

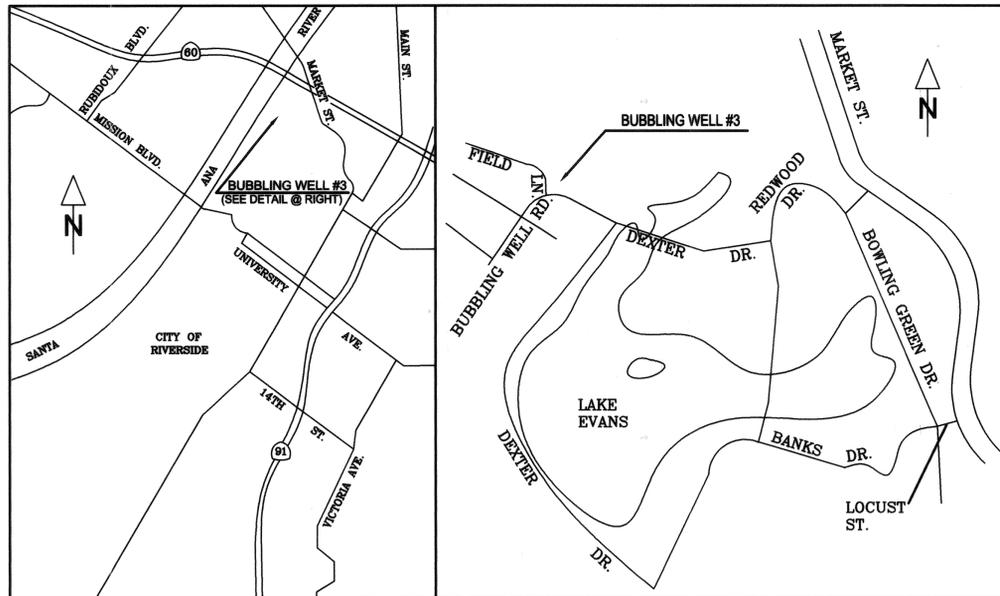

RIVERSIDE CALIFORNIA
PARK AND RECREATION DEPARTMENT

CONSTRUCTION DRAWINGS

CITY OF RIVERSIDE BUBBLING WELL #3
ABOVE GROUND PIPING CONSTRUCTION
BUBBLING WELL #3 N'LY OF BUBBLING WELL RD. & E'LY OF FIELD LN.

GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THESE PLANS AND THE PROJECT SPECIFICATIONS FOR "THE CONSTRUCTION OF BUBBLING WELL NO. 3" CITY OF RIVERSIDE, PARK AND RECREATION DEPARTMENT, APPLICABLE AWWA STANDARDS AND SPECIFICATIONS, AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2001 EDITION, AND AMENDMENTS.
2. CONSTRUCTION CONTRACTOR SHALL PROVIDE ALL MATERIALS AND MAKE ALL IMPROVEMENTS UNLESS OTHERWISE NOTED TO BE INSTALLED OR SUPPLIED BY CITY FORCES OR OTHERS.
3. ALL NECESSARY PERMITS SHALL BE OBTAINED BY THE CONTRACTOR (REFER TO SECTION 7-5 OF THE SPECIFICATIONS).
4. ALL STATIONING IS ALONG THE CENTER GRADE OF PIPE UNLESS OTHERWISE NOTED.
5. CALL SURVEY AT (909) 826-5707 48 HOURS IN ADVANCE TO STAKE LOCATION OF NEW MAIN AND ALL RELATED APPURTENANCES.
6. EXACT WELL SITE LOCATION WILL BE STAKED IN THE FIELD BY CONTRACTOR.
7. CONSTRUCTION CONTRACTOR SHALL PROTECT IN PLACE OR REPAIR ALL IRRIGATION SYSTEM PIPING AND APPURTENANCES DISTURBED DURING CONSTRUCTION AND SHALL AT THE END OF CONSTRUCTION DEMONSTRATE TO THE SATISFACTION OF THE CITY THAT ALL IRRIGATION FACILITIES AFFECTED BY CONSTRUCTION ARE OPERATING PROPERLY.
8. CONSTRUCTION CONTRACTOR SHALL MAINTAIN A TEMPORARY IRRIGATION SYSTEM DURING CONSTRUCTION IF THE GOLF COURSE IRRIGATION SYSTEM IS DAMAGE DURING CONSTRUCTION, IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN IRRIGATION TO THE GOLF COURSE AT ALL TIMES.
9. THE CONSTRUCTION CONTRACTOR SHALL LOCATE, PROTECT IN PLACE OR REPAIR ALL UTILITIES DISTURBED DURING CONSTRUCTION.
10. CLEAR AND GRUB A MINIMUM OF 10 FEET BEYOND WORK AREA PERIMETER PRIOR TO GRADING.
11. CONTRACTOR IS RESPONSIBLE FOR EROSION, DUST, AND TEMPORARY DRAINAGE CONTROL.
12. ALL GRADING SHALL COMPLY WITH THE UNIFORM BUILDING CODE APPENDIX 33.
13. CONTOURS SHOWN ON PLANS ARE APPROXIMATE, BASED ON FIELD SURVEY DATA AND CALCULATED ELEVATIONS USING LINEAR SLOPES.
14. CONTRACTOR SHALL ENSURE THAT COMPACTION HAS BEEN ATTAINED UNDER SUPPORT PADS, CONTRACTOR SHALL GIVE 48-HOUR PRIOR NOTIFICATION TO CITY TO SCHEDULE COMPACTION AND FINAL GRADE TESTING.
15. ALL ABOVE GROUND PIPE TO BE STD. WALL STEEL PIPE PER ASTM A-53-B.
16. ALL UNDERGROUND CONDUITS SHALL BE SCH 40 PVC.
17. REINFORCEMENT PER ASTM A 615-GR. 40
18. CONCRETE PER PROJECT SPECIFICATIONS. $f_c = 4000$ PSI @ 28 DAYS. CONCRETE TESTING AND INSPECTION SHALL CONFORM TO THE PROJECT SPECIFICATIONS. **NO "SPECIAL INSPECTION" REQUIRED.**



ABBREVIATIONS

C/C	CENTER TO CENTER	LT.	LEFT
C/L	CENTERLINE	MIN.	MINIMUM
CTR.	CENTER	RT.	RIGHT
ELL.	ELBOW	SHT.	SHEET
EXIST.	EXISTING	W/	WITH
F.G.	FINISH GRADE		

LOCATION MAP
N.T.S.

INDEX

DRAWING NO.	DESCRIPTION
1	TITLE SHEET
2	PLOT PLAN, 8" DISCHARGE LINE

CONSTRUCTION NOTES

ITEM	DESCRIPTION
1	PROP. PUMP UNIT TO BE INSTALLED PER PROJECT SPECIFICATIONS
2	8" BOLTED FLANGE ADAPTER
3	8" C.M.L. & PAINTED STL. PIPE & APPURTENANCES
4	PIPE SUPPORT & APPURTENANCES PER DETAIL <u>HEREON ON SHEET 2</u>
5	STEEL SHROUD AND SCREEN W/APPURTENANCES PER DETAIL <u>HEREON ON SHEET 2</u>
6	90° WELDED ELL
7	180° WELDED ELL
8	EXIST. CONCRETE STAND PIPE
9	CONTRACTOR TO REMOVE EXISTING WELL, 8" DISCHARGE LINE AND APPURTENANCES INCLUDING SUPPORTS
10	1-1/4" OUTLET AND 1-1/4x3/4" BRONZE BUSHING PER STANDARD DWG. A-297 WITH 3/4" CORP STOP, JAMES JONES J-1500 W/BRONZE PLUG.

NOTES

- (A) CONTRACTOR SHALL PROVIDE 8 INCH DISCHARGE PIPE HORIZONTAL RUN TO MEET FINAL LOCATION OF BUBBLING WELL.
- (B) CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
- (C) CONTRACTOR SHALL REMOVE AND REPLACE WITH "LIKE KIND" ALL FENCES AS DISTURBED BY THIS WORK.
- (D) CONTRACTOR SHALL PROTECT IN PLACE EXISTING DRIVING RANGE NET AND REPLACE W/"LIKE KIND" ALL NETTING DAMAGED AS A RESULT OF THIS WORK.

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE 1-800-227-2600
48 HOURS BEFORE YOU DIG

REGISTERED PROFESSIONAL ENGINEER
K.B. COZAD
No. 26159
Exp. 3/31/06
CIVIL
STATE OF CALIFORNIA

Kevin Cozad
CIVIL/STRUCTURAL ENGINEERS
- MUNICIPAL CONSULTANTS
- SURVEYING OPS
- PLANNERS
121 South Grand Street • Hemet, Co 82844 • (909) 652-4454
FAX (909) 786-8942 E-MAIL kcozad@kcozad.com
PREPARED UNDER THE SUPERVISION OF:
Kevin B. Cozad
KEVIN B. COZAD
REGISTERED CIVIL ENGINEER NO. 26159
REGISTRATION EXPIRES: 03/31/06

CITY OF RIVERSIDE
PARK AND RECREATION DEPARTMENT

MARK	REVISION	APPROVED	DATE

BUBBLING WELL #3 DISCHARGE LINE
TITLE SHEET

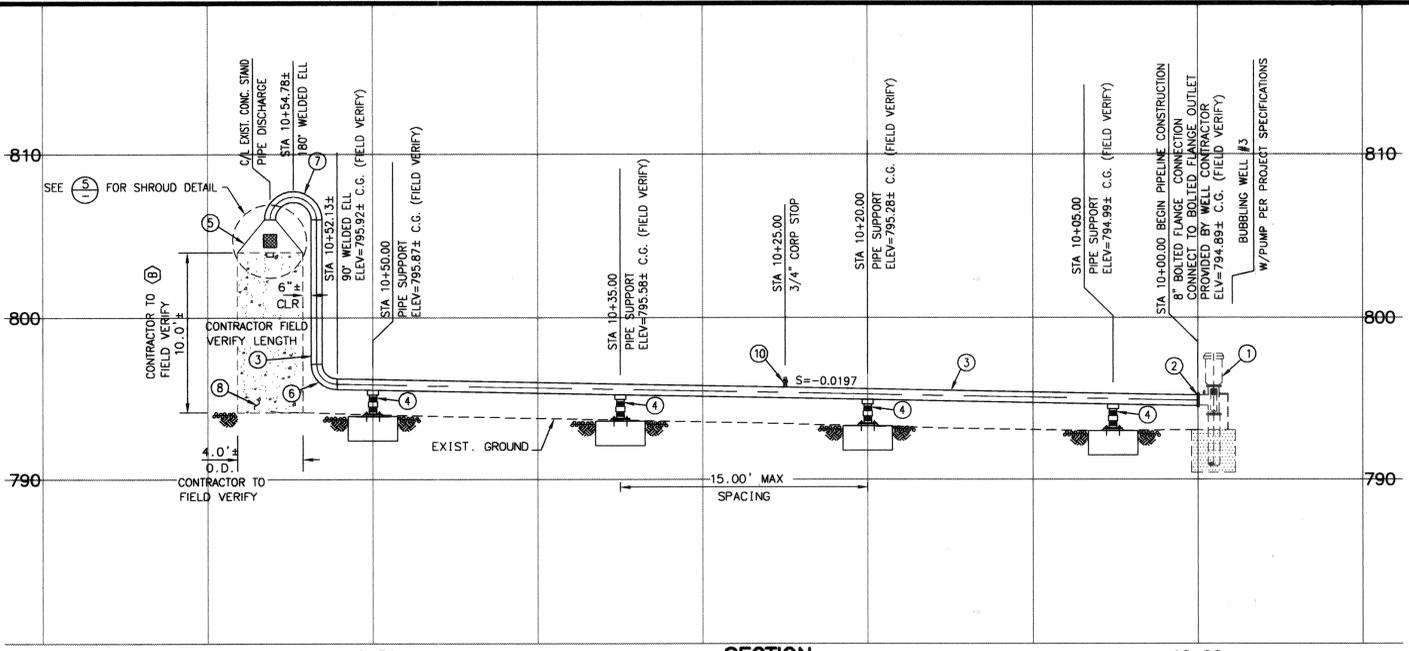
SCALE	AS SHOWN	DRAWN		CITY OF RIVERSIDE PARK AND RECREATION DEPARTMENT
DATE	AUGUST 2002	CHECKED	K.B.C.	
JOB NO.	X	APPROVED	K.B.C.	W
F.B. NO.	X			1
				1 of 2

CONSTRUCTION NOTES

ITEM	DESCRIPTION	QUANTITY
1	PROP. PUMP UNIT TO BE INSTALLED PER PROJECT SPECIFICATIONS	NOT APPLICABLE
2	CONSTRUCT 8" BOLTED FLANGE CONNECTION	1 EA
3	CONSTRUCT 8" C.M.L. & PAINTED STL. PIPE & APPURTENANCES ALL PIPE JOINTS FULLY WELDED PER LATEST AWWA STANDARDS	65 LF ±
4	CONSTRUCT PIPE SUPPORT & APPURTENANCES PER DETAIL HEREON	4 EA
5	CONSTRUCT STEEL SHROUD AND SCREEN W/APPURTENANCES PER DETAIL HEREON	1 EA
6	CONSTRUCT 90° WELDED ELL C.M.L. & PAINTED STEEL PIPE	1 EA
7	CONSTRUCT 180° WELDED ELL C.M.L. & PAINTED STEEL PIPE	1 EA
8	EXIST. CONCRETE STAND PIPE (PROTECT IN PLACE)	1 EA
9	CONTRACTOR TO REMOVE EXISTING WELL, 8" DISCHARGE LINE AND APPURTENANCES INCLUDING SUPPORTS	1 EA
10	1-1/4" OUTLET AND 1-1/4x3/4" BRONZE BUSHING PER STANDARD DWG. A-297 WITH 3/4" CORP STOP, JAMES JONES J-1500 W/BONZE PLUG.	1 EA

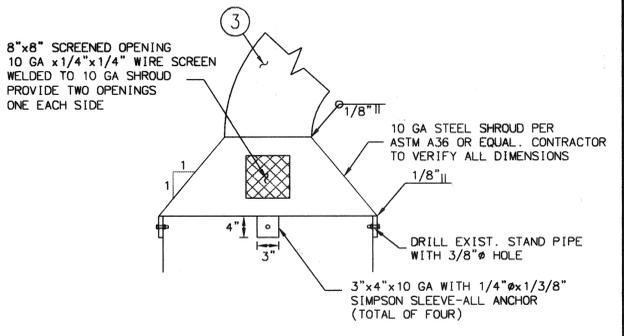
NOTES

- A CONTRACTOR SHALL PROVIDE 8 INCH DISCHARGE PIPE HORIZONTAL RUN TO MEET FINAL LOCATION OF BUBBLING WELL.
- B CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
- C CONTRACTOR SHALL REMOVE AND REPLACE WITH "LIKE KIND" ALL FENCES AS NECESSARY DURING CONSTRUCTION.
- D CONTRACTOR SHALL PROTECT IN PLACE EXISTING DRIVING RANGE NET OR REPLACE W/"LIKE KIND"

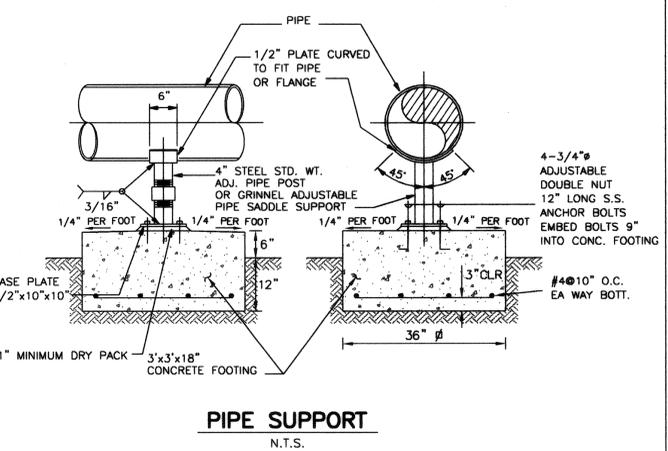


SECTION

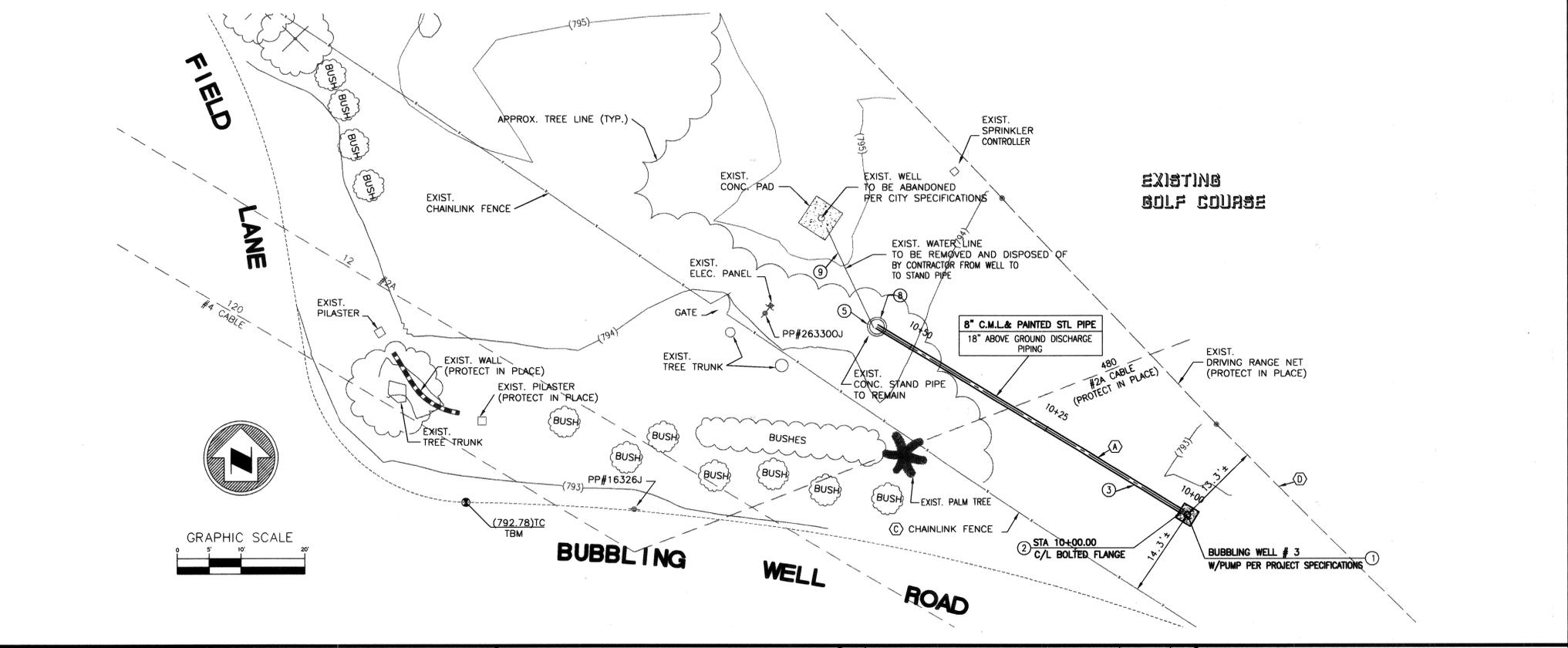
8" WELL PUMP DISCHARGE
SCALE HORIZ. 1"=5'
VERT. 1"=5'



5 SHROUD DETAIL
N.T.S.



PIPE SUPPORT
N.T.S.



UNDERGROUND SERVICE ALERT
CALL TOLL FREE
1-800-227-2600
48 HOURS BEFORE YOU DIG

Kevin Cozad
REGISTERED CIVIL ENGINEER NO. 26159
REGISTRATION EXPIRES: 03/31/06

CITY OF RIVERSIDE
PARK AND RECREATION DEPARTMENT

MARK	REVISION	APPROVED	DATE

BUBBLING WELL #3
PLOT PLAN, 8" DISCHARGE PIPE LINE

SCALE AS SHOWN	DRAWN	CITY OF RIVERSIDE
DATE AUGUST 2002	CHECKED	PARK AND RECREATION DEPARTMENT
JOB NO. X	APPROVED	DRAWING NO. 2
F.B. NO. X		REV. 2 of 2

ELECTRICAL SYMBOL LIST

SYMBOL	DESCRIPTION
	CONDUIT HOMERUN TO BOARD/PANEL. LETTER AND NUMERAL(S) INDICATE BOARD/PANEL AND CIRCUIT NUMBER(S)
	CONDUIT RUN, UNDERGROUND
	CROSS LINES ON CONDUIT INDICATE NUMBER OF #12 AWG, 600V. CONTAINED THEREIN. TWO #12'S ARE INDICATED WHEN CROSS LINES ARE NOT SHOWN. NUMERAL, AT CROSS LINES, INDICATES THE SIZE OF CONDUCTOR(S) IN LIEU OF #12. CROSS LINE IN ELLIPSE INDICATES GROUND, #12 UNLESS NOTED OTHERWISE.
	BRANCH CIRCUIT PANEL, FLUSH MOUNTED (+6"-0" A.F.F. TO TOP)
	JUNCTION BOX
	DISCONNECT SWITCH, SIZED AS NOTED, F=FUSED, (+4"-6" TO HANDLE, UNLESS NOTED OTHERWISE) FUSES SHALL COMPLY WITH EQUIPMENT MANUFACTURERS RECOMMENDATIONS, UNLESS NOTED OTHERWISE. ALL DISCONNECT SWITCH FUSES, FOR MOTOR LOADS, SHALL COMPLY WITH NEC 430-152.
	CIRCUIT BREAKER, AMPERE RATING AND NUMBER OF POLES AS NOTED
	CURRENT TRANSFORMERS
	CONDUCTORS CONNECTED
	COMBINATION MAGNETIC MOTOR STARTER WITH MOLDED CASE CIRCUIT BREAKER?: 2S= TWO SPEED; R=REVERSING; RV=REDUCED VOLTAGE AUTO TRANSFORMER; PW=PART WINDING; ROMAN NUMERAL INDICATES SIZE.

ABBREVIATIONS

A. AMPERE	DTL. DETAIL DRAWING	MIN. MINIMUM MAIN LUGS ONLY	TTC. TELEPHONE TERMINAL CABINET
A.F. AMPERE FRAME	ELEC. ELECTRICAL	M.L.O. MOUNTED	TYP. TYPICAL
A.F.C. AVAILABLE FAULT CURRENT	EMT. ELECTRICAL METALLIC TUBING	MTD. MOUNTING	UG. UNDERGROUND
A.F.F. ABOVE FINISHED FLOOR	END OF LINE RESISTOR	M.V. MERCURY VAPOR	UL. UNDERWRITERS LABORATORIES
A.F.G. ABOVE FINISHED GRADE	EQUIP. EQUIPMENT	NEC. NATIONAL ELECTRICAL CODE	UN.O. UNLESS NOTED OTHERWISE
A.I.C. AMPERE INTERRUPTING CAPACITY	EXST. EXISTING	NEMA. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	V.O.J. VERIFY ON JOB
AL. ALUMINUM	EXT. EXTERIOR	NOT IN CONTRACT	V.D. VOLTAGE DROP
APPROX. APPROXIMATE	FA. FIRE ALARM	NOT TO SCALE	W. WITH
ARCH. ARCHITECT	F.A.T.C. FIRE ALARM TERMINAL CABINET	OR APPROVED EQUAL	W/O WITHOUT
A.T. AMPERE TRIP	F.L.R. FLOOR	ON CENTER	WP. WEATHERPROOF
AWG. AMERICAN WIRE GAUGE	FT. FOOT OR FEET	OWNER FURNISHED	XFMR. TRANSFORMER
BC. BARE COPPER	GFI. GROUND FAULT INTERRUPTED	CONTRACTOR INSTALLED	
BD. BOARD	GRD. GROUND	OWNER FURNISHED	
BLDG. BUILDING	H.L.D. HIGH INTENSITY DISCHARGE	CONTRACTOR INSTALLED	
C. CONDUIT	H.O.A. HAND-OFF-AUTOMATIC	OWNER FURNISHED	
CAB. CABINET	HP. HORSEPOWER	OWNER INSTALLED	
CAT. NO. CATALOG NUMBER	HPS. HIGH PRESSURE SODIUM	POLE	
C/B. CIRCUIT BREAKER	HV. HIGH VOLTAGE	P.A. PUBLIC ADDRESS	
C.C.R. CALIFORNIA CODE OF REGULATIONS	HZ. HERTZ	P.H. PHASE	
C.E.C. CALIFORNIA ELECTRICAL CODE	INC. INCANDESCENT	P.N.L. PANEL	
C.F.C.I. CONTRACTOR FURNISHED CONTRACTOR INSTALLED	J-BOX JUNCTION BOX	P.O.C. POINT OF CONNECTION	
	KOMIL. THOUSAND CIRCULAR MILS	P.V.C. POLYVINYL CHLORIDE	
	KVA. KILOVOLT AMPERE	P.W.R. POWER ROOM	
	KW. KILOWATTS	R.M. ROOM	
	L.C.L. LONG CONTINUED LOAD	SHT. SHEET	
	LOC. LOCATION	SPEC. SPECIFICATION	
	LPS. LOW PRESSURE SODIUM	SW. SWITCH	
	LTG. LIGHTING	SWBD. SWITCHBOARD	
	L.V. LOW VOLTAGE	T24. CALIFORNIA CODE OF REGULATIONS, TITLE 24	
	MAX. MAXIMUM	T.C. TIME CLOCK	
	MECH. MECHANICAL	TEL. TELEPHONE	
	MFR. MANUFACTURER	TIB. TELEPHONE TERMINAL BOARD	
	M.H. METAL HALIDE		

GENERAL NOTES

- ELECTRICAL EQUIPMENT AND MATERIALS SHALL BE LISTED, LABELED, AND INSTALLED PER A RECOGNIZED ELECTRICAL TESTING LABORATORY.
- CONTRACTOR SHALL INSTALL CONDUIT AND/OR ELECTRICAL EQUIPMENT IN LOCATIONS WHICH CAUSE AS LITTLE INTERFERENCE AS POSSIBLE WITH INSTALLATION AND MAINTENANCE OF ANY NEW OR EXISTING MECHANICAL AND/OR PLUMBING DUCTS, LINES AND EQUIPMENT.
- FINAL CONNECTIONS TO OWNER-FURNISHED EQUIPMENT SHALL BE MADE BY CONTRACTOR, UNLESS NOTED OTHERWISE.
- DRAWINGS ARE DIAGRAMMATIC ONLY. EXACT ROUTING OF CONDUIT SHALL BE DETERMINED BY CONTRACTOR. ANY ADDITIONAL COST REQUIRED TO ROUTE CONDUIT DIFFERENTLY THAN IS INDICATED ON THESE DRAWINGS SHALL BE INCURRED BY THE CONTRACTOR.
- CONTRACTOR SHALL VISIT THE SITE, THOROUGHLY FAMILIARIZE HIMSELF WITH EXISTING CONDITIONS AND ACCEPT THOSE CONDITIONS UNDER WHICH HE WILL BE REQUIRED TO WORK.
- WHEREVER A DISCREPANCY IN SIZE OF CONDUIT, WIRE OR EQUIPMENT ARISES ON THE DRAWINGS, CONTRACTOR SHALL INFORM THE ARCHITECT AND BE RESPONSIBLE FOR INSTALLING THE LARGEST INDICATED SIZE OF ITEMS IN QUESTION.
- IN SOME INSTANCES, IT MAY BE NECESSARY TO DEFER WORK IN CERTAIN AREAS OR LOCATIONS UNTIL EXISTING OPERATIONS CAN BE RELOCATED OR REARRANGED BY THE OWNER. WHENEVER IT BECOMES NECESSARY TO PERFORM WORK IN AREAS WHICH WOULD DISRUPT OWNER'S OPERATIONS, ADVISE THE OWNER RELATIVE TO THIS REQUIREMENT. FOLLOW CLOSELY ANY DIRECTIVE ISSUED BY THE OWNER CONCERNING TIME AND PROCEDURES. ALLOW OWNER FORTY EIGHT (48) HOURS PRIOR NOTICE. WORK SHALL BE ARRANGED TO PROVIDE ABSOLUTE MINIMUM DOWN TIME.
- REFERENCE SINGLE LINE DIAGRAM(S) FOR CONDUIT AND/OR CONDUCTOR SIZES TO PANELS, TRANSFORMERS, MOTOR CONTROL CENTERS, MECHANICAL EQUIPMENT, ETC.
- IT SHALL BE UNDERSTOOD THAT ANY SUBSTITUTION(S) OF SPECIFIED PRODUCTS ARE DONE FOR THE PURPOSE OF COST SAVINGS TO THE OWNER. THEREFORE, ANY MATERIAL SUBSTITUTIONS OR DEVIATIONS, PROPOSED BY THE CONTRACTOR, SHALL BE INCLUDED WITH THE INITIAL BID AND SHALL SHOW A LINE ITEM CREDIT TO THE OWNER FOR EACH ITEM SUBSTITUTED IN LIEU OF SPECIFIED PRODUCTS. THE CONTRACTOR SHALL GUARANTEE SUBSTITUTE ITEM AS BEING EQUAL IN ALL RESPECTS TO THE SPECIFIED ITEM.
- CONTRACTOR SHALL BE RESPONSIBLE FOR SAWCUTTING, TRENCHING, BACKFILLING, COMPACTING AND PATCHING AS REQUIRED TO PERFORM HIS WORK. ATTENTION IS CALLED TO THE FACT THAT THERE MAY BE EXISTING UNDERGROUND UTILITY LINES. CONTRACTOR SHALL COORDINATE WITH THE OWNER AND SHALL USE CAUTION WHEN TRENCHING FOR HIS WORK. CONTRACTOR SHALL REPAIR ANY DAMAGES CAUSED BY HIM OR HIS WORK, AT NO ADDITIONAL COST TO THE OWNER.
- ITEMS RELATED TO ELECTRICAL POWER, TELEPHONE AND/OR OTHER SERVICE(S); (i.e. SPECIAL INSTALLATION REQUIREMENTS, MATERIALS, LABOR, PERMITS, FEES, ETC.) SHALL BE VERIFIED WITH THE RESPECTIVE SERVING UTILITY COMPANY PRIOR TO SUBMISSION OF A BID. THE ACT OF SUBMITTING A BID SHALL CONSTITUTE FULL RESPONSIBILITY OF THE CONTRACTOR TO INSTALL SERVICE(S) IN COMPLIANCE WITH THE REQUIREMENTS OF THE SERVING UTILITY COMPANY AND THE ELECTRICAL ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHARGES LEVIED BY THE SERVING UTILITY COMPANY EXCEPTING THE FIRST BILLING DEPOSIT.

SEISMIC NOTES

THE SEISMIC BRACING AND ANCHORAGE OF ELECTRICAL CONDUIT SHALL BE IN ACCORDANCE WITH THE "GUIDELINES FOR SEISMIC RESTRAINT OF MECHANICAL SYSTEMS AND THE PLUMBING PIPING SYSTEM", PUBLISHED BY SMOONA AND PPG, AND APPROVED BY D.S.A. PRE-APPROVAL NO. R0010 OR AS PER D.S.A. ANCHORAGE PRE-APPROVAL NO. R0003 FOR SUPERSTRUT SEISMIC RESTRAINT SYSTEM, OR PER D.S.A. PRE-APPROVAL NO. R0071 FOR IN-LINE SEISMIC RESTRAINT SYSTEM, OR PER D.S.A. PRE-APPROVAL NO. R0120 FOR UNISTRUT SEISMIC RESTRAINT SYSTEM.

ANCHORAGE OF EQUIPMENT WEIGHING LESS THAN 400 POUNDS AND SUPPORTED DIRECTLY ON THE FLOOR OR ROOF STRUCTURE NEED NOT BE DETAILED ON THE PLANS (CALIFORNIA BUILDING CODE, SECTION 2336(a)). HOWEVER, SUCH EQUIPMENT MUST BE ANCHORED AND THE ANCHORAGE SHALL BE APPROVED BY THE ARCHITECT. THE INSPECTOR OF RECORD SHALL ASSURE THAT THE ABOVE REQUIREMENTS ARE ENFORCED.

ALL ELECTRICAL EQUIPMENT WEIGHING LESS THAN 1000 POUNDS SHALL BE BRACED AND/OR ANCHORED TO RESIST A HORIZONTAL FORCE ACTING IN ANY DIRECTION USING THE FOLLOWING CRITERIA:

FIXED EQUIPMENT ON GRADE	20% OF OPERATING WEIGHT
FIXED EQUIPMENT ON STRUCTURE	30% OF OPERATING WEIGHT
EMERGENCY POWER & COMMUNICATION EQUIPMENT ON GRADE	50% OF OPERATING WEIGHT
EMERGENCY POWER & COMMUNICATION EQUIPMENT ON STRUCTURE	75% OF OPERATING WEIGHT

FOR FLEXIBLY MOUNTED EQUIPMENT - USE 4 x THE ABOVE VALUE
SIMULTANEOUS VERTICAL FORCE - USE 1/3 x THE HORIZONTAL FORCE

FOR ALL ELECTRICAL EQUIPMENT WEIGHING OVER 1000 POUNDS, CONTRACTOR SHALL PROVIDE BRACING AND ANCHORAGE CALCULATIONS BY A REGISTERED (STATE OF CALIFORNIA) STRUCTURAL ENGINEER, AND THE CALCULATIONS SHALL MEET THE REQUIREMENTS OF TITLE 24 AND ANY OTHER STATE REQUIREMENTS.

WHERE ANCHORAGE DETAILS ARE NOT SHOWN ON DRAWINGS THE FIELD INSTALLATION SHALL BE SUBJECT TO THE APPROVAL OF THE ARCHITECT AND THE PROJECT INSPECTOR OF RECORD.

FEEDER SCHEDULE:

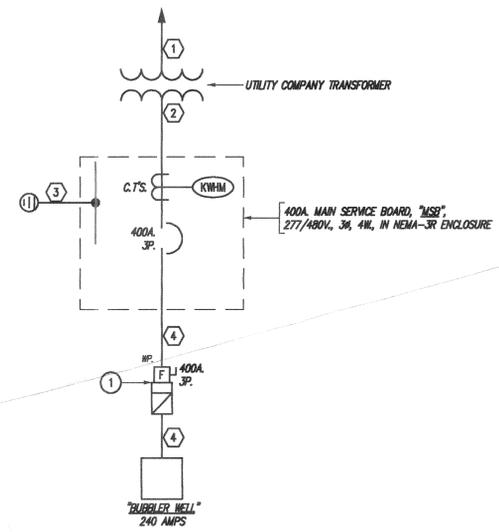
- ① - 4" C.O. (CONDUCTORS BY UTILITY)
- ② - (1) 4" C.O. (CONDUCTORS BY UTILITY)
- ③ - 3/4" C., 1 #4 GROUND TO 5/8" x 10' GROUND ROD
- ④ - 4" C. 4 #600 KOMIL, 1 #2 GRD.

NOTES:

- ALL ELECTRICAL EQUIPMENT INDICATED ON THIS DIAGRAM SHALL BE NEW, UNLESS NOTED OTHERWISE.
- ALL CONDUCTORS SHALL BE COPPER TYPE "THIN" OR "THAN".
- ALL CIRCUIT BREAKERS SHALL BE SERIES RATED.

KEYNOTES:

- ① COMBINATION STARTER/DISCONNECT, VERIFY EXACT ELECTRICAL REQUIREMENTS WITH MANUFACTURERS REQUIREMENTS PRIOR TO INSTALLATION



SINGLE LINE DIAGRAM
NO SCALE



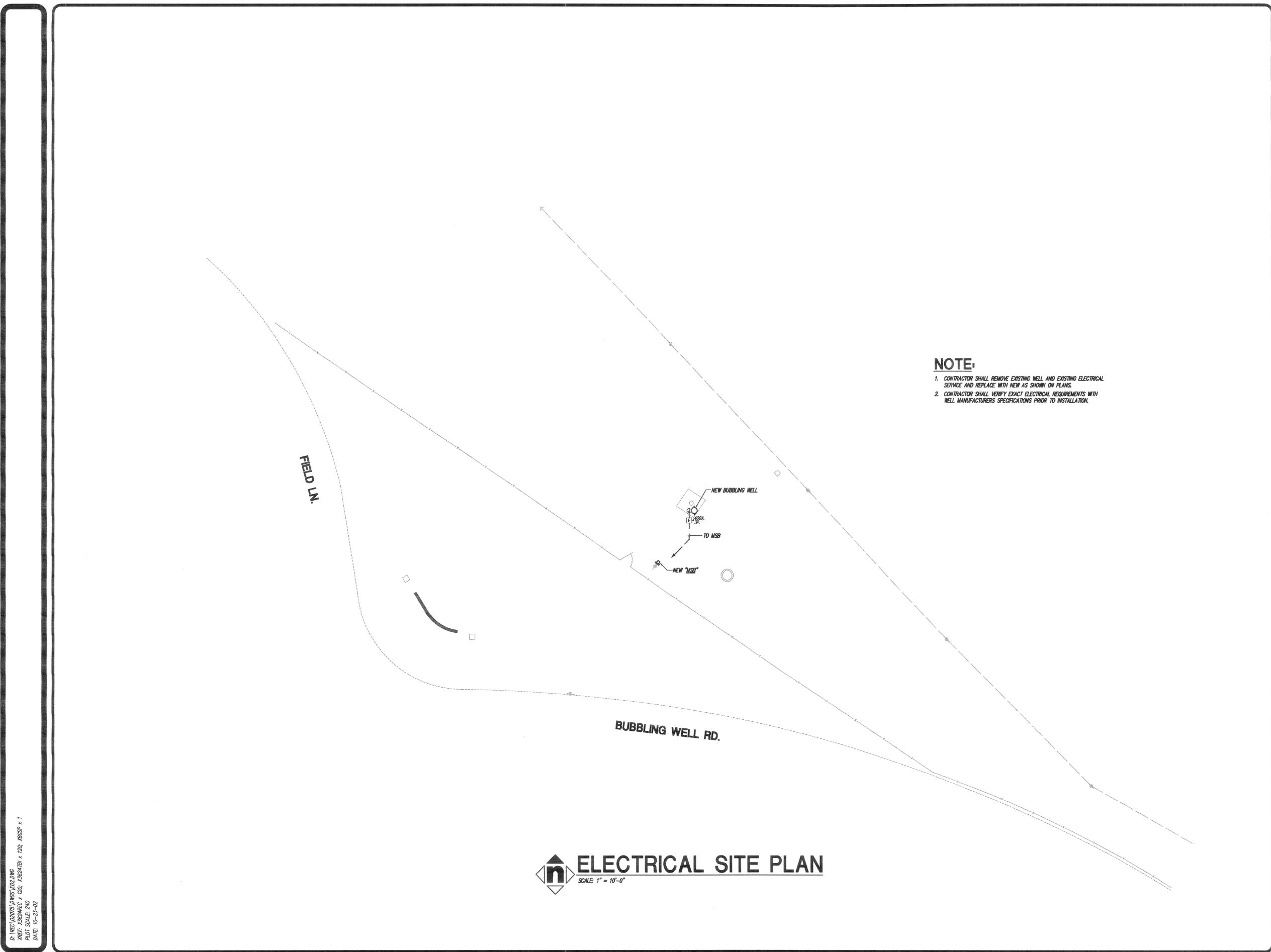
REDLANDS ENGINEERING COMPANY, INC.
ELECTRICAL CONSULTING ENGINEERS
555 NEW JERSEY STREET, SUITE "A"
REDLANDS, CALIFORNIA 92373
PHONE: (909) 792-1111 FAX: (909) 792-6568

BUBBLING WELL #3
 N'LY OF BUBBLING WELL RD. & ELY OF FIELD LN.
 RIVERSIDE, CALIFORNIA

NUMBER	DATE	BY	DESCRIPTION OF REVISIONS

SHEET TITLE
**ELECTRICAL SYMBOL LIST,
LIGHT FIXTURE SCHEDULE,
NOTES & ABBREVIATIONS**

DESIGNED BY	TML	SHEET NO.	E-1
DRAWN BY	TML		
CHECKED BY	GEM		
DATE	12/09/03		
SCALE	AS NOTED		
JOB NO.	02075		
FILE NAME	ED1.DWG		



NOTE:

1. CONTRACTOR SHALL REMOVE EXISTING WELL AND EXISTING ELECTRICAL SERVICE AND REPLACE WITH NEW AS SHOWN ON PLANS.
2. CONTRACTOR SHALL VERIFY EXACT ELECTRICAL REQUIREMENTS WITH WELL MANUFACTURERS SPECIFICATIONS PRIOR TO INSTALLATION.

ELECTRICAL SITE PLAN
SCALE: 1" = 10'-0"



REDLANDS ENGINEERING COMPANY, INC.
ELECTRICAL CONSULTING ENGINEERS
505 NEW JERSEY STREET, SUITE "A"
IRVINE, CALIFORNIA 92718
PHONE: (949) 752-4811 FAX: (949) 752-4504

BUBBLING WELL #3
N'LY OF BUBBLING WELL RD. & E'LY OF FIELD LN.
RIVERSIDE, CALIFORNIA

NUMBER	DATE	BY	DESCRIPTION OF REVISIONS

SHEET TITLE
ELECTRICAL SITE PLAN

DESIGNED BY TML	SHEET NO.
DRAWN BY TML	E-2
CHECKED BY GEM	
DATE 12/09/03	
SCALE AS NOTED	
JOB NO. 02075	FILE NAME E02.DWG

D:\REC\02075\DWG\E02.DWG
APP: X3624REC x 120; X3624TBI x 120; X60SP x 1
PLOT SCALE: 240
DATE: 12-23-03

ELECTRICAL SPECIFICATIONS

SECTION 16100

BASIC ELECTRICAL REQUIREMENTS

PART 1 - PRODUCTS

1.01 DESCRIPTION
A. THE GENERAL CONDITIONS, THE SUPPLEMENTARY GENERAL CONDITIONS AND DIVISION 1 GENERAL REQUIREMENTS APPLY TO THIS SECTION.

B. PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT REQUIRED TO COMPLETE THE ELECTRICAL WORK SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.

C. A BRIEF OUTLINE OF THESE REQUIREMENTS INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING:

- UNDERGROUND CONDUITS, PULLBOXES, PADS, VAULTS, ETC. FOR POWER, TELEPHONE, CABLE TV, SERVICES PER REQUIREMENTS OF EACH SERVING UTILITY COMPANY INCLUDING FEES AND PERMITS WHERE APPLICABLE.
- MAIN ELECTRICAL SERVICE AND DISTRIBUTION EQUIPMENT, INCLUDING SWITCHGEAR, PULL SECTION, TEST BLOCKS, METERING, ETC.
- COMPLETE INTERIOR AND EXTERIOR LIGHTING, POWER, TELEPHONE, AND CABLE TV SYSTEMS INCLUDING BRANCH CIRCUIT DISTRIBUTION AS INDICATED.

1.02 LISTINGS AND CODES
A. ALL ELECTRICAL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL BE LISTED BY UNDERWRITERS' LABORATORIES (UL) AND BEAR THEIR LABELS, OR LISTED AND CERTIFIED BY A NATIONALLY RECOGNIZED TESTING AUTHORITY WHERE IT DOES NOT HAVE A LISTING. IN ADDITION, THE MATERIALS, EQUIPMENT, AND INSTALLATION SHALL COMPLY WITH THE REQUIREMENTS, WHERE APPLICABLE, OF THE LATEST EDITION OF THE FOLLOWING:

- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
- AMERICAN STANDARD ASSOCIATION (ASA)
- NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
- AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)
- CALIFORNIA CODE OF REGULATION, TITLE 24 (CCR)
- NATIONAL ELECTRICAL CODE (NEC)
- ALL LOCAL AND STATE CODES HAVING JURISDICTION

IN THE CASE WHERE THE CODES HAVE DIFFERENT LEVELS OF REQUIREMENTS, THE MOST STRINGENT RULE SHALL APPLY.

1.03 SHOP DRAWINGS

A. CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL SIX (6) SETS OF A COMPLETE LIST AND CATALOG CUTS OF ALL MATERIALS HE PROPOSES TO PROVIDE FOR THE ELECTRICAL SYSTEMS COVERED BY THESE SPECIFICATIONS. EACH ELECTRICAL ITEM SHALL BE IDENTIFIED BY THE MANUFACTURER AND TRADE NAME OF THE ITEM AS WELL AS THE DESCRIPTION GIVEN ON THE ELECTRICAL ENGINEERS PLANS. UNLESS OTHERWISE SPECIFICALLY AUTHORIZED BY THE ELECTRICAL ENGINEER, MAKE ALL SUBMITTALS IN GROUPS CONTAINING ALL ASSOCIATED ITEMS. THE ELECTRICAL ENGINEER MAY REJECT PARTIAL SUBMITTALS AS NOT COMPLYING WITH THE PROVISIONS OF THIS SECTION. NO MATERIALS SHALL BE DELIVERED TO THE JOB UNTIL THE LIST HAS BEEN APPROVED BY THE ARCHITECT. ACCEPTANCE OR REJECTION OF SUBSTITUTE MATERIALS SHALL BE AT THE DISCRETION OF THE ARCHITECT.

B. MAKE ALL SUBMITTALS IN ACCORDANCE WITH THE GENERAL CONTRACTOR'S SCHEDULE OF SHOP DRAWINGS AND FAR ENOUGH IN ADVANCE OF SCHEDULED DATES OF INSTALLATION TO PROVIDE REQUIRED TIME FOR REVIEW, SECURING NECESSARY APPROVALS, POSSIBLE REVISION AND RESEMBLANCE, INCLUDING PLACING ORDERS AND SECURING DELIVERY.

C. SUBMIT FOR APPROVAL, COMPLETE DETAILS IN ACCORDANCE WITH A. AND B. ABOVE FOR THE FOLLOWING ITEMS:

- LIGHTING FIXTURES AND LAMPS
- PANELBOARDS, TRANSFORMERS AND DISTRIBUTION EQUIPMENT
- WIRING DEVICES
- PULL BOXES AND VAULTS
- NAMEPATES FOR EQUIPMENT
- COMMUNICATION SYSTEMS EQUIPMENT
- FIRE ALARMS EQUIPMENT

1.04 LOCATIONS AND ACCESSIBILITY
WORK SPECIFIED AND NOT CLEARLY DEFINED BY THE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ELECTRICAL ENGINEER PRIOR TO INSTALLATION SO THAT IT MAY BE INSTALLED AND ARRANGED IN A SATISFACTORY MANNER.

1.05 TESTING AND ADJUSTMENT
UPON COMPLETION OF ELECTRICAL WORK, ADJUST AND TEST CIRCUITS, LIGHTS AND OTHER ELECTRICAL ITEMS TO INSURE PROPER OPERATION OF ALL ELECTRICAL EQUIPMENT.

A. CHECK SERVICE VOLTAGES UNDER MAXIMUM OBTAINABLE LOADS. EQUIPMENT, FIXTURES, AND PARTS FOUND TO BE IN NEED OF CORRECTION DURING SUCH TESTING SHALL BE IMMEDIATELY REPAIRED OR REPLACED WITH NEW EQUIPMENT, AND THAT PART OF THE SYSTEM SHALL BE RE-TESTED. SUCH REPAIR OR REPLACEMENT SHALL BE DONE AT NO ADDITIONAL COST TO THE OWNER.

B. ALL FAILURES SHALL BE CORRECTED IN A MANNER SATISFACTORY TO THE ENGINEER. THE CONTRACTOR SHALL FURNISH ALL NECESSARY COSTS OF RETESTING EQUIPMENT AND CORRECTING FAILURES.

C. ALL ELECTRICAL TESTS SHALL BE WITNESSED BY AN INSPECTOR THAT SHALL HAVE EXPERIENCE IN ELECTRICAL WORK, EQUAL TO THAT OF AN ELECTRICIAN HAVING AT LEAST FIVE (5) YEARS EXPERIENCE AS AN I.B.E.W. JOURNEYPERMAN.

1.06 LAYOUT AND INSTALLATION

A. LAYOUT AND INSTALLATION OF ELECTRICAL WORK SHALL BE COORDINATED WITH THE OVERALL CONSTRUCTION SCHEDULE AND WORK SCHEDULE OF VARIOUS TRADES, TO PREVENT DELAY IN THE COMPLETION OF THE PROJECT. COMPLETE DRAWINGS AND SPECIFICATIONS FOR THE ENTIRE PROJECT SHALL BE AVAILABLE AT THE JOB SITE. IT SHALL BE OBLIGATORY TO THOROUGHLY CHECK THESE DOCUMENTS BEFORE ORGANIZING THE ELECTRICAL WORK SCHEDULE OR INSTALLING MATERIAL AND EQUIPMENT.

1. WHERE OUTLETS ARE PLACED IN A WALL, THEY SHALL BE LOCATED AT THE SAME HEIGHT WITH RESPECT TO EACH OTHER AND OTHER FEATURES AND/OR FINISHES ON THE WALL.

2. LOCATIONS SHOWN ON ARCHITECTURAL, REFLECTED CEILING PLANS, OR ON WALL ELEVATIONS SHALL TAKE PRECEDENCE OVER ELECTRICAL PLAN LOCATIONS.

3. REVIEW EXACT LOCATIONS OF EACH OUTLET INDICATED AND COORDINATE WITH THE ARCHITECTURAL DRAWINGS. MAJOR RELOCATIONS SHALL BE MADE WITHOUT INCURRING ADDITIONAL COST TO OWNER.

4. THE ARCHITECTURAL, STRUCTURAL, ELECTRICAL, PLUMBING AND MECHANICAL DRAWINGS AND SPECIFICATIONS, TAKEN TOGETHER, INDICATE THE WORK TO BE DONE UNDER THIS PROJECT. THE WORK SHALL BE EXECUTED IN ACCORDANCE WITH THESE DRAWINGS AND ANY DETAIL SCALE DRAWINGS WHICH MAY BE FURNISHED BY THE ARCHITECT DURING THE PROGRESS OF THE WORK. THE CONTRACTOR SHALL EXAMINE ALL ARCHITECTURAL, STRUCTURAL, ELECTRICAL, PLUMBING AND MECHANICAL DRAWINGS IN ORDER TO BE FULLY INFORMED AS TO THE SCOPE, AND DETAIL OF THE WORK WHICH WILL BE REQUIRED.

5. THE ELECTRICAL DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE PREFERRED LOCATIONS OF OUTLETS AND EQUIPMENT, AND ARE TO BE FOLLOWED AS CLOSELY AS POSSIBLE. IT IS NOT WITHIN THE SCOPE OF THE DRAWINGS TO SHOW ALL SERVIC, OFFSETS, PULLBOXES, AND OBSTRUCTIONS AND IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INCLUDE SUCH IN THE BID. THE DRAWINGS ARE INTENDED TO BE SCALED, AND THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND LIMITATIONS OF THE BUILDING STRUCTURE, AND TO THE MECHANICAL DRAWINGS FOR THE LOCATION OF EQUIPMENT REQUIRING ELECTRICAL SERVICE AND CONNECTIONS.

6. IN THE EVENT THAT CHANGES IN THE INDICATED LOCATIONS OR ARRANGEMENTS ARE NECESSARY DUE TO FIELD CONDITIONS, SUCH CHANGES SHALL BE MADE BY THE CONTRACTOR WITHOUT EXTRA COSTS, PROVIDED THE CHANGE HAS BEEN APPROVED BY THE ARCHITECT BEFORE THE WORK HAS BEEN COMMENCED AND NO ADDITIONAL MATERIALS ARE REQUIRED. THE CONTRACTOR SHALL ADVISE THE ARCHITECT OF ANY REQUIRED ADDITIONAL COSTS AND HAVE APPROVAL OF SAME BEFORE PROCEEDING.

1.07 OPERATION AND MAINTENANCE INSTRUCTIONS
FULLY INSTRUCT AND DEMONSTRATE TO THE OWNER'S OPERATING PERSONNEL THE PERFORMANCE, OPERATION AND MAINTENANCE OF EQUIPMENT. THE TIME ALLOWED FOR SAID INSTRUCTION SHALL BE INCLUDED AS PART OF THESE CONTRACT DOCUMENTS.

1.08 WARRANTY
ALL MATERIALS AND EQUIPMENT FURNISHED AND INSTALLED UNDER THIS SECTION SHALL BE WARRANTED IN WRITING BY THE CONTRACTOR FOR A PERIOD OF ONE YEAR (EXCEPT BALLASTS FOR LIGHTING FIXTURES SHALL HAVE A TWO YEAR WARRANTY), FROM DATE OF ACCEPTANCE OF THE WORK. SHOULD ANY TROUBLE DEVELOP DURING THIS PERIOD, DUE TO DEFECTIVE MATERIALS OR FAULTY WORKMANSHIP, THE CONTRACTOR SHALL FURNISH ALL NECESSARY LABOR AND MATERIALS TO CORRECT THE TROUBLE AT NO EXTRA COST TO THE OWNER.

1.09 FINAL REVIEW AND ACCEPTANCE
UPON STATED COMPLETION OF CONTRACT WORK SHALL BE SUBJECT TO REVIEW BY REPRESENTATIVES OF OWNER, ARCHITECT AND ENGINEER FOR ADHERENCE TO CONTRACT DRAWINGS AND SPECIFICATIONS. ANY CHANGES REQUIRED TO BRING WORK INTO SUBSTANTIAL CONFORMANCE WITH DRAWINGS AND SPECIFICATIONS SHALL BE MADE BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

1.10 RECORD DRAWINGS
PROVIDE AND MAINTAIN IN GOOD ORDER A COMPLETE SET OF ELECTRICAL CONTRACT PRINTS. ALL CHANGES SHALL BE CLEARLY RECORDED ON THIS SET OF PRINTS. AT THE END OF THE PROJECT, THE CONTRACTOR SHALL TRANSFER ALL CHANGES TO ONE SET OF MULAR TRANSPARENTS FOR SUBMISSION TO THE ARCHITECT. MULARS SHALL BE PROVIDED BY THE CONTRACTOR TO THE ARCHITECT WHEN REQUESTED AND AT COST OF PROVIDING. UPON COMPLETION OF THE WORK, DELIVER TO THE ARCHITECT ONE COMPLETE SET OF FINAL PRINTS OF THE MULARS AND THE MULARS THEMSELVES, WITH COMPLETE INSTALLATION AND CHANGES IN THE WORK INDICATED THEREON. ALL SHEETS SHALL BE INITIALED BY THE CONTRACTOR AS BEING A CORRECT AND ACCURATE RECORD OF THE INSTALLATION.

END OF SECTION

SECTION 16100

GENERAL MATERIALS FOR EQUIPMENT

PART 1 - PRODUCTS

1.01 MAIN SERVICE EQUIPMENT AND PANELBOARDS
MAIN SERVICE SHALL CONSIST OF PULL METER AND MAIN SECTIONS PER REQUIREMENTS OF THE SERVING UTILITY COMPANY AND RATED AS INDICATED ON THE DOCUMENTS.

A. MAIN DISCONNECT SWITCHES SHALL BE SIZED AS INDICATED ON THE DRAWINGS. HEAVY DUTY TYPE WITH CLASS R SELECTING CLIPS. SWITCHES SHALL BE UL APPROVED FOR USE AS A SERVICE ENTRANCE.

B. FUSES, IF SPECIFIED SHALL BE DUAL-ELEMENT, CURRENT LIMITING TYPE, UNLESS NOTED OTHERWISE.

C. SERVICE ENTRANCE EQUIPMENT SHALL BE ADEQUATE FOR A SHORT CIRCUIT DUTY AVAILABLE AT THE SITE AS REQUIRED BY THE SERVING UTILITY COMPANY.

D. PANELBOARDS SHALL BE FLUSH OR SURFACE MOUNTED AS INDICATED ON PLANS AND SHALL CONFORM TO THE REQUIREMENTS OF THE UL. FRONT SIZES SHALL BE FINISHED TO RESIST CORROSION WITH NOT LESS THAN ONE PRIMER COAT AND ONE FINISHING COAT. EXPOSED PARTS OF TRIM AND DOORS SHALL BE PAINTED BY OTHERS AFTER INSTALLATION. ALL BRANCH CIRCUIT PANELBOARD DOORS SHALL BE "LITE KEYED" WITH THREE KEYS FINISHED TO OWNER. ADJACENT POLES OF SINGLE POLE DEVICES SHALL BE OF DIFFERENT PHASE WITH SPILT PHASE BEING. CIRCUITS SHALL BE NUMBERED FROM TOP TO BOTTOM WITH ODD NUMBERS ON THE LEFT AND EVEN NUMBERS ON THE RIGHT. A NEATLY TYPED CIRCUIT DIRECTORY WITH A PLASTIC COVER SHALL BE PROVIDED IN A HOLDER MOUNTED INSIDE THE CABINET. DOOR BREAKERS SHALL BE OF THE FOLLOWING TYPE AS INDICATED ON PANELS. SCREWS WITH FINISH AS SHOWN ON THE DRAWINGS WITH A MINIMUM SHORT CIRCUIT RATING OF 10,000 AMPS SYMMETRICAL. THE FRONT SHALL INCLUDE FLUSH HINGED DOOR WITH LOCK, COVERING ALL BREAKERS.

E. IDENTIFICATION NAMEPLATES SHALL BE PROVIDED OF MINIMATA 1/8" THICK, OF APPROVED SIZE, WITH BEVELLED EDGES AND ENGRAVED WHITE LETTERS 1/4" HIGH MINIMUM ON BLACK BACKGROUND. THESE NAMEPLATES SHALL BE PROVIDED FOR ALL CIRCUITS IN THE SERVICE DISTRIBUTION AND POWER DISTRIBUTION BOARDS, MOTOR CONTROL CENTERS, LIGHTING DISTRIBUTION PANELBOARDS, SEPARATELY MOUNTED STARTING SWITCHES, DISCONNECT SWITCHES, MOTOR CONTROL PUSH-BUTTON STATIONS, SELECTOR SWITCHES, TRANSFORMERS, TERMINAL CABINETS, TELEPHONE CABINETS, ETC. THESE NAMEPLATES SHALL HAVE THE SAME IDENTIFICATION NAMES AS INDICATED ON THE PLANS.

1.02 CONDUITS AND RACEWAYS

ALL CONDUITS AND RACEWAYS SHALL CONFORM TO UL STANDARDS AS APPLICABLE.

A. ELECTRICAL METALLIC TUBING (EMT), NO LESS THAN 1/2" TRADE SIZE, 2" MAXIMUM TRADE SIZE. EMT MAY BE USED IN DRY LOCATIONS ONLY, ILLU, COLE-FLEX, ROROBY OR EQUAL.

B. RIGID GALVANIZED STEEL CONDUIT (RGS) SHALL BE STEEL, GALVANIZED OR ZINC COATED FULL WEIGHT, NO LESS THAN 1/2" TRADE SIZE. ALLEN, CONDUIT INTERNATIONAL, K&K OR EQUAL.

C. LIQUID-TIGHT FLEXIBLE CONDUIT (LFC) NO LESS THAN 1/2" TRADE SIZE. FLEXIBLE GALVANIZED STEEL CORE COMPLETELY COVERED IN A POLYMER OR RUBBER JACKET. K&K, ALLEN, CARLON, CAL DUCT OR EQUAL.

D. NON-METALLIC POLYMER CHLORIDE (PVC) NO LESS THAN 1/2" TRADE SIZE, SCHEDULE 40, UNLESS NOTED OTHERWISE. SUNLIGHT RESISTANT AND RATED FOR 90C CONDUCTORS. CARLON, CANTEX, CAL DUCT OR EQUAL.

E. FLEXIBLE METALLIC CONDUIT, NO LESS THAN 1/2" TRADE SIZE, STEEL, FORMED FROM CONTINUOUS STRIP AND ZINC COATED. KFC, COLE-FLEX, ROROBY OR EQUAL.

1.03 FITTINGS, FITTINGS AND OUTLETS FOR CONDUITS SHALL CONFORM TO THE FOLLOWING:

A. FITTINGS FOR ELECTRICAL METALLIC TUBING (EMT) FOR SIZES 1/2" THROUGH 2" SHALL BE WRENCH TIGHTENED COMPRESSION TYPE. THIN WALL SHALL PROVIDE FULL OR FUROR RESISTANCE AND ELECTRICAL CONTINUITY AS REQUIRED BY UL. NO INDENTING FITTINGS OR ADJUSTABLE SET SCREW TYPE FITTINGS SHALL BE USED. O-Z GEDNEY, THOMAS & BETTS, RAOO OR EQUAL.

B. FITTINGS FOR RIGID GALVANIZED STEEL CONDUIT (RGS) SHALL BE STEEL, THREADED FITTINGS ONLY. SPLIT AND "SET SCREW" TYPE FITTINGS ARE NOT ACCEPTABLE. O-Z GEDNEY, THOMAS & BETTS, RAOO OR EQUAL.

C. FITTINGS FOR LIQUID-TIGHT FLEXIBLE CONDUIT SHALL BE OF THE COMPRESSION TYPE WITH THREADED FERRULE, SEALING RING AND SUITABLE FOR MET LOCATIONS. O-Z GEDNEY, THOMAS & BETTS, RAOO OR EQUAL.

D. FITTINGS FOR PVC SHALL BE NON-METALLIC, SUNLIGHT RESISTANT, AND OF THE SAME COMPOUND AS THE CONDUITS WHICH THEY ARE BEING UTILIZED WITH. CARLON, CANTEX, CAL DUCT OR EQUAL.

E. FITTINGS FOR FLEXIBLE METALLIC CONDUIT SHALL BE OF THE "SQUEEZE" TYPE WITH EITHER ONE (1) OR TWO (2) SCREWS, CAST OR MALLEABLE IRON, CADMIUM OR ZINC COATED. O-Z GEDNEY, THOMAS & BETTS, RAOO OR EQUAL.

1.04 CONDUCTORS
CONDUCTOR SIZES ARE SPECIFIED BY AMERICAN WIRE GAUGE (AWG). CONDUCTORS SHALL BE COPPER. WIRE SIZES #10 AND SMALLER SHALL BE SOLID CONDUCTOR. HOWEVER, CONTROL AND SIGNAL SYSTEMS MAY BE WIRED WITH #14 STRANDED INSULATION FOR WIRING SHALL BE 600 VOLT TYPE "THIN" TYPE RATED FOR DRY OR WET LOCATIONS OR TYPE "THIN", 90C, RATED FOR DRY LOCATIONS. ALUMINUM CONDUCTORS SHALL BE ALLOWED FOR MAIN SERVICE FEEDERS ONLY.

A. CONDUCTOR SIZES SHALL BE AS INDICATED; WHERE SIZES ARE NOT INDICATED THEY SHALL BE AS REQUIRED BY CODE. ALL WIRING SHALL BE COLOR CODED FOR PHASE IDENTIFICATION AS FOLLOWS:

- | | |
|--------------------|------------------|
| 120/208V, 3Ø, 4W | 277/480V, 3Ø, 4W |
| 1. PHASE A = BLACK | PHASE A = BROWN |
| 2. PHASE B = RED | PHASE B = ORANGE |
| 3. PHASE C = BLUE | PHASE C = YELLOW |
| NEUTRAL = WHITE | NEUTRAL = WHITE |
| GROUND = GREEN | GROUND = GREEN |

B. MAKE SPACES FOR CONDUCTORS #6 AND SMALLER WITH STEEL OR COPPER SPRING INSULATED WIRE NUTS. SPACES FOR CONDUCTORS #6 OR LARGER SHALL BE WITH SPLIT BOLTS OR "YEARKEYS" WHICH WHEN USED SHALL BE THOROUGHLY INSULATED.

C. THE GREEN GROUND WIRE SHOWN ON CONDUIT RUNS SHALL RUN CONTINUOUS FROM PANEL TO LAST OUTLET. THIS WIRE SHALL BE INSTALLED IN EACH OUTLET FOR CONNECTION TO BOX AND DEVICE SO THAT IF THE DEVICE IS REMOVED, THE GROUND WILL NOT BE INTERRUPTED.

1.05 OUTLET BOXES
ALL BOXES SHALL BE SIZED FOR THE NUMBER AND SIZE OF CONDUCTORS AND CONDUITS ENTERING THE BOX AND EQUIPPED WITH PLASTER RING OR PLASTER RING WITH BUSHING. ALL BOXES SHALL BE LABELED TO INDICATE PANEL AND CIRCUIT NUMBER OF CONDUCTORS CONTAINED WITHIN. IN NO CASE SHALL ANY BOX BE LESS THAN 4" ROUND OR SQUARE, UNLESS SPECIFICALLY NOTED OTHERWISE. OUTLET BOXES FOR CONCEALED WORK SHALL BE GALVANIZED OR SHEARWAZED, ONE PRIZE, PRESSED STEEL, WITH INDENTIONS AS REQUIRED.

A. LIGHT OUTLETS SHALL BE 4" OCTAGON, 4" SQUARE OR LARGER PER NEC 370-6 (g) AND SHALL BE EQUIPPED WITH A GASKET, PLASTER RING OR BUSHING REQUIRED TO PROVIDE A FLUSH MOUNTING CONDITION. PLASTER RING SHALL HAVE A 3" ROUND OPENING WITH TWO THREADED MOUNTING HOLES. RAOO OR EQUAL.

B. SWITCH OUTLETS SHALL BE 4" SQUARE BOX FOR SINGLE AND TWO GANG APPLICATIONS. SPECIAL MULTI-GANG BOXES SHALL BE UTILIZED FOR MORE THAN TWO SWITCHES COMPLETE WITH PLASTER RING FOR MOUNTING SWITCHES. RAOO OR EQUAL.

C. RECEPTACLE, TELEPHONE AND COMPUTER/DATA OUTLETS SHALL BE 4" SQUARE, OR LARGER BOX PER NEC 370-6(g), WITH SINGLE GANG OR LARGER PLASTER RING TO SUIT THE DEVICE(S) INSTALLED. UNLESS SPECIAL BOXES ARE SPECIFIED OTHERWISE, ALL BOXES SHALL BE 1/2" THICK, 90C, RATED FOR DRY LOCATIONS OR OTHERWISE AS REQUIRED.

D. FLOOR BOXES, MOUNTED ON CONCRETE, FOR RECEPTACLE, TELEPHONE AND COMPUTER/DATA OUTLETS SHALL BE ROUND OR SQUARE, SINGLE OR MULTI-GANG AS REQUIRED. BOXES SHALL BE PRESSED STEEL OR CAST IRON AS SPECIFIED ON DRAWINGS. BUT IN NO CASE OF LESS THAN 20 CIRC INCH OF CAPACITY. BOXES SHALL HAVE THE CAPABILITY OF WITHSTANDING TRAFFIC. AREAS SHALL BE PROVIDED WITH TRAFFIC RATED COVERS. ALL BOXES SHALL BE PERMANENTLY IDENTIFIED AS TO THE TYPE OF SERVICE CONNECTED THEREIN (E.G. SOC, COMMUNICATIONS, ETC.) BOXES LOCATED IN DAMP OR WET AREAS SHALL BE RATED NEMA 3R. EXTERIOR PULL BOXES SHALL BE PLAZED TO AVOID SURFACE WATER FLOW AREAS.

1.07 SWITCHES
LIGHTING SWITCHES SHALL BE SPECIFICATION GRADE, SINGLE POLE, ON-OFF, 3-WAY, TOGGLE TYPE AS INDICATED, 20 AMP, 120/277V, A.C. RATING FOR FULL CAPACITY OF CONTACTS FOR LAMP LOADS, RUBBERELL OR EQUAL, BY APPROVAL OF THE ARCHITECT.

1.08 DISCONNECTS

A. MANUAL MOTOR STARTER SWITCHES SHALL BE TOGGLE TYPE ON/OFF, AS REQUIRED FOR CONTROL OF SINGLE AND THREE PHASE MOTORS AND RESISTANCE HEATER LOADS. SWITCHES SHALL BE SOLID WHELED AND COMPLETE WITH OVERSIZE SILVER CONTACTS. RUBBERELL, HUBBELL, EAGLE OR EQUAL.

B. SAFETY SWITCHES SHALL BE HEAVY-DUTY INDUSTRIAL TYPE. SWITCHES SHALL BE FIRED OR HOPMISED AS INDICATED ON THE DRAWINGS. ENCLOSURES SHALL BE RATED EITHER NEMA 1 OR NEMA 3R AS REQUIRED BY INSTALLATION. UNITS SHALL BE QUICK MAKE, QUICK BREAK WITH OPERATING HANDLE WHICH CAN BE PADLOCKED IN THE "OFF" POSITION. FINISH SHALL BE A STANDARD LIGHT GRAY ENAMEL. SWITCHES SHALL HAVE APPROVED TO COVERS, A NAMEPLATE INDICATING WHAT ITEM IS CONTROLLED BY SWITCH.

1. RUSES SHALL BE OF CORRECT RATING FOR EACH INSTALLATION, AND SHALL BE EITHER CURRENT LIMITING OR MULTI-ELEMENT TIME DELAY AS REQUIRED BY EQUIPMENT MANUFACTURERS' RECOMMENDATION. ROSSMAN, CHASE-SHANNUT, GOLD OR EQUAL.

1.09 RECEPTACLES

A. DUPLEX RECEPTACLES SHALL BE RATED 20 AMP, 125V A.C., 3 WIRE GROUNDING TYPE AND UNLESS OTHERWISE INDICATED, CONFIGURATION SHALL BE NEMA 5-20R. A BONDING JUMPER SHALL BE PROVIDED FOR GROUND BETWEEN THE GROUNDED OUTLET BOX AND THE RECEPTACLE GROUND TERMINAL. GROUNDING THROUGH THE RECEPTACLE MOUNTING STRIPS IS NOT ACCEPTABLE. RUBBERELL, HUBBELL, EAGLE OR EQUAL BY SERIAL OR LEVITON.

B. CLOCK OUTLETS SHALL BE 15 AMP, 125V A.C., 3 WIRE GROUNDING TYPE RECESSED RECEPTACLES WITH CLOCK HANGER SUPPORT AND INTERNAL PLASTIC PLATE. EAGLE #775 OR EQUAL BY LEVITON OR PASS & SEAMOUR.

C. GROUND FAULT TYPE DUPLEX RECEPTACLE SHALL PROVIDE 20A FEED THROUGH RATING AND 0.025 SECOND, NORMAL TRIP PER UL STANDARD. LEVITON 6889-4 OR EQUAL BY PASS AND SEAMOUR OR HUBBELL.

D. ISOLATED GROUND RECEPTACLES SHALL BE 15 AMP, 125V 3 WIRE GROUNDING TYPE, ORANGE IN COLOR. RECEPTACLE SHALL NOT GROUND THROUGH MOUNTING STRIP, BUT ONLY THROUGH THE GROUND SCREW WHEN CONNECTED TO AN INDEPENDENT GROUNDING CONDUCTOR. LEVITON #6882-4 OR EQUAL BY PASS AND SEAMOUR OR HUBBELL.

1.10 PLATES

PROVIDE PLATES FOR EVERY SWITCH, RECEPTACLE AND TELEPHONE/DATA OUTLET.

A. ALL INTERIOR PLATES SHALL BE Ivory COLORED SMOOTH NYLON OR PHENOLIC PLASTIC FOR ALL OUTLET LOCATIONS, UNLESS SPECIFICALLY NOTED OTHERWISE. LEVITON, HUBBELL, PASS AND SEAMOUR OR EQUAL.

B. ALL EXTERIOR COVERS SHALL BE WEATHERPROOF PER NEC 410-57(b) THERMOPLASTIC, WITH CLEAR POLYCARBONATE TOP HINGED COVER AND PLATE GASKET. PASS AND SEAMOUR #770 SERIES OR TRIMCO OR HUBBELL.

C. PLATES FOR ISOLATED GROUND RECEPTACLES SHALL BE ORANGE COLORED, SMOOTH NYLON OR PHENOLIC PLASTIC, U.N.O. LEVITON #6875-4 OR EQUAL BY PASS AND SEAMOUR OR HUBBELL.

1.11 LIGHT FIXTURES
FURNISH ALL LIGHT FIXTURES, LIGHTING EQUIPMENT AND COMPONENTS SHOWN ON THE PLANS, LISTED IN THE FIXTURE SCHEDULE AND SPECIFIED HEREIN.

A. BALLASTS FOR FLUORESCENT FIXTURES SHALL BE HIGH POWER FACTOR, ENERGY SAVING TYPE, COMPATIBLE WITH LAMPS AND THEIR DESIGN. CONSTRUCTION SHALL CONFORM TO C.E.C. OR OTHER LOCAL STANDARDS WHERE APPLICABLE. GENERAL ELECTRIC "WATT-METER", ADVANCE "MARK II", UNIVERSAL "WATT REDUCER" OR EQUAL.

B. FLUORESCENT LAMPS SHALL BE ENERGY SAVING, COOL WHITE AND OF THE LENGTH AND VOLTAGE TO FIT THE FIXTURE IN WHICH USED. ALL 4" RAPID START LAMPS SHALL BE 34W, GENERAL ELECTRIC, SYLVANIA OR EQUAL.

C. INCANDESCENT LAMPS SHALL BE OF THE INSIDE FROSTED TYPE, WITH A RATING OF 120V, AND SCREW BASE, UNLESS NOTED OTHERWISE. GENERAL ELECTRIC, SYLVANIA, PHILIPS OR EQUAL.

D. HIGH INTENSITY DISCHARGE (HID) BALLASTS SHALL BE HIGH POWER FACTOR AND RATED OF START-UP AT 20° F. ON ALL OUTDOOR FIXTURES. LAMPS AND BALLASTS SHALL BE COMPATIBLE WITH BALLASTS MULTI-VOLTAGE RATED.

E. LIGHTING FIXTURE DIFFUSERS: ALL PLASTIC DIFFUSERS FOR FLUORESCENT FIXTURES SHALL BE ACRYLIC. THEY SHALL BE 100% PURE VIRGIN ACRYLIC, MINIMUM THICKNESS .125" OVERALL.

1.12 PULL BOXES
INSTALL AN UNSPLINED PULL LINE IN ALL EMPTY CONDUITS. PULL LINE SHALL BE A 3/16" BRAIDED POLYPROPYLENE LINE.

1.13 GROUND RODS
PROVIDE STEEL CENTERED COPPER CLAD GROUND RODS AS REQUIRED PER NEC 250. MINIMUM LENGTH SHALL BE 3/4" X 8" DIAMEN RIGIDLY FULL LENGTH INTO THE EARTH WITH NO MORE THAN 2" LEFT ABOVE GRADE FOR PROPER CONNECTION TO THE GROUNDING CONDUCTORS.

1.14 TRANSFORMERS
TRANSFORMERS SHALL BE DRY-TYPE, NEMA-1 FOR DRY LOCATIONS OR NEMA 3R FOR WET OR DAMP LOCATIONS. TRANSFORMERS SHALL HAVE VENTILATED CORE AND COIL ASSEMBLIES MOUNTED ON RUBBER ISOLATION PADS TO MINIMIZE THE SOUND LEVEL. (6) 2-1/2% FULL CAPACITY TAPS WITH (2) ABOVE AND (4) BELOW SHALL BE PROVIDED AT 150% C.R. USE, UNLESS NOTED OTHERWISE.

1.15 THE SWITCHES

A. TIME SWITCHES FOR CONTROLLING MECHANICAL EQUIPMENT, SIGNS, DISPLAYS, ETC. SHALL BE A 7 DAY TYPE, SPOT, ADJUSTABLE WITH RESERVE POWER, 120V, WITH (3) 20 AMP CONTACTS AND PHOTOELECTRIC INTERCONNECTION TERMINALS. TORX #900, OR EQUAL, BY INTERMATIC OR PARAGON.

B. TIME SWITCHES FOR CONTROLLING EXTERIOR LIGHTING, DUTY CYCLING, VENTILATING FANS, ETC. SHALL BE A 7 DAY TYPE, SPOT, WITH MANUAL BY-PASS SWITCHES, RESERVE POWER 120V, WITH (3) 20 AMP CONTACTS. TORX #7M-300 SERIES OR EQUAL BY INTERMATIC OR PARAGON.

1.16 PHOTOCELLS
PHOTOCELLS SHALL BE OUTDOOR TYPE, 120V, 2000W CURRENT RATING, ADJUSTABLE, TORX #171 OR EQUAL.

1.17 LOCATIONS
EQUIPMENT OUTLETS, LIGHTING FIXTURES, CONDUIT, WIRE, AND CONNECTION METHODS IN HVAC AIR-PLenums SHALL BE APPROVED FOR SUCH USE.

END OF SECTION

SECTION 16105

INSTALLATION OF ELECTRICAL WORK

PART 1 - EXECUTION

1.01 GENERAL
REQUIREMENTS OF SECTIONS 16100 AND 16100 APPLY TO THIS SECTION. ANY CUTTING, PATCHING OR FINISH REPAIR OF THE WORK OR WORK OF OTHER TRADES NECESSARY FOR THE INSTALLATION OF THE ELECTRICAL WORK SHALL BE PROVIDED UNDER THIS SECTION.

1.02 MISCELLANEOUS

A. PROVIDE TRENCHING, CONCRETE ENCASMENT WHEN REQUIRED, BACKFILLING AND COMPACTION FOR ALL UNDERGROUND CONDUITS AND/OR STRUCTURES.

B. FLASHINGS SHALL BE PROVIDED AT ALL POINTS WHERE CONDUIT OR OTHER ELECTRICAL COMPONENTS PENETRATE THE ROOF. FLASHINGS SHALL EXTEND A MINIMUM OF 6" ABOVE THE SURROUNDING ROOF SURFACE WITH WEATHERPROOF MASTIC APPLIED, TO PREVENT MOISTURE OR DUST FROM ENTERING THE OPENING. FLASHINGS SHALL BE DELIVERED TO THE ROOFING CONTRACTOR FOR INSTALLATION. THE CORRECT LOCATION OF ALL SUCH PENETRATIONS SHALL BE VERIFIED BY THE CONTRACTOR.

C. PROVIDE SLEEVES UNDER WALLS, CONCRETE FOOTINGS AND FOUNDATIONS. SLEEVES SHALL HAVE AN INSIDE DIAMETER OF NOT LESS THAN 1" LARGER THAN THE OUTSIDE DIAMETER OF CONDUIT CONTAINED THEREIN.

1.03 CONDUIT
CONDUIT FOR LINE VOLTAGE WIRING SHALL BE CONCEALED WITHIN FINISHED WALLS, CEILINGS AND UNDERFLOOR FLOORS. EXPOSED CONDUITS ABOVE CEILINGS AND SURFACE MOUNTED IN MECHANICAL AND SERVICE AREAS SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO THE BUILDING WALLS. RIGHT ANGLE TURNS SHALL CONSIST OF CONDUIT BODIES OR "STANDARD" BENDS. ALL CONDUITS SHALL BE PROPERLY SECURED WITH COMPONENTS SPECIFICALLY MANUFACTURED FOR THIS USE. ALL CONDUITS SHALL BE SIZED IN ACCORDANCE WITH ALL CAPACITIES SET FORTH IN NEC ARTICLE 348. ALL CONDUIT RUNS SHALL BE INSTALLED TO AVOID TRAPPED CONDENSATION.

A. ELECTRICAL METALLIC TUBING (EMT), DO NOT EMBED ENT IN CONCRETE OR BELOW GRADE. ENT MAY BE USED WHERE CONCEALED OR WHERE NOT SUBJECT TO DAMAGE.

B. ALL CONDUIT PASSING THROUGH CONCRETE SLABS SHALL MEET ALL LOCAL CODE STANDARDS.

C. FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FLEXIBLE CONNECTIONS TO ALL VIBRATING AND MECHANICAL EQUIPMENT. A CODE GRADE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN SUCH CONDUITS. FLEXIBLE METALLIC CONDUIT SHALL BE USED IN LENGTHS OF LESS THAN 6' FOR CONNECTIONS TO FIXTURES, PROVIDED THAT A CODE GRADE INSULATED EQUIPMENT GROUNDING CONDUCTOR IS PROVIDED. LIQUID-TIGHT FLEXIBLE CONDUIT SHALL BE USED FOR ALL DAMP OR WET LOCATIONS.

D. POLYMER CHLORIDE CONDUIT (PVC) SHALL ONLY BE USED UNDERGROUND AT A MINIMUM OF 30" BELOW FINISHED GRADE WHEN NOT INSTALLED UNDER A CONCRETE SLAB OR FOOTING. PROVIDE A CODE GRADE GREEN GROUND WIRE IN ALL PVC RUNS. ALL UNDERGROUND CONDUIT RUNS SHALL SLOPE TO DRAIN TO EACH END AND TERMINATE WITH PRE-MANUFACTURED BELL ENDS AT ALL MANHOLES AND PULL BOXES.

E. CONDUIT ENDS SHALL BE CUT SQUARE AND SHALL BE CAREFULLY REMOVED OUT TO FULL SIZE WITH A TAPERED BURRING REMOVER AND SMOOTHED TO THE FITTINGS.

F. BENDS IN CONDUIT SHALL BE MADE SO THAT THE CONDUIT WILL NOT BE DAMAGED, AND THAT THE INTERNAL DIAMETER OF THE CONDUIT WILL NOT BE EFFECTIVELY REDUCED. THE RADIUS OF THE CURVE OF THE INNER EDGE SHALL NOT BE LESS THAN SHOWN IN TABLE 346-10 OF THE NEC.

6. CONDUIT SUPPORTS SHALL BE PROVIDED FOR ALL ABOVE GROUND SYSTEMS. CONDUIT SHALL BE SECURELY SUPPORTED AND FASTENED WITHIN 3 FEET OF ANY TERMINATION POINT AND AT A MAXIMUM OF EVERY 10 FEET ALONG LENGTH OF RUN.

H. CLEARANCE
CONDUIT SHALL NOT RUN CLOSER THAN 6" TO ANY HOT WATER PIPE, STEAM PIPE, HEATER FLUE, OR VENT.

I. CONDULETS SHALL BE USED WHERE CONDUIT RUNS MUST GO AROUND OUTSIDE CORNERS OF WALLS, BEAMS, EQUIPMENT, ETC. ALL CONDULETS COVERS SHALL BE ACCESSIBLE.

1.04 CONDUCTORS AND TERMINATIONS
WIRE AND CABLE SHALL BE CONTINUOUS FROM OUTLET TO OUTLET, WITH THE SPLICES ONLY IN JUNCTION BOXES, OUTLETS, EQUIPMENT OR OTHER APPROVED LOCATIONS.

A. MAKE SPLICES, JOINTS, TAPS AND CONNECTIONS TO EQUIPMENT WITH APPROVED SOLDERLESS LUGS SIZED FOR THE WIRE OR CONDUCTOR INVOLVED.

B. IDENTIFY POWER AND LIGHTING FEEDERS WITH PERMANENT TAGS AT PANELS, PULL BOXES AND POINTS WHERE CONDUIT RUN IS BROKEN.

C. INSTALLATION
THOROUGHLY