTRACTOR SHALL DO ALL CUTTING, DRILLING, ETC. REQUIRED FOR WORK, INCLUDING PREPARING OF FINISHED SURFACES, ALL REQUIRED SHORING AND BRACING, AND ALL PROTECTION FOR SAFETY OF PERSONS AND PROPERTY.

## 7. EXCAVATING AND BACKFILLING

THE ELECTRICAL CONTRACTOR SHALL DO ALL TRENCH AND PIT EXCAVATING AND BACKFILLING REQUIRED FOR WORK UNDER THIS SECTION OF THE SPECIFICATIONS, INCLUDING REPAIRING OF FINISHED SURFACES, ALL REQUIRED SHORING, BRACING, PUMPING, AND ALL PROTECTION FOR SAFETY OF PERSONS AND PROPERTY.

## 8. MATERIALS AND WORKMANSHIP

ALL MATERIALS AND APPARATUS REQUIRED FOR THIS WORK SHALL BE NEW UNLESS INDICATED OTHERWISE ON THE PLANS. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL ELECTRICAL EQUIPMENT AS SHOWN, VERIFYING ALL MOUNTING HEIGHTS AND EXACT LOCATIONS OF ALL WALL-MOUNTED ELECTRICAL DEVICES WITH THE ENGINEER PRIOR TO ROUGH-IN. CONNECTIONS AND JUNCTION BOXES TO EQUIPMENT ARE DIAGRAMMATIC. VERIFY EXACT LOCATION OF CONNECTIONS TO SPECIFIC EQUIPMENT AND DEVICES.

## 9. PANELBOARDS AND BREAKERS

BREAKERS SHALL BE AS MANUFACTURED BY CUTLER-HAMMER (OR EQUAL) AND BE OF SIZE AND RATING AS SHOWN ON THE DRAWING. MULTI-POLE BREAKERS SHALL HAVE A SINGLE HANDLE TRIP AND HAVE AN AIC RATING TO MATCH OTHER BREAKERS IN THE PANEL. PROVIDE A REVISED CIRCUIT DIRECTORY, TYPED AND MOUNTED IN A CLEAR PLASTIC SLEEVE, INSIDE THE PANELBOARD.

## 10. GROUNDING

ALL CONDUITS SHALL HAVE A GROUND WIRE INSTALLED. A CONDUIT GROUND SHALL NOT BE USED. NEW EQUIPMENT SHALL NOT HAVE SEPARATE GROUND ROD, BUT SHALL BE BONDED TO EXISTING GROUNDING SYSTEM VIA GROUNDING CONDUCTORS.

## 11. MISCELLANEOUS EQUIPMENT

LIGHTING FIXTURES SHALL BE INSTALLED IN ACCORDANCE WITH NEC 2002. CONDUCTORS - ABOVE GROUND CONDUCTORS SHALL BE RATED 600V, XHHW OR EQUAL. CONDUCTORS #12 AWG AND LARGER SHALL BE STRANDED.

## 12. CONDUIT

CONDUIT SHALL BE EMT INSIDE & RGS OUTSIDE. LIQUID TIGHT FLEX SHALL BE USED FOR FINAL CONNECTION TO ALL FIXED EQUIPMENT.

## 13. EQUIPMENT FURNISHED BY OTHERS

ELECTRICAL CONTRACTOR SHALL PROVIDE ALL CONDUIT, WIRE AND DISCONNECT SWITCHES TO CONNECT ELECTRICAL EQUIPMENT SUPPLIED BY OTHERS, WHICH SHALL INCLUDE NEW AND RELOCATED EXISTING EQUIPMENT. ELECTRICAL CONTRACTOR SHALL MAKE ALL FINAL ELECTRICAL CONNECTIONS.

## 14. RECORD DRAWINGS

THE ELECTRICAL CONTRACTOR SHALL KEEP ACCURATE RECORDS OF ACTUAL CONSTRUCTION, INCLUDING DEVICE LOCATIONS AND CONDUIT RUNS IF DIFFERENT FROM THE PLANS. THE CONTRACTOR SHALL PROVIDE THE OWNER WITH A REPRODUCIBLE SET OF PLANS OF THE COMPLETE ELECTRICAL SYSTEM AS INSTALLED (AS-BUILT DRAWINGS). THE SCALE ON THESE AS-BUILT DRAWINGS SHALL BE NO SMALLER THAN THE SCALE USED ON THE ORIGINAL PLANS.

## 15. TESTING

FINAL TESTS SHALL BE MADE ONLY AFTER THE ENGINEER IS SATISFIED THAT ALL WORK HAS BEEN COMPLETED. TESTING SHALL INCLUDE ALL SYSTEMS AND SUBSYSTEMS, AND SHALL BE COORDINATED WITH OTHER TRADES. ELECTRICAL CONTRACTOR SHALL NOT BE RELIEVED OF HIS RESPONSIBILITIES UNTIL FINAL TESTING HAS BEEN COMPLETED AND INSTALLATION IS SATISFACTORY TO THE ENGINEER AND OWNER'S REPRESENTATIVE.

## 16. FINAL ACCEPTANCE

AFTER TESTING, THE FINAL INSPECTION SHALL BE MADE BY THE ENGINEER AND OTHER AUTHORIZED PERSONS ALONG WITH THE ELECTRICAL CONTRACTOR. FINAL ACCEPTANCE OF THE PROJECT SHALL NOT PREJUDICE THE OWNER'S RIGHT TO REQUIRE REPLACEMENT AND/OR REPAIR OF ANY DEFECTIVE WORK OR MATERIALS.

## 17. ELECTRICAL NOTES

FURNISH ALL LABOR, MATERIAL, EQUIPMENT, TOOLS, INSURANCE, SERVICES AND PERMITS NECESSARY TO CONSTRUCT AND INSTALL A COMPLETE OPERATING ELECTRICAL SYSTEM.

ALL WORK SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) AND ALL APPLICABLE CODES AS REQUIRED BY THE CITY OF PEARLAND.

CONTRACTOR SHALL OBTAIN ALL PERMITS AND SHALL PAY FOR ALL ASSOCIATED EXPENSES, PRINTING AND INSPECTIONS.

CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND SHALL

OTHER TRADES.

ALL MATERIAL SHALL BE NEW AND UL LISTED. MATERIAL SHALL BEAR THE APPROVAL LABEL OF UL, WHEN SUCH IS AVAILABLE.

UNLESS OTHERWISE SHOWN, ALL BRANCH CIRCUIT WIRES SHALL BE THHN/THWN COPPER. FEEDERS TO PANELBOARDS AND INCOMING SERVICE SHALL BE THW OR THWN COPPER.

ALL ELECTRICAL CONDUITS, RACEWAYS AND CABLES SHALL HAVE A GROUND CONDUCTOR. MINIMUM SIZE SHALL BE NO. 12 AWG.

EXACT LOCATION AND MOUNTING HEIGHT OF LIGHTING FIXTURES, WIRING DEVICES, AND OUTLET BOXES FOR ELECTRICAL EQUIPMENT SHALL BE COORDINATED WITH THE OWNER AND THE EQUIPMENT VENDOR.

TOGGLE SWITCHES SHALL BE MOUNTED AT 42 INCHES ABOVE FINISHED FLOOR. WALL MOUNTED RECEPTACLES SHALL BE MOUNTED AT 15 INCHES A.F.F. AND 6 INCHES ABOVE COUNTERS.

WIRING DEVICES THAT OCCUR TOGETHER SHALL BE GANGED UNDER A COMMON WALL PLATE.

COLOR OF WALL PLATES SHALL BE AS DIRECTED BY THE ARCHITECT.

OUTDOOR RECEPTACLES SHALL HAVE "IN-USE" WEATHERPROOF COVER PER NEC BY CARLON ELECTRICAL PRODUCTS, OR EQUAL.

ALL BALLASTS SHALL BE HIGH POWER FACTOR, CONSTANT WATTAGE. FLOURESCENT LAMP BALLASTS SHALL BE ELECTRONIC, 20 THD, CBM CERTIFIED WITH "A" SOUND RATING. BALLASTS SHALL BE HOWARD INDUSTRIES OR EQUAL.

EACH PANEL AND SAFETY SWITCH SHALL BE IDENTIFIED BY AN ENGRAVED, LAMINATED NAMEPLATE.

ALL NEW PANELBOARDS SHALL HAVE A FULL NEUTRAL AND GROUND BUS.

COORDINATE CONDUIT ROUTING AND METHOD OF SUPPORT WITH THE ARCHITECT.

VERIFY ACTUAL NAMEPLATE LOADS OF EQUIPMENT AND INSTALL THE PROPER NEC SIZE FUSE OR CIRCUIT BREAKER. NOTIFY THE ENGINEER IF CHANGES IN WIRE AND RATING SIZES ARE REQUIRED.

FEEDER INSTALLATION SHALL BE EMT INDOORS AND HDG RIGID STEEL CONDUIT FOR EXPOSED WORK OUTDOORS. BRANCH CIRCUIT INSTALLATION IN CEILING SHALL UTILIZE TYPE AC CABLE WITH GROUND WIRE. CONDUCTORS SHALL BE NO 12 AWG MINIMUM.

HOMERUNS OF 20 AMP BRANCH CIRCUITS EXCEEDING 100 FEET IN LENGTH SHALL BE NO. 10 AWG.

COMPLETE, TYPED PANEL DIRECTORIES SHALL BE PROVIDED UPON COMPLETION OF WORK, INCLUDING EXISTING PANELS.

UPON COMPLETION OF WORK, THE CONTRACTOR SHALL FURNISH THE OWNER A RED MARKED SET OF DRAWINGS INDICATING ALTERATION THAT WERE MADE, UNDERGROUND CONDUIT ROUTING, SCHEMATICS AND EQUIPMENT WIRING DIAGRAMS.

CONTRACTOR SHALL CONNECT ALL OWNER-PROVIDED EQUIPMENT AS LISTED IN PANEL SCHEDULES, EQUIPMENT SCHEDULE, AND AS SHOWN ON THE DRAWINGS.

FINAL CONNECTIONS TO CEILING MOUNTED LIGHTING FIXTURES SHALL BE MADE WITH FLEXIBLE METALLIC CONDUIT OR AC CABLE. PROVIDE SLACK SO THAT FIXTURE CAN BE MOVED TO THE NEXT CEILING TILE.

FLOOR CHASE LOCATIONS SHALL BE COORDINATED WITH THE ARCHITECT.

WIRING DEVICES SHALL BE SPECIFICATION GRADE.

FLOOR BOXES (IF REQ'D) SHALL BE CAST IRON WITH BRASS FINISH COVER PLATE, AS MANUFACTURED BY HUBBELL OR APPROVED EQUAL.

EXISTING EQUIPMENT AND DEVICES THAT ARE NOT PART OF THIS WORK SHALL BE MADE OPERATIONAL AS A PART OF THE CONTRACT.

CONDUCTOR SIZES, WHERE SHOWN ON THE ONE-LINE DIAGRAM, ARE THE MINIMUM REQUIRED BY THE NEC. CONTRACTOR MAY RESIZE THE PANELBOARD FEEDERS IF CONDITIONS WARRANT. THESE DRAWINGS IDENTIFIED ALL KNOWN ELECTRICAL LOADS AND ASSIGNED CIRCUITS TO EACH OF THE LOADS.

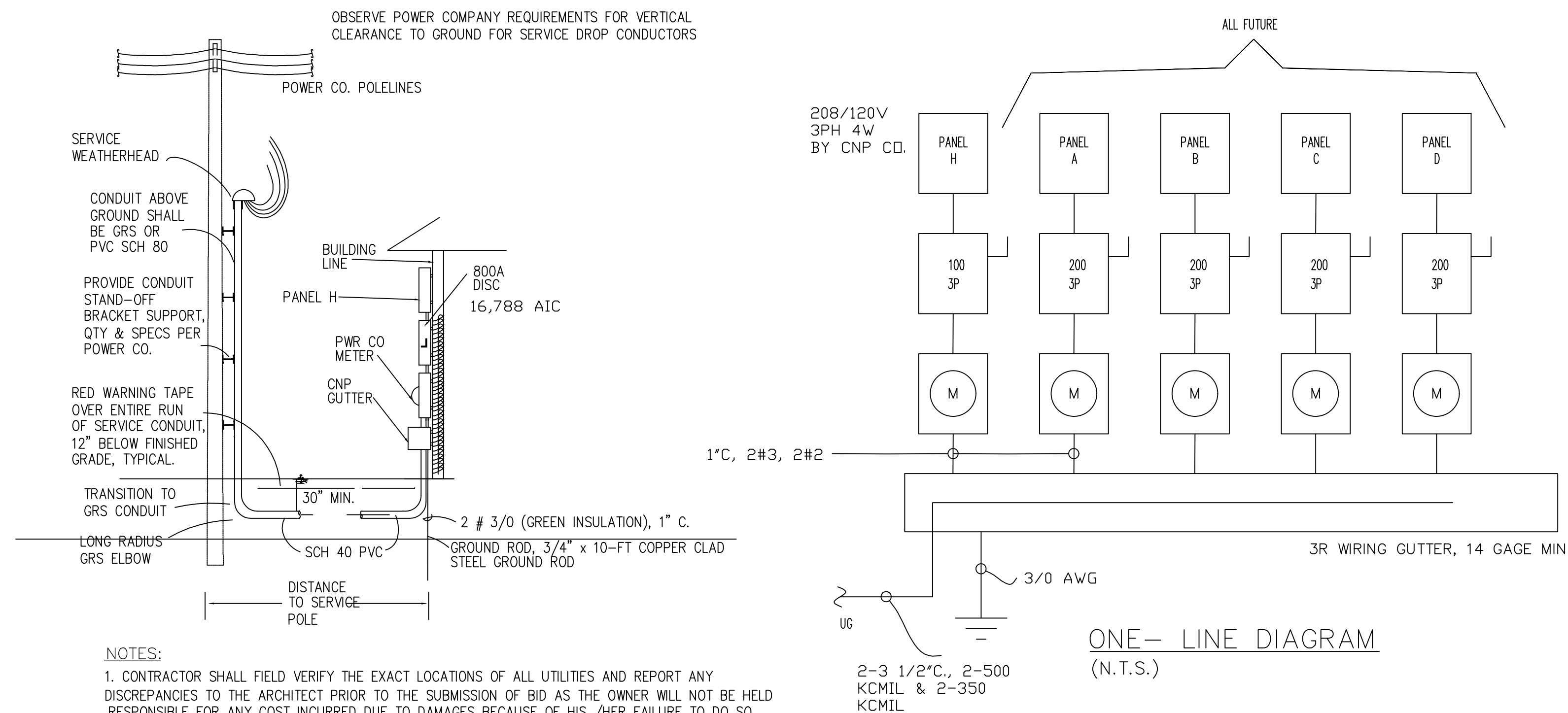
CONTRACTOR MAY CONNECT EQUIPMENT TO ANOTHER PANELBOARD OR CIRCUIT AS REQUIRED BY FIELD CONDITIONS.

WHEN CONDUIT CAN NOT BE CONCEALED IN THE WALL, UTILIZE SURFACE RACEWAY BY PANDUIT OR APPROVED EQUAL.

WATER HEATER PROVIDED BY MECHANICAL CONTR. CONNECT TO WATER HEATER CKT.

SCOPE OF WORK PROVIDED IS INTENDED TO COVER MOST ITEMS REQUIRED, BUT SCOPE IS NOT NECESSARILY ALL INCLUSIVE. CONTRACTOR IS RESPONSIBLE FOR ALL WORK ITEMS IDENTIFIED IN THESE PLANS.

CONTRACTOR AT CONCLUSION OF WORK SHALL FIELD VERIFY THAT ALL CIRCUITS ARE NON-OVERLOADING. CONTRACTOR SHALL RE-CIRCUIT AS REQUIRED AND COMBINE CIRCUITS AS NECESSARY TO OBTAIN BALANCED LOADS.



### NOTES:

- CONTRACTOR SHALL FIELD VERIFY THE EXACT LOCATIONS OF ALL UTILITIES AND REPORT ANY DISCREPANCIES TO THE ARCHITECT PRIOR TO THE SUBMISSION OF BID AS THE OWNER WILL NOT BE HELD RESPONSIBLE FOR ANY COST INCURRED DUE TO DAMAGES BECAUSE OF HIS /HER FAILURE TO DO SO.
- PROVIDE WATERPROOF SEAL AT ALL BUILDING PENETRATIONS BELOW GRADE.

# SPECIAL INSTRUCTIONS

1. CONTRACTOR SHALL USE OFF-THE-SHELF MOUNTING HARDWARE WIRE AVAILABLE, BUT SHALL FIELD-MODIFY PARTS AS REQUIRED IF HARDWARE IS NOT AVAILABLE.

2. CONTRACTOR SHALL FIELD-VERIFY AVAILABILITY OF CIRCUITS AND MODIFY DRAWINGS TO ACCOMMODATE CIRCUITS AS REQUIRED.

3. SHORT CIRCUIT CALCULATION AND LABELING REQUIREMENTS

A PERMANENTLY AFFIXED LABEL SHALL BE APPLIED WITH AVAILABLE FAULT CURRENT AT THE TIME OF INSTALLATION AND CALCULATION. THE LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION. THE LABEL SHALL BE 2" X 3" IN SIZE AND SAHLL BE BLUE LETTERING ON A CONTRASTING BACKGROUND. THIS LABEL SHALL ALSO INCLUDE THE DATE OF THE CALCULATION.

### KEYED NOTES:

- PROVIDE NEW 208/120V, 3 PH, 4 W UNDERGROUND SERVICE TO NEW LEASE SPACE.
- 800A/3P DISCONNECT, 3R, 3-FRN-800-R, HD. PROVIDE NEUTRAL AND GROUND KITS.
- PANEL 'L', SEE PANEL SCHEDULE.

### NOTES

- NEC 2014 IS APPLICABLE.
- PROVIDE PANEL WARNING LABELS FOR ARC FLASH HAZARD PER NEC 110.16.
- EC TO FIELD-VERIFY ACTUAL AIC INTERRUPTING RATING WITH CPE PRIOR TO DOING ANY WORK OR ORDERING ANY EQUIPMENT. PROVIDE EQUIPMENT AS REQUIRED FOR FULLY RATED SYSTEM.

### SHORT CIRCUIT CALCULATIONS

(A) XFMR Z (OHMS) 212.00  $\square$  0.003 OHMS

(B) CONDUCTORS Z (OHMS)  $\square$  0.027 X 127/1000 X 1  $\square$  0.03 OHMS

SERVICE IC  $\square$  A+B  $\square$  0.0034+0.131  $\square$  0.165 OHMS

PANEL A (IC)  $\square$  120/0.165  $\square$  16788 AIC SYMM

DISCONNECT FUSES FR5-400 SUITABLE FOR 100KAIC.

PANEL 'L'  $\square$  25 KATC

MAX ISC  $\square$  16788 AT DISCONNECT

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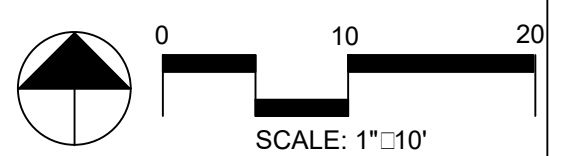
- Mechanical • Electrical •
- Plumbing Design •
- Firm Registration #F1288

RECORD OF ISSUE					
Revised	Date				
Checked					
Approved					
Engineer					
Geotechnical					
Structural					

PREPARED FOR:

NEW PROJECT  
SHELL BUILDING 1  
OVERLAND TRAILS DRIVE  
17211 IH 45  
HOUSTON, TX 77090

Project Name	Name	Date
Drawn By	SR	12/26/17
Checked By	JET	12/26/17
Approved By	JET	12/26/17



Date Created: 12/26/17

Project Number: -

Drawing Title: ONE-LINE DIAGRAM

Sheet Number: E3.0

# ONE LINE DIAGRAM

SCALE: NTS

