

**1 ELECTRICAL LIGHTING PLAN**  
SCALE: 1/4"=1'-0"

**LIGHTING PLAN GENERAL NOTES:**

1. COORDINATE EXACT COLOR, LOCATION AND MOUNTING HEIGHT OF ALL DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.
2. OBTAIN A COPY OF AND REVIEW LANDLORD'S LATEST EDITION OF THE "TENANT DESIGN AND CONSTRUCTION" HANDBOOK, IF AVAILABLE, AND COMPLY WITH ALL REQUIREMENTS. WHERE CONFLICTS BETWEEN HANDBOOK AND CONSTRUCTION DOCUMENTS ARISE, MOST STRINGENT VERSION SHALL GOVERN.
3. REMOVE ALL EXISTING ELECTRICAL EQUIPMENT, FIXTURES, SYSTEMS, CONDUIT AND WIRING, ETC., NOT BEING RE-USED. DO NOT JUST ABANDON.
4. ALL EQUIPMENT SHALL BEAR UNDERWRITERS LABORATORIES, INC. LABELS FOR THE USE INTENDED.
5. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE JURISDICTIONAL AUTHORITIES, THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE, CLARK COUNTY NEVADA AND THE LANDLORD'S INSURANCE CARRIER.
6. MINIMUM CONDUIT SIZE SHALL BE 3/4" CONDUIT.
7. IF ALLOWED BY CODE AND THE AUTHORITY HAVING JURISDICTION, TYPE MC CABLE MAY BE USED FOR BRANCH CIRCUIT WIRING (EXCEPT HOMERUNS) ABOVE ACCESSIBLE CEILING, WITHIN FURRED SPACES, OR IN HOLLOW FRAMED PARTITIONS. INSTALL AND SUPPORT TYPE MC CABLE PER NEC 330.30. MC CABLE SHALL ONLY BE USED IN DRY LOCATIONS WHERE NOT SUBJECT TO PHYSICAL DAMAGE. MC CABLE SHALL HAVE A BLUE STRIPE ON THE SHEATH.
8. ALL WIRING SHALL ONLY BE INSTALLED IN CONDUIT. BX, OR ROMEX TYPE WIRING SHALL NOT BE PERMITTED.
9. ALL WIRING SHALL BE COPPER ONLY. ALL CONDUCTORS ARE TO HAVE 600-VOLT INSULATION, TYPE THHN/THWN.
10. MINIMUM WIRE SIZE IS NO. 12 AWG EXCLUDING LOW VOLTAGE WIRING. ALL WIRING SHALL BE COLOR CODED PER NEC. SAME COLOR SHALL IDENTIFY SAME PHASE THROUGHOUT THE SYSTEM.
11. FLEXIBLE CONDUIT MAY BE USED FOR FINAL CONNECTIONS ONLY WITH A 6'-0" MAXIMUM LENGTH.
12. ALL TENANT ELECTRICAL EQUIPMENT MUST BE AS MANUFACTURED BY GENERAL ELECTRIC.
13. THE FLOOR SHALL NOT BE SAW CUT TO BRING ELECTRICAL SERVICE TO FREESTANDING ELEMENTS. THE FLOOR SHALL BE CORE DRILLED, SLEEVED AND EQUIPPED WITH THE APPROPRIATE ASSEMBLY TO PROVIDE FOR PROPER FIRE AND MOISTURE CONTROL.
14. REFERENCE ARCHITECTURAL DRAWINGS ON SHEET A003 FOR LIGHTING FIXTURE SPECIFICATIONS AND EXACT LOCATIONS. (MS) INDICATES OCCUPANCY SENSOR CONTROL. (TC) INDICATES TIME SWITCH CONTROL.
15. IN SALES AREA, BATTERY PACKS FOR EXIT AND EMERGENCY LIGHTING MUST BE REMOTE OR RECESSED. PAINT EXPOSED SURFACES TO MATCH ADJACENT SURFACE FINISH.

**LIGHTING PLAN KEYED NOTES:**

- 1 LOCATE CONTACTORS ABOVE TIMESWITCHES, AND TIMESWITCHES AT STANDARD SWITCH HEIGHT.
- 2 NORMAL AND EMERGENCY EGRESS LIGHTING OUTSIDE THE TENANT SPACE IS THE LANDLORD'S RESPONSIBILITY.
- 3 PROVIDE JUNCTION BOX FOR POWER CONNECTION TO ALL COVE LIGHTING.
- 4 PROVIDE WATT STOPPER WALL MOUNTED OCCUPANCY SENSOR #WA-200. SET TIME DELAY TO MAXIMUM.
- 5 PROVIDE WATT STOPPER CEILING MOUNTED OCCUPANCY SENSOR #WT-1105 WITH POWER PACK. SET TIME DELAY TO MAXIMUM. REFER TO DETAIL #2/E200 FOR MORE INFORMATION.
- 6 LOCATION OF MASTER LIGHTING CONTROL SWITCHES FOR SALES FLOOR LIGHTING. REFER TO DETAIL #3 ON E200 FOR SWITCH BANK ELEVATION.
- 7 LOCATION OF DIMMER SWITCH CONTROLLING CHANDELIERS. DIMMER SWITCH SHALL BE DOWNSTREAM OF THE LIGHTING CONTACTOR. PROVIDE LUTRON NOVA-T #NT-1000 INCANDESCENT DIMMER WITH COVER PLATE. COORDINATE COLOR WITH ARCHITECT PRIOR TO ORDERING. REFER TO DETAIL #3 ON E200 FOR SWITCH BANK ELEVATIONS.
- 8 LOCATION OF DIMMER SWITCH CONTROLLING CHANDELLIER. DIMMER SWITCH SHALL BE DOWNSTREAM OF THE LIGHTING CONTACTOR. PROVIDE LUTRON NOVA-T #NT-1000 INCANDESCENT DIMMER WITH COVER PLATE. COORDINATE COLOR WITH ARCHITECT PRIOR TO ORDERING.

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THE SHOPS AT THE PALAZZO, SPACE #102, 3363 LAS VEGAS BOULEVARD SOUTH, LAS VEGAS, NV, 89109

**ELECTRICAL LIGHTING PLAN**

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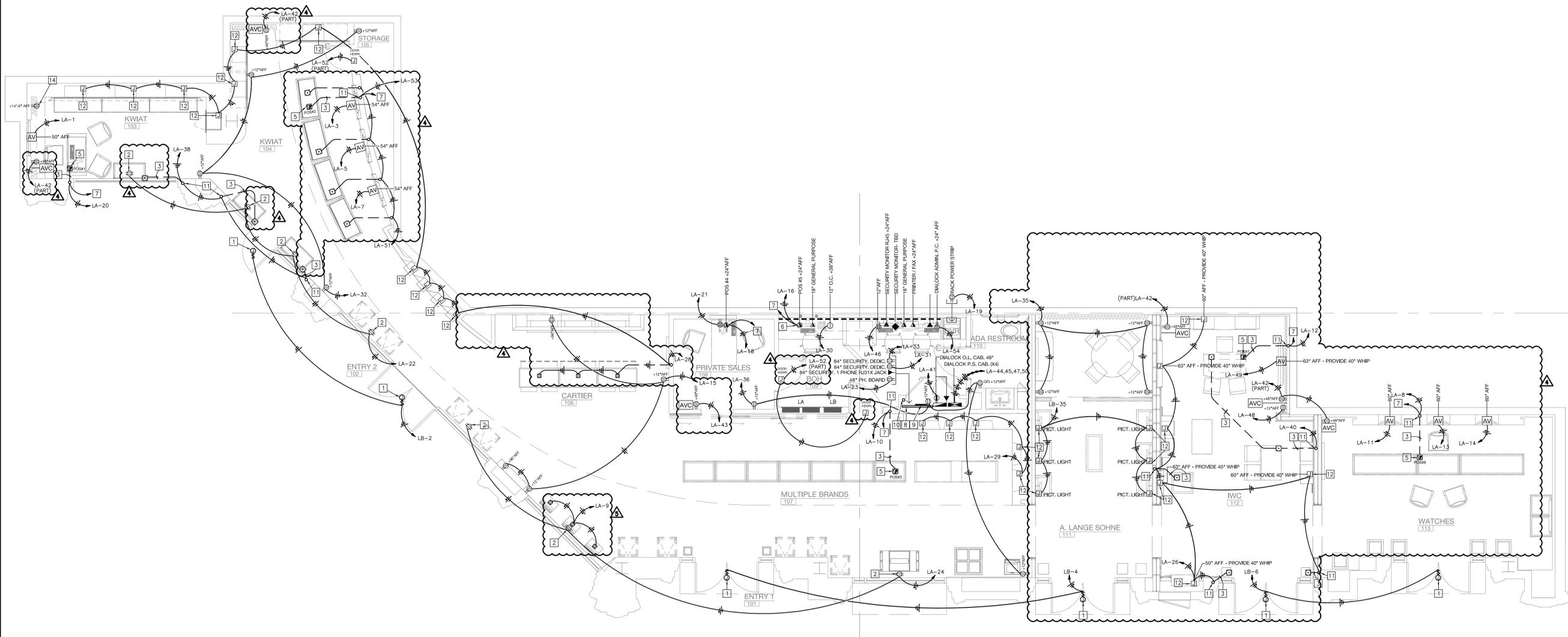
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THE SHOPPES AT THE PALAZZO, SPACE #1102, 3300 LAS VEGAS BOULEVARD SOUTH, LAS VEGAS, NV, 89109

ELECTRICAL POWER PLAN



**1 ELECTRICAL POWER PLAN**  
 SCALE: 1/4"=1'-0"

**POWER PLAN GENERAL NOTES:**

- COORDINATE EXACT COLOR, LOCATION AND MOUNTING HEIGHT OF ALL DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.
- OBTAIN A COPY OF AND REVIEW LANDLORD'S LATEST EDITION OF THE "TENANT DESIGN AND CONSTRUCTION" HANDBOOK, IF AVAILABLE, AND COMPLY WITH ALL REQUIREMENTS. WHERE CONFLICTS BETWEEN HANDBOOK AND CONSTRUCTION DOCUMENTS ARISE, MOST STRINGENT VERSION SHALL GOVERN.
- REMOVE ALL EXISTING ELECTRICAL EQUIPMENT, FIXTURES, SYSTEMS, CONDUIT AND WIRING, ETC., NOT BEING RE-USED. DO NOT JUST ABANDON.
- ALL EQUIPMENT SHALL BEAR UNDERWRITERS LABORATORIES, INC. LABELS FOR THE USE INTENDED.
- ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE JURISDICTIONAL AUTHORITIES, THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE, CLARK COUNTY NEVADA AND THE LANDLORD'S INSURANCE CARRIER.
- MINIMUM CONDUIT SIZE SHALL BE 3/4" CONDUIT.
- IF ALLOWED BY CODE AND THE AUTHORITY HAVING JURISDICTION, TYPE MC CABLE MAY BE USED FOR BRANCH CIRCUIT WIRING (EXCEPT HOMERUNS) ABOVE ACCESSIBLE CEILING, WITHIN FURRED SPACES, OR IN HOLLOW FRAMED PARTITIONS. INSTALL AND SUPPORT TYPE MC CABLE PER NEC 330.30. MC CABLE SHALL ONLY BE USED IN DRY LOCATIONS WHERE NOT SUBJECT TO PHYSICAL DAMAGE. MC CABLE SHALL HAVE A BLUE STRIPE ON THE SHEATH.
- ALL WIRING SHALL ONLY BE INSTALLED IN CONDUIT. BX, OR ROMEX TYPE WIRING SHALL NOT BE PERMITTED.
- ALL WIRING SHALL BE COPPER ONLY. ALL CONDUCTORS ARE TO HAVE 600-VOLT INSULATION, TYPE THHN/THWN.
- MINIMUM WIRE SIZE IS NO. 12 AWG EXCLUDING LOW VOLTAGE WIRING. ALL WIRING SHALL BE COLOR CODED PER NEC. SAME COLOR SHALL IDENTIFY SAME PHASE THROUGHOUT THE SYSTEM.
- FLEXIBLE CONDUIT MAY BE USED FOR FINAL CONNECTIONS ONLY WITH A 6'-0" MAXIMUM LENGTH.
- ALL TENANT ELECTRICAL EQUIPMENT MUST BE AS MANUFACTURED BY GENERAL ELECTRIC.
- THE FLOOR SHALL NOT BE SAW CUT TO BRING ELECTRICAL SERVICE TO FREESTANDING ELEMENTS. THE FLOOR SHALL BE CORE DRILLED, SLEEVED AND EQUIPPED WITH THE APPROPRIATE ASSEMBLY TO PROVIDE FOR PROPER FIRE AND MOISTURE CONTROL.

**POWER PLAN KEYED NOTES:**

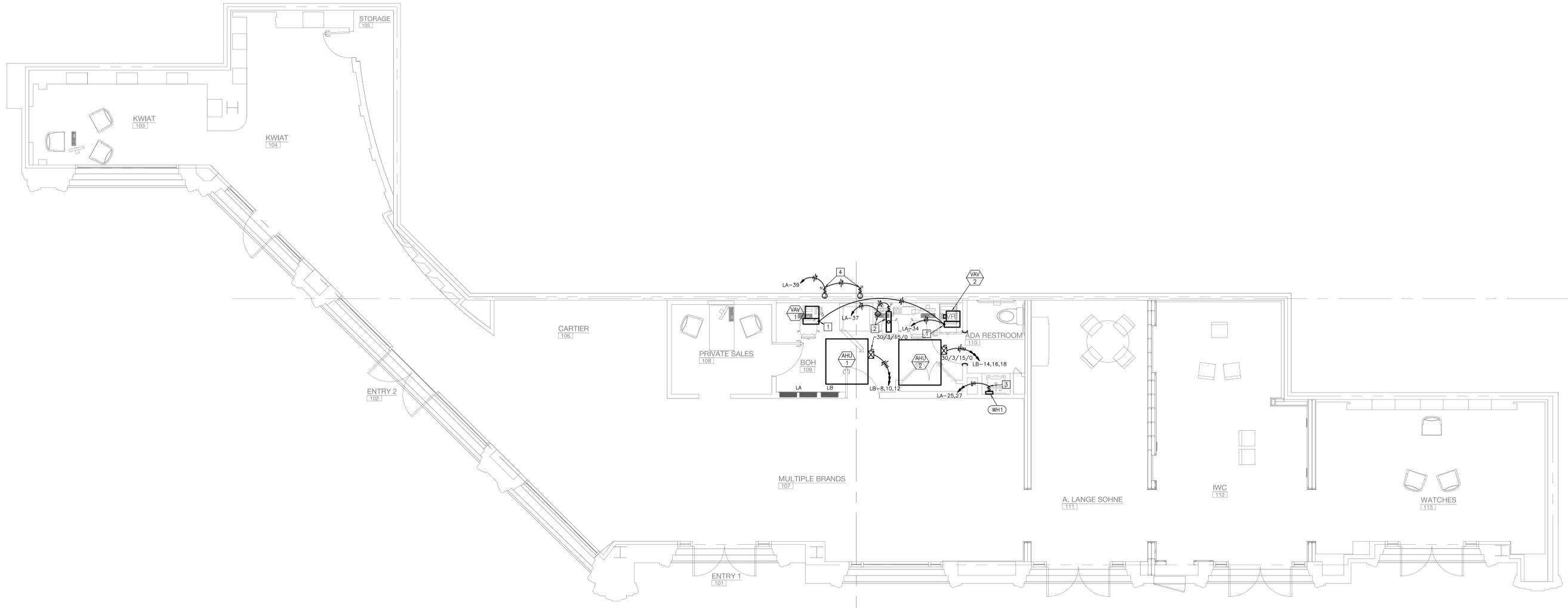
- PROVIDE JUNCTION BOX WITH 20A/1P TOGGLE DISCONNECT SWITCH IN ACCESSIBLE LOCATION FOR POWER CONNECTION TO SIGN LIGHTING. COORDINATE EXACT LOCATION WITH ARCHITECT AND SIGN PROVIDER PRIOR TO ROUGH-IN.
- PROVIDE CEILING MOUNTED SHOW WINDOW RECEPTACLE. COORDINATE EXACT LOCATION AND COLOR WITH ARCHITECT PRIOR TO INSTALLATION.
- CONDUIT ROUTED BELOW FLOOR. COORDINATE CONDUIT ROUTING BELOW FLOOR WITH ARCHITECT AND TENANT COORDINATOR PRIOR TO ROUGH-IN.
- PROVIDE FLUSH FLOOR MOUNTED DUPLEX RECEPTACLE (STAINLESS STEEL). COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
- FLOOR MOUNTED POS. PROVIDE (1) DEDICATED DOUBLE DUPLEX RECEPTACLE, (2) DATA PORTS, AND (2) TELEPHONE PORTS. PROVIDE STAINLESS STEEL FINISH FOR ALL EXPOSED SURFACES. BOX RECESSED AND COVER PLATE EXPOSED AT WOOD AND CARPET FLOOR FINISHES.
- WALL MOUNTED POS. PROVIDE (1) DEDICATED DOUBLE DUPLEX RECEPTACLE, (2) DATA PORTS, AND (2) TELEPHONE PORTS. PROVIDE STAINLESS STEEL FINISH FOR ALL EXPOSED SURFACES.
- PROVIDE 3/4" CONDUIT WITH PULL STRING FOR EACH TELEPHONE/DATA DEVICE BACK TO TELEPHONE BOARD UNLESS NOTED OTHERWISE.
- PROVIDE 48" WIDE, 3/4" FIRE RESISTANT PLYWOOD, 30" A.F.F. TO THE CEILING FOR MOUNTING OF TELEPHONE/SECURITY/MIS EQUIPMENT. PROVIDE 3/4" CONDUIT WITH PULLSTRING FROM EACH TELEPHONE AND DATA OUTLET BACK TO THIS LOCATION.
- PROVIDE COMMUNICATIONS SYSTEM GROUND BAR PER TIA/EIA STANDARDS AND CONNECT WITH #6 COPPER GROUND IN 3/4" CONDUIT TO NEUTRAL GROUND BOND CONNECTION AT BUILDING SERVICE ENTRANCE.
- EXTEND 1-1/2" TELEPHONE CONDUIT TO THIS LOCATION.
- CONDUIT RISER CONCEALED IN WALL TO ABOVE ACCESSIBLE CEILING.
- PROVIDE JUNCTION BOX FOR POWER CONNECTION TO MILLWORK LIGHTING. COORDINATE EXACT NUMBER AND LOCATION OF JUNCTION BOXES WITH MILLWORK CONTRACTOR/SHOP DRAWINGS AND ARCHITECT PRIOR TO ROUGH-IN.
- PROVIDE A DUPLEX RECEPTACLE AND 2'-0" FLUORESCENT STRIP FIXTURE WITH WIRE GUARD, EQUIPPED WITH ILLUMINATED PILOT TYPE LIGHT SWITCH ABOVE CEILING ADJACENT TO HVAC EQUIPMENT. SWITCH SHALL BE COVERED WITH PULLSTRING AND DATA OUTLET BACK TO THIS LOCATION.
- EXISTING LANDLORD RECEPTACLE TO BE RELOCATED TO ACCESSIBLE LOCATION. MAINTAIN EXISTING CIRCUITING TO LANDLORD PANELBOARD. EXTEND CONDUIT AND CONDUCTORS AS NECESSARY TO REACH NEW ACCESSIBLE LOCATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND ANY REQUIREMENTS OR DOWN TIME WITH LANDLORD REPRESENTATIVE.

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**1 HVAC POWER PLAN**  
SCALE: 1/4"=1'-0"

**HVAC POWER PLAN GENERAL NOTES:**

1. COORDINATE EXACT COLOR, LOCATION AND MOUNTING HEIGHT OF ALL DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.
2. OBTAIN A COPY OF AND REVIEW LANDLORD'S LATEST EDITION OF THE "TENANT DESIGN AND CONSTRUCTION" HANDBOOK, IF AVAILABLE, AND COMPLY WITH ALL REQUIREMENTS. WHERE CONFLICTS BETWEEN HANDBOOK AND CONSTRUCTION DOCUMENTS ARISE, MOST STRINGENT VERSION SHALL GOVERN.
3. REMOVE ALL EXISTING ELECTRICAL EQUIPMENT, FIXTURES, SYSTEMS, CONDUIT AND WIRING, ETC., NOT BEING RE-USED. DO NOT JUST ABANDON.
4. ALL EQUIPMENT SHALL BEAR UNDERWRITERS LABORATORIES, INC. LABELS FOR THE USE INTENDED.
5. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE JURISDICTIONAL AUTHORITIES, THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE, CLARK COUNTY NEVADA AND THE LANDLORD'S INSURANCE CARRIER.
6. MINIMUM CONDUIT SIZE SHALL BE 3/4" CONDUIT.
7. IF ALLOWED BY CODE AND THE AUTHORITY HAVING JURISDICTION, TYPE MC CABLE MAY BE USED FOR BRANCH CIRCUIT WIRING (EXCEPT HOMERUNS) ABOVE ACCESSIBLE CEILING, WITHIN FURRED SPACES, OR IN HOLLOW FRAMED PARTITIONS. INSTALL AND SUPPORT TYPE MC CABLE PER NEC 330.30. MC CABLE SHALL ONLY BE USED IN DRY LOCATIONS WHERE NOT SUBJECT TO PHYSICAL DAMAGE. MC CABLE SHALL HAVE A BLUE STRIPE ON THE SHEATH.
8. ALL WIRING SHALL ONLY BE INSTALLED IN CONDUIT. BX, OR ROMEX TYPE WIRING SHALL NOT BE PERMITTED.
9. ALL WIRING SHALL BE COPPER ONLY. ALL CONDUCTORS ARE TO HAVE 600-VOLT INSULATION, TYPE THHN/THWN.
10. MINIMUM WIRE SIZE IS NO. 12 AWG EXCLUDING LOW VOLTAGE WIRING. ALL WIRING SHALL BE COLOR CODED PER NEC. SAME COLOR SHALL IDENTIFY SAME PHASE THROUGHOUT THE SYSTEM.
11. FLEXIBLE CONDUIT MAY BE USED FOR FINAL CONNECTIONS ONLY WITH A 6'-0" MAXIMUM LENGTH.
12. ALL TENANT ELECTRICAL EQUIPMENT MUST BE AS MANUFACTURED BY GENERAL ELECTRIC.
13. THE FLOOR SHALL NOT BE SAW CUT TO BRING ELECTRICAL SERVICE TO FREESTANDING ELEMENTS. THE FLOOR SHALL BE CORE DRILLED, SLEEVED AND EQUIPPED WITH THE APPROPRIATE ASSEMBLY TO PROVIDE FOR PROPER FIRE AND MOISTURE CONTROL.

**HVAC POWER PLAN KEYED NOTES:**

- 1 PROVIDE CONNECTION TO INTEGRAL DISCONNECT. COORDINATE EXACT LOCATION WITH DIVISION 15.
- 2 PROVIDE A DUPLEX RECEPTACLE AND 2'-0" FLUORESCENT STRIP FIXTURE WITH WIRE GUARD, EQUIPPED WITH ILLUMINATED PILOT TYPE LIGHT SWITCH ABOVE CEILING ADJACENT TO HVAC EQUIPMENT. SWITCH SHALL BE ILLUMINATED WHEN OFF. COORDINATE FINAL DEVICE LOCATIONS WITH DIVISION 15.
- 3 PROVIDE 20A/2P DISCONNECT SWITCH FOR POWER CONNECTION TO WATER HEATER. COORDINATE EXACT LOCATION WITH DIVISION 15.
- 4 PROVIDE 20A/1P MOTOR RATED TOGGLE DISCONNECT SWITCH FOR POWER CONNECTION TO MOTORIZED FIRE/SMOKE DAMPER. COORDINATE EXACT LOCATION AND CONTROL REQUIREMENTS WITH DIVISION 15.

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**HVAC POWER PLAN**

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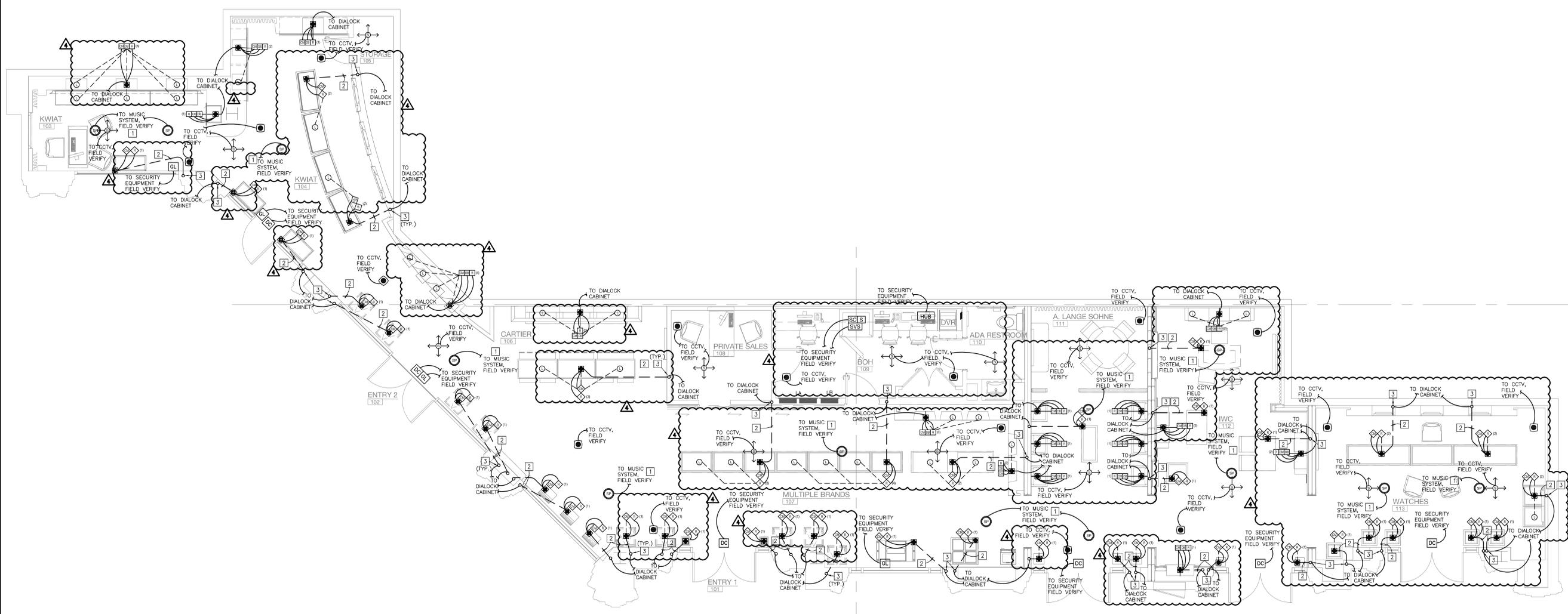


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THE SHOPPES AT THE PALAZZO, SPACE #102, 3363 LAS VEGAS BOULEVARD SOUTH, LAS VEGAS, NV 89109

**ELECTRICAL SECURITY PLAN**



**1 ELECTRICAL SECURITY PLAN**  
SCALE: 1/4"=1'-0"

**SECURITY PLAN GENERAL NOTES:**

1. COORDINATE EXACT COLOR, LOCATION AND MOUNTING HEIGHT OF ALL DEVICES WITH ARCHITECT PRIOR TO ROUGH-IN.
2. OBTAIN A COPY OF AND REVIEW LANDLORD'S LATEST EDITION OF THE "TENANT DESIGN AND CONSTRUCTION" HANDBOOK, IF AVAILABLE, AND COMPLY WITH ALL REQUIREMENTS. WHERE CONFLICTS BETWEEN HANDBOOK AND CONSTRUCTION DOCUMENTS ARISE, MOST STRINGENT VERSION SHALL GOVERN.
3. REMOVE ALL EXISTING ELECTRICAL EQUIPMENT, FIXTURES, SYSTEMS, CONDUIT AND WIRING, ETC., NOT BEING RE-USED. DO NOT JUST ABANDON.
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5. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE JURISDICTIONAL AUTHORITIES, THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE, CLARK COUNTY NEVADA AND THE LANDLORD'S INSURANCE CARRIER.
6. MINIMUM CONDUIT SIZE SHALL BE 3/4" CONDUIT.
7. IF ALLOWED BY CODE AND THE AUTHORITY HAVING JURISDICTION, TYPE MC CABLE MAY BE USED FOR BRANCH CIRCUIT WIRING (EXCEPT HOMERUNS) ABOVE ACCESSIBLE CEILING, WITHIN FURRED SPACES, OR IN HOLLOW FRAMED PARTITIONS. INSTALL AND SUPPORT TYPE MC CABLE PER NEC 330.30. MC CABLE SHALL ONLY BE USED IN DRY LOCATIONS WHERE NOT SUBJECT TO PHYSICAL DAMAGE. MC CABLE SHALL HAVE A BLUE STRIPE ON THE SHEATH.
8. ALL WIRING SHALL ONLY BE INSTALLED IN CONDUIT, BX, OR ROMEX TYPE WIRING SHALL NOT BE PERMITTED.
9. ALL WIRING SHALL BE COPPER ONLY. ALL CONDUCTORS ARE TO HAVE 600-VOLT INSULATION, TYPE THHN/THWN.
10. MINIMUM WIRE SIZE IS NO. 12 AWG EXCLUDING LOW VOLTAGE WIRING. ALL WIRING SHALL BE COLOR CODED PER NEC. SAME COLOR SHALL IDENTIFY SAME PHASE THROUGHOUT THE SYSTEM.
11. FLEXIBLE CONDUIT MAY BE USED FOR FINAL CONNECTIONS ONLY WITH A 6'-0" MAXIMUM LENGTH.
12. ALL TENANT ELECTRICAL EQUIPMENT MUST BE AS MANUFACTURED BY GENERAL ELECTRIC.
13. THE FLOOR SHALL NOT BE SAW CUT TO BRING ELECTRICAL SERVICE TO FREESTANDING ELEMENTS. THE FLOOR SHALL BE CORE DRILLED, SLEEVED AND EQUIPPED WITH THE APPROPRIATE ASSEMBLY TO PROVIDE FOR PROPER FIRE AND MOISTURE CONTROL.
14. PROVIDE ALL EQUIPMENT, WIRING AND TERMINATIONS UNLESS OTHERWISE NOTED.
15. PROVIDE HOMERUN FOR ALL SPEAKER WIRING TO SOUND SYSTEM HEAD END LOCATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND SOUND SYSTEM VENDOR.
16. PROVIDE HOMERUN FOR ALL SECURITY DEVICE WIRING TO SECURITY HEAD END LOCATION. COORDINATE EXACT LOCATION WITH ARCHITECT AND SECURITY SYSTEM VENDOR.
17. REFER TO CEILING SECURITY LEGEND ON SHEET E201 FOR ADDITIONAL INFORMATION AND CONTRACTOR RESPONSIBILITIES.
18. ALL DATA WIRING TO BE CAT5E. EXTEND ALL CONDUIT FROM EQUIPMENT LOCATIONS TO 6" ABOVE CEILING. CONCEAL ALL CONDUIT WITHIN NEW CONSTRUCTION AND FINISHES.
19. ALL CEILING MOUNTED SECURITY DEVICES ARE TO BE WHITE UNLESS OTHERWISE NOTED.
20. PROVIDE HOME RUN FROM EACH CAMERA AND FLAT SCREEN MONITOR BACK TO INTELLEX SECURITY MONITOR.
21. LOW VOLTAGE WIRING FOR CONTROLS, AUDIO/VISUAL, TELEPHONE/DATA AND SECURITY MAY UTILIZE PLENUM RATED CONDUCTORS NOT INSTALLED IN CONDUIT WHEN NEC, LOCAL AUTHORITY HAVING JURISDICTION, CLARK COUNTY NEVADA, LANDLORD AND LANDLORD'S INSURANCE CARRIER PERMIT. SUCH CABLING MUST BE PROPERLY SUPPORTED IN ACCORDANCE WITH THE NEC. OTHERWISE PROVIDE 3/4" CONDUIT HOMERUN.

**SECURITY PLAN KEYED NOTES:**

- 1 TO MUSIC SYSTEM HEAD-END EQUIPMENT. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN.
- 2 CONDUIT ROUTED BELOW FLOOR. COORDINATE CONDUIT ROUTING BELOW FLOOR WITH ARCHITECT AND TENANT COORDINATOR PRIOR TO ROUGH-IN.
- 3 CONDUIT RISER CONCEALED IN WALL TO ABOVE ACCESSIBLE CEILING.

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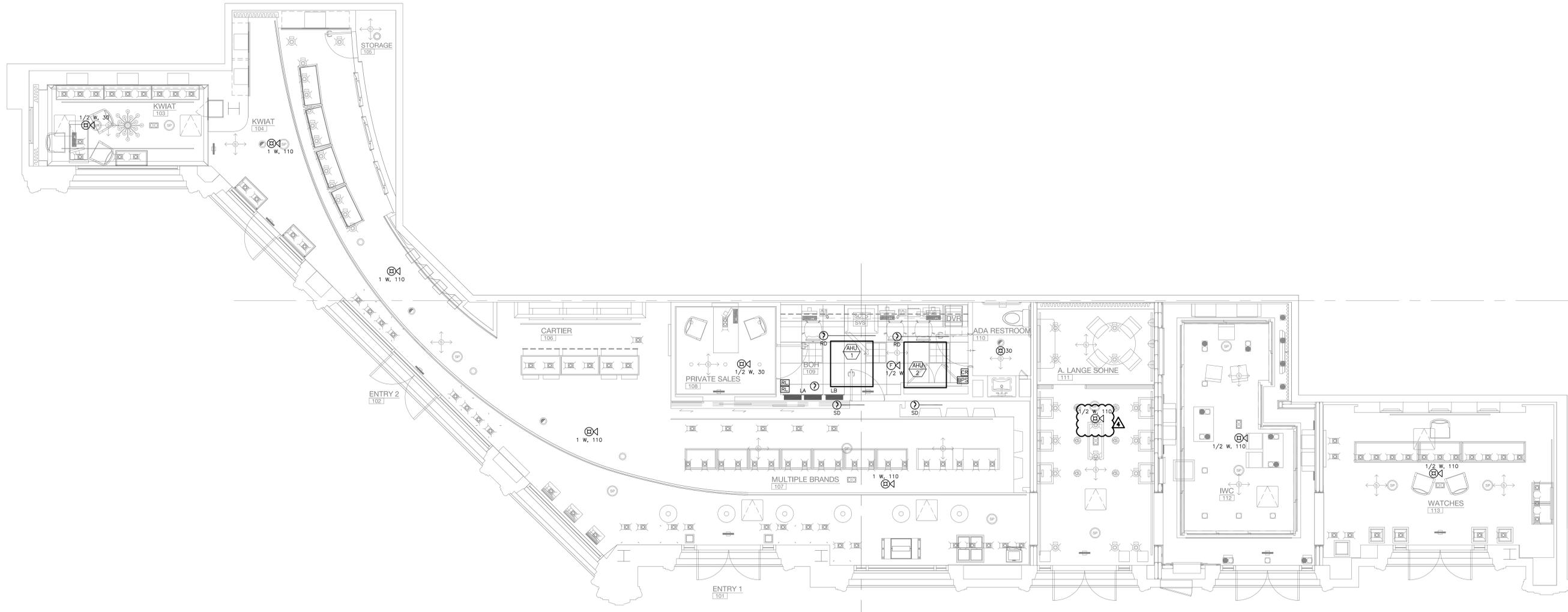


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THE SHOPPES AT THE PALAZZO, SPACE #1102, 3302 LAS VEGAS BOULEVARD SOUTH, LAS VEGAS, NV, 89109

FIRE ALARM PLAN



**1 FIRE ALARM PLAN**  
SCALE: 1/4"=1'-0"

- FIRE ALARM GENERAL NOTES:**
1. FIRE ALARM SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH NFPA 70 AND NFPA 72. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
  2. DRAWINGS ARE FOR REFERENCE ONLY. SEE CONTRACTOR SUBMITTAL FOR FURTHER INFORMATION.
  3. ALL FIRE ALARM WIRING MUST BE INSTALLED IN CONDUIT.

FIRE ALARM LEGEND	
SYMBOL	TYPE
	FIRE ALARM PULL STATION MOUNTED AT 48" AFF, UNO
	CONTROL RELAY FOR MUSIC MUTE UPON ALARM FUNCTION
	BOOSTER POWER SUPPLY
	CEILING MOUNTED AUDIBLE APPLIANCE X W INDICATES SPEAKER WATTAGE
	CEILING MOUNTED VISIBLE APPLIANCE XX INDICATES CANDELA RATING
	CEILING MOUNTED AUDIBLE/VISIBLE APPLIANCE X W INDICATES SPEAKER WATTAGE, XX INDICATES CANDELA RATING
	SMOKE DETECTOR SD= MOUNTED IN SUPPLY DUCT RD= MOUNTED IN RETURN DUCT
	REMOTE TEST STATION WITH INDICATING LIGHT

- REVISIONS**
- 08-27-07 ISSUED FOR PRICING
  - 10-29-07 REVISION NO. 1
  - 11-28-07 REVISION NO. 2
  - 11-29-07 REVISION NO. 3

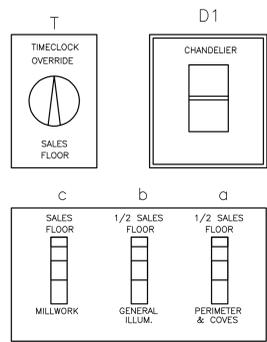
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PROJECT NO. 06100  
DATE 12-11-06  
SCALE AS NOTED  
DRAWN BY ELS  
APPROVED \_\_\_\_\_

DRAWING NUMBER

**E103**

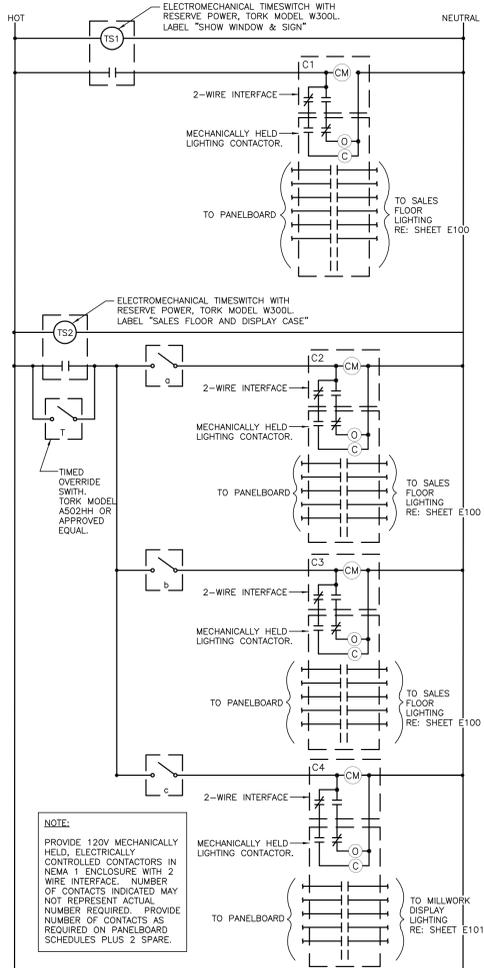
**NOTE:**  
FIRE ALARM APPLIANCE LAYOUT IS FOR REFERENCE ONLY. PLEASE REFER TO CONTRACTOR DRAWINGS PROVIDED BY THE LANDLORD'S FIRE ALARM CONTRACTOR (SAFE ELECTRONICS) FOR FINAL APPLIANCE LAYOUT, WIRING, SEQUENCE OF OPERATIONS, ETC.



MAIN SWITCHBANK

- NOTE:
- ARRANGE SWITCHES AND TIME SWITCH OVERRIDE AS INDICATED ABOVE. FIELD MODIFY ARRANGEMENT TO COMPLY WITH SPACE LIMITATIONS.
  - PROVIDE FACTORY ENGRAVED FACE-PLATES OR MACHINE PRINTED LABELS WITH TEXT AS INDICATED.

3 SWITCHBANK ELEVATION  
NO SCALE

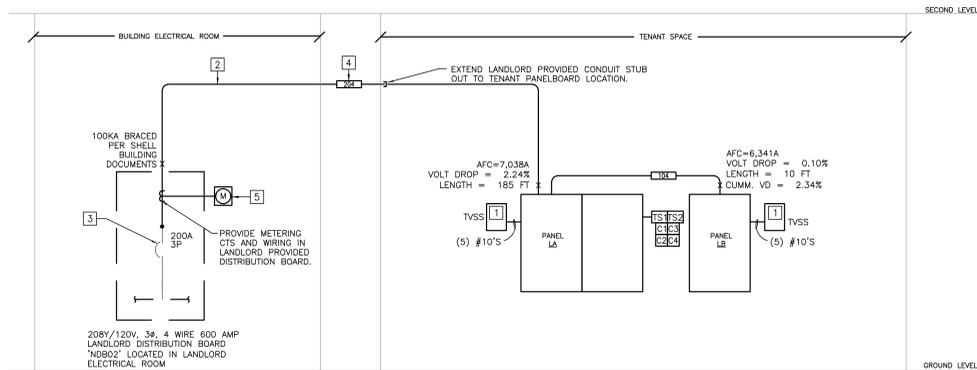


4 LIGHTING CONTROL DIAGRAM  
NOT TO SCALE

CIRCUIT SCHEDULE:

ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATION AND COPPER CONDUCTORS WITH TYPE THHN/THWN-2 INSULATION. WHERE ALUMINUM CONDUCTORS ARE ALLOWED PER SPECIFICATIONS AND FOR TERMINATION OR INSULATION TYPES RATED LESS THAN 75 DEG C, MODIFY SIZES ACCORDING TO NFPA 70.

- 104 100A, (4)#3, (1)#6G, 1-1/4" C
- 204 200A, (4)#3/0 (1)#6G, 2" C



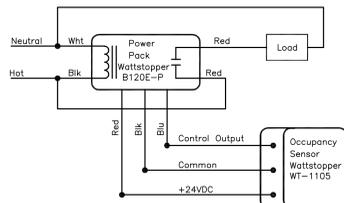
1 ELECTRICAL RISER DIAGRAM  
NOT TO SCALE

TENANT ELECTRICAL FEEDER LOAD SUMMARY			
TENANT OCCUPANCY TYPE:	M	FEEDER DESCRIPTION:	
TENANT SQUARE FOOTAGE:	3,056	208Y/120V, 3PH, 4W	
LOAD DESCRIPTION	Connected KVA	Demand FACTOR	Demand KVA
HVAC - SUMMER	0.00	100%	0.00
HVAC - WINTER	0.00	100%	0.00
LIGHTING (PER NEC-220)	12.61	125%	15.76
RECEPTACLES	2.88	100%/50%	2.88
MOTOR LOADS	1.73	100%	1.73
LARGEST MOTOR LOAD	1.73	125%	2.16
SUPPLEMENTAL ELECTRIC HEAT	3.00	100%	3.00
MISCELLANEOUS EQUIPMENT	11.53	100%	11.53
DISPLAY CASE/SIGNAGE	6.34	125%	7.93
SHOW WINDOW / TRACK LIGHTING	10.80	PER NEC	13.50
TOTAL LOAD	50.62	KVA	58.49
TOTAL AMPACITY	140.51	AMPS	162.35
FEEDER AMPACITY	200	AMPS	200.00
SPARE CAPACITY		AMPS	38

PANELBOARD: LB (NEW)

CKT NO.	DESCRIPTION	VOLTAMPS/PHASE			WIRE NO.	BKR NO.	P	WIRE NO.	VOLTAMPS/PHASE			DESCRIPTION	CKT NO.
		A	B	C					A	B	C		
EM 1	LTG - BOH/ATRG/RSR+EM LTG	518			12	1	1	20	12	1,200		PWR - STOREFRONT SIGN S	2
C1 3	LTG - CHANDELIERS		300		12	1	1	20	12	1,200		PWR - STOREFRONT SIGN NE	4
C2 5	LTG - COVES			700	12	1	1	20	12	1,200		PWR - STOREFRONT SIGN SE	6
C3,EM 7	LTG - KWAT 103+EM LTG	1,101			12	1	1	20	12	576		AHU-1	8
9	SPARE				20	1	3	15	12			1-1/2 HP	10
C3 11	LTG - MULTI-BRAND OVER CASES			506	12	1	1	20	12	576		577	12
C3,EM 15	LTG - A. LANGE SONNE+EM LTG			950	12	1	3	15	12	577		1-1/2 HP	14
C1 17	LTG - SHOW WINDOWS			782	12	1	1	20	12			578	16
C2,EM 19	LTG - SALES FLOOR PERIM.+EM LTG	628			12	1	1	20	12			578	18
C3,EM 21	LTG - 107/108 GENERAL +EM LTG			1,004	12	1	1	20	12				20
C2,EM 23	LTG - 104/106 GENERAL +EM LTG			759	12	1	1	20	12				22
C2,EM 25	LTG - MULTI-BRAND PERIM.+EM LTG	616			12	1	1	20	12				24
C2 27	LTG - IWC+EM LTG			1,350	12	1	1	20	12				26
29	PWR - TIMESWITCHES & CNTCTRS			200	12	1	1	20	12				28
31	SPARE				20	1	1	20	12				30
33	SPARE				20	1	1	20	12				32
35	PWR - A. LANGE SONNE PIG LTS			600	12	1	1	20	12				34
37	SPARE				20	1	1	20	12				36
39	SPARE				20	1	3	30	10				38
41	SPARE				20	1	1	20	12				40
43	SPARE				20	1	1	20	12				42
45	SPARE				20	1	1	20	12				44
47	SPARE				20	1	1	20	12				46
49	SPARE				20	1	1	20	12				48
51	SPARE				20	1	1	20	12				50
53	SPARE				20	1	1	20	12				52
55	SPARE				20	1	1	20	12				54
57	SPARE				20	1	3	100	2				56
59	SPARE				20	1	1	20	12				58
61	SPARE				20	1	1	20	12				60

NOTE: # - VIA LTG CONTACTOR # EM - EMERG LTG / LOCKABLE TAB



2 OCCUPANCY SENSOR DETAIL  
NOT TO SCALE

RISER DIAGRAM GENERAL NOTES:

- ALL TENANT ELECTRICAL EQUIPMENT MUST BE AS MANUFACTURED BY GENERAL ELECTRIC.
- TENANT'S ENTIRE ELECTRICAL SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF THE JURISDICTIONAL AUTHORITIES, THE NATIONAL ELECTRICAL CODE, CLARK COUNTY NEVADA, AND THE LANDLORD'S INSURANCE CARRIER.
- ALL WIRE SHALL BE COPPER TYPE THHN/THWN INSULATION IN METALLIC CONDUIT. FLEX CONDUIT MAY BE USED FOR FINAL CONNECTIONS ONLY (6"-0" MAXIMUM LENGTH). AC (BX) CABLE IS NOT PERMITTED.
- ENGRAVED MECHANICALLY ATTACHED NAME PLATES SHALL BE FURNISHED AND INSTALLED ON EACH COMPONENT OF THE ELECTRICAL DISTRIBUTION SYSTEM TO INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING: PANELBOARDS, TRANSFORMERS, DISCONNECT SWITCHES, MOTOR STARTERS, ETC.
- AFC IS THE AVAILABLE FAULT CURRENT.
- PANELBOARD PHASE LOADS MUST BE BALANCED TO WITHIN 10% OF EACH OTHER.
- BREAKERS MUST BE BOLT-ON TYPE.
- ALL EQUIPMENT SHALL BE UL LISTED.
- COORDINATE ALL NEW WORK WITH LANDLORD AND IN ACCORDANCE WITH LANDLORD REQUIREMENTS.

RISER DIAGRAM KEYED NOTES:

- LIBERT ACCUAR #A1120Y11RKE TRANSIENT VOLTAGE SURGE SUPPRESSOR, MOUNT WITHIN 6" OF PANELBOARD AND NIPPLE THROUGH. CONDUCTOR LENGTHS SHALL BE AS SHORT AND STRAIGHT AS POSSIBLE.
- REUSE EXISTING CONDUIT IF SCHEDULED CONDITIONS CAN BE MET. PROVIDE NEW AS REQUIRED.
- EXISTING 200A CIRCUIT BREAKER DISCONNECT SWITCH IN LANDLORD SWITCHBOARD. COORDINATE ALL TI-IN REQUIREMENTS WITH LANDLORD REPRESENTATIVE AND LOCAL UTILITY.
- CONDUCTORS AND CONDUIT UPSIZED FOR VOLTAGE DROP.
- PROVIDE METER IN LANDLORD PROVIDED METER CABINET PER UTILITY COMPANY REQUIREMENTS AND AS DIRECTED BY THE LANDLORD. VERIFY EXACT LOCATION AND REQUIREMENTS WITH LANDLORD REPRESENTATIVE.

PANELBOARD: LA (NEW)

CKT NO.	DESCRIPTION	VOLTAMPS/PHASE			WIRE NO.	BKR NO.	P	WIRE NO.	VOLTAMPS/PHASE			DESCRIPTION	CKT NO.
		A	B	C					A	B	C		
1	RCPT - KWAT 103 TV/DISPLAY			250	12	20	1	1	20	12		TVSS	2
3	RCPT - KWAT 104 TV/DISPLAY 1			250	12	20	1	3	30	10			4
5	RCPT - KWAT 104 TV/DISPLAY 2			250	12	20	1	1	20	12			6
7	RCPT - KWAT 104 TV/DISPLAY 3			450	12	20	1	1	20	12	400	RCPT - POS 8 WATCHES	8
9	RCPT - ENTRY FLOOR			300	12	20	1	1	20	12	400	RCPT - POS 3 MULTIPLE BRANDS	10
11	RCPT - WATCHES WEST TV			250	12	20	1	1	20	12	250	RCPT - POS 7 WAL MARE	12
13	RCPT - WATCHES MID TV			250	12	20	1	1	20	12	250	RCPT - POS 6 WAL MARE	14
15	RCPT - SOUTH GEN PURPOSE			340	12	20	1	1	20	12	400	RCPT - POS 5 BOH	16
17	RCPT - IWC TV DISPLAY WEST			300	12	20	1	1	20	12	400	RCPT - POS 4 PRIVATE SALES	18
19	RCPT - BOH A/V			500	12	20	1	1	20	12	400	RCPT - POS 1 KWAT	20
21	RCPT - PRIVATE SALES			360	12	20	1	1	20	12	540	RCPT - NORTH SHOW WIND.	22
23	RCPT - TELEPHONE BOARD			180	12	20	1	1	20	12	720	RCPT - SOUTH SHOW WIND.	24
25	WATER HEATER			1,500	12	20	2	1	20	12	1,750	LTG - IWC DISPLAYS	26
27	3.0 KW			1,500	12	20	1	1	20	12	1,158	LTG - KWAT & CARTER DISPLAYS	28
29	LTG - MULTI-BRAND WALL DISPLAY			260	12	20	1	1	20	12	1,080	RCPT - BOH PLUMBGLD A	30
31	RCPT - SECURITY A			180	12	20	1	1	20	12	540	RCPT - KWAT GEN. PURPOSE	32
33	RCPT - SECURITY B			180	12	20	1	1	20	12	250	PWR - VAV CONTROLS	34
35	RCPT - A. LANGE SONNE GENERAL			720	12	20	1	1	20	12	720	RCPT - NORTH GEN. PURPOSE	36
37	RCPT/LTG - AHU MAINTENANCE			245	12	20	1	1	20	12	225	PWR - KWAT SW DISPLAYS	38
39	PWR - FIRE/SMOKE DAMPERS			200	12	20	1	1	20	12	500	LTG - IWC DISPLAY DESKS	40
41	RCPT - DIALOCK OL CABINET			200	12	20	1	1	20	12	200	RCPT - KEYPAD CTRLS	42
43	RCPT - PRIV. SALES KEYPAD CTRLS			180	12	20	1	1	20	12	250	PWR - DIALOCK POWER SUPPLY A	44
45	PWR - DIALOCK POWER SUPPLY B			250	12	20	1	1	20	12	360	RCPT - SECURITY MONITOR	46
47	PWR - DIALOCK POWER SUPPLY C			250	12	20	1	1	20	12	180	RCPT - IWC GENERAL	48
49	RCPT - IWC TV DISPLAY			340	12	20	1	1	20	12	250	PWR - DIALOCK POWER SUPPLY D	50
51	PWR - KWAT 104 DISPLAYS			600	12	20	1	1	20	12	100	PWR - DOOR HARDWARE	52
53	RCPT - POS 2 KWAT 104			400	12	20	1	1	20	12	6,135	RCPT - DIALOCK ADMIN PC	54
55	SPARE				20	1	1	20	12				56
57	SPARE				20	1	3	100	2		6,017	PNLBD LB	58
59	SPARE				20	1	1	20	12		5,900		60

NOTE: # - VIA LTG CONTACTOR # FA - RED/LOCKABLE TAB FEED THRU CONNECTION: #4/0

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED SHORT CIRCUIT CALCULATIONS AND THE AIC RATINGS INDICATE FOR EACH DEVICE IS ADEQUATE TO PROTECT THE EQUIPMENT AND THE ELECTRICAL SYSTEM.

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED VOLTAGE DROP CALCULATIONS AND ALL BRANCH CIRCUITS AND FEEDERS COMPLY WITH NEC 210-19(c) FPN NO. 4.

THE DESIGN PROFESSIONAL HAS PERFORMED ALL REQUIRED LOAD CALCULATIONS AND VERIFIES THAT ALL UPSTREAM PANELS AND EQUIPMENT ARE NOT OVERLOADED.



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ELECTRICAL DETAILS AND SCHEDULES

REVISIONS  
08-27-07 ISSUED FOR PRICING  
10-29-07 REVISION NO. 1  
11-28-07 REVISION NO. 2  
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PROJECT NO. 06100  
DATE 12-11-06  
SCALE AS NOTED  
DRAWN BY ELS  
APPROVED

DRAWING NUMBER  
**E200**



**SECTION 16A GENERAL ELECTRICAL REQUIREMENTS**

**16A-1 GENERAL INSTRUCTIONS**  
**16A-1-1 GENERAL REQUIREMENTS**

ALL REQUIREMENTS UNDER DIVISION 1 AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS SECTION AND DIVISION 1 WHERE THE REQUIREMENTS OF THIS SECTION AND DIVISION EXCEED THOSE OF DIVISION 1. THIS SECTION AND DIVISION 1 TAKE PRECEDENCE AND BECOME THOROUGHLY FAMILIAR WITH ALL THE CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION, SECTION OR BOTH. WORK REQUIRED UNDER THIS DIVISION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE ELECTRICAL SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, OR REASONABLY INFERRED TO BE NECESSARY TO FACILITATE EACH SYSTEM'S FUNCTIONING AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED.

THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK.

DRAWINGS ARE GRAPHIC REPRESENTATIONS OF THE WORK UPON WHICH THE CONTRACT IS BASED. THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER, INCLUDING SIZES, SHAPES, LOCATIONS, AND CONNECTIONS. THEY ALSO CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE EQUIPMENT, FIXTURES, OUTLETS AND CIRCUITS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. USE THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK, AND TO VERIFY THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES, AND WHICH, WHEN INSTALLED PER MANUFACTURERS' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY AND PROPERLY OPERATING SYSTEM.

DRAWINGS ARE SCHEMATIC IN NATURE, SHOW THE VARIOUS COMPONENTS OF THE SYSTEMS APPROXIMATELY TO SCALE AND ATTEMPT TO INDICATE HOW THEY SHALL BE INTEGRATED WITH OTHER PARTS OF THE WORK. FIGURED DIMENSIONS TAKE PRECEDENCE TO SCALED DIMENSIONS. DETERMINE EXACT LOCATIONS AND MEASUREMENTS, BY CHECKING THE REQUIREMENTS OF OTHER TRADES, AND BY REVIEWING ALL CONTRACT DOCUMENTS. CORRECT ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION, AT NO ADDITIONAL COST TO THE OWNER.

SPECIFICATIONS DEFINE THE QUALITATIVE REQUIREMENTS FOR PRODUCTS, MATERIALS, AND WORKMANSHIP UPON WHICH THE CONTRACT IS BASED.

**16A-1-2 DEFINITIONS**

WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, THE FOLLOWING TERMS SHALL HAVE THE INDICATED MEANINGS:

1. FURNISH: "TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR OPERATIONS."
2. INSTALL: "TO PERFORM ALL OPERATIONS AT THE PROJECT SITE, INCLUDING, BUT NOT LIMITED TO, AND AS REQUIRED: UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE."
3. PROVIDE: "TO FURNISH AND INSTALL COMPLETE, AND READY FOR THE INTENDED USE."
4. FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: "AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE, AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS AND SERVICES INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION."
5. ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS TO THESE SPECIFICATIONS. IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE "ARCHITECT".
6. AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.
7. NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA), AND APPROVED BY THE AHJ OVER THIS PROJECT.
8. THE TERMS "APPROVED EQUAL," "EQUIVALENT," OR "EQUAL" ARE USED SYNCHRONOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED." THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, CERTIFIED, OR ALL THREE, BY AN NRTL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

**16A-1-3 PRE-BID SITE VISIT**

PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED OF CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

**16A-1-4 MATERIAL AND WORKMANSHIP**

PROVIDE ALL MATERIAL AND EQUIPMENT NEW AND IN FIRST CLASS CONDITION. PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REVISION AND REVISIONS TO SHOW SIZE AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE BY EXPERIENCED MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE THE FOLLOWING QUALITY GRADES FOR ALL MATERIALS AND EQUIPMENT (LIGHT DUTY AND RESIDENTIAL TYPE EQUIPMENT WILL NOT BE ACCEPTABLE):

1. COMMERCIAL SPECIFICATION GRADE

PROVIDE ALL HOISTS, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE ELECTRICAL WORK. STORE AND MAINTAIN MATERIAL AND EQUIPMENT IN CLEAN CONDITION, AND PROTECTED FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.

FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED, LABELED, CERTIFIED, OR ALL THREE, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), WHENEVER ANY LISTING OR LABELING EXISTS FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED. AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1 (LATEST EDITION), "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION".

**16A-1-5 MANUFACTURERS**

IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.

WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.

WHERE MANUFACTURERS ARE NOT LISTED, PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS THAN 5 YEARS.

**16A-1-6 COORDINATION**

COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. REFER TO ALL DRAWINGS, INCLUDING, BUT NOT LIMITED TO, CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PLUMBING, AND TO RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES. MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, BEAMS AND OTHER STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.

**16A-1-7 ORDINANCES, CODES, AND STANDARDS**

COMPLY, AT A MINIMUM, WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE, WORKMANSHIP, EQUIPMENT, AND MATERIALS. ADDITIONALLY, COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.

WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT. WHEREVER REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, EXCEED THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, SHALL GOVERN. CODE COMPLIANCE, AT A MINIMUM, IS MANDATORY. CONSTRUCT NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THESE CODES.

BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.

PROVIDE AND MAINTAIN ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS DIVISION.

**16A-1-8 PROTECTION OF EQUIPMENT AND MATERIALS**

STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE. IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS, FOR MATERIALS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNESS, OR TEMPERATURE VARIATIONS, STORE INSIDE IN CONDITION SPACES. FOR MATERIALS AND EQUIPMENT NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.

PLUG OR CAP OPEN ENDS OF CONDUITS WHILE STORED AND INSTALLED DURING CONSTRUCTION WHEN NOT IN USE TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.

**16A-1-9 SUBSTITUTIONS**

INCLUDE IN THE BASE BID THE PRODUCTS SPECIFICALLY NAMED IN THESE SPECIFICATIONS OR IN THE DRAWINGS. SUBMIT, IN THE FORM OF ALTERNATE, WITH BID PROPOSALS, AND OTHER MANUFACTURERS FOR SIMILAR USE, PROVIDED THE DIFFERENCES IN COST, IF ANY, ARE INCLUDED FOR EACH PROPOSED ALTERNATE.

PRIOR TO THE BID DATE, SUBSTITUTIONS WILL NOT BE CONSIDERED UNLESS SUBMITTED TO THE ARCHITECT FOR ENGINEER'S REVIEW, AT LEAST TEN CALENDAR DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS. INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING CUTSHEETS, PHOTOGRAPHIC DATA, AND ALL OTHER INFORMATION NECESSARY FOR AN EVALUATION FOR EACH SUCH REQUEST.

AFTER THE BID DATE, PROPOSALS TO SUBSTITUTE LIGHT FIXTURES FOR THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN, WILL ONLY BE CONSIDERED AS A DEDUCT. SUBMIT OTHERS HAVING JURISDICTION. REFER TO EACH SUBSTITUTION, THE ARCHITECT, ENGINEER, OR BOTH, WILL THEN REVIEW PROPOSED SUBSTITUTIONS.

THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS HEREIN DESCRIBED ARE REJECTED, FURNISH THE SPECIFIED ITEM.

**16A-1-10 SUBMITTALS**

ASSEMBLE AND SUBMIT TO THE ARCHITECT, FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR MATERIAL AND EQUIPMENT TO BE FURNISHED, INSTALLED, OR BOTH, UNDER THIS DIVISION, INCLUDING SHOP DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1; HOWEVER, AT A MINIMUM, SUBMIT SEVEN (7) SETS. BEFORE SUBMITTING, VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, FIT THE AVAILABLE SPACES, AND ALLOW AMPLIFIED AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL CONTAIN THE FOLLOWING INFORMATION. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION:

1. THE PROJECT NAME.
2. THE APPLICABLE SPECIFICATION SECTION AND PARAGRAPH.
3. THE SUBMITTAL DATE.
4. THE CONTRACTOR'S STAMP, WHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, CONFORM WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.

TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME, PLUS MAILING TIME, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF NECESSARY. TRANSMIT SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES; OR FOR OMITTING COMPONENTS OR FITTINGS; OR FOR NOT COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS.

**16A-1-11 ELECTRONIC DRAWING FILES**

IN PREPARATION OF SHOP DRAWINGS, CONTRACTOR MAY, AS AN OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD OR DXF FORMAT FROM THE ENGINEER FOR A FEE OF \$15 PER DRAWING AND HANDLING FEE OF \$200 FOR A DRAWING SET UP TO 12 SHEETS AND \$15 PER SHEET FOR EACH ADDITIONAL SHEET. CONTRACTOR SHALL CONTACT THE ARCHITECT FOR WREITEM AUTHORIZATION; AND, CONTACT THE ENGINEER TO OBTAIN THE NECESSARY RELEASE AGREEMENT FORM AND TO INDICATE THE DESIRED SHIPPING METHOD AND DRAWING FORMAT. IF A 100 MB ZIP DISK OR CD-ROM IS DESIRED, ADD THE APPROPRIATE CHARGE INDICATED IN ADDITION TO PAYMENT. ARCHITECT'S WRITTEN AUTHORIZATION AND ENGINEER'S RELEASE AGREEMENT FORM MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

**16A-1-12 OPERATION AND MAINTENANCE INSTRUCTIONS**

SUBMIT TO THE ARCHITECT, FOR ENGINEER'S REVIEW, COPIES EACH OF OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS, APPROPRIATELY BOUND INTO MANUAL FORM. PROVIDE APPROVED COPIES OF THE FOLLOWING, REVISED IF NECESSARY TO SHOW SYSTEM AND EQUIPMENT AS ACTUALLY INSTALLED. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1; HOWEVER, AT A MINIMUM, SUBMIT THREE (3) SETS, AND INCLUDE, AT A MINIMUM, THE FOLLOWING INFORMATION:

1. MANUFACTURERS' CATALOGS AND PRODUCT DATA SHEETS
2. WIRING DIAGRAMS
3. MAINTENANCE INSTRUCTIONS
4. OPERATING INSTRUCTIONS
5. PARTS LISTS
6. TEST REPORTS AS DEFINED IN NETA ATS FOR THE SYSTEMS AND EQUIPMENT PROVIDED OR FURNISHED AND INSTALLED UNDER THIS CONTRACT.
7. NAMES, ADDRESSES, TELEPHONE NUMBERS, AND E-MAIL ADDRESSES OF LOCAL CONTACTS FOR WARRANTY SERVICES AND SPARE PARTS.

SUBMIT MANUALS PRIOR TO REQUESTING THE FINAL PUNCH LIST AND BEFORE ANY REQUESTS FOR SUBSTANTIAL COMPLETION, ALSO PROVIDE ADEQUATE VERBAL AND WRITTEN TRAINING TO THE OWNER'S REPRESENTATIVE TO OBTAIN ACCEPTANCE AT THE COMPLETION OF, AND BEFORE FINAL ACCEPTANCE OF, THE WORK.

**16A-1-13 TRAINING**

AT A TIME MUTUALLY AGREED UPON BETWEEN THE OWNER AND CONTRACTOR, PROVIDE THE SERVICES OF FACTORY TRAINED AND AUTHORIZED REPRESENTATIVE TO TRAIN OWNER'S DESIGNATED PERSONNEL ON THE OPERATION AND MAINTENANCE OF THE EQUIPMENT PROVIDED FOR THIS PROJECT.

PROVIDE TRAINING TO INCLUDE BUT NOT BE LIMITED TO AN OVERVIEW OF THE SYSTEM AND/OR EQUIPMENT AS IT RELATES TO THE FACILITY AS A WHOLE; OPERATION AND MAINTENANCE PROCEDURES AND SCHEDULES RELATED TO STARTUP AND SHUTDOWN, TROUBLESHOOTING, SERVICING, PREVENTIVE MAINTENANCE AND APPROPRIATE OPERATOR INTERVENTION; AND REVIEWING OF DATA INCLUDED IN THE OPERATION AND MAINTENANCE INSTRUCTIONS.

SUBMIT A CERTIFICATION LETTER TO THE ARCHITECT STATING THAT THE OWNER'S DESIGNATED REPRESENTATIVE HAS BEEN TRAINED AS SPECIFIED HEREIN. LETTER SHALL INCLUDE DATE, TIME, ATTENDEES AND SUBJECT OF TRAINING. THE CONTRACTOR AND THE OWNER'S REPRESENTATIVE SHALL SIGN THE CERTIFICATION LETTER INDICATING AGREEMENT THAT THE TRAINING HAS BEEN PROVIDED.

SCHEDULE TRAINING WITH OWNER WITH AT LEAST 7 DAYS' ADVANCE NOTICE.

**16A-1-14 WARRANTIES**

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FACTORY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS AND DIVISION 1.

ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:

1. ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.
2. ALL RACEWAY SEALS ARE EFFECTIVE.
3. THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.

THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.

PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD. EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

**16A-1-15 MISCELLANEOUS REMODELING WORK**

PROVIDE ALL DEMOLITION OF EXISTING ELECTRICAL SYSTEMS AND NEW ELECTRICAL SYSTEM MODIFICATIONS REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS, OR NECESSARY FOR PROPER OPERATION AND NEW CONSTRUCTION. REMOVE ALL ABANDONED CABLES AND WIRING.

**16A PART 2 ELECTRICAL WORK**

**16A-2-1 BUILDING OPERATION**

COMPLY WITH THE SCHEDULE OF OPERATIONS AS OUTLINED IN THE ARCHITECTURAL PORTIONS OF THIS SPECIFICATION. BUILDING SHALL BE IN CONTINUOUS OPERATION. ACCOMPLISH WORK THAT REQUIRES INTERRUPTION OF BUILDING OPERATION AT A TIME WHEN THE BUILDING IS NOT IN OPERATION, AND ONLY WITH WRITTEN APPROVAL OF BUILDING OWNER AND/OR TENANT. COORDINATE INTERRUPTION OF BUILDING OPERATION WITH THE OWNER AND/OR TENANT. A MINIMUM OF 7 DAYS IN ADVANCE OF WORK.

**16A-2-3 COINCIDENTAL DAMAGE**

REPAIR ALL STREETS, SIDEWALKS, DRIVES, PAVING, WALLS, FINISHES, AND OTHER FACILITIES DAMAGED IN THE COURSE OF THIS WORK. REPAIR MATERIALS SHALL MATCH EXISTING CONSTRUCTION. REPAIR MATERIALS SHALL GENERALLY MATCH EXISTING CONSTRUCTION. ALL BACKFILLING AND REPAIRING SHALL MEET ALL REQUIREMENTS OF THE OWNER, CITY AND OTHERS HAVING JURISDICTION. REPAIR WORK SHALL BE THOROUGHLY FIRST CLASS, CONFORM TO ALL REQUIREMENTS OF DIVISION 2 OF THESE SPECIFICATIONS.

**16A-2-4 CUTTING AND PATCHING**

FOLLOWING THE REQUIREMENTS IN DIVISION 1, CUT WALLS, FLOORS, CEILINGS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED TO PERFORM WORK UNDER THIS DIVISION. OBTAIN PERMISSION OF THE ENGINEER, OWNER, OR BOTH, BEFORE DOING ANY CUTTING. CUT ALL HOLES AS SMALL AS POSSIBLE. PATCH WALLS, FLOORS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED BY WORK UNDER THIS DIVISION. ALL PATCHING SHALL BE THOROUGHLY FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION, INCLUDING FIRE RATINGS IF APPLICABLE.

**16A-2-5 ROUGH-IN**

COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH OTHER DIVISIONS. CONCEAL ALL RACEWAYS EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE INDICATED ON THE DRAWINGS.

**16A-2-6 SUPPORT SYSTEMS**

STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH; COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, HILTI INC., POWER-STRUT, THOMAS & BETTS CORPORATION, UNISTRUT.

**FINISHES:**

1. METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3.

**FIELD FABRICATION:**

1. FOR FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.
2. FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANER TO REMOVE OILS, RUST, SHARP EDGES AND SPARDS.
3. FOR CHANNEL, WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).

**16A-2-7 PENETRATIONS**

COORDINATE SLEEVE SELECTION AND APPLICATION WITH SELECTION AND APPLICATION OF FIRE-STOPPING SPECIFIED IN DIVISION 7 SECTION THROUGH-PENETRATION FIRESTOP SYSTEM.

**ROOFS:**

1. COORDINATE ALL ROOF PENETRATIONS WITH ENGINEER, OWNER, AND AS APPLICABLE, THE ROOFING CONTRACTOR PROVIDING A ROOF WARRANTY.
2. KEEP ALL RACEWAY PENETRATIONS WITH MECHANICAL EQUIPMENT CURBS WHEREVER POSSIBLE. COORDINATE WITH DIVISION 15 WORK.
3. FLASH AND COUNTERTFLASH ALL OPENINGS THROUGH ROOF, AND/OR PROVIDE PRE-FABRICATED MOLDED SEALS COMPATIBLE WITH THE ROOF CONSTRUCTION INSTALLED, OR AS REQUIRED BY THE ENGINEER, OWNER, OR ROOFING CONTRACTOR. ALL ROOF PENETRATIONS SHALL BE LEAKTIGHT AT THE TERMINATION OF THE WORK AND SHALL NOT VOID ANY NEW OR EXISTING ROOF WARRANTIES.

**WALLS AND FLOORS:**

1. SLEEVES FOR RACEWAYS AND CABLES
- A. STEEL PIPE SLEEVES: ASTM A 53/A 53M, TYPE E, GRADE B, SCHEDULE 40, GALVANIZED STEEL, PLAIN ENDS AND DRIP RINGS.
- B. CAST-IRON PIPE SLEEVES: CAST OR FABRICATED "WALL PIPE," EQUIVALENT TO DUCTILE-IRON PRESSURE PIPE, WITH PLAIN ENDS AND INTERNAL WATERSTOP, UNLESS OTHERWISE INDICATED.
2. SLEEVES FOR RECTANGULAR OPENINGS: GALVANIZED SHEET STEEL WITH MINIMUM 0.052-INCH THICKNESS AS INDICATED AND OF LENGTH TO SUIT APPLICATION.

**16B-2-8 FIRE-STOPPING THROUGH PENETRATIONS**

FIRE-RESISTANT THROUGH PENETRATION SEALANTS: TWO-PART, FOAMED-IN-PLACE, SILICONE SEALANT FORMULATED FOR USE IN THROUGH-PENETRATION FIRE-STOPPING AROUND CABLES, RACEWAYS, AND CABLE TRAY PENETRATIONS THROUGH FIRE-RATED WALLS AND FLOORS. SEALANTS AND ACCESSORIES SHALL HAVE FIRE-RESISTANCE RATINGS INDICATED, AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES IN ACCORDANCE WITH ASTM E 814, BY UNDERWRITERS' LABORATORIES, INC., OR OTHER NRTL ACCEPTABLE TO AHJ.

1. ACCEPTABLE MANUFACTURERS:

- A. HILTI, INC.
- B. 3M CORP.
- C. RECTORSEAL.
- D. SPECIFY TECHNOLOGY INC.
- E. UNITED STATES GYPSUM COMPANY.

**SUBMITTALS**

1. SUBMIT PRODUCT DATA: MANUFACTURER'S SPECIFICATIONS AND TECHNICAL DATA FOR EACH MATERIAL INCLUDING THE COMPOSITION AND LIMITATIONS, DOCUMENTATION OF UL FIRESTOP SYSTEMS TO BE USED AND MANUFACTURER'S INSTALLATION INSTRUCTIONS TO COMPLY WITH DIVISION 1.
2. MANUFACTURER'S ENGINEERING JUDGMENT IDENTIFICATION NUMBER AND DRAWING DETAILS WHEN NO UL SYSTEM IS AVAILABLE FOR AN APPLICATION. ENGINEERING JUDGMENT SHALL INCLUDE BOTH PROJECT NAME AND CONTRACTOR'S NAME WHO WILL INSTALL FIRESTOP SYSTEM AS DESCRIBED IN DRAWINGS.
3. SUBMIT MATERIAL SAFETY DATA SHEETS PROVIDED WITH PRODUCT DELIVERED TO JOB-SITE.

**16A-2-9 ACCESS DOORS**

PROVIDE ACCESS DOORS IN CEILINGS AND WALLS, WHERE INDICATED OR REQUIRED FOR ACCESS OR MAINTENANCE TO CONCEALED EQUIPMENT INSTALLED UNDER THIS SECTION. PROVIDE CONCEALED HINGES, SCREWDRIVER-TYPE LOCK, AND ANCHOR STRAPS. MANUFACTURED BY MILCOR, ZURN, TITUS, OR EQUAL. OBTAIN ARCHITECT'S APPROVAL OF TYPE, SIZE, LOCATION AND COLOR BEFORE ORDERING.

**16A-2-10 EQUIPMENT FURNISHED BY OTHERS**

PROVIDE NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS, IN LOCATIONS AS INDICATED ON THE DRAWINGS, SPECIFIED HEREIN, OR BOTH. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE SUCH ITEMS AS FLEXIBLE CORDS AND PLUGS, AS REQUIRED FOR PROPER OPERATION OF THE COMPLETE SYSTEM, IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS. BE RESPONSIBLE FOR CORRECT ROUGH-IN DIMENSIONS, AND VERIFY THEM WITH ENGINEER, OWNER'S REPRESENTATIVE, EQUIPMENT SUPPLIER, OR ALL THREE, PRIOR TO ROUGH-IN AND SERVICE INSTALLATIONS.

**16A-2-11 CLEANING**

IN ADDITION TO THE REQUIREMENTS OF DIVISION 1, REMOVE FROM THE PREMISES DIRT AND REFUSE RESULTING FROM THE PERFORMANCE OF THE ELECTRICAL WORK, AS REQUIRED, TO PREVENT ACCUMULATION. COOPERATE IN MAINTAINING REASONABLY CLEAN PREMISES AT ALL TIMES. IMMEDIATELY PRIOR TO FINAL INSPECTION, MAKE A FINAL CLEANUP OF DIRT AND REFUSE RESULTING FROM THE WORK. CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THIS DIVISION. REMOVE DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER FROM WALLS AND CEILING. TOUCH UP AND RESTORE ALL DAMAGED FINISHES TO THEIR ORIGINAL CONDITION.

**16A-2-12 ADJUSTING, ALIGNING AND TESTING**

ADJUST, ALIGN, AND TEST ALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION, FOR PROPER OPERATION.

TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA ATS (LATEST EDITION) AND ALL ADDITIONAL REQUIREMENTS SPECIFIED IN FOLLOWING SECTIONS.

MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMPMETER, AND A MEGOHMMETER INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.

**16A-2-14 EQUIPMENT IDENTIFICATION**

PROVIDE EQUIPMENT IDENTIFICATION NAMEPLATES:

1. ON ALL PANELBOARDS, SWITCHES, STARTERS, DIMMERS, SWITCHES IN DISTRIBUTION PANELBOARDS AND SWITCHBOARDS.
1. ENGRAVED, CONTRASTING COLOR, THREE-LAYER, LAMINATED PLASTIC INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE DRAWINGS AND IN THE SPECIFICATIONS.
2. SELF-ADHERING, WITH A PERMANENT, WEATHERPROOF ADHESIVE.
3. ATTACHMENT METHOD SHALL BE ACCEPTABLE TO THE MANUFACTURERS OF THE EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED.
4. COLOR: BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER; RED BACKGROUND WITH WHITE LETTERS FOR EMERGENCY POWER. LETTER HEIGHT: 1/4-INCH MINIMUM.

**16A-2-15 SYSTEM START UP**

PRIOR TO STARTING UP THE ELECTRICAL SYSTEMS:

1. CHECK ALL COMPONENTS AND DEVICES.
2. LUBRICATE ITEMS ACCORDINGLY.
3. TIGHTEN SCREWS AND BOLTS FOR CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A.
4. ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE.
5. CHECK AND RECORD BUILDING'S SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE, AND PROPER PHASING.
6. BALANCE ALL SINGLE-PHASE LOADS AT EACH PANELBOARD, REDISTRIBUTING BRANCH CIRCUIT CONNECTIONS UNTIL BALANCE IS ACHIEVED. DO NOT TYPE UP FINAL PANELBOARD DIRECTORIES UNTIL ALL RE-BALANCING AND REDISTRIBUTION OF CIRCUITS ARE COMPLETE.
7. REPLACE ALL BURNED-OUT LAMPS AND LAMPS USED FOR TEMPORARY CONSTRUCTION LIGHTING IN PERMANENT LIGHT FIXTURES.
8. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

**16A PART 3 EXISTING EQUIPMENT REUSE AND REMOVAL**

REMOVE ALL EXISTING WIRING, LIGHT FIXTURES, EXPOSED CONDUITS AND OTHER ELECTRICAL INSTALLATIONS NOT REUSED PRIOR TO SUBSTANTIAL COMPLETION OF THE WORK. EXISTING RACEWAYS MAY BE REUSED IF THEIR POINTS OF TERMINATIONS ARE SUITABLE; IF THEY ARE CLEAN INSIDE WITH NO EVIDENCE OF RUST OR BURRS; IF FREE FROM CRACKS, FLATTENED SECTIONS OR SHARP BENDS; AND, IF SUITABLY LOCATED TO AVOID CONFLICTS WITH OTHER TRADES OR INSTALLATIONS. CAREFULLY FISH ALL EXISTING CONDUITS REUSED UNDER THIS CONTRACT TO REMOVE ALL DEBRIS AND OBSTRUCTIONS, AND SWAB UNTIL ALL MOISTURE IS REMOVED. CUT, PATCH, AND REPAIR WHERE REQUIRED FOR NEW ELECTRICAL INSTALLATIONS, AND PATCH AND REPAIR ALL SURFACE DAMAGE RESULTING FROM THIS WORK. CUT FLUSH WITH THE FLOOR AND PLUG AT BOTH ENDS, RACEWAYS STUBBED ABOVE THE FLOOR AND NOT USED AT SUBSTANTIAL COMPLETION OF THE WORK.

RELOCATE ALL EXISTING ELECTRICAL SYSTEMS REQUIRED TO BE IN OPERATION AT SUBSTANTIAL COMPLETION OF THE CONTRACT, IF REQUIRED, AS A RESULT OF WORK INCLUDED UNDER THIS CONTRACT, EVEN IF NOT SPECIFICALLY INDICATED IN THE DRAWINGS OR SPECIFICATIONS.

**16A PART 4 ALTERNATES**

INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR AND INCIDENTAL TO THE COMPLETION OF ALL WORK UNDER EACH PARTICULAR ALTERNATE. FURNISH SEPARATE BIDS FOR EACH APPLICABLE ALTERNATE, STATING THE AMOUNT TO BE ADDED TO OR DEDUCTED FROM THE BASE BID FOR EACH ALTERNATE ACCEPTED. APPLICABLE SECTIONS OF THE BASE SPECIFICATIONS APPLY TO ALL WORK REQUIRED BY THE ALTERNATES UNLESS OTHERWISE SPECIFIED. REFER TO THE ARCHITECTURAL PORTION OF THE SPECIFICATIONS FOR THE LIST OF ALTERNATES.

END OF SECTION 16100



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DIVISION 16  
SECTION 16B BASIC ELECTRICAL MATERIALS AND METHODS  
16B-1 METHODS  
16B-1-1 RACEWAYS

METALLIC CONDUIT AND TUBING:

- ELECTRICAL METALLIC TUBING AND FITTINGS (EMT): ANSI C80.3, UL 797.
- FLEXIBLE METAL CONDUIT (FMC): ZINC-COATED STEEL OR ALUMINUM, UL 1. REDUCED-WALL FMC IS NOT ALLOWED.
- INTERMEDIATE METAL CONDUIT (IMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT; ANSI C80.6, UL 1242.
- LIGHTDUTY FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET; UL 360.
- RIGID METAL CONDUIT (RMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS); ANSI C80.1, UL 6.
- RIGID ALUMINUM CONDUIT (RAC): ANSI C80.5, UL 6A.
- PLASTIC-COATED IMC, RMC, AND FITTINGS: NEMA RN 1, UL LISTED.
- IMC AND RMC FITTINGS: NEMA FB 1; COMPATIBLE WITH CONDUIT TYPE AND MATERIAL, UL LISTED.

16B-1-2 RACEWAY INSTALLATION

INSTALL ALL CIRCULAR RACEWAYS CONCEALED ABOVE SUSPENDED CEILINGS OR CONCEALED IN WALLS OR FLOORS WHEREVER POSSIBLE EXCEPT WHERE OTHERWISE INDICATED.

PROVIDE GRS FOR ALL CONDUITS RUN UNDERGROUND, EXPOSED TO WEATHER, OR EXPOSED TO OTHER HAZARDOUS CONDITIONS. PROVIDE GRS INSTALLED BELOW GRADE WITH A CORROSION RESISTANT BONDED-PLASTIC OR APPROVED MASTIC COATING. THIS SHALL INCLUDE THE 90-DEGREE ELBOW BELOW GRADE AND THE ENTIRE VERTICAL TRANSITION TO ABOVE GRADE.

ALL OTHER RACEWAY MAY BE EMT WHERE APPROVED BY LOCAL CODE. USE COMPRESSION TYPE FITTINGS FOR EMT, WITH ALL FITTINGS UL LISTED FOR THE ENVIRONMENT IN WHICH THEY ARE USED.

USE FMC FOR FINAL CONNECTION TO EACH MOTOR AND TRANSFORMER, AND TO ANY DEVICE THAT WOULD OTHERWISE TRANSMIT MOTION, VIBRATION, OR NOISE. USE LFMC WHERE EXPOSED TO LIQUIDS, VAPORS OR SUNLIGHT. PROVIDE ALL FMC AND LFMC WITH AN INSULATED BONDING CONDUCTOR.

USE ONLY METAL RACEWAYS FOR ALL POWER WIRING FROM THE OUTPUT OF VARIABLE FREQUENCY DRIVES TO THEIR RESPECTIVE MOTORS.

INSTALL RACEWAYS PARALLEL AND PERPENDICULAR TO BUILDING LINES.

INSTALL RACEWAYS TO REQUIREMENTS OF STRUCTURE AND TO REQUIREMENTS OF ALL OTHER WORK ON THE PROJECT. INSTALL RACEWAY TO CLEAR ALL OPENINGS, DEPRESSIONS, PIPES, DUCTS, REINFORCING STEEL, AND OTHER IMMOVABLE OBSTACLES. USE MANUFACTURED ELBOWS FOR ALL FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE. EXCEPT WHERE APPROVED IN WRITING BY THE ENGINEER, INSTALL NO RACEWAY IN A SLAB-ON-GRADE. LOCATE RACEWAY BELOW GRANULAR FILL BELOW SLABS-ON-GRADE.

INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45- AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH AND EVEN AND WITHOUT ANY DISCONTINUITIES. MAKE ALL GALVANIZING OR ENAMEL. RADI OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW. USE LONG RADIUS ELBOWS WHERE NECESSARY, INDICATED, OR BOTH.

SECURELY FASTEN RACEWAYS IN PLACE WITH APPROVED STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. ATTACH RACEWAY SUPPORTS TO THE BUILDING STRUCTURE. HANG SINGLE RACEWAYS FOR FEEDERS WITH MALLEABLE SPLIT RING HANGERS WITH ROD AND TURNBUCKLE SUSPENSION FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. CLAMP GROUPS OF HORIZONTAL FEEDER RACEWAYS TO STEEL CHANNELS THAT ARE SUSPENDED FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. SECURELY CLAMP VERTICAL FEEDER RACEWAYS TO STRUCTURAL STEEL MEMBERS ATTACHED TO STRUCTURE. INSTALL CABLE CLAMPS FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. ADD RACEWAY SUPPORTS WITHIN 12 INCHES OF ALL BENDS, ON BOTH SIDES OF THE BENDS. DO NOT SUPPORT RACEWAYS FROM SUSPENDED CEILING COMPONENTS.

REAM RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLING CONDUCTORS Wires. PROVIDE RACEWAYS OF AMPLE SIZE FOR PULLING OF WIRE AND NOT SMALLER THAN CODE REQUIREMENTS AND NOT LESS THAN 1/2-INCH IN SIZE, UNLESS INDICATED OTHERWISE ON DRAWINGS.

PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGH-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.

ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL EQUIPMENT AND JUNCTION BOXES.

INSTALL APPROVED EXPANSION/DEFLECTION FITTINGS WHERE RACEWAYS PASS THROUGH (IF EMBEDDED) OR ACROSS (IF EXPOSED) EXPANSION JOINTS.

INSTALL A PULL WIRE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF CONDUCTORS OR CABLES UNDER OTHER DIVISIONS OR CONTRACTS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 24 INCHES OF SLACK AT EACH END OF PULL WIRE.

MAKE ALL JOINTS AND CONNECTIONS IN A MANNER THAT WILL ENSURE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY.

EFFECTIVELY SEAL RACEWAYS, BY INSTALLING A CONDUIT FITTING AT THE BOUNDARY OF THE TWO SPACES, AND FILLING IT WITH AN APPROVED PLUMB MATERIAL, AFTER CONDUCTORS OR CABLES HAVE BEEN INSTALLED AND TESTED, WHEN EVER.

16B-1-3 BUSHINGS AND LOCKNUTS

RIGIDLY TERMINATE CONDUITS ENTERING SHEET METAL ENCLOSURES TO THE ENCLOSURE WITH A BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT OR AN APPROVED HUB ON THE OUTSIDE. CONDUIT SHALL ENTER THE ENCLOSURE SQUARELY.

PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS.

WHERE EMT ENTERS A BOX, PROVIDE APPROVED EMT COMPRESSION CONNECTORS.

USE INSULATED, GROUNDING, OR COMBINATION, BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION OR MOISTURE, WHEN REQUIRED BY NFPA 70, OR BOTH.

16B-1-4 CONDUCTORS AND CABLES

CONDUCTOR MATERIAL:

- ANNEALED (SOFT) COPPER COMPLYING WITH ICEA S-95-658/NEMA WC70;
- SOLID CONDUCTOR FOR NO. 10 AWG AND SMALLER; CONCENTRIC, COMPRESSED STRANDED FOR NO. 8 AWG AND LARGER.
- CONDUCTOR INSULATION TYPES: 90-DEGREE C-RATED, TYPE THHH/THHW-2 OR XHHW-2 COMPLYING WITH ICEA S-95-658/NEMA W870.
- SIZES OF CONDUCTORS AND CABLES INDICATED OR SPECIFIED ARE IN AMERICAN WIRE GAGE (AWG - BROWN AND SHARPE).
- UNLESS INDICATED OTHERWISE, SPECIAL PURPOSE CONDUCTORS AND CABLES, SUCH AS LOW VOLTAGE CONTROL AND SHIELDED INSTRUMENT WIRING, SHALL BE AS RECOMMENDED BY THE SYSTEM EQUIPMENT MANUFACTURER.

ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 8 AWG AND LARGER: STRANDED, TYPE THHW-2 OR XHHW-2 INSULATION.

ALL CONDUCTORS, NO. 10 AWG AND SMALLER, USED FOR POWER AND LIGHTING CIRCUITS: SOLID COPPER, TYPE THHW-2 (WET OR DAMP LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB), TYPE THHN (DRY LOCATIONS ONLY AND ABOVE GRADE) INSULATION, OR DUAL-RATED TYPE THHH/THHW-2.

ALL BRANCH CIRCUIT WIRING: NOT SMALLER THAN NO. 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THE MINIMUM CONDUCTOR SIZE PER NFPA 70 AND BASED ON THE INDICATED BRANCH CIRCUIT OVERCURRENT PROTECTIVE DEVICE (OCPD) RATING AND NUMBER OF POLES. WHERE NO CIRCUIT SIZE (I.E., CONDUCTORS AND OCPD) IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE THREE NO. 12 AWG CONDUCTORS, IN 3/4-INCH RACEWAY, AND A 20A CIRCUIT BREAKER.

CONDUCTORS FIELD-INSTALLED WITHIN FLUORESCENT LIGHT FIXTURE CHANNELS: TYPE THHN.

CONTROL WIRING: STRANDED COPPER CONDUCTORS, 600V INSULATION, OF THE PROPER TYPE, SIZE AND NUMBER AS REQUIRED TO ACCOMPLISH SPECIFIED FUNCTION. MINIMUM SIZE: NO. 14 AWG, UNLESS NOTED OTHERWISE.

TYPE MC CABLE: 600V, UNJACKETED, ANSI E119 AND E814, UL STANDARDS 44 OR 83 (AS APPLICABLE), AND 1569, NFPA 70 ARTICLE 330; ALUMINUM OR GALVANIZED STEEL INTERLOCKED ARMOR: THHN- OR XHHW-INSULATED CONDUCTORS; COLOR CODE: ICEA METHOD 1, WITH GREEN INSULATED GROUNDING CONDUCTOR

16B-1-5 INSTALLATION OF CONDUCTORS AND CABLES.

INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES, EXCEPT FOR LOW-VOLTAGE WIRING OR, WHERE TYPE MC CABLE IS SPECIFIED AS ACCEPTABLE.

SUPPORT ALL CONDUCTORS AND CABLES IN VERTICAL INSTALLATIONS, AS REQUIRED BY NFPA 70, BY INSTALLING CABLE SUPPORTS OR PLUG-TYPE CONDUIT RISER SUPPORTS, OR WIRE-MESH SAFETY GRIPS.

INSTALL ALL CONDUCTORS AND CABLE IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTORS, OR CRIMP CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED. INSULATE ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.

ALL MATERIALS USED TO TERMINATE, SPLICE OR TAP CONDUCTORS: DESIGNED FOR, PROPERLY SIZED FOR, AND UL LISTED FOR THE SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

WHERE WIRING IS INDICATED AS INSTALLED, BUT THE CONNECTION IS INDICATED "FUTURE" OR "BY OTHER DIVISION, TRADES, OR CONTRACTS", LEAVE A MINIMUM 3-FOOT "PIGTAIL" AT THE BOX, TAP, THE END OF THE CONDUCTORS, AND COVER THE BOX.

THE NUMBER OF CONDUCTORS IN A SPECIFIC RACEWAY "HOME RUN" IS INDICATED WITH CROSS LINES (TICK MARKS) ON EACH "CIRCUIT RUN" ON THE DRAWINGS. IN GENERAL, THE DIRECTION OF BRANCH CIRCUIT "HOME RUN" ROUTING IS INDICATED ON THE DRAWINGS. COMPLETE WITH CIRCUIT NUMBERS AND PANELBOARD DESIGNATION. CONTINUE ALL SUCH "HOME RUN" WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH "CIRCUIT RUNS" WERE INDICATED IN THEIR ENTIRETY.

WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS FOUR (CONDUCTOR COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS), THE FOLLOWING RESTRICTIONS APPLY, WHICH ARE IN ADDITION TO THOSE IN NFPA 70:

- NORMAL OR NON-ESSENTIAL CIRCUITS.
- MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY. FOR UP TO EIGHT CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE: 3/4-INCH. FOR GREATER THAN EIGHT CONDUCTORS, MINIMUM RACEWAY SIZE: 1-INCH. DO NOT INSTALL ANY OTHER TYPE OF CIRCUIT IN THIS RACEWAY.
- THE MINIMUM WIRE SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10 AWG.
- ONLY 15A AND 20A BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.

A. DO NOT USE MULTI-CONDUCTOR CIRCUITS, WITH A SHARED NEUTRAL, FOR ANY GFCI CIRCUIT BREAKER OR RECEPTACLE CIRCUIT.

FOR BRANCH CIRCUITS FED FROM GFCI CIRCUIT BREAKERS, LIMIT THE ONE-WAY CONDUCTOR LENGTH TO 100 FEET BETWEEN THE PANELBOARD AND THE MOST REMOTE RECEPTACLE OR LOAD ON THE GFCI CIRCUIT.

WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW. IN LARGER SIZES, WHERE PROPERLY COLORED INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUCTOR AT ALL TERMINATION POINTS, JUNCTION AND PULL BOXES.

System Voltage	Conductor Type	Color
208Y/120	Phase A	Black
	Phase B	Red
	Phase C	Blue
	Neutral	White
	Equipment Ground	Green
	Isolated Ground	Green w/yellow stripe

TYPE MC CABLE MAY ONLY BE USED:

- IN LIEU OF FLEXIBLE CONDUIT AND WIRING FROM LIGHT FIXTURES IN ACCESSIBLE CEILINGS AND JUNCTION BOXES (ATTACHED TO BUILDING STRUCTURE) ABOVE THE CEILING. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 6-FOOT RADIUS OF ITS INSTALLED LOCATION, BUT NOT EXCEEDING 6 FEET IN UNSUPPORTED LENGTHS.
- FOR VERTICAL DROPS IN STUD WALLS.
- IN LIEU OF EMT, ONLY FOR 15A AND 20A BRANCH CIRCUITS (WITH UP TO FOUR (4) CONDUCTORS) INCLUDING GROUNDING CONDUCTOR, AND ONLY IN DRY CONCEALED LOCATIONS ABOVE GRADE, EXCEPT WHERE SPECIFICALLY NOT PERMITTED BY NFPA 70.
- DO NOT USE MC CABLE FOR THE FOLLOWING:
  - HOMERUNS TO PANELBOARDS.
  - WHERE EXPOSED TO VIEW.
  - WHERE EXPOSED TO DAMAGE.
  - HAZARDOUS LOCATIONS.
  - WET LOCATIONS.
- WHEN RESTRICTED OTHERWISE ABOVE, AND WHEN SPECIFICALLY DISALLOWED BY THE NATIONAL ELECTRICAL CODE, OR BOTH.

PROPERLY IDENTIFY ALL TERMINAL BLOCKS AND WIRE TERMINALS FOR CONTROL WIRING WITH VINYL STICK-ON MARKERS OR EQUIVALENT. PROVIDE ENGINEER WITH A LIST OF PROPOSED IDENTIFYING NUMBERS FOR REVIEW PRIOR TO INSTALLING MARKERS.

PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL FEEDER AND NON-LIGHTING BRANCH CIRCUITS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.

PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL BRANCH CIRCUITS AND FEEDERS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.

VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 2 PERCENT.

16B-1-6 JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS

PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED.

JUNCTION BOXES INSTALLED BEHIND WALL CASES, AND IN OR ON OTHER STORE FIXTURES, EXCEPT WHERE OTHERWISE SPECIFIED, SHALL BE 4-INCH SQUARE OR LARGER, WITH GALVANIZED COVERS.

HORIZONTALLY MOUNT JUNCTION BOXES UNDER CENTER FIXTURES (AND CASES), HANDY BOXES OR 4-INCH SQUARE BOXES WITH TOPS OF BOXES NOT MORE THAN 3-1/2 INCHES ABOVE THE FLOOR. SIZE JUNCTION BOXES TO ADEQUATELY CONTAIN ALL REQUIRED CONDUCTORS AND SPLICES.

16B-1-7 OUTLET BOXES

ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: NATIONAL ELECTRICAL, APPLETON, STEEL CITY, RACO, OR APPROVED EQUAL, GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY; SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES IN WALLS, COLUMNS, FLOORS, OR CEILINGS SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES, WITH HUBS AND WEATHERPROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WET, OR HARSH CONDITIONS.

16B-1-8 OUTLET LOCATIONS

COORDINATE LOCATIONS OF OUTLET BOXES. OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ARCHITECT.

16B-1-9 MOUNTING HEIGHTS

UNLESS NOTED OTHERWISE, INSTALL WIRING DEVICES AS INDICATED BELOW (NOTE: ALL DIMENSIONS ARE TO THE BOTTOM OF THE OUTLET BOX UNLESS NOTED OTHERWISE):

RECEPTACLES:

- GENERAL:
  - VERTICALLY WITH THE GROUND SLOT MOUNTED AT THE BOTTOM: 16 INCHES ABOVE FINISHED FLOOR.
  - HORIZONTALLY, WITH NEUTRAL SLOT MOUNTED AT THE BOTTOM: 16 INCHES ABOVE FINISHED FLOOR.
- ABOVE COUNTERS:
  - FOR 36-INCH HIGH COUNTER TOPS: 44 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
  - FOR 34-INCH HIGH COUNTER TOPS: 40 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
- GFCI RECEPTACLES: SAME AS GENERAL RECEPTACLES.

SWITCHES:

- GENERAL: 44 INCHES ABOVE FINISHED FLOOR.
- ABOVE COUNTERS: SAME AS FOR RECEPTACLES.
  - CONCRETE BLOCK WALLS: 40 INCHES ABOVE FINISHED FLOOR (DIMENSION MAY BE ADJUSTED SLIGHTLY, AS REQUIRED TO COMPENSATE FOR VARIABLE JOINT DIMENSIONS, SUCH THAT BOTTOM OF BOXES ARE AT BLOCK JOINTS).
  - WALLS WITH WANSOOTING: 6 INCHES MINIMUM ABOVE WANSOOTING, BUT NOT EXCEEDING 48 INCHES ABOVE FINISHED FLOOR.

TELEPHONE/DATA OUTLET BOXES:

- GENERAL: MATCH MOUNTING HEIGHT OF ADJACENT WIRING DEVICE LISTED ABOVE.
- WALL-MOUNTED TELEPHONE: 40 INCHES ABOVE FINISHED FLOOR.

- FOR OTHER THAN WIRING DEVICES, REFER TO PARAGRAPHS, ARTICLES, SECTIONS, DIVISIONS, OR DRAWINGS TO OBTAIN MOUNTING HEIGHTS FOR SPECIFIC EQUIPMENT OR SYSTEMS.

16B-1-10 WIRING DEVICES

THE CATALOG NUMBERS LISTED FOR WIRING DEVICES ARE GENERALLY FOR 20A RATED DEVICES, WHERE APPLICABLE. AS NOTED ON THE DRAWINGS, OR SPECIFIED FOR CIRCUIT RATING LIMITATIONS, PROVIDE WIRING DEVICES EQUIVALENT TO THOSE SPECIFIED FOR 20A, BUT RATED FOR 15A.

PROVIDE THE FOLLOWING WIRING DEVICES WHERE SHOWN ON DRAWINGS OR REQUIRED: MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH STRUCTURAL AND BUILDING REQUIREMENTS AS DETERMINED IN THE COURSE OF CONSTRUCTION. PROVIDE ALL WIRING DEVICES OF THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT, TO THE MAXIMUM EXTENT POSSIBLE. PROVIDE COLOR OF TOGGLES AND RECEPTABLES AS REQUESTED BY THE ENGINEER. REFER TO DETAIL SHOWING RECEPTABLES TABLE.

Type of Device	Hubbell	Leviton
Simplex Receptacle	HBL2161	16361
Duplex Receptacle	HBL2162	16362
GFCI Receptacle	GF5362	8998
Isolated Ground (IG) Receptacle	IG2162	16362-IG
Single Pole Switch	HBL2121	5621-2
Double Pole Switch	HBL2122	5622-2
Three-Way Switch	HBL2123	5623-2
Momentary SPDT, Center-Off Switch	HBL 1557	1251

16B-1-11 SWITCH AND OUTLET COVER PLATES

SWITCH AND OUTLET PLATES: COLORED, SMOOTH NYLON; BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHEREVER POSSIBLE. VERIFY DESIRED MATERIALS AND COLORS WITH ENGINEER BEFORE INSTALLATION. SWITCH PLATES IN UNFINISHED ROOMS AND SPACES: STAMPED STEEL, CADMIUM PLATED. INSTALL GROUPS OF SWITCHES UNDER ONE GANGED-PLATE, USUALLY HORIZONTALLY; OR, WHERE REQUIRED BY DETAILS, VERTICALLY. SET ALL COVER PLATES PLUMB, PARALLEL, AND FINISHED FLUSH WITH THE WALL.

16B-2 ELECTRICAL SERVICE AND GROUNDING

16B-2-1 ELECTRICAL SERVICE

SEE DRAWINGS FOR TYPE, SIZE, VOLTAGE, PHASE, AND OTHER REQUIREMENTS.

PROVIDE, OR ARRANGE WITH THE SERVING UTILITY FOR INSTALLATION TO PROVIDE, A RECORDING VOLTMETER AT THE SERVICE POINT, ON THE FIRST DAY THE FACILITY IS OPEN FOR BUSINESS, FOR A 24-HOUR VOLTAGE TEST. IF VOLTAGE AND REGULATION ARE NOT WITHIN ACCEPTABLE LIMITS, ARRANGE WITH THE UTILITY FOR PROPER VOLTAGE. SUBMIT TO THE OWNER A REPORT OF MAXIMUM AND MINIMUM VOLTAGE AND A COPY OF THE RECORDING VOLTMETER CHART.

16B-2-2 CONNECTION TO LANDLORD AND SERVING UTILITIES

PROVIDE RACEWAYS, TERMINATIONS, METERING PROVISIONS, AND MISCELLANEOUS EQUIPMENT, AS REQUIRED, FOR ELECTRICAL AND TELEPHONE SERVICES FOR CONNECTION BY THE LANDLORD & SERVING UTILITY, IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF ALL APPLICABLE CODES AND OF THE LANDLORD & SERVING UTILITY INVOLVED. VERIFY ALL SERVICE TERMINATIONS AND CONNECTION POINTS IN THE FIELD AND WORK IN CONJUNCTION WITH THE LANDLORD & UTILITY INVOLVED IN THE INSTALLATION OF ALL SERVICES. PROVIDE ALL MATERIALS AND EQUIPMENT REQUIRED FOR COMPLETE LANDLORD & UTILITY CONNECTION BUT NOT FURNISHED BY THE LANDLORD OR SERVING UTILITY. NOTIFY THE LANDLORD & UTILITY COMPANIES INVOLVED WITHIN TWO WEEKS AFTER NOTICE TO PROCEED, OF ALL REQUIRED INFORMATION NECESSARY FOR THE UTILITY TO SUPPLY THE PROJECT WITHOUT DELAY. PAY ALL CHARGES OF THE LANDLORD & SERVING UTILITY FOR THE ELECTRICAL SERVICE(S).

16B-2-3 GROUNDING

PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS. USE BARE OR INSULATED CONDUCTORS, AS SPECIFIED HEREIN, AND OTHER MATERIALS INDICATED ON THE DRAWINGS.

16B PART 3 DISTRIBUTION AND CONTROL EQUIPMENT

16B 3-1 LIGHTING AND APPLIANCE PANELBOARDS

PANELBOARDS: SQUARE D TYPE NQDD OR NF, AS APPLICABLE, BASED ON VOLTAGE AND AMPERE RATINGS AND REQUIRED SHORT-CIRCUIT INTERRUPTING RATINGS AS SCHEDULED ON THE DRAWINGS, OR APPROVED EQUAL BY SIEMENS, OR CUTLER HAMMER, COMPLETE WITH BOLT-ON THERMAL MAGNETIC, MOLDED CASE CIRCUIT BREAKERS ASSEMBLED IN A DEAD-FRONT FINISHED CABINET CONTAINING A TYPEWRITTEN CARD DIRECTORY INDICATING EXACTLY WHAT EACH CIRCUIT BREAKER CONTROLS; FULLY-RATED AND WITH THE INTEGRATED SHORT CIRCUIT CURRENT RATINGS INDICATED ON THE DRAWINGS. PLUG-IN TYPE BREAKERS WILL NOT BE ACCEPTABLE. ALL TWO AND THREE POLE BREAKERS, COMMON TRIP TYPE, BREAKERS USED AS SWITCHES FOR 120V OR 277V LIGHTING CIRCUITS; APPROVED FOR THE PURPOSE AND MARKED "SW"; BREAKERS USED FOR THE PROTECTION OF HVAC AND REFRIGERATION EQUIPMENT; HACR TYPE.

16B 3-2 DISCONNECT (SAFETY) SWITCHES

DISCONNECT (SAFETY) SWITCHES: SQUARE D, SIEMENS, OR CUTLER HAMMER, FUSED OR NON-FUSED (AS INDICATED ON DRAWINGS OR REQUIRED) NEMA KS1, HEAVY DUTY, EXTERNALLY OPERATED, VISIBLE-BLADE SAFETY SWITCHES; NEMA ENCLOSURE TYPE. INDICATED ON THE DRAWINGS OR SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED, BASED ON FUSEIBLE SWITCH AND FUSE SIZE INDICATED, INCLUDE CLASS R, J, OR L FUSE PROVISIONS AS APPLICABLE.

PROVIDE SWITCHES WHERE NOT FURNISHED WITH THE STARTING EQUIPMENT, AT ALL OTHER POINTS REQUIRED BY NFPA 70, AND WHERE INDICATED ON THE DRAWINGS.

16B 3-3 FUSES

PROVIDE EACH CIRCUIT AND SET OF FUSE CLIPS THROUGHOUT THE WORK WITH BUSSMANN, FENRIZ SHANNON, OR LITTLEFUSE FUSES; SIZES AND TYPES AS REQUIRED AND INDICATED. ALL FUSES LARGER THAN 600A, UL CLASS L, SIMILAR TO TYPE KRP-C BUSSMANN LOW PEAK OR EQUAL. FUSES USED TO PROTECT MOTORS: UL CLASS RK5, BUSSMANN FUSELINK OR EQUAL. FUSES USED TO PROTECT ALL OTHER ELECTRICAL EQUIPMENT: UL CLASS RK1, DUAL ELEMENT, BUSSMANN LPS/LPN OR EQUAL. ALL FUSED DEVICES SHALL BE LABELED AS TO TYPE AND SIZE OF FUSE REQUIRED.

FURNISH THREE SPARE FUSES OF EACH SIZE AND TYPE USED ON THE PROJECT (EXCEPT FOR MAIN SWITCH FUSES, FURNISH ONE SPARE), NEATLY CONTAINED IN A PROPERLY LABELED CABINET.

16B PART 4 LIGHT FIXTURES, LAMPS AND BALLASTS

16B 4-1 LIGHT FIXTURE LOCATIONS

LIGHT FIXTURES SHOWN ON THE ELECTRICAL DRAWINGS REPRESENT GENERAL ARRANGEMENTS ONLY. REFER TO ARCHITECTURAL DRAWINGS FOR MORE EXACT LOCATIONS. COORDINATE LOCATION WITH ALL OTHER TRADES BEFORE INSTALLATION TO AVOID CONFLICTS. COORDINATE LIGHT FIXTURE LOCATIONS IN MECHANICAL ROOMS WITH FINAL INSTALLED PIPING AND DUCTWORK LAYOUTS.

16B 4-2 LIGHT FIXTURES

PROVIDE LIGHT FIXTURES AS SCHEDULED ON DRAWINGS, INCLUDING ALL LAMPS, ALL NECESSARY ACCESSORIES, MATERIAL AND LABOR TO SECURELY HANG, CLEAN, AND MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. PROVIDE ALL HANGERS, SUPPORTS AND MISCELLANEOUS HARDWARE REQUIRED TO INSTALL LIGHT FIXTURES; PROPER TRIM TO FIT EACH CEILING CONDITION ACTUALLY ENCOUNTERED; ADDITIONAL TIE WIRES CONNECTED TO STRUCTURE TO CONFORM TO SEISMIC REQUIREMENTS WHERE REQUIRED BY THE APPLICABLE BUILDING CODE.

PACKAGING OF LIGHT FIXTURES WILL NOT BE ALLOWED. ONLY THOSE LUMINAIRES LISTED IN THE LIGHT FIXTURE SCHEDULE WILL BE ACCEPTED, WHERE THE LIGHT FIXTURE SCHEDULE INDICATES AN ALLOWANCE FOR A SPECIFIC LIGHT FIXTURE, THE PRICE IS A CONTRACTOR PRICE. INCLUDE ALL ADDITIONAL COSTS FOR FREIGHT, LAMPS, AND INSTALLATION OF LIGHT FIXTURE AND LAMPS.

THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILINGS, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. THE WHIP SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE LIGHT FIXTURE TO BE RELOCATED WITHIN A 6-FOOT RADIUS ON THE DRAWINGS.

16B 4-3 LAMPS

FLUORESCENT LAMPS AS INDICATED ON THE DRAWINGS FOR ALL LIGHT FIXTURES; OR, IF NOT INDICATED, AS RECOMMENDED BY THE LIGHT FIXTURE MANUFACTURER. IN ALL CASES, ALL LAMPS SHALL BE COMPATIBLE WITH THE SPECIFIED LIGHT FIXTURE, ACCEPTABLE LAMP MANUFACTURERS: GENERAL ELECTRIC, OSRAM/SYLVANIA, PHILIPS, OR VENTURE.

ALL FLUORESCENT LAMPS SHALL BE MINIMUM OF 3500 DEGREES K, WITH A MINIMUM COLOR-RENDERING INDEX OF 70. UNLESS NOTED OTHERWISE, ALL FLUORESCENT LAMPS IN SALES AREAS SHALL BE 3000 DEGREES K WITH A COLOR-RENDERING INDEX OF 80. ALL METAL HALIDE LAMPS IN SALES AREAS SHALL BE COATED, 3000 DEGREES K WITH A COLOR-RENDERING INDEX OF 70.

INCANDESCENT LAMPS: TYPE AND WATTAGE AS SHOWN ON THE DRAWINGS; RATED 130V UNLESS OTHERWISE SPECIFIED OR NOTED.

16B 4-4 BALLASTS

FLUORESCENT BALLASTS: LOW HEAT TYPE, THERMALLY PROTECTED AGAINST OVERHEATING; ETL-CBM, CLASS P TO MEET ALL REQUIREMENTS OF SECTION 410-73 (E) OF THE NFPA 70 AS A MINIMUM, COMPLY WITH THE NATIONAL BALLAST ENERGY LAW, 90- PERCENT POWER FACTOR OR GREATER; SOUND LEVELS NOT EXCEEDING CLASS A AMBIENT NOISE LEVELS.

- INDOOR FLUORESCENT BALLASTS: ELECTRONIC TYPE, SUITABLE FOR OPERATION OF 18 LAMPS; TOTAL HARMONIC DISTORTION LESS THAN 20 PERCENT; FREQUENCY OF OPERATION OF 20 KHZ OR GREATER WITH NO VISIBLE FLICKER; LINE TRANSIENT WITHSTAND RATINGS AS DEFINED IN ANSI/IEEE C62.41, CATEGORY A; MANUFACTURERS: ADVANCE REL/VEL SERIES OR APPROVED EQUAL, BY MAGNETEK, MOTOROLA, OR OSRAM.

EMERGENCY LIGHTING/BALLASTS: SHALL BE BODINE B50 OR IOTA I-232 FOR FOUR-FOOT FLUORESCENT LAMPS; SHALL BE BODINE B30 OR IOTA I-60 FOR EIGHT-FOOT FLUORESCENT LAMPS.

16B PART 5 MISCELLANEOUS ELECTRICAL

16B 5-1 WIRING OF MECHANICAL EQUIPMENT

PROVIDE ALL RACEWAYS AND POWER WIRING FOR ALL DIVISION 15 EQUIPMENT REQUIRING ELECTRIFIED CONNECTIONS, INCLUDING, BUT NOT LIMITED TO, PUMPS, WATER HEATERS, AND HVAC EQUIPMENT; AND ALL LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 15. CONNECT PER MANUFACTURERS' WIRING DIAGRAMS. COORDINATE WITH DIVISION 15 FOR DISCONNECTS FURNISHED WITH EQUIPMENT, AND PROVIDE ALL DISCONNECT SWITCHES AS REQUIRED. AFTER INSTALLING WIRING, VERIFY THAT EACH MOTOR LOAD HAS THE CORRECT PHASE ROTATION.

VERIFY THE ACTUAL "MAXIMUM OVERCURRENT PROTECTION" (MOCP) DEVICE RATINGS AND "MINIMUM CIRCUIT AMPACITY" (MCA) CONDUCTOR SIZING FOR MECHANICAL EQUIPMENT FROM THE EQUIPMENT MANUFACTURER. BASIC ELECTRICAL INSTALLATIONS ON ACTUAL, REQUIRED AMPERAGES, WHICH MAY VARY SOMEWHAT FROM THE CONDUCTOR AND EQUIPMENT SIZES SHOWN ON THE DRAWINGS; HOWEVER, IN NO CASE, REDUCE THE SIZE OF CONDUCTORS INDICATED ON THE DRAWINGS WITHOUT AUTHORIZATION FROM THE ENGINEER. PROVIDE PROPERLY SIZED ELECTRICAL WIRING AND EQUIPMENT WITHOUT EXTRA COST TO THE OWNER. NOTIFY THE ENGINEER OF ALL CHANGES REQUIRED IN THE ELECTRICAL INSTALLATION TO EQUIPMENT VARIANCES SO THAT THE EFFECTS ON FEEDERS, BRANCH CIRCUITS, PANELBOARDS, FUSES AND CIRCUIT BREAKERS CAN BE CHECKED PRIOR TO PURCHASING AND INSTALLATION. BE RESPONSIBLE FOR COORDINATING WITH DIVISION 15 TO VERIFY THE ACTUAL AMPACITIES AND CORRECT SIZES OF ALL CONDUCTORS AND OVERCURRENT PROTECTIVE DEVICES FOR ALL EQUIPMENT, AND CORRECT OVERLOAD HEATERS FOR ALL MOTORS, WHEN STARTERS ARE PROVIDED UNDER DIVISION 16.

16B 5-2 WIRING OF THERMOSTATS, TIME AND TEMPERATURE CONTROLS

PROVIDE ALL RACEWAYS, POWER WIRING, AND LINE-VOLTAGE CONTROL AND INTERLOCK WIRING NOT PROVIDED UNDER DIVISION 15, FOR ALL THERMOSTATS, TEMPERATURE CONTROL DEVICES, AND CONTROLS, INCLUDING, BUT NOT LIMITED TO, NIGHT-STATS, WATER HEATER INTERLOCKS, TIME SWITCHES AND OVERRIDE TIMERS. SEE MECHANICAL DRAWINGS FOR LOCATIONS AND TEMPERATURE CONTROL DIAGRAMS. LOW-VOLTAGE CONDUCTORS FOR THERMOSTATS AND TEMPERATURE CONTROL SYSTEM MAY BE RUN EXPOSED ABOVE FINISHED ACCESSIBLE CEILINGS, IF APPROVED AND LISTED FOR THIS PURPOSE, BUT SHALL BE INSTALLED IN CONDUIT WITHIN WALLS AND WHERE EXPOSED IN THE WORK AREAS.



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MECHANICAL HVAC PLAN

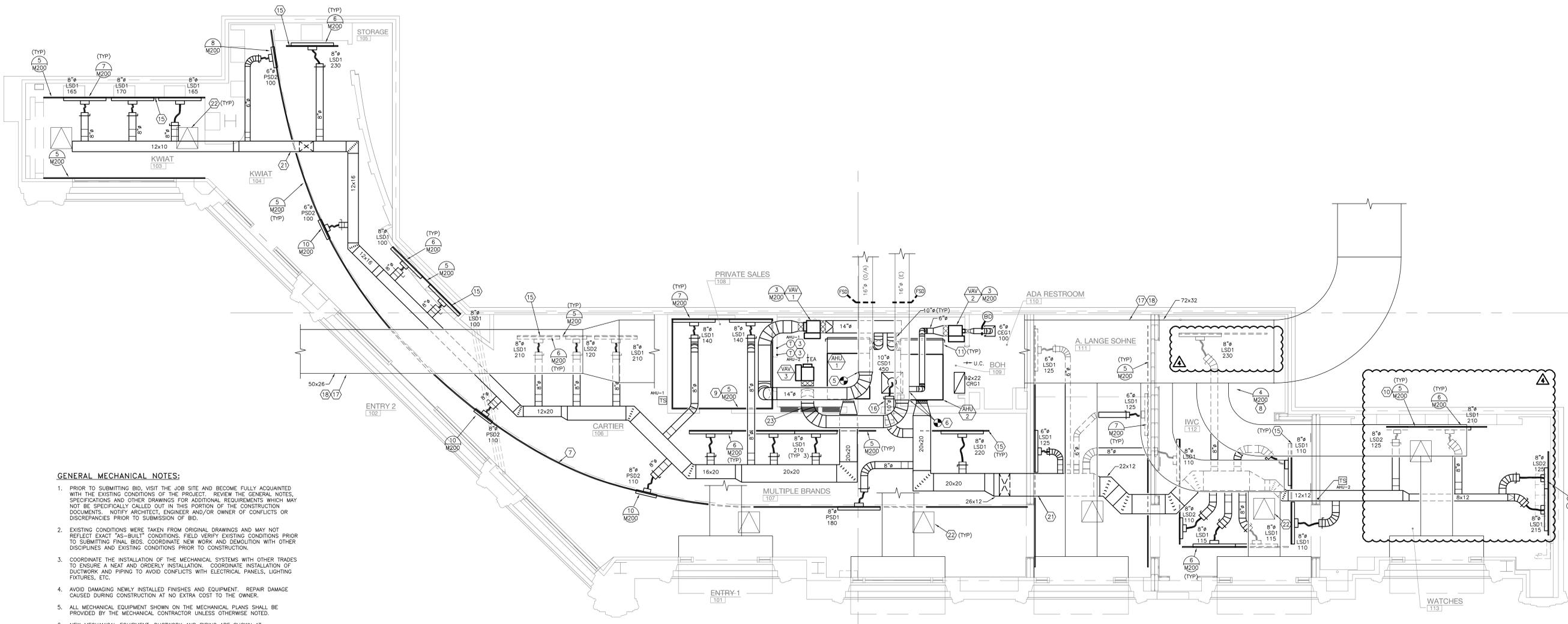
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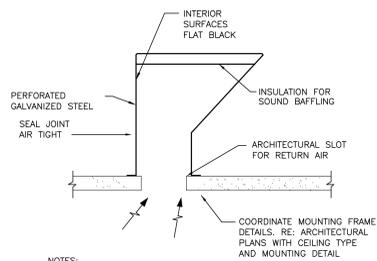
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PROJECT NO. 06100  
 DATE 12-11-06  
 SCALE AS NOTED  
 DRAWN BY JMO  
 APPROVED \_\_\_\_\_

DRAWING NUMBER

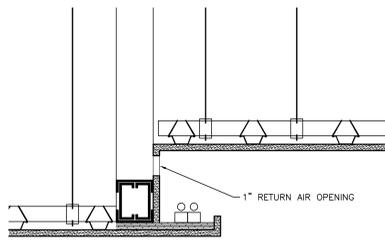
**M100**





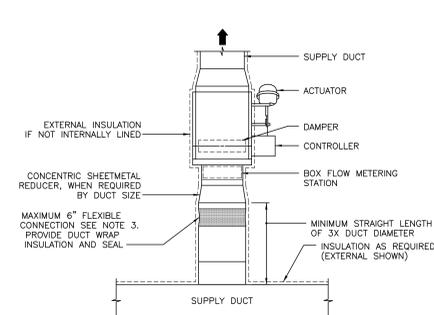
NOTES:  
UNITS SHIP FROM TITUS IN 4 FEET INCREMENTS. FIELD CUT FOR SHORTER LENGTHS.

**5 RETURN AIR LIGHT SHIELD**  
NO SCALE



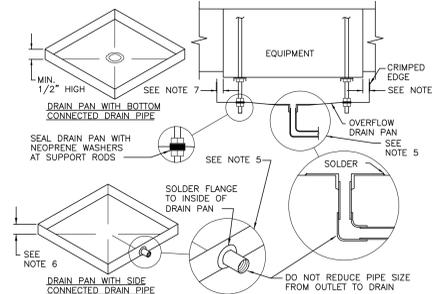
NOTES:  
REFERENCE ARCHITECTURAL PLANS FOR MORE INFORMATION.

**4 LIGHT COVE RETURN AIR OPENING**  
NO SCALE



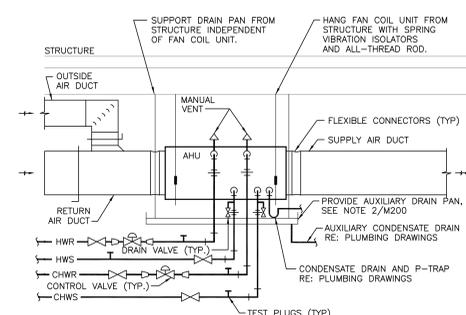
NOTES:  
1. SUPPORT AIR TERMINAL UNIT, BOTH ENDS WITH MINIMUM 2" WIDE GALVANIZED 22 GA. HANGER STRAPS.  
2. INSTALL BOX NOT MORE THAN 3 FEET ABOVE THE CEILING TO ENABLE ACCESS FOR MAINTENANCE.  
3. FLEXIBLE CONNECTION SHALL BE ATCO MODEL UPC# 017, OR DURO-DYNE INSULFLEX.

**3 VARIABLE AIR VOLUME BOX**  
NO SCALE



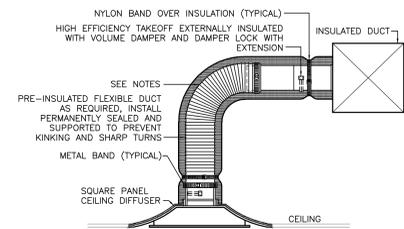
NOTES:  
1. CROSS BREAK BOTTOM OF SHEET METAL DRAIN PAN TO PROVIDE SLOPED DRAINAGE TO OUTLET.  
2. SOLDER ALL JOINTS TO MAKE DRAIN PAN LEAK TIGHT.  
3. SUSPEND DRAIN PAN WITH EQUIPMENT SUPPORT RODS WHEN POSSIBLE, OTHERWISE ATTACH TO BUILDING STRUCTURE.  
4. FABRICATE DRAIN PAN FROM 20 GAUGE GALVANIZED SHEET METAL.  
5. WHERE NOT SHOWN ON DRAWINGS, ROUTE DRAIN TO CODE APPROVED LOCATION. SEE PLUMBING PLAN FOR ROUTING.  
6. HEIGHT OF DRAIN PAN TO BE MINIMUM 1/2" GREATER THAN DIAMETER OF DRAIN PIPE FLANGE.  
7. DRAIN PAN SHALL EXTEND MINIMUM 3" BEYOND EQUIPMENT ON ALL SIDES.

**2 CONDENSATE OVERFLOW DRAIN PAN**  
NO SCALE



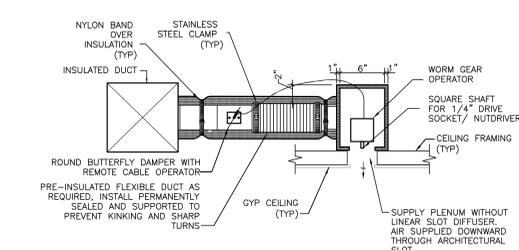
NOTES:  
1. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS OR MEET LOCAL CODE REQUIREMENTS.  
2. SIZE CONTROL VALVE FOR MAXIMUM PRESSURE DROP OF 5 PSIG BUT NOT LESS THAN 1/2 INCH.  
3. EXTEND AUXILIARY DRAIN PAN MINIMUM 3" BEYOND UNIT ON ALL SIDES PER 2/M200.  
4. PROVIDE TEST PLUGS FOR PRESSURE/TEMPERATURE CHECK AT ALL UNITS.

**1 4-PIPE AIR HANDLING UNIT DETAIL**  
NO SCALE



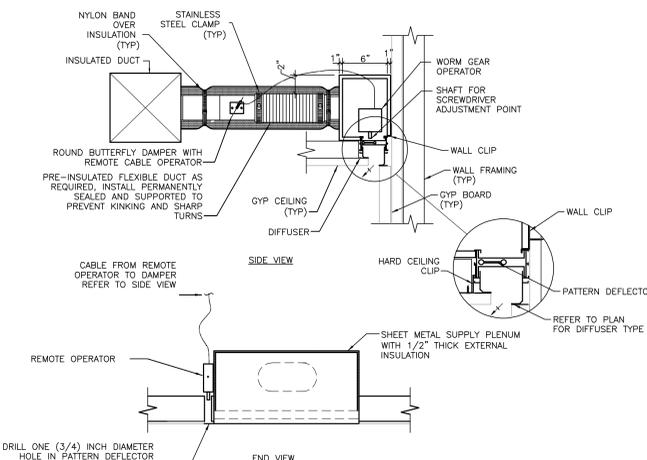
NOTES:  
EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.

**9 LAY-IN CEILING DIFFUSER DETAIL**  
NO SCALE



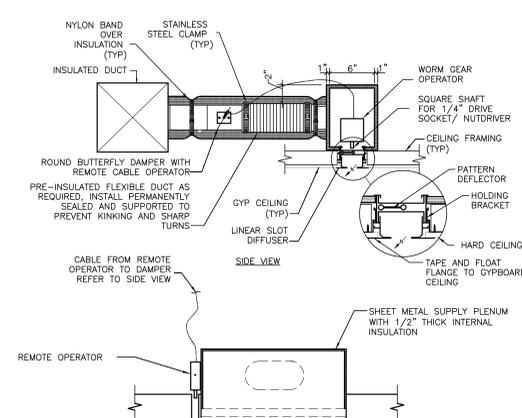
NOTES:  
EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.  
COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.  
DAMPER OPERATOR ASSEMBLY SHALL BE MODEL #RT-250 MANUFACTURED BY METROPOLITAN AIR TECHNOLOGY (1-800-585-7686).  
ALL FLEXIBLE DUCT OFFSETS SHALL MAINTAIN A RADIUS OF 1.5 TIMES THE DIAMETER AND SHALL BE A MAXIMUM OF 5'-0" IN LENGTH.

**8 LINEAR SUPPLY PLENUM**  
NO SCALE



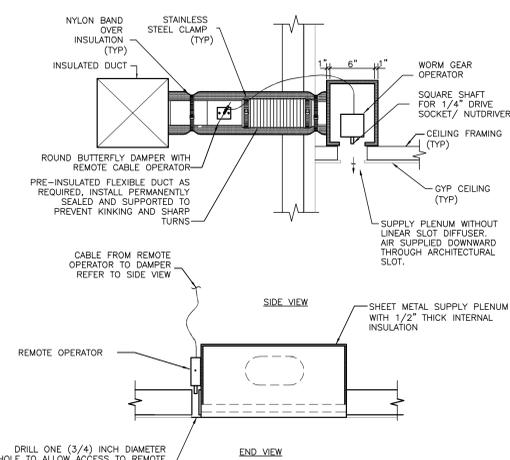
NOTES:  
EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.  
COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.  
PORTIONS OF THE SLOT DIFFUSER NOT USED FOR SUPPLY SHALL REMAIN OPEN TO THE PLENUM FOR RETURN UNLESS NOTED OTHERWISE.  
DAMPER OPERATOR ASSEMBLY SHALL BE MODEL #RT-250 MANUFACTURED BY METROPOLITAN AIR TECHNOLOGY (1-800-585-7686).  
ALL FLEXIBLE DUCT OFFSETS SHALL MAINTAIN A RADIUS OF 1.5 TIMES THE DIAMETER AND SHALL BE A MAXIMUM OF 5'-0" IN LENGTH.

**7 LINEAR SLOT DIFFUSER DETAIL (CEILING/WALL)**  
NO SCALE



NOTES:  
EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.  
COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.  
DAMPER OPERATOR ASSEMBLY SHALL BE MODEL #RT-250 MANUFACTURED BY METROPOLITAN AIR TECHNOLOGY (1-800-585-7686).  
ALL FLEXIBLE DUCT OFFSETS SHALL MAINTAIN A RADIUS OF 1.5 TIMES THE DIAMETER AND SHALL BE A MINIMUM OF 3'-0" AND MAXIMUM OF 5'-0" IN LENGTH.

**6 LINEAR SLOT DIFFUSER DETAIL (CEILING/CEILING)**  
NO SCALE



NOTES:  
EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH LIMITATION.  
COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.  
DAMPER OPERATOR ASSEMBLY SHALL BE MODEL #RT-250 MANUFACTURED BY METROPOLITAN AIR TECHNOLOGY (1-800-585-7686).  
ALL FLEXIBLE DUCT OFFSETS SHALL MAINTAIN A RADIUS OF 1.5 TIMES THE DIAMETER AND SHALL BE A MAXIMUM OF 5'-0" IN LENGTH.

**10 LINEAR SUPPLY PLENUM BEHIND WALL**  
NO SCALE

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**MECHANICAL DETAILS**

REVISIONS

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PROJECT NO.	06100
DATE	12-11-06
SCALE	AS NOTED
DRAWN BY	JMO
APPROVED	

DRAWING NUMBER

**M200**

# MECHANICAL SYMBOLS

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

## PIPING

—CD—	CONDENSATE DRAIN (CD)
—ACD—	AUXILIARY CONDENSATE DRAIN (ACD)
—RL—	REFRIGERANT LIQUID (RL)
—RD—	REFRIGERANT DISCHARGE (HOT GAS) (RD)
—RS—	REFRIGERANT SUCTION (RS)
—HWS—	HEATING HOT WATER SUPPLY (HWS)
—HWR—	HEATING HOT WATER RETURN (HWR)
—CWS—	CHILLED WATER SUPPLY (CWS)
—CWR—	CHILLED WATER RETURN (CWR)
—HS—	HEAT PUMP SUPPLY (HS)
—HR—	HEAT PUMP RETURN (HR)
—LPS—	LOW PRESSURE STEAM SUPPLY (LPS)
—LPC—	LOW PRESSURE STEAM CONDENSATE (LPC)
—	EXISTING PIPING TO BE REMOVED
—	EXISTING PIPING TO REMAIN
→	DIRECTION OF FLOW
●	BALL VALVE
○	CONTROL VALVE
⊕	THREE-WAY CONTROL VALVE
⊘	SHUTOFF VALVE
⊚	CHECK VALVE
⊚	BALANCING VALVE WITH PRESSURE PORTS
⊚	TRIPLE DUTY VALVE WITH PRESSURE PORTS
○	WATER METER
○	STRAINER
○	SOLENOID VALVE
○	PRESSURE GAUGE
○	THERMOMETER
○	UNION
○	FLANGE CONNECTION
○	ELBOW UP
○	ELBOW DOWN
○	TEE UP
○	TEE DOWN

## HVAC EQUIPMENT & DUCTWORK

NOTE: ALL DUCT DIMENSIONS SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS. SEE SECTION 15250 OF THE SPECIFICATION FOR DUCTWORK TO RECEIVE INSULATION OR LINER.

—	EXISTING DUCTWORK OR EQUIPMENT TO REMAIN
- - -	EXISTING DUCTWORK OR EQUIPMENT TO BE REMOVED
—	BRANCH DUCT WITH 45° RECTANGLE-ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER
—	ELBOW WITH TURNING VANES
—	RETURN, EXHAUST, OR OUTSIDE AIR DUCT UP
—	RETURN, EXHAUST, OR OUTSIDE AIR DUCT DOWN
—	SUPPLY AIR DUCT UP
—	SUPPLY AIR DUCT DOWN
—	EQUIPMENT WITH FLEXIBLE DUCT CONNECTION
—	18" FSD-1 300 CFM NECK SIZE, TYPE CFM OF SUPPLY DIFFUSER OR REGISTER
—	MANUAL VOLUME DAMPER
—	SQUARE TO ROUND TRANSITION
—	DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN)
FD	FIRE DAMPER
FSD	FIRE SMOKE DAMPER
SD	SMOKE DAMPER
VD	VOLUME DAMPER
MD	MOTORIZED DAMPER
BD	BACKDRAFT DAMPER
M	BTU METER
HS	HUMIDITY SENSOR
PS	PULL STATION
SP	STATIC PRESSURE SENSOR
TS	TEMPERATURE SENSOR
H	HUMIDISTAT
T	THERMOSTAT

## ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR
BAS	BUILDING AUTOMATION SYSTEM	MIN	MINIMUM
BD	BACKDRAFT DAMPER	NC	NOISE CRITERIA
CFM	CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
DDC	DIRECT DIGITAL CONTROL	RA	RETURN AIR
DX	DIRECT EXPANSION	SA	SUPPLY AIR
EA	EXHAUST AIR	SD	SMOKE DUCT DETECTOR
FFA	FROM FLOOR ABOVE	TFA	TO FLOOR ABOVE
FFB	FROM FLOOR BELOW	TFB	TO FLOOR BELOW
GPM	GALLONS PER MINUTE	TYP	TYPICAL
IN WC	INCHES OF WATER COLUMN	UNO	UNLESS NOTED OTHERWISE
MAX	MAXIMUM	W/	WITH
MBH	1000 BTU PER HOUR	W/O	WITHOUT

## STANDARD MOUNTING HEIGHTS

MECHANICAL THERMOSTATS (USER ADJUSTABLE)	48"
CONTROLS (CENTERLINE)	48"

## ANNOTATION

①	MECHANICAL PLAN CALLOUT
CU	MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE)
○	CONNECTION POINT OF NEW WORK TO EXISTING
①	DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER
MT	SECTION CUT DESIGNATION

## AIR HANDLING UNIT SCHEDULE (HOT WATER HEAT)

MARK	MANUFACTURER	MODEL	SUPPLY FAN				COOLING COIL				HEATING COIL				FINAL FILTERS	DISC. TYPE	STARTER TYPE	MCA (AMPS)	MOCF (AMPS)	NOTES														
			FAN TYPE	CFM	ESP (IN)	MIN HP (Y/N)	V/PH	TH (MBH)	SH (MBH)	EAT (DB/WB)	LAT (DB/WB)	GPM SUMMER	EWT/LWT WINTER (°F)	GPM WINTER							EWT/LWT WINTER (°F)	VEL (FPM)	ROWS / FPI	CAP. (MBH)	EAT (DB)	LAT (DB)	GPM	EWT/LWT (°F)	MAX. WPD (FT)	MAX. APD (IN)	VEL. (FPM)	ROWS / FPI	MIN. O/A CFM	
AHU-1	TRANE	BCXC090	FC	2,800	1.00	1.5	N	208/3	45.0	43.0	71.4/60.9	56.1/55.1	5.6	44/60	9	50/60	<500	6/14	64.5	71.4	93.5	6.45	180/160	1.84	0.08	<500	1/12	475	2"	DIV 16	DIV 16	6	15	A-K
AHU-2	TRANE	BCXC090	FC	2,800	1.00	1.5	N	208/3	45.0	43.0	71.4/60.9	56.1/55.1	5.6	44/60	9	50/60	<500	6/14	64.5	71.4	93.5	6.45	180/160	1.84	0.08	<500	1/12	475	2"	DIV 16	DIV 16	6	15	A-K

NOTES:  
A. PROVIDE OPTIONAL HIGH CAPACITY 6 ROW COOLING COILS.  
B. DISCONNECT SWITCH FURNISHED BY DIVISION 16 CONTRACTOR.  
C. STARTER FURNISHED BY DIVISION 16 CONTRACTOR.  
D. SIZE FILTERS FOR 400 FPM MAXIMUM FACE VELOCITY AND AIR PRESSURE DROP OF 0.4" FOR CLEAN FINAL FILTERS.  
E. SPECIFIED FAN ESP AND TSP INCLUDE LOSSES FOR DIRTY FILTERS.  
F. DIVISION 16 CONTRACTOR TO FURNISH AND INSTALL SMOKE DETECTORS IN SUPPLY AIR AND RETURN AIR DUCTS.  
G. UNIT SHALL BE DRAW THRU CONFIGURATION.  
H. PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-THREAD HANGING RODS.  
I. OUTSIDE AIR IS SUPPLIED AT 60 +/- 5°F. ENTERING AIR TEMPERATURES REPRESENT CONDITION OF MIXED RETURN AIR AND OUTSIDE AIR WHEN OUTSIDE AIR IS AT 65°F.  
K. SIZE EQUIPMENT FOR ELEVATION OF 2000 FEET ABOVE SEA LEVEL.

## VARIABLE AIR VOLUME TERMINAL SCHEDULE (NO HEAT)

MARK	UNIT	MANUFACTURER	MODEL	INLET SIZE (IN)	PRIMARY CFM	MINIMUM CFM (%)	SOUND		NOTES
							RADIATED	DISCHARGE	
VAV-1	OUTSIDE AIR	TITUS	AESV	10	950	N/A	49	60	A-G
VAV-2	RESTROOM EXHAUST	TITUS	AESV	4	100	N/A	-	-	B-G
VAV-3	EXHAUST AIR	TITUS	AESV	10	1150	N/A	53	62	A-G

NOTES:  
A. VAV BOX SHALL HAVE ABILITY TO FULLY CLOSE.  
B. INSTALL FLEXIBLE DUCT CONNECTOR AT INLET CONNECTION.  
C. PROVIDE INTEGRAL DISCONNECT SWITCH.  
D. PROVIDE FACTORY INSTALLED CONTROL POWER TRANSFORMER.  
E. PROVIDE FACTORY-INSTALLED, PRESSURE INDEPENDENT, ELECTRONIC CONTROL PACKAGE.  
F. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED NOISE DB USING 0.5" W.G. INLET PRESSURE IN THE 3RD OCTAVE BAND.  
G. VAV BOX CONTROLS TO BE PRESSURE INDEPENDENT. INTERLOCK VAV-BOX CONTROLS WITH LANDLORD BUILDING MONITORING SYSTEM.

## GRILLE, REGISTER AND DIFFUSER SCHEDULE

MARK	MANUFACTURER	MODEL	FACE TYPE	MOUNTING LOCATION	FACE SIZE OR LENGTH (IN)	SLOT NUMBER	MAX. SLOT WIDTH (IN)	NC	NOTES
CSD1	TITUS	OMNI	PLAQUE	CEILING	24"x24"	N/A	30	A, B, C, D, E, G, K	
CRG1	TITUS	PAR	PERFORATED	CEILING	24"x12"	N/A	30	A, B, C, D, E, G	
LSD1	TITUS	FLOWBAR	LINEAR	CEILING	4'-0"	(1) - 1"	30	A, D, F, G, H, I	
LSD2	TITUS	FLOWBAR	LINEAR	CEILING	2'-0"	(1) - 1"	30	A, D, F, G, H, I	
PSD1	N/A	N/A	N/A	RE: DRAWINGS	4'-0"	(1) - 1"	30	A, D, G, H, I, J	
PSD2	N/A	N/A	N/A	RE: DRAWINGS	2'-0"	(1) - 1"	30	A, D, G, H, I, J	
CEG1	TITUS	OMNI	PLAQUE	CEILING	12"x12"	N/A	30	A, B, C, D, E, G	

NOTES:  
A. NECK SIZE EQUIVALENT TO DUCT RUN OUT SHOWN ON DRAWINGS UNLESS INDICATED OTHERWISE.  
B. 4-WAY THROW PATTERN UNLESS OTHERWISE SHOWN ON DRAWINGS.  
C. BAKED ENAMEL FINISH, WHITE TO MATCH CEILING COLOR.  
D. PROVIDE NECK FOR DUCT CONNECTION.  
E. FRAME TYPE TO MATCH CEILING CONSTRUCTION, COORDINATE WITH ARCHITECTURAL REFLECTED CEILING PLAN.  
F. PROVIDE BORDER TYPE TO MATCH CEILING CONSTRUCTION WITH CONCEALED MOUNTING, AND INSULATED PLENUM WITH NECK.  
G. ALUMINUM CONSTRUCTION.  
H. PLENUM SHALL BE INSULATED.  
I. VERIFY THERE IS NOT ANY LIGHT LEAKAGE INTO PLENUM.  
J. PLENUM BOXES ONLY, ARCHITECTURAL SLOTS (PER ARCHITECTURAL DETAILS) WILL BE UTILIZED IN LEIU OF LINEAR SLOT DIFFUSERS.  
K. INSTALL PER DETAIL # 9/M200.



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THE SHOPPER AT THE PALAZZO, SPACE #1102, 3300 LAS VEGAS BOULEVARD SOUTH, LAS VEGAS, NV, 89109

MECHANICAL SCHEDULES AND LEGEND

REVISIONS

08-27-07	ISSUED FOR PRICING
10-29-07	REVISION NO. 1
11-28-07	REVISION NO. 2
11-29-07	REVISION NO. 3

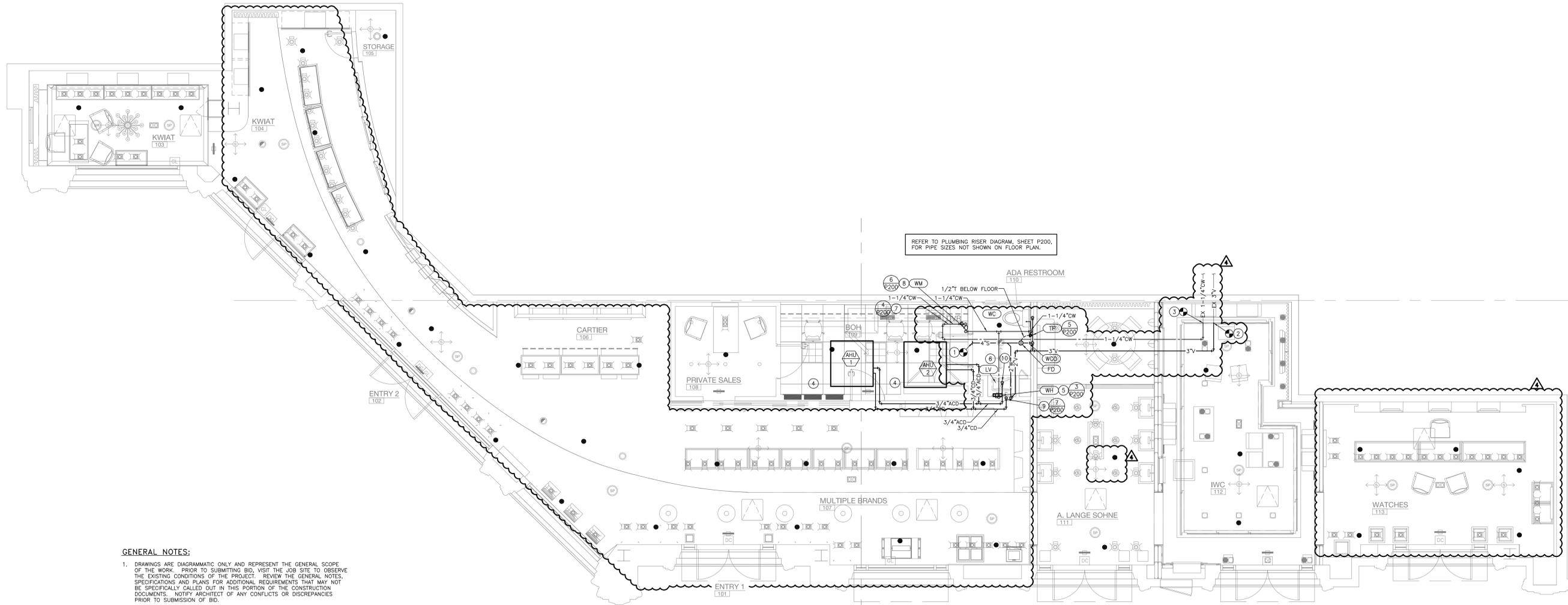
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PROJECT NO. 06100  
DATE 12-11-06  
SCALE AS NOTED  
DRAWN BY JMO  
APPROVED \_\_\_\_\_

DRAWING NUMBER

**M300**





REFER TO PLUMBING RISER DIAGRAM, SHEET P200, FOR PIPE SIZES NOT SHOWN ON FLOOR PLAN.

**GENERAL NOTES:**

- DRAWINGS ARE DIAGRAMMATIC ONLY AND REPRESENT THE GENERAL SCOPE OF THE WORK. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE TO OBSERVE THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND PLANS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- FURNISH A CONSTRUCTION RECORD SET OF "AS-BUILT" DOCUMENTS TO THE ARCHITECT REFLECTING ANY VARIANCES OF INSTALLED PIPING LOCATIONS OR EQUIPMENT CONTRARY TO THE CONSTRUCTION DOCUMENTS PREPARED BY THE ENGINEER-OF-RECORD AFTER FINAL INSPECTION OF INSTALLED PLUMBING SYSTEMS.
- FURNISH TO THE ARCHITECT A COPY OF INSPECTION REPORTS AND APPROVAL CERTIFICATES FROM LOCAL AND STATE INSPECTIONS.
- INSTALLATION SHALL COMPLY WITH LEGALLY CONSTITUTED CODES AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AND ALSO MEET ALL REQUIREMENTS OF THE LANDLORD.
- PLANS AND SPECIFICATIONS GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.
- VERIFY LOCATION AND DEPTH OF UTILITIES AT POINTS OF CONNECTION BEFORE START OF PROJECT.
- REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING FIXTURES.
- DO NOT SCALE FLOOR PLANS FOR EXACT HORIZONTAL LOCATION OF PIPE ROUTING.
- VALVES SHALL BE LINE SIZE UNLESS OTHERWISE NOTED.
- PIPING IN FINISHED AREAS SHALL BE ROUTED CONCEALED; EXPOSED PIPING, WHERE NECESSARY, SHALL BE ROUTED AS HIGH AS POSSIBLE AND TIGHT TO WALLS.
- NO PLASTIC PIPE OF ANY KIND SHALL BE INSTALLED INSIDE OR UNDER THE BUILDING. NO PLASTIC PIPE SHALL BE INSTALLED IN THE CEILING RETURN AIR PLenum.
- COORDINATE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
- COORDINATE PIPING INSTALLATION WITH STRUCTURAL GRADE BEAMS, FOOTINGS, COLUMN PIERS, ETC. SLEEVE PIPING THROUGH GRADE BEAMS, FOOTING, ETC. WHERE REQUIRED AND AS NOTED ON PLANS. COORDINATE SLEEVE INSTALLATIONS WITH THE ARCHITECT, STRUCTURAL ENGINEER, STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR BEFORE CONCRETE IS INSTALLED.
- CLEAN FAUCET AERATORS AND PIPE STRAINERS PRIOR TO TURNING BUILDING OVER TO THE OWNER.
- PROVIDE TRAP PRIMERS WHERE REQUIRED BY LOCAL AUTHORITIES.
- COORDINATE PIPE ROUTING AWAY FROM ELECTRICAL PANELS. DO NOT ROUTE PIPING OVER ELECTRICAL PANELS.
- PAINT ALL EXPOSED WATER PIPING USING RUST INHIBITOR PAINT. PAINT AND COLOR SHALL BE COORDINATED WITH THE ARCHITECT AND / OR OWNER.
- COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES. MAINTAIN 10' MINIMUM CLEARANCE FROM ALL AIR INTAKES. MAINTAIN 2' CLEARANCE FROM ALL OTHER EQUIPMENT.
- WATER HAMMER ARRESTORS SHALL BE SIZE "A" UNLESS NOTED OTHERWISE.
- PROVIDE STACK SLEEVES AT PIPING PENETRATIONS OF ELEVATED WATERPROOF FLOOR SLABS, REFER TO SPECIFICATIONS.

**FIRE SPRINKLER GENERAL NOTES:**

- SPRINKLER SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH NFPA 13. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
- INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. LAYOUT SYSTEM, PERFORM REQUIRED CALCULATIONS AND COORDINATE WITH OTHER TRADES.
- PROVIDE ADDITIONAL MATERIALS AND LABOR REQUIRED DUE TO LACK OF COORDINATION AND TO MEET AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.
- MODIFY EXISTING SPRINKLER SYSTEM. RELOCATE AND/OR PROVIDE ADDITIONAL SPRINKLERS, PIPING, HANGERS, ETC. COORDINATE WITH WALLS, CEILINGS, LIGHTS, DIFFUSERS, STRUCTURE, OBSTRUCTIONS, ETC., IN AREAS AFFECTED BY SCOPE OF WORK.
- PROVIDE MINIMUM ORDINARY HAZARD GROUP 2 DESIGN CRITERIA (0.20 GPM/SF OVER 1500 SF HYDRAULIC REMOTE AREA) THROUGHOUT BUILDING UNLESS REQUIRED OTHERWISE. INCLUDE HOSE ALLOWANCE AT BASE OF RISER.
- COORDINATE PIPE ROUTING NEAR ELECTRICAL EQUIPMENT WITH NFPA 70.
- DO NOT CONNECT MORE THAN ONE SPRINKLER TO AN EXISTING ONE-INCH OUTLET.
- REMOVE ALL ABANDONED PIPING, FITTINGS, HANGERS, ETC.
- COORDINATE SPRINKLER TEMPERATURES NEAR HEAT-PRODUCING SOURCES WITH NFPA 13.
- FORWARD COMPLETED CONTRACTOR MATERIAL TEST CERTIFICATES TO THE OWNER.
- REFER TO SPECIFICATIONS AND LANDLORD CRITERIA FOR ADDITIONAL REQUIREMENTS.

FIRE SPRINKLER LEGEND		
SYMBOL	DESCRIPTION	REMARKS
●	CONCEALED SPRINKLER WITH COVER PLATE	COVER PLATE FINISH TO MATCH CEILING FINISH. COORDINATE WITH ARCHITECT.

**1 PLUMBING PLAN**  
SCALE: 1/4"=1'-0"

**PLUMBING PLAN NOTES:**

- CONNECT NEW SANITARY PIPING INTO THE EXISTING SANITARY SYSTEM. FIELD VERIFY THAT THE EXISTING SANITARY SYSTEM'S LOCATION, SIZE, INVERT AND DIRECTION OF FLOW IS COMPATIBLE FOR MEETING THE NEW SANITARY PIPE CONNECTION AND REQUIREMENTS. PRIOR TO START OF INSTALLATION, CONTRACTOR SHALL NOTIFY THE ARCHITECT AS SOON AS POSSIBLE IF CONFLICTS ARE FOUND WITH NEW DESIGN AND THE EXISTING SANITARY SYSTEM.
- CONNECT NEW VENT PIPING INTO THE EXISTING VENT THROUGH ROOF. FIELD VERIFY THAT THE EXISTING VENT SYSTEM'S LOCATION AND SIZE IS COMPATIBLE FOR MEETING THE NEW VENT PIPE CONNECTION AND REQUIREMENTS. PRIOR TO START OF INSTALLATION, CONTRACTOR SHALL NOTIFY THE ARCHITECT AS SOON AS POSSIBLE IF CONFLICTS ARE FOUND WITH NEW DESIGN AND THE EXISTING VENT SYSTEM.
- CONNECT NEW WATER PIPING INTO THE EXISTING WATER SUPPLY. FIELD VERIFY THAT THE EXISTING WATER SYSTEM'S LOCATION, SIZE AND DIRECTION IS COMPATIBLE FOR MEETING THE NEW WATER PIPE CONNECTION AND REQUIREMENTS. PRIOR TO START OF INSTALLATION, CONTRACTOR SHALL NOTIFY THE ARCHITECT AS SOON AS POSSIBLE IF CONFLICTS ARE FOUND WITH NEW DESIGN AND THE EXISTING WATER SYSTEM.
- DO NOT ROUTE WATER, VENT OR CONDENSATE PIPING OVER ELECTRICAL AND TELEPHONE PANEL BOARDS OR IT TECHNOLOGY EQUIPMENT. COORDINATE ALL PIPE ROUTING AROUND THE REQUIRED CLEAR SPACE OF ALL PANELS.
- INSTALL INSTANTANEOUS ELECTRIC WATER HEATER BELOW LAVATORY. INSTALLATION SHALL MEET ADA CLEARANCE REQUIREMENTS.
- REFER TO ARCHITECTURAL DRAWINGS AND LANDLORD CRITERIA FOR WATER PROOFING REQUIREMENTS OF TOILET ROOM FLOOR.
- HOLD ALL WATER AND VENT PIPING AS HIGH AS POSSIBLE IN CEILING SPACE. COORDINATE ROUTING WITH EXISTING LANDLORD DUCTWORK AND ALL OTHER TRADES TO AVOID CONFLICTS.
- INSTALL MAIN SHUT-OFF VALVE DOWNSTREAM OF TENANT TAP TO LANDLORD SERVICE. COORDINATE WATER METER COMPATIBILITY, INSTALLATION AND INTERLOCK TO LANDLORD'S CENTRAL MONITORING SYSTEM WITH LANDLORD'S CONSTRUCTION MANAGER.
- 3/4" CONDENSATE DRAIN, DOWN IN WALL AND DISCHARGE TO LAVATORY TAILPIECE.
- PROVIDE 3/4" OVERFLOW CONDENSATE DOWN THROUGH TO 1" BELOW CEILING CENTERED OVER LAVATORY. PROVIDE ESCUTCHEON.

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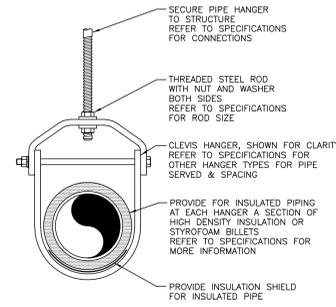
**PLUMBING PLAN**

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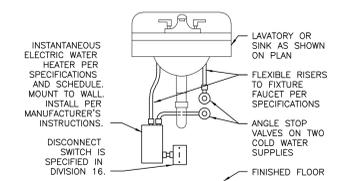
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DATE 12-11-06  
SCALE AS NOTED  
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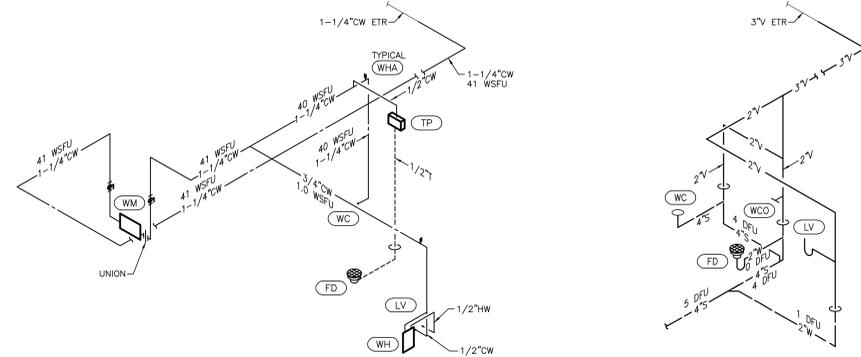
DRAWING NUMBER  
**P100**



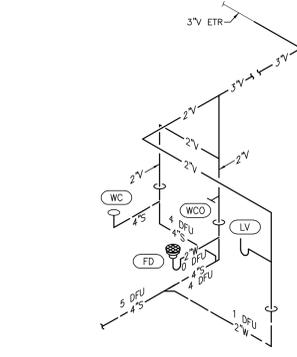
4 PIPE HANGER DETAIL NOT TO SCALE



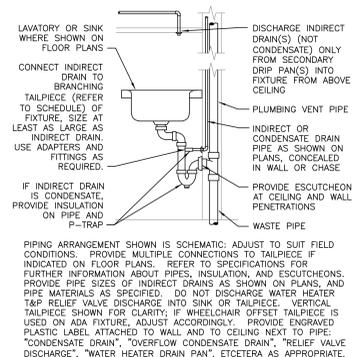
3 INSTANTANEOUS WATER HEATER NOT TO SCALE



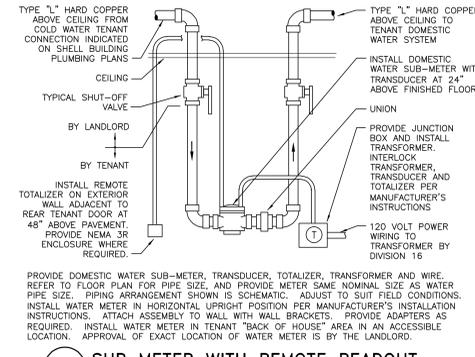
2 DOMESTIC WATER RISER DIAGRAM NOT TO SCALE



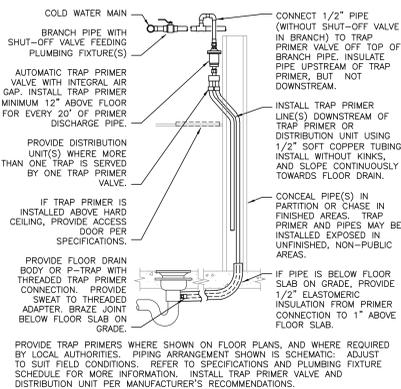
1 WASTE AND VENT RISER DIAGRAM NOT TO SCALE



7 INDIRECT DRAINS TO SINK NOT TO SCALE



6 SUB METER WITH REMOTE READOUT NOT TO SCALE



5 TRAP PRIMER OVERHEAD NOT TO SCALE

FIXTURE	COLD WATER	HOT WATER	WASTE	VENT
WATER CLOSET (TANK)	1/2"	---	4"	2"
LAVATORY/ HAND SINK FLOOR DRAIN	1/2"	1/2"	2"	1-1/2"
NOTE:				
PIPE SIZES SHOWN ARE MINIMUM.				

PIPING SYSTEM	ABBREVIATION	PIPING MATERIAL
SANITARY DRAINAGE & VENT (ABOVE GRADE)	S, W OR V	HUBLESS CAST IRON
SANITARY DRAINAGE & VENT (BELOW GRADE)	S, W OR V	SERVICE WEIGHT CAST IRON
POTABLE WATER (ABOVE GRADE)	CW, HW OR HWR	TYPE L HARD DRAWN COPPER
POTABLE WATER - 2" & SMALLER (BELOW GRADE)	CW, HW OR HWR	TYPE K SOFT DRAWN COPPER
CONDENSATE DRAIN - 1" & SMALLER	CD	TYPE M HARD ANNEAL COPPER (PVC DWV OPTIONAL)
FIRE PROTECTION - 3" & LARGER (BELOW GRADE)	FP	DUCTILE IRON
FIRE PROTECTION (ABOVE GRADE)	FP	SCHEDULE 10 OR 40 BLACK STEEL
REFER TO SPECIFICATIONS FOR FITTINGS, INSTALLATION REQUIREMENTS AND FURTHER INFORMATION		

FD FLOOR DRAIN: JAY R. SMITH # 2005L (-B), CAST IRON BODY AND CLAMPING COLLAR, ADJUSTABLE 6" SQUARE NICKEL BRONZE STRAINER. USE PUSH-ON JOINT OF OUTLET SIZE AS SHOWN ON PLANS.	HD HUB DRAIN: PROVIDE A P-TRAP BELOW FINISHED FLOOR AND STUB THE BELL END OF A CAST IRON PIPE 4" ABOVE FINISHED FLOOR. SIZE AS SHOWN ON FLOOR PLANS.
LV UNDERCOUNTER LAVATORY (ADA ACCESSIBLE): AMERICAN STANDARD # 0614.000 \"STUDIO\" 21-1/4\" X 15-1/4\" UNDER MOUNT WHITE VITREOUS CHINA FIXTURE WITH FRONT OVERFLOW, SET IN BED OF SILICONE SEALANT. FAUCET: AMERICAN STANDARD #2555.801.002, TOWN SQUARE TWO HANDLE, POLISHED CHROME, WIDESPREAD FAUCET WITH LEVER HANDLES, 0.5 GPM AERATOR AND POP UP DRAIN, 1/2\"/> <td>TP TRAP PRIMER: PRECISION PLUMBING PRODUCTS # PR-100 \"PRIME RITE\", CORROSION RESISTANT BRASS BODY, \"O\" RING SEALS, 1/2\"/&gt; </td>	TP TRAP PRIMER: PRECISION PLUMBING PRODUCTS # PR-100 \"PRIME RITE\", CORROSION RESISTANT BRASS BODY, \"O\" RING SEALS, 1/2\"/>
WC FLOOR-MOUNTED WATER CLOSET (ADA ACCESSIBLE): AMERICAN STANDARD # 3043.102 \"MADERA\" WHITE VITREOUS CHINA FIXTURE WITH ELONGATED BOWL, 1.6 GALLON PER FLUSH, AND DIRECT-FED SIPHON JET ACTION. VALVE: SLOAN \"SLOAN\" # 111 EXPOSED CHROME-PLATED DIAPHRAGM TYPE FLUSH VALVE WITH CHLORAMINE RESISTANT DIAPHRAGM AND PROTECTED ORIFICE, OSCILLATING ADA COMPLIANT HANDLE, ESCUTCHEON, INTEGRAL, SCREWDRIVER STOP WITH VANDAL RESISTANT CAP, VACUUM BREAKER, AND SWEAT ADAPTER KIT. INSTALL FLUSH VALVE HANDLE ON THE WIDE SIDE OF THE STALL. TRIM: CHURCH # 9500SSC WHITE OPEN-FRONT CONToured, SOLID PLASTIC, HEAVY DUTY, SEAT LESS COVER WITH SELF-SUSTAINING CHECK WINGES AND STAINLESS STEEL BOLTS.	WCO WALL CLEANOUT: JAY R. SMITH # 4530S, CAST IRON CLEANOUT TEE, COUNTER SUNK PLUG, STAINLESS STEEL ROUND COVER AND SCREW, AND IRON PLUG WITH GASKET SEAL. REFER TO SPECIFICATIONS FOR INSTALLATION.
WH WATER HEATER: EEMAX # SP3208, INSTANTANEOUS, NI CHROME REPLACEMENT CARTRIDGE TYPE HEATING ELEMENT, 3 KW INPUT, GLASS REINFORCED BODY, WHITE ABS COVER, 3/8\"/> <td>WHA WATER HAMMER ARRESTER: PRECISION PLUMBING PRODUCTS, HAND DRAWN COPPER BODY WITH WROUGHT COPPER FITTINGS, PISTON TYPE WITH LUBRICATED EPDM \"O\" RING SEALS, ASSE 1010 CERTIFICATION. PROVIDE PDI SIZE \"X\" THROUGH \"T\" AS SHOWN ON PLANS. PROVIDE SIZE \"X\" UNLESS SHOWN OTHERWISE ON THE PLANS.</td>	WHA WATER HAMMER ARRESTER: PRECISION PLUMBING PRODUCTS, HAND DRAWN COPPER BODY WITH WROUGHT COPPER FITTINGS, PISTON TYPE WITH LUBRICATED EPDM \"O\" RING SEALS, ASSE 1010 CERTIFICATION. PROVIDE PDI SIZE \"X\" THROUGH \"T\" AS SHOWN ON PLANS. PROVIDE SIZE \"X\" UNLESS SHOWN OTHERWISE ON THE PLANS.
WM WATER METER: AMCO # C700 3/4\", BRONZE MAINCASE AND MEASURING CHAMBER, BRONZE BOTTOM PLATE, STAINLESS STEEL TRIM AND BOLTS, THERMOPLASTIC STRAINER, OSCILLATING PISTON MEASURING ELEMENT, STRAIGHT READING HERMETICALLY SEALED REGISTER, REGISTRATION IN US GALLONS, MAGNETIC DRIVE, AND COMPLIANCE WITH ANSI/AWWA C700. PROVIDE WITH REMOTE READING SYSTEM IF / AS REQUIRED.	

PLUMBING SYMBOLS

NOTE: THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS, ABBREVIATIONS, ETC. ARE NECESSARILY USED ON THE DRAWINGS.

ANNOTATION	PIPING
1 PLUMBING PLAN NOTE CALLOUT	--- DOMESTIC COLD WATER (CW)
2 PLUMBING EQUIPMENT DESIGNATION, (CONTRACTOR FURNISHED AND INSTALLED), REFER TO PLUMBING FIXTURE OR EQUIPMENT SCHEDULES	--- SOFTENED COLD WATER (SCW)
3 EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)	--- DOMESTIC HOT WATER (HW)
4 MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR FURNISHED AND INSTALLED, UNLESS NOTED OTHERWISE)	--- DOMESTIC HOT WATER REIRC. (HWR)
5 CONNECTION POINT OF NEW WORK TO EXISTING	--- 140\"/>

PIPING
--- DOMESTIC COLD WATER (CW)
--- SOFTENED COLD WATER (SCW)
--- DOMESTIC HOT WATER (HW)
--- DOMESTIC HOT WATER REIRC. (HWR)
--- 140\"/>

STANDARD MOUNTING HEIGHTS

PLUMBING	(AFF. AFF. UNLESS NOTED OTHERWISE)
REFER TO THE ARCHITECTURAL DRAWINGS FOR PLUMBING FIXTURE MOUNTING HEIGHTS. UNLS. INSTALL PLUMBING FIXTURES WITH THE MOUNTING HEIGHTS AS LISTED BELOW WITH FINAL APPROVAL BY THE ARCHITECT.	
ADA ACCESSIBLE DRINKING FOUNTAIN	17\"/>

--- VENT PIPING (V)	--- VENT PIPING (V)
--- VENT BELOW GRADE (VBG)	--- VENT BELOW GRADE (VBG)
--- VENT BELOW FLOOR (VBF)	--- VENT BELOW FLOOR (VBF)
--- ID INDIRECT DRAIN (ID)	--- ID INDIRECT DRAIN (ID)
--- CDH CONDENSATE DRAIN - HIGH EFFICIENCY RTU (CDH)	--- CDH CONDENSATE DRAIN - HIGH EFFICIENCY RTU (CDH)
--- CD CONDENSATE DRAIN (CD)	--- CD CONDENSATE DRAIN (CD)
--- ACD AUXILIARY CONDENSATE DRAIN (ACD)	--- ACD AUXILIARY CONDENSATE DRAIN (ACD)
--- SPD SUMP OR SEWAGE PUMP DISCHARGE (SPD)	--- SPD SUMP OR SEWAGE PUMP DISCHARGE (SPD)
--- CA COMPRESSED AIR (CA)	--- CA COMPRESSED AIR (CA)
--- G NATURAL GAS (G)	--- G NATURAL GAS (G)
--- G NATURAL GAS ON ROOF (G)	--- G NATURAL GAS ON ROOF (G)
--- AI MEDICAL AIR INTAKE (AI)	--- AI MEDICAL AIR INTAKE (AI)
--- MA MEDICAL AIR (MA)	--- MA MEDICAL AIR (MA)
--- MV MEDICAL VACUUM (MV)	--- MV MEDICAL VACUUM (MV)
--- VE MEDICAL VACUUM EXHAUST (VE)	--- VE MEDICAL VACUUM EXHAUST (VE)
--- EV EVACUATION (EV)	--- EV EVACUATION (EV)
--- CO CARBON DIOXIDE (CO)	--- CO CARBON DIOXIDE (CO)
--- N NITROGEN (N)	--- N NITROGEN (N)
--- O OXYGEN (O)	--- O OXYGEN (O)
--- NO NITROUS OXIDE (NO)	--- NO NITROUS OXIDE (NO)
--- NPW NON POTABLE WATER (NPW)	--- NPW NON POTABLE WATER (NPW)
--- LPG LIQUIFIED PETROLEUM GAS (LPG)	--- LPG LIQUIFIED PETROLEUM GAS (LPG)
--- WS WATER SERVICE (WS)	--- WS WATER SERVICE (WS)
--- FP FIRE PROTECTION (FP)	--- FP FIRE PROTECTION (FP)
--- PD CONDENSATE PUMP DISCHARGE (PD)	--- PD CONDENSATE PUMP DISCHARGE (PD)
--- EXISTING PIPING TO BE REMOVED	--- EXISTING PIPING TO BE REMOVED
--- EXISTING PIPING TO REMAIN	--- EXISTING PIPING TO REMAIN
--- SQUARE FLOOR DRAIN (FS), SIZE & TYPE	--- SQUARE FLOOR DRAIN (FS), SIZE & TYPE
--- ROUND FLOOR DRAIN (FD), SIZE & TYPE	--- ROUND FLOOR DRAIN (FD), SIZE & TYPE
--- ROOF DRAIN (RD), SIZE & TYPE	--- ROOF DRAIN (RD), SIZE & TYPE
--- OXYGEN OUTLET	--- OXYGEN OUTLET
--- NITROUS OXIDE OUTLET	--- NITROUS OXIDE OUTLET
--- MEDICAL AIR OUTLET	--- MEDICAL AIR OUTLET
--- NITROGEN OUTLET	--- NITROGEN OUTLET
--- MEDICAL VACUUM INLET	--- MEDICAL VACUUM INLET
--- BALL VALVE	--- BALL VALVE
--- CONTROL VALVE	--- CONTROL VALVE
--- THREE-WAY CONTROL VALVE	--- THREE-WAY CONTROL VALVE
--- SHUTOFF VALVE	--- SHUTOFF VALVE
--- CHECK VALVE	--- CHECK VALVE
--- BALANCING VALVE WITH PRESSURE PORTS	--- BALANCING VALVE WITH PRESSURE PORTS
--- TRIPLE TEE VALVE WITH PRESSURE PORTS	--- TRIPLE TEE VALVE WITH PRESSURE PORTS
--- WATER METER	--- WATER METER
--- STRAINER	--- STRAINER
--- STRAINER WITH BLOWOFF	--- STRAINER WITH BLOWOFF
--- RELIEF/SAFETY VALVE	--- RELIEF/SAFETY VALVE
--- SOLENOID VALVE	--- SOLENOID VALVE
--- PRESSURE REDUCING VALVE	--- PRESSURE REDUCING VALVE
--- GAS PRESSURE REGULATING VALVE	--- GAS PRESSURE REGULATING VALVE
--- THERMOSTATIC MIXING VALVE	--- THERMOSTATIC MIXING VALVE
--- PIPE ANCHOR	--- PIPE ANCHOR
--- EXPANSION JOINT	--- EXPANSION JOINT
--- BACKFLOW PREVENTER	--- BACKFLOW PREVENTER
--- PRESSURE GAUGE	--- PRESSURE GAUGE
--- THERMOMETER	--- THERMOMETER
--- UNION	--- UNION
--- FLANGE CONNECTION	--- FLANGE CONNECTION
--- HOSE BIBB (HB)	--- HOSE BIBB (HB)
--- NONFREEZE WALL HYDRANT (NW)	--- NONFREEZE WALL HYDRANT (NW)
--- MANUAL / AUTOMATIC AIR VENT OR VACUUM RELIEF VALVE	--- MANUAL / AUTOMATIC AIR VENT OR VACUUM RELIEF VALVE
--- CLEANOUT	--- CLEANOUT
--- CAP	--- CAP
--- WALL CLEANOUT (WCO)	--- WALL CLEANOUT (WCO)
--- FLOOR CLEANOUT (FCO)	--- FLOOR CLEANOUT (FCO)
--- EXTERIOR CLEANOUT (ECO)	--- EXTERIOR CLEANOUT (ECO)
--- ELBOW UP	--- ELBOW UP
--- ELBOW DOWN	--- ELBOW DOWN
--- TEE UP	--- TEE UP
--- TEE DOWN	--- TEE DOWN
--- ELBOW UP WITH SHUT-OFF VALVE (SOV)	--- ELBOW UP WITH SHUT-OFF VALVE (SOV)
--- ELBOW DOWN WITH SHUT-OFF VALVE (SOV)	--- ELBOW DOWN WITH SHUT-OFF VALVE (SOV)
--- TEE UP WITH SHUT-OFF VALVE (SOV)	--- TEE UP WITH SHUT-OFF VALVE (SOV)
--- TEE DOWN WITH SHUT-OFF VALVE (SOV)	--- TEE DOWN WITH SHUT-OFF VALVE (SOV)
--- \"A\" WATER HAMMER ARRESTER (WHA) WITH PDI SIZES, (A, B, C, D, & E)	--- \"A\" WATER HAMMER ARRESTER (WHA) WITH PDI SIZES, (A, B, C, D, & E)
--- RECIRCULATION PUMP	--- RECIRCULATION PUMP
--- P-TRAP	--- P-TRAP
--- GAS COCK	--- GAS COCK
--- TRAP PRIMER	--- TRAP PRIMER
--- TRAP PRIMER WITH DISTRIBUTION UNIT	--- TRAP PRIMER WITH DISTRIBUTION UNIT

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PLUMBING DETAILS

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PROJECT NO. 06100  
 DATE 12-11-06  
 SCALE AS NOTED  
 DRAWN BY JEU  
 APPROVED

DRAWING NUMBER  
**P200**

SECTION 15B: PLUMBING

15B-1 GENERAL INSTRUCTIONS

15B 1-1 GENERAL REQUIREMENTS

REQUIREMENTS UNDER DIVISION ONE AND THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THE SPECIFICATIONS... THE CONTRACTOR SHALL BE RESPONSIBLE TO BECOME THOROUGHLY ACQUAINTED WITH ITS CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION OR SECTION.

THE SPECIFICATIONS AND THE DRAWINGS ARE COMPLEMENTARY, AND ANY PORTION OF WORK DESCRIBED IN ONE SHALL BE DEEMED TO BE DESCRIBED IN BOTH... IN THE EVENT OF DISCREPANCIES ON THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF SAME PRIOR TO PROCEEDING WITH THE WORK INVOLVED.

15B 1-2 DEFINITIONS

FURNISH: "TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS."

INSTALL: "TO PERFORM ALL OPERATIONS AT THE PROJECT SITE INCLUDING, BUT NOT LIMITED TO THE ACTUAL UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE."

PROVIDE: "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

FURNISHED BY OWNER OR FURNISHED BY OTHERS: "AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OF THE CONTRACT SHALL BE CLEARLY MARKED AND ACCESSORIES LISTED, APPROVED SHOP DRAWINGS, AND DESCRIPTIVE LITERATURE AS FURNISHED BY THE EQUIPMENT MANUFACTURER."

ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS OF THE SPECIFICATIONS.

AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

NETL: NATIONAL RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 19107.2 (E.G., UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

THE TERMS "APPROVED EQUAL," "EQUIVALENT," OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED" THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, OR BOTH, BY AN NETL, AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

15B 1-3 PERMITS, SITE VISIT

PRIOR TO SUBMITTING BID, VISIT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE DONE.

MATERIAL, EQUIPMENT, AND APPARATUS PROVIDED UNDER THIS CONTRACT SHALL BE NEW UNLESS OTHERWISE STATED HEREIN, OF BEST QUALITY NORMALLY USED FOR THE PURPOSE IN GOOD COMMERCIAL PRACTICE, AND FREE FROM DEFECTS.

PIPE, PIPE FITTINGS, PIPE SPECIALTIES AND VALVES SHALL BE MANUFACTURED IN PLANTS LOCATED IN THE UNITED STATES.

WORK PERFORMED UNDER THIS CONTRACT SHALL PROVIDE A NEAT AND "WORKMANLIKE" APPEARANCE WHEN COMPLETED, TO THE SATISFACTION OF THE ARCHITECT AND ENGINEER.

INSTALLATION SHALL FUNCTION AS DESIGNED AND INTENDED WITH RESPECT TO EFFICIENCY, CAPACITY, AND NOISE LEVEL, ETC. ABNORMAL NOISE CAUSED BY RATTLING EQUIPMENT OR PIPING AND SQUEAKS IN ROTATING COMPONENTS WILL NOT BE ACCEPTABLE.

REPAIR OR REPLACE PUBLIC AND PRIVATE PROPERTY DAMAGED AS A RESULT OF WORK PERFORMED UNDER THIS CONTRACT TO THE SATISFACTION OF AUTHORITIES AND REGULATIONS HAVING JURISDICTION.

15B 1-5 COORDINATION

COORDINATE WORK WITH THAT OF OTHER TRADES SO THAT THE VARIOUS COMPONENTS OF THE SYSTEMS WILL BE INSTALLED AT THE PROPER TIME, WILL FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE AND MAINTENANCE.

UNLESS NOTED ELSEWHERE, GENERAL CONTRACTOR SHALL PROVIDE CHASES AND OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF PLUMBING EQUIPMENT.

FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS. CONTRACTOR SHALL TAKE HIS OWN MEASUREMENTS, AND VARIATIONS MAY OCCUR.

PROVIDE MATERIALS WITH TRIM THAT WILL PROPERLY FIT THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.

WORK PERFORMED UNDER THIS CONTRACT SHALL, AT A MINIMUM, BE IN CONFORMANCE WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES HAVING JURISDICTION.

UNLESS NOTED ELSEWHERE, GENERAL CONTRACTOR SHALL PROVIDE CHASES AND OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF PLUMBING EQUIPMENT.

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THE ENGINEER'S CHECKING AND SUBSEQUENT APPROVAL OF SUCH SHOP DRAWINGS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, QUANTITIES, OMISSIONS OF COMPONENTS OR FITTINGS, COORDINATION OF ELECTRICAL REQUIREMENTS, OR FOR PORTIONS OF THE WORK MAY BE MADE, AND WHEN SATISFACTORY CONDITIONS, PROCEED WITH THE PROCUREMENT AND INSTALLATION OF EQUIPMENT ONLY AFTER RECEIVING APPROVED SHOP DRAWINGS RELATIVE TO EACH ITEM.

CATALOG DATA SHALL BE PROPERLY BOLD, IDENTIFIED, INDEXED AND TABBED IN A 3-RING BINDER. EACH ITEM OR MODEL NUMBER SHALL BE CLEARLY MARKED AND ACCESSORIES INDICATED. LABEL THE CATALOG DATA WITH THE EQUIPMENT IDENTIFICATION ACRONYM OR NUMBER AS APPLICABLE.

15B 1-10 ELECTRONIC DRAWINGS

IN PREPARATION OF SHOP DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN PDF OR DWX FORMAT FROM THE ENGINEER FOR A SHIPPING AND HANDLING FEE OF \$200 FOR A DRAWING SET UP TO 12 SHEETS AND \$15 PER SHEET FOR EACH ADDITIONAL SHEET.

15B 1-11 OPERATION AND MAINTENANCE INSTRUCTIONS

DURING THE COURSE OF CONSTRUCTION, COLLECT AND COMPIL A COMPLETE BROCHURE OF EQUIPMENT FURNISHED AND INSTALLED ON THIS PROJECT.

15B 1-12 WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBMITTAL OF THE WORK.

15B 1-13 SPARE PARTS

FURNISH TO OWNER, WITH RECEIPT, THE SPARE PARTS TO INCLUDE FAUCET WASHERS AND O-RINGS AND WATER CLOSET TANK REPAIR KITS FOR THE FIXTURES FURNISHED FOR THIS PROJECT.

15B 1-14 COINCIDENTAL DAMAGE

CONTRACTOR SHALL REPAIR STREETS, SIDEWALKS, DRIVES, PAVING, WALLS AND FINISHES ETC. THAT HE DAMAGES IN THE COURSE OF THIS PROJECT.

15B 1-15 CUTTING AND PATCHING

OBTAIN PERMISSION FROM THE ARCHITECT BEFORE CUTTING WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED BY THE WORK.

15B 1-16 ROUGH-IN

BEFORE STARTING CONSTRUCTION, COORDINATE WITH OTHER CONTRACTORS REGARDING ROUGH-IN WITH GENERAL CONSTRUCTION.

15B 1-17 STRUCTURAL STEEL

STRUCTURAL STEEL USED FOR PIPE SUPPORTS, EQUIPMENT SUPPORTS, ETC., SHALL BE NEW AND CLEAN, AND SHALL CONFORM TO ASTM DESIGNATION A-36.

15B 1-18 ACCESS DOORS

PROVIDE ACCESS DOORS IN CEILINGS AND WALLS WHERE INDICATED OR REQUIRED FOR ACCESS TO CONCEALED VALVES AND EQUIPMENT INSTALLED UNDER THIS SECTION.

15B 1-19 PENETRATIONS

SEAL FLOOR AND ROOF PENETRATIONS WATER AND WEATHERTIGHT WITH APPROPRIATE NON-SHRINK, NON-HARDENING COMMERCIAL CONSTRUCTION SEALANT.

15B 1-20 ELECTRICAL WIRING

LINE VOLTAGE WIRING SHALL BE PROVIDED BY DIVISION 16. LINE VOLTAGE CONTROL AND INTERLOCK WIRING FOR PLUMBING SYSTEMS SHALL ALSO BE PROVIDED BY DIVISION 16.

15B 1-21 UTILITY CONNECTIONS

PROVIDE UTILITY CONNECTIONS REQUIRED AND INDICATED ON THE DRAWINGS. INSTALL INTERIOR CONNECTIONS TO "MANS" AND EXISTING SERVICE LINES COMPLETE AND FUNCTIONING.

15B 1-22 MISCELLANEOUS REMODELING WORK

PROVIDE ITEMS OF PLUMBING SYSTEMS MODIFICATION REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS, OR NECESSARY FOR PROPER OPERATION.

15B 1-8 SUBSTITUTIONS

THE BASE BID SHALL INCLUDE ONLY THE PRODUCTS FROM MANUFACTURERS SPECIFICALLY NAMED IN THE DRAWINGS AND SPECIFICATIONS.

15B 1-9 SHOP DRAWINGS

UPON BEING AWARDED A CONTRACT, SUBMIT TO THE ARCHITECT FOR APPROVAL SIX (6) COPIES OF MANUFACTURER'S SHOP DRAWINGS FOR EQUIPMENT TO BE FURNISHED UNDER THIS CONTRACT.

15B 1-23 BUILDING OPERATION

COMPLY WITH THE SCHEDULE OF OPERATIONS AS OUTLINED IN THE ARCHITECTURAL PORTIONS OF THIS SPECIFICATION.

15B 1-24 SYSTEM TESTING AND ADJUSTING

UPON COMPLETION OF EACH PHASE OF THE INSTALLATION, TEST EACH SYSTEM IN CONFORMANCE WITH LOCAL CODE REQUIREMENTS AND AS NOTED BELOW.

NOTIFY THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION, THREE (3) WORKING DAYS PRIOR TO MAKING PLUMBING SYSTEM TESTS.

UPON COMPLETION OF THE SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE ARCHITECT AND ENGINEER, MAKE GENERAL OPERATING TESTS TO DEMONSTRATE THAT EQUIPMENT AND SYSTEMS ARE FUNCTIONING PROPERLY.

TEST THE DRAINAGE AND VENT SYSTEM BY PLUGGING OPENINGS WITH TEST PLUGS, EXCEPT THOSE AT THE TOP OF THE STACKS. FILL THE SYSTEM WITH WATER.

TEST THE DOMESTIC WATER SYSTEM BY FILLING IT WITH WATER AND THEN ISOLATING THE SYSTEM FROM ITS SOURCE.

15B 1-25 GUARANTEE

THE WORK TO BE PERFORMED UNDER THIS CONTRACT SHALL INCLUDE THE FURNISHING, INSTALLATION AND CONNECTION OF PLUMBING SYSTEMS INDICATED ON THE DRAWINGS.

GUARANTEE THAT THE PLUMBING INSTALLED UNDER THIS CONTRACT IS FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF SUBMITTAL OF THE WORK.

15B 1-12 WARRANTIES

IF DEFECTS OCCUR DURING THE ONE YEAR GUARANTEE PERIOD, REPAIR OR REPLACE SUCH DEFECTS AT NO EXPENSE TO THE OWNER, AND TO THE SATISFACTION OF THE OWNER.

15B2 PLUMBING PIPING

15B 2-1 PIPING MATERIALS

DOMESTIC WATER (COLD AND HOT); DOMESTIC WATER PIPING INSTALLED ABOVE THE FLOOR SLAB UNDER THE BUILDING SHALL BE TYPE "L" HARD TEMPER COPPER TUBE WITH WROUGHT COPPER FITTINGS AND SOLDERED CONNECTIONS.

15B 2-2 PIPING AND EQUIPMENT INSULATION

DOMESTIC COLD WATER, HOT WATER, INDIRECT AND CONDENSATE DRAIN PIPE (WITHIN BUILDING) 1" ONE-PIECE FIBERGLASS COVERING WITH FIRE-RESISTANT JACKET WITH SELF-SEALING LAD TO PROVIDE A CONTINUOUS WATER BARRIER.

15B 2-3 VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

15B 2-4 PIPING INSTALLATION

GENERAL: CLEAN PIPE THOROUGHLY PRIOR TO INSTALLATION. REAM ENDS OF PIPE TO REMOVE BURRS.

15B 2-5 PIPING SANITIZATION

15B 2-6 CLEANOUTS AND FLOOR DRAINS

15B 2-7 VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

15B 2-8 PIPING ACCESSORIES

15B 2-9 TRAP PRIMERS

15B 2-10 PLUMBING FIXTURES

15B 2-11 PLUMBING FIXTURES

15B 2-12 PLUMBING FIXTURES

15B 2-13 PLUMBING FIXTURES

15B 2-14 PLUMBING FIXTURES

15B 2-15 PLUMBING FIXTURES

15B 2-16 PLUMBING FIXTURES

15B 2-17 PLUMBING FIXTURES

15B 2-18 PLUMBING FIXTURES

15B 2-19 PLUMBING FIXTURES

15B 2-20 PLUMBING FIXTURES

15B 2-21 PLUMBING FIXTURES

15B 2-22 PLUMBING FIXTURES

15B 2-23 PLUMBING FIXTURES

15B 2-24 PLUMBING FIXTURES

CAST IRON PIPE: EVERY 10' AND WITHIN 1' OF EACH JOINT. 2" AND SMALLER WITH 3/8" HANGER RODS; 3" WITH 1/2" HANGER RODS; 4" WITH 5/8" HANGER RODS; 6" WITH 3/4" HANGER RODS; 8" AND LARGER WITH 7/8" HANGER RODS.

SUPPORTS ON FLOOR: SUPPORT PIPING FROM THE FLOOR WHERE REQUIRED FOR FERROUS PIPE INSULATED ABOVE GRADE SHALL BE FLANGES, VALVE STEMS, ETC. SHALL BE SHOWN ON THE SADDLE, THREADED SHANK FOR HEIGHT ADJUSTMENT AND FLOOR STAND SECURED TO THE FLOOR.

BELOW GROUND INSTALLATION FOR SOIL AND WASTE: INSTALL SOIL AND WASTE PIPING TO A UNIFORM SLOPE DRAIN TUBES OR RISER PIPES AT 1/8" PER FOOT FOR PIPING 4" OR SMALLER.

CLEANOUTS AND FLOOR DRAINS SHALL BE BY ONE MANUFACTURER AND SHALL BE OF THE SAME TYPE AND MATERIAL.

LAVATORY, SINK AND WATER CLOSET SUPPLIES SHALL BE SOLID BRASS ANGLE OR STRAIGHT TYPE WITH FULL TURN BRASS STEM, WHEEL HANDLE OR LOOSE KEY TYPES AS NOTED ON DRAWINGS.

LAVATORY DRAINS SHALL BE GRID TYPE CHROME PLATED 1/2 GAUGE BRASS OPEN GRID WITH 1-1/4" X 6" LONG SEAMLESS BRASS TALPICE AND BRASS LOCKNUT WITH HEAVY RUBBER GASKET WASHER AND FIBER FRICTION WASHER.

SINK DRAINS SHALL BE BASKET TYPE WITH CHROME PLATED FORGED BRASS BASKET STRAINER AND STRAINER BODY WITH 1-1/2" X 4" LONG SEAMLESS BRASS TALPICE AND CAST BRASS LOCK AND COUPLING NUTS BY MCGUIRE, BRASS CRAFT, DEARBORN BRASS, EBC, PROFLO OR ZURN.

PROVIDE HANDICAP INSULATION KITS FOR LAVATORIES AND SINKS ON EXPOSED WATER AND WASTE PIPES AND FITTINGS, INCLUDING OPTIC DRAIN AND CONTINUOUS WASTE COVER WHERE REQUIRED.

PROVIDE FLUSH VALVES AS SPECIFIED ON DRAWINGS: SLOAN OR APPROVED EQUAL BY DELANEY OR ZURN WITH CHROME PLATED BRASS BODY, CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE, SCREW DRIVER ANGLE STOP, NON-HOLD OPEN FEATURE AND SWEAT ADAPTER KIT.

15B 4-3 WATER HEATER

WATER HEATER SHALL BE CHROMONITE, EMAX, HOT AQUA OR PVI WITH CAPACITY AS SCHEDULED ON THE DRAWINGS.

15B 2-1 PIPING MATERIALS

DOMESTIC WATER (COLD AND HOT); DOMESTIC WATER PIPING INSTALLED ABOVE THE FLOOR SLAB UNDER THE BUILDING SHALL BE TYPE "L" HARD TEMPER COPPER TUBE WITH WROUGHT COPPER FITTINGS AND SOLDERED CONNECTIONS.

15B 2-2 PIPING AND EQUIPMENT INSULATION

15B 2-3 VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

15B 2-4 PIPING INSTALLATION

15B 2-5 PIPING SANITIZATION

15B 2-6 CLEANOUTS AND FLOOR DRAINS

15B 2-7 VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

15B 2-8 PIPING ACCESSORIES

15B 2-9 TRAP PRIMERS

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15B 2-11 PLUMBING FIXTURES

15B 2-12 PLUMBING FIXTURES

15B 2-13 PLUMBING FIXTURES

15B 2-14 PLUMBING FIXTURES

15B 2-15 PLUMBING FIXTURES

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15B 2-21 PLUMBING FIXTURES

15B 2-22 PLUMBING FIXTURES

15B 2-23 PLUMBING FIXTURES

15B 2-24 PLUMBING FIXTURES

15B 2-25 PLUMBING FIXTURES

15B 2-26 PLUMBING FIXTURES

15B 4-2 PLUMBING FIXTURE TRIM

FAUCETS AND TRIM IN CONTACT WITH DRINKING WATER SHALL MEET OR EXCEED THE SAFE WATER DRINKING ACT (SWDA) LEAD-FREE STANDARDS OF ANSI/NSF STANDARD 61, SECTION 9.

PROVIDE FAUCETS AS SCHEDULED ON DRAWINGS: BY KOHLER, CHICAGO, SPEAKMAN, ZURN, OR T&S BRASS.

FIXTURE P-TRAPS SHALL BE 17 GAUGE BRASS BODY WITH CLEANOUT, 17 GAUGE SEAMLESS TUBULAR WALL BEND WITH CAST BRASS SLIP NUT, SHALLOW STEEL FLANGE, ALL CHROME PLATED BY MCGUIRE, BRASS CRAFT, DEARBORN BRASS, EBC, PROFLO, WATTS BRASS AND TUBULAR OR ZURN.

LAVATORY, SINK AND WATER CLOSET SUPPLIES SHALL BE SOLID BRASS ANGLE OR STRAIGHT TYPE WITH FULL TURN BRASS STEM, WHEEL HANDLE OR LOOSE KEY TYPES AS NOTED ON DRAWINGS.

LAVATORY DRAINS SHALL BE GRID TYPE CHROME PLATED 1/2 GAUGE BRASS OPEN GRID WITH 1-1/4" X 6" LONG SEAMLESS BRASS TALPICE AND BRASS LOCKNUT WITH HEAVY RUBBER GASKET WASHER AND FIBER FRICTION WASHER.

SINK DRAINS SHALL BE BASKET TYPE WITH CHROME PLATED FORGED BRASS BASKET STRAINER AND STRAINER BODY WITH 1-1/2" X 4" LONG SEAMLESS BRASS TALPICE AND CAST BRASS LOCK AND COUPLING NUTS BY MCGUIRE, BRASS CRAFT, DEARBORN BRASS, EBC, PROFLO OR ZURN.

PROVIDE HANDICAP INSULATION KITS FOR LAVATORIES AND SINKS ON EXPOSED WATER AND WASTE PIPES AND FITTINGS, INCLUDING OPTIC DRAIN AND CONTINUOUS WASTE COVER WHERE REQUIRED.

PROVIDE FLUSH VALVES AS SPECIFIED ON DRAWINGS: SLOAN OR APPROVED EQUAL BY DELANEY OR ZURN WITH CHROME PLATED BRASS BODY, CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE, SCREW DRIVER ANGLE STOP, NON-HOLD OPEN FEATURE AND SWEAT ADAPTER KIT.

15B 4-3 WATER HEATER

WATER HEATER SHALL BE CHROMONITE, EMAX, HOT AQUA OR PVI WITH CAPACITY AS SCHEDULED ON THE DRAWINGS.



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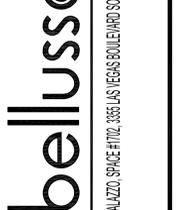
SEAL

PROVIDE FLUSH VALVES AS SPECIFIED ON DRAWINGS: SLOAN OR APPROVED EQUAL BY DELANEY OR ZURN WITH CHROME PLATED BRASS BODY, CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE, SCREW DRIVER ANGLE STOP, NON-HOLD OPEN FEATURE AND SWEAT ADAPTER KIT.

15B 4-3 WATER HEATER

WATER HEATER SHALL BE CHROMONITE, EMAX, HOT AQUA OR PVI WITH CAPACITY AS SCHEDULED ON THE DRAWINGS.

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PLUMBING SPECIFICATIONS

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PROJECT NO. 06100  
DATE 12-11-06  
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**SECTION 15C AUTOMATIC SPRINKLER SYSTEM:**

**15C1 GENERAL**

**15C 1-1 GENERAL REQUIREMENTS**

ALL REQUIREMENTS UNDER THE GENERAL AND SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS SHALL BE A PART OF THIS SECTION. EACH CONTRACTOR SHALL BE RESPONSIBLE TO THOROUGHLY BECOME FAMILIAR WITH ALL ITS CONTENTS AS TO CODES AND REQUIREMENTS THAT AFFECT THIS DIVISION OR SECTION. THE WORK REQUIRED UNDER THIS SECTION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, TRANSPORTATION, SERVICES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS.

THE SPECIFICATIONS WRITTEN HEREIN AND THE ASSOCIATED DRAWINGS ARE COMPLEMENTARY, AND ANY PORTION OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN THE OTHER. IN THE EVENT OF DISCREPANCY BETWEEN THE DRAWINGS AND SPECIFICATIONS, THE CONTRACTOR SHALL ADVISE THE ENGINEER OF SAME PRIOR TO PROCEEDING WITH THE WORK INVOLVED, IN ORDER THAT CORRECT PROGRESS OF THE WORK MAY BE ENSURED. REFER TO SECTION 15B PLUMBING FOR ADDITIONAL REQUIREMENTS THAT APPLY TO THIS INSTALLATION THAT ARE NOT WRITTEN HEREIN.

**15C 1-2 DEFINITIONS**

FURNISH: THE TERM "FURNISH" IS USED TO MEAN "SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION AND SIMILAR OPERATIONS."

INSTALL: THE TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT THE PROJECT SITE INCLUDING THE ACTUAL UNLOADING, UNPACKING, ASSEMBLY, ERECTION, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS."

PROVIDE: THE TERM "PROVIDE" MEANS "TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

FURNISHED BY OWNER OR FURNISHED BY OTHERS: THE ITEM WILL BE FURNISHED BY THE OWNER OR OTHERS. IT IS TO BE INSTALLED AND CONNECTED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE AND READY FOR OPERATION, INCLUDING ITEMS INCIDENTAL TO THE WORK, INCLUDING SERVICES NECESSARY FOR PROPER INSTALLATION AND OPERATION. THE INSTALLATION SHALL BE INCLUDED UNDER THE GUARANTEE REQUIRED BY THIS DIVISION.

ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSIONAL FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO, THE ARCHITECT.

AJH: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

THE TERMS "APPROVED EQUAL," "EQUIVALENT," OR "EQUAL" ARE USED SYNONYMOUSLY AND SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED." THE TERM "APPROVED" SHALL MEAN LABELED, LISTED, OR BOTH, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (E.G. UL, ETL, CSA), AND ACCEPTABLE TO THE AJH OVER THIS PROJECT.

**15C 1-3 INSPECTION OF SITE**

THE CONTRACTOR SHALL PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED AS TO THE CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

**15C 1-4 SCOPE**

PROVIDE COMPLETE WITH ALL RELATED ITEMS, A WET-PIPE, FIRE PROTECTION AUTOMATIC SPRINKLER SYSTEM FOR THE BUILDING OR AREA OF WORK SHOWN ON THE DRAWINGS. CONTRACTOR SHALL BE APPROVED AND STATE LICENSED FOR DESIGN AND INSTALLATION OF FIRE PROTECTION SYSTEMS. THE WORK DONE UNDER THIS SECTION SHALL BE PERFORMED ONLY BY A CONTRACTOR WHOSE WORKMEN ARE EXPERIENCED AND REGULARLY ENGAGED IN THE INSTALLATION OF FIRE PROTECTION SYSTEMS. CONTRACTOR SHALL BE CAPABLE OF PREPARING HYDRAULIC CALCULATIONS AND SYSTEM LAYOUTS.

PROVIDE ALL FIRE SPRINKLER ALARM DEVICES INCLUDING WATERFLOW ALARM AND VALVE TAMPER SWITCHES FOR ALL SYSTEM CONTROL VALVES AS REQUIRED. COORDINATE ALL WIRING AND CONDUIT FOR A COMPLETE AND FUNCTIONAL INSTALLATION.

THIS CONTRACTOR SHALL VERIFY DESIGN CRITERIA AND RATING HAZARDS WITH THE OWNER'S INSURER PRIOR TO DESIGNING THE SYSTEM. WATERFLOW AND PRESSURE TEST DATA SHALL BE ACQUIRED BEFORE SYSTEM IS CALCULATED AND BE DATED NOT MORE THAN 12 MONTHS PRIOR TO THE SUBMITTAL OF SPRINKLER DRAWINGS. ARRANGEMENTS FOR AND TEST BY THE CONTRACTOR'S RESPONSIBLE HYDRAULIC CALCULATIONS SHALL BE SUBMITTED AS REQUIRED INCLUDING SUPPLY AND DEMAND GRAPH; ALL HYDRAULIC REFERENCE POINTS AND AREA OF APPLICATION SHALL APPEAR ON THE PLAN. CONTRACTOR SHALL VERIFY WITH AUTHORITY HAVING JURISDICTION ANY MINIMUM SAFETY FACTOR REQUIREMENTS. DEMAND SHALL NOT BE LESS THAN 10% BELOW THE SUPPLY AT THE DEMAND POINT.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE HYDRAULIC CALCULATIONS, THE FINAL SYSTEM DESIGN, AND THE LAYOUT OF ALL COMPONENTS OF THE SYSTEM AS REQUIRED FOR THE APPROVAL BY THE OWNER'S INSURER, THE AUTHORITY HAVING JURISDICTION AND ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES AND STANDARDS.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR COORDINATING SYSTEM LAYOUT WITH OTHER CONTRACTORS. CHANGES TO SYSTEM DESIGN DUE TO LACK OF COORDINATION SHALL BE PAID FOR BY THIS CONTRACTOR.

DESIGNS REQUIRING CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS SHALL NOT BE ACCEPTED. WHEN DESIGN APPEARANCE OR SIMILAR ASPECTS REQUIRES CUTTING, DUE TO ECONOMY, IT SHALL BE HELD TO AN ABSOLUTE MINIMUM AND DONE ONLY WITH THE ARCHITECT AND STRUCTURAL ENGINEER'S WRITTEN APPROVAL. ANY EXCESSIVE REQUIREMENTS OF THIS TYPE SHALL BE IDENTIFIED DURING THE BID PERIOD.

SPRINKLER SPACING SHALL CONFORM TO NFPA 13. EXTENDED COVERAGE SPRINKLERS SHALL NOT BE USED IN UNFINISHED (SHELL) SPACES.

THE HYDRAULIC AREA OF OPERATION SHALL NOT BE REDUCED AS ALLOWED BY NFPA 13 FOR AREAS UTILIZING QUICK RESPONSE SPRINKLERS.

**15C 1-5 SYSTEM DESIGN**

THIS CONTRACTOR SHALL VERIFY DESIGN CRITERIA AND RATING HAZARDS WITH THE OWNER'S INSURER PRIOR TO DESIGNING THE SYSTEM. WATERFLOW AND PRESSURE TEST DATA SHALL BE ACQUIRED BEFORE SYSTEM IS CALCULATED AND BE DATED NOT MORE THAN 12 MONTHS PRIOR TO THE SUBMITTAL OF SPRINKLER DRAWINGS. ARRANGEMENTS FOR AND TEST BY THE CONTRACTOR'S RESPONSIBLE HYDRAULIC CALCULATIONS SHALL BE SUBMITTED AS REQUIRED INCLUDING SUPPLY AND DEMAND GRAPH; ALL HYDRAULIC REFERENCE POINTS AND AREA OF APPLICATION SHALL APPEAR ON THE PLAN. CONTRACTOR SHALL VERIFY WITH AUTHORITY HAVING JURISDICTION ANY MINIMUM SAFETY FACTOR REQUIREMENTS. DEMAND SHALL NOT BE LESS THAN 10% BELOW THE SUPPLY AT THE DEMAND POINT.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE HYDRAULIC CALCULATIONS, THE FINAL SYSTEM DESIGN, AND THE LAYOUT OF ALL COMPONENTS OF THE SYSTEM AS REQUIRED FOR THE APPROVAL BY THE OWNER'S INSURER, THE AUTHORITY HAVING JURISDICTION AND ALL APPLICABLE LOCAL, STATE AND NATIONAL CODES AND STANDARDS.

THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR COORDINATING SYSTEM LAYOUT WITH OTHER CONTRACTORS. CHANGES TO SYSTEM DESIGN DUE TO LACK OF COORDINATION SHALL BE PAID FOR BY THIS CONTRACTOR.

DESIGNS REQUIRING CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS SHALL NOT BE ACCEPTED. WHEN DESIGN APPEARANCE OR SIMILAR ASPECTS REQUIRES CUTTING, DUE TO ECONOMY, IT SHALL BE HELD TO AN ABSOLUTE MINIMUM AND DONE ONLY WITH THE ARCHITECT AND STRUCTURAL ENGINEER'S WRITTEN APPROVAL. ANY EXCESSIVE REQUIREMENTS OF THIS TYPE SHALL BE IDENTIFIED DURING THE BID PERIOD.

SPRINKLER SPACING SHALL CONFORM TO NFPA 13. EXTENDED COVERAGE SPRINKLERS SHALL NOT BE USED IN UNFINISHED (SHELL) SPACES.

THE HYDRAULIC AREA OF OPERATION SHALL NOT BE REDUCED AS ALLOWED BY NFPA 13 FOR AREAS UTILIZING QUICK RESPONSE SPRINKLERS.

**15C 1-6 SHOP DRAWINGS**

SIX (6) COPIES OF SHOP DRAWINGS AND HYDRAULIC CALCULATIONS SHALL BE FURNISHED TO THE ARCHITECT AND/OR ENGINEER, FOR HIS APPROVAL. THE ARCHITECT WILL FORWARD ONE SET TO THE CONTRACTOR AFTER FINAL APPROVAL. SUBMITTED SHOP DRAWINGS SHALL BEAR A STAMP INDICATING APPROVAL BY THE AUTHORITY HAVING JURISDICTION.

SHOP DRAWINGS SHALL MEET THE REQUIREMENTS OF NFPA 13 AND SHALL INCLUDE THE FOLLOWING:

- 1) SUBMIT WORKING PLANS PER NFPA 13 INCLUDING LAYOUT DRAWINGS OF THE COMPLETE OVERHEAD SPRINKLER SYSTEM INDICATING RELATIONSHIP OF SPRINKLER PIPING AND SPRINKLERS TO ALL OTHER OVERHEAD ITEMS INCLUDING CEILING GRID AND TILES, LIGHT FIXTURES, DIFFUSERS, REGISTERS, GRILLES, DUCTWORK, ETC. LOCATION OF RISERS, PIPING, ETC., SHALL BE AS INCONSPICUOUS AS POSSIBLE AND SHALL FULFILL ALL FUNCTIONAL REQUIREMENTS. SYSTEM DESIGN CAPABILITIES AND WATER DEMANDS SHALL ALSO BE NOTED ON THE DRAWINGS.
- 2) SUBMIT COMPLETE DETAILS AND SECTIONS AS REQUIRED TO CLEARLY DEFINE AND CLARIFY THE DESIGN, INCLUDING A MATERIALS LIST DESCRIBING ALL PROPOSED MATERIALS BY MANUFACTURER'S NAME AND CATALOG NUMBER.
- 3) HYDRAULIC CALCULATIONS AS REQUIRED.
- 4) PRODUCT DATA FOR ALL FIRE SPRINKLER SYSTEM COMPONENTS.

PROVIDE NEXT TO THE SPRINKLER RISER MAIN, A PRINTED SHEET, PROTECTED BY GLASS OR A TRANSPARENT PLASTIC COVER, GIVING BRIEF INSTRUCTIONS REGARDING CONTROL, EMERGENCY PROCEDURE AND OTHER DATA AS REQUIRED BY NFPA 13. FOR HYDRAULICALLY DESIGNED SYSTEMS, A PLACARD MUST BE PERMANENTLY ATTACHED TO THE RISER INDICATING THE LOCATION, AND THE BASIS OF DESIGN (DISCHARGE DENSITY AND SYSTEM DEMAND).

**15C 1-7 ELECTRONIC DRAWINGS**

IN PREPARATION OF SHOP DRAWINGS, CONTRACTOR MAY, AT HIS OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD VERSION 14, 2002, OR DWT FORMAT ON 3.5 INCH FLOPPY DISK, 100 MB ZIP DISK OR CD-ROM DISK, AS DESIRED, FROM THE ENGINEER FOR A FEE OF \$200 FOR A DRAWING SET UP TO 12 SHEETS AND \$15 PER SHEET FOR EACH ADDITIONAL SHEET. CONTRACTOR SHALL CONTACT THE ENGINEER TO OBTAIN THE NECESSARY RELEASE AGREEMENT FORM AND TO SPECIFY SHIPPING METHOD AND DRAWING FORMAT. PAYMENT MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

**15C 1-8 RECORD DRAWINGS**

DURING PROGRESS OF THE WORK OF THIS SECTION, THIS CONTRACTOR SHALL MAINTAIN AN ACCURATE RECORD OF ALL CHANGES MADE IN THE INSTALLATION OF THE SYSTEM. UPON COMPLETION OF THE WORK, ACCURATELY TRANSFER ALL RECORD INFORMATION TO THREE IDENTICAL BLUELINE PRINT SETS OF THE APPROVED SHOP DRAWINGS. INSERT ONE SET INTO EACH COPY OF THE MANUAL DESCRIBED BELOW.

**15C 1-9 TESTING AND ACCEPTANCE**

UPON COMPLETION OF EACH PHASE OF THE INSTALLATION, EACH SYSTEM SHALL BE TESTED IN CONFORMANCE WITH LOCAL CODE REQUIREMENTS AND AS NOTED BELOW. THE CONTRACTOR SHALL FURNISH ALL LABOR AND EQUIPMENT REQUIRED TO PROPERLY TEST ALL SPRINKLER EQUIPMENT INSTALLED UNDER THIS CONTRACT, AND HE SHALL ASSUME ALL COSTS INVOLVED IN MANAGING THE TESTS, AND REPAIRING AND/OR REPLACING ALL DAMAGE RESULTING THEREFROM.

THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION, THREE (3) WORKING DAYS PRIOR TO MAKING SPRINKLER SYSTEM TESTS. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL THE REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF NECESSARY DUE TO CONSTRUCTION PROCEDURE, TESTS ON PORTIONS OF THE WORK MAY BE MADE, AND IF SATISFACTORY, THE WORK MAY BE CONCEALED. ALL PIPING SHALL BE SUBJECT TO THE SPECIFIED PRESSURE FOR THE UNINTERRUPTED SPECIFIED PERIOD. ALL LINES, JOINTS, FLANGES, VALVE STEMS, ETC., SHALL BE LEAK TIGHT. ALL SYSTEM DEFECTS SHALL BE REPAIRED OR REPLACED WITH NEW MATERIALS. CALCULATING OF DEFECTIVE JOINTS, CRACKS OR HOLES WILL NOT BE PERMITTED. TESTS SHALL BE REPEATED AFTER DEFECTS HAVE BEEN ELIMINATED. ALL TESTS SHALL BE MADE IN THE PRESENCE OF THE ADMINISTRATIVE AUTHORITY AND/OR THE OWNER'S AUTHORIZED REPRESENTATIVE.

UPON COMPLETION OF THE SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE ENGINEER AND OWNER, THIS CONTRACTOR SHALL MAKE GENERAL OPERATING TESTS TO DEMONSTRATE THAT ALL EQUIPMENT AND SYSTEMS ARE IN PROPER WORKING ORDER, AND ARE FUNCTIONING IN CONFORMANCE WITH THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.

ABOVE GROUND PIPING SHALL BE TESTED IN ACCORDANCE WITH NFPA 13. ALL SPRINKLER PIPING SHALL BE HYDROSTATICALLY TESTED AT A MINIMUM PRESSURE OF 200-PSI FOR A MINIMUM 2-HOUR PERIOD OF TIME. CORRECT ANY FAULTY OR LEAKING JOINTS AND PIPE. THE USE OF ANY SUBSTANCE OR MATERIAL ADDED TO THE WATER TO CORRECT LEAKS SHALL NOT BE PERMITTED.

AFTER COMPLETION OF THE INSTALLATION, TEST, RETEST, AND MAKE ALL CORRECTIONS NECESSARY TO SECURE ACCEPTANCE BY THE FIRE MARSHAL AND/OR ANY OTHER AUTHORITY HAVING JURISDICTION. FURNISH ALL TEST EQUIPMENT AND PERSONNEL REQUIRED.

**15C 1-10 SYSTEM MANUAL**

UPON COMPLETION OF THE INSTALLATION, AND AS A CONDITION OF ITS ACCEPTANCE, CONTRACTOR SHALL COMPLY THREE 8-1/2" BY 11" MANUALS, FIRMLY BOUND IN HEAVYWEIGHT PLASTIC OR PAPER COVER TO WITHSTAND HARD USE. LOOSE-LEAF BINDING IS NOT ACCEPTABLE. MANUALS SHALL BE DELIVERED TO THE ARCHITECT, AND SHALL CONTAIN THE FOLLOWING ITEMS:

- 1) IDENTIFICATION CLEARLY VISIBLE ON OR THROUGH THE COVER, THE NAME OF THE PROJECT AND "FIRE SPRINKLER SYSTEM MANUAL."
- 2) NEATLY TYPED INDEX AT FRONT WITH ALL EMERGENCY INFORMATION CLEARLY IDENTIFIED.
- 3) COMPLETE LIST OF ALL SYSTEM COMPONENTS WITH MANUFACTURER'S NAMES, CATALOG NUMBERS, AND ALL DATA FOR ORDERING PARTS.
- 4) ONE COPY OF THE RECORD DRAWINGS, AS DESCRIBED ABOVE.
- 5) ALL INFORMATION REQUIRED TO SECURE EMERGENCY REPAIRS OR SERVICE.

6) CONTRACTOR'S "MATERIAL AND TEST CERTIFICATE(S) FOR SPRINKLER SYSTEM", AS DESCRIBED IN NFPA 13.

**15C 1-11 GUARANTEE**

THE ENTIRE INSTALLATION SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION. IF DEFECTS OCCUR DURING THE ONE-YEAR GUARANTEE PERIOD, THIS CONTRACTOR SHALL REPAIR OR REPLACE SUCH DEFECTS AT NO EXPENSE TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.

**15C 1-12 INSTRUCTIONS**

AFTER COMPLETION OF ALL INSTALLATION, TESTS, ETC., AND PRIOR TO THE FINAL ACCEPTANCE DATE, THE CONTRACTOR SHALL INSTRUCT THE BUILDING OWNER AND HIS SELECTED PERSONNEL IN THE OPERATION OF THE SPRINKLER SYSTEM AND THE PROCEDURE TO CONDUCT QUARTERLY MAIN DRAIN TESTS AS REQUIRED BY NFPA 25. SPECIAL CARE SHALL BE TAKEN TO MAKE SURE THE BUILDING PERSONNEL WILL IMMEDIATELY RECOGNIZE WHETHER THE MAIN VALVE IS IN AN OPEN POSITION, WILL KNOW HOW TO DRAIN THE SYSTEM, AND WILL KNOW HOW TO TEST THE ALARM VALVE IF APPLICABLE. THE BUILDING PERSONNEL SHALL ALSO BE MADE FAMILIAR WITH THE EXISTENCE AND CONTENTS OF THE SYSTEM MANUAL DESCRIBED IN THIS SPECIFICATION.

**15C2 MATERIALS AND INSTALLATION**

**15C 2-1 PRODUCTS**

ALL FIRE PROTECTION SYSTEM COMPONENTS SHALL BE UNDERWRITER'S LABORATORIES LISTED FOR THEIR INTENDED USE.

**15C 2-2 PIPING AND COMPONENTS**

SPRINKLER PIPING BE SCHEDULE SCHEDULE 40 BLACK STEEL. SPRINKLER PIPING 2" AND SMALLER SHALL BE SCHEDULE 40. PIPES SHALL HAVE WELDED, THREADED, OR MECHANICALLY JOINED FITTINGS, BASED ON THE PIPE MATERIAL AND SIZE PER NFPA 13 REQUIREMENTS.

**15C 2-3 SPRINKLERS**

SPRINKLERS IN AREAS WITH GYPSUM BOARD CEILINGS SHALL BE FULLY CONCEALED TYPE WITH WHITE DROP-AWAY COVERPLATES. COORDINATE FINISH COLOR WITH ARCHITECT PRIOR TO INSTALLATION.

SPRINKLERS IN AREAS WITH SUSPENDED ACUSTICAL CEILINGS SHALL BE FULLY CONCEALED TYPE WITH WHITE DROP-AWAY COVERPLATES. COORDINATE FINISH COLOR WITH ARCHITECT PRIOR TO INSTALLATION.

SPRINKLERS IN AREAS OF EXPOSED PIPING MAY BE PENDENT OR UPRIGHT TYPES WITH ROUGH BRASS FINISH.

**15C 2-5 INSTALLATION**

COORDINATE ALL SCHEDULING AND WORK WITH OTHER TRADES SO AS TO PREVENT CONFLICTS, AND TO ENSURE ORDERLY PROGRESS OF THE WORK, WITH A MINIMUM OF DELAYS. WHEN SPRINKLER PIPING IS INSTALLED WITHOUT COORDINATING WITH OTHER TRADES AND CONFLICTS OCCUR, SPRINKLER PIPING SHALL BE RELOCATED AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER TO RESOLVE THE CONFLICTS.

PIPING IN AREAS HAVING CEILINGS, OTHER THAN THE UNDERSIDE OF THE ROOF DECK, SHALL BE CONCEALED. PIPING IN AREAS WITHOUT CEILINGS MAY BE EXPOSED BUT KEPT AT A MINIMUM DISTANCE FROM THE DECK. ALL PIPING SHALL BE CLEAN AND FREE OF RUST. INSTALL SYSTEM SUCH THAT ALL PIPING IS RIGIDLY SECURED AND SUPPORTED. ALL DUCTWORK, LIGHTS, STRUCTURAL MEMBERS AND MAIN RUNS OF PIPING SHALL TAKE PRECEDENCE OVER SPRINKLER PIPING. CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS WILL NOT BE PERMITTED. ALL HORIZONTAL PIPING IN CEILING SPACE SHALL BE AT AN ELEVATION ABOVE THE TOP OF LIGHT FIXTURES AND AIR OUTLETS TO ALLOW FOR ACCESS TO LIGHT FIXTURES AND AIR OUTLETS WITHOUT REMOVING HORIZONTAL PIPING. ROUTE ALL SPRINKLER PIPING AND PROVIDE ALL OFFSETS, BENDS, AND ELBOWS AROUND ALL MECHANICAL, ELECTRICAL, AND STRUCTURAL MEMBERS AS REQUIRED.

CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR AND/OR ELECTRICAL CONTRACTOR THE CONNECTION OF THE FIRE SPRINKLER ALARM DEVICES TO THE FIRE ALARM SYSTEM AS REQUIRED.

WHERE EXPOSED PIPING PASSES THROUGH FINISH WORK, CHROME PLATED (OR OTHER FINISH ACCEPTABLE TO THE ARCHITECT) SPLIT WALL PLATES OR ESCUTCHEONS SHALL BE INSTALLED TO FIT SNUGLY AROUND THE PIPING. WHERE PIPING IS CONCEALED OR INSTALLED IN UNFINISHED AREAS, SUITABLE PLATES SHALL BE PROVIDED AT EACH PENETRATION TO ASSURE EFFECTIVENESS OF CONSTRUCTION AS A FIRE STOP.

ALL OPENINGS FOR PIPING SHALL BE ANTICIPATED AND INDICATED ON THE APPROVED SHOP DRAWINGS. ANY ADDITIONAL CUTTING OF OPENINGS MUST HAVE THE WRITTEN APPROVAL OF THE ARCHITECT.

CONTRACTOR SHALL COMPLETE THE AUTOMATIC FIRE SPRINKLER SYSTEM, AS SOON AS POSSIBLE, WHEN BUILDING CONSTRUCTION ALLOWS. THEN THE CONTRACTOR SHALL ACTIVATE THE SYSTEM FOR ITS INTENDED USE. AFTER THE SYSTEM HAS BEEN ACTIVATED FOR CONTINUOUS USE, WATER CHARGES IF ANY WILL BE PAID BY OWNER.

PIPING SHALL BE ROUTED PARALLEL TO BUILDING LINES.

**15C 2-6 PENETRATIONS**

SEAL ALL FIRE PROTECTION FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND FIRE PROTECTION PENETRATIONS WITH 3M CP-25, OR APPROVED EQUAL FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE-RATED ASSEMBLIES.

END OF SECTION 15C

THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND THE AUTHORITY HAVING JURISDICTION, THREE (3) WORKING DAYS PRIOR TO MAKING SPRINKLER SYSTEM TESTS. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL THE REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF NECESSARY DUE TO CONSTRUCTION PROCEDURE, TESTS ON PORTIONS OF THE WORK MAY BE MADE, AND IF SATISFACTORY, THE WORK MAY BE CONCEALED. ALL PIPING SHALL BE SUBJECT TO THE SPECIFIED PRESSURE FOR THE UNINTERRUPTED SPECIFIED PERIOD. ALL LINES, JOINTS, FLANGES, VALVE STEMS, ETC., SHALL BE LEAK TIGHT. ALL SYSTEM DEFECTS SHALL BE REPAIRED OR REPLACED WITH NEW MATERIALS. CALCULATING OF DEFECTIVE JOINTS, CRACKS OR HOLES WILL NOT BE PERMITTED. TESTS SHALL BE REPEATED AFTER DEFECTS HAVE BEEN ELIMINATED. ALL TESTS SHALL BE MADE IN THE PRESENCE OF THE ADMINISTRATIVE AUTHORITY AND/OR THE OWNER'S AUTHORIZED REPRESENTATIVE.

UPON COMPLETION OF THE SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE ENGINEER AND OWNER, THIS CONTRACTOR SHALL MAKE GENERAL OPERATING TESTS TO DEMONSTRATE THAT ALL EQUIPMENT AND SYSTEMS ARE IN PROPER WORKING ORDER, AND ARE FUNCTIONING IN CONFORMANCE WITH THE INTENT OF THE DRAWINGS AND SPECIFICATIONS.

ABOVE GROUND PIPING SHALL BE TESTED IN ACCORDANCE WITH NFPA 13. ALL SPRINKLER PIPING SHALL BE HYDROSTATICALLY TESTED AT A MINIMUM PRESSURE OF 200-PSI FOR A MINIMUM 2-HOUR PERIOD OF TIME. CORRECT ANY FAULTY OR LEAKING JOINTS AND PIPE. THE USE OF ANY SUBSTANCE OR MATERIAL ADDED TO THE WATER TO CORRECT LEAKS SHALL NOT BE PERMITTED.

AFTER COMPLETION OF THE INSTALLATION, TEST, RETEST, AND MAKE ALL CORRECTIONS NECESSARY TO SECURE ACCEPTANCE BY THE FIRE MARSHAL AND/OR ANY OTHER AUTHORITY HAVING JURISDICTION. FURNISH ALL TEST EQUIPMENT AND PERSONNEL REQUIRED.

**15C 1-10 SYSTEM MANUAL**

UPON COMPLETION OF THE INSTALLATION, AND AS A CONDITION OF ITS ACCEPTANCE, CONTRACTOR SHALL COMPLY THREE 8-1/2" BY 11" MANUALS, FIRMLY BOUND IN HEAVYWEIGHT PLASTIC OR PAPER COVER TO WITHSTAND HARD USE. LOOSE-LEAF BINDING IS NOT ACCEPTABLE. MANUALS SHALL BE DELIVERED TO THE ARCHITECT, AND SHALL CONTAIN THE FOLLOWING ITEMS:

- 1) IDENTIFICATION CLEARLY VISIBLE ON OR THROUGH THE COVER, THE NAME OF THE PROJECT AND "FIRE SPRINKLER SYSTEM MANUAL."
- 2) NEATLY TYPED INDEX AT FRONT WITH ALL EMERGENCY INFORMATION CLEARLY IDENTIFIED.
- 3) COMPLETE LIST OF ALL SYSTEM COMPONENTS WITH MANUFACTURER'S NAMES, CATALOG NUMBERS, AND ALL DATA FOR ORDERING PARTS.
- 4) ONE COPY OF THE RECORD DRAWINGS, AS DESCRIBED ABOVE.
- 5) ALL INFORMATION REQUIRED TO SECURE EMERGENCY REPAIRS OR SERVICE.

6) CONTRACTOR'S "MATERIAL AND TEST CERTIFICATE(S) FOR SPRINKLER SYSTEM", AS DESCRIBED IN NFPA 13.

**15C 1-11 GUARANTEE**

THE ENTIRE INSTALLATION SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION. IF DEFECTS OCCUR DURING THE ONE-YEAR GUARANTEE PERIOD, THIS CONTRACTOR SHALL REPAIR OR REPLACE SUCH DEFECTS AT NO EXPENSE TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.

**15C 1-12 INSTRUCTIONS**

AFTER COMPLETION OF ALL INSTALLATION, TESTS, ETC., AND PRIOR TO THE FINAL ACCEPTANCE DATE, THE CONTRACTOR SHALL INSTRUCT THE BUILDING OWNER AND HIS SELECTED PERSONNEL IN THE OPERATION OF THE SPRINKLER SYSTEM AND THE PROCEDURE TO CONDUCT QUARTERLY MAIN DRAIN TESTS AS REQUIRED BY NFPA 25. SPECIAL CARE SHALL BE TAKEN TO MAKE SURE THE BUILDING PERSONNEL WILL IMMEDIATELY RECOGNIZE WHETHER THE MAIN VALVE IS IN AN OPEN POSITION, WILL KNOW HOW TO DRAIN THE SYSTEM, AND WILL KNOW HOW TO TEST THE ALARM VALVE IF APPLICABLE. THE BUILDING PERSONNEL SHALL ALSO BE MADE FAMILIAR WITH THE EXISTENCE AND CONTENTS OF THE SYSTEM MANUAL DESCRIBED IN THIS SPECIFICATION.

**15C2 MATERIALS AND INSTALLATION**

**15C 2-1 PRODUCTS**

ALL FIRE PROTECTION SYSTEM COMPONENTS SHALL BE UNDERWRITER'S LABORATORIES LISTED FOR THEIR INTENDED USE.

**15C 2-2 PIPING AND COMPONENTS**

SPRINKLER PIPING SHALL BE SCHEDULE 40 BLACK STEEL. PIPES SHALL HAVE WELDED, THREADED, OR MECHANICALLY JOINED FITTINGS, BASED ON THE PIPE MATERIAL AND SIZE PER NFPA 13 REQUIREMENTS.

**15C 2-3 SPRINKLERS**

SPRINKLERS IN AREAS WITH GYPSUM BOARD CEILINGS SHALL BE FULLY CONCEALED TYPE WITH WHITE DROP-AWAY COVERPLATES.

SPRINKLERS IN AREAS WITH SUSPENDED ACUSTICAL CEILINGS SHALL BE FULLY CONCEALED TYPE WITH WHITE DROP-AWAY COVERPLATES).

**15C 2-4 INSTALLATION**

COORDINATE ALL SCHEDULING AND WORK WITH OTHER TRADES SO AS TO PREVENT CONFLICTS, AND TO ENSURE ORDERLY PROGRESS OF THE WORK, WITH A MINIMUM OF DELAYS. WHEN SPRINKLER PIPING IS INSTALLED WITHOUT COORDINATING WITH OTHER TRADES AND CONFLICTS OCCUR, SPRINKLER PIPING SHALL BE RELOCATED AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER TO RESOLVE THE CONFLICTS.

PIPING IN AREAS HAVING CEILINGS, OTHER THAN THE UNDERSIDE OF THE ROOF DECK, SHALL BE CONCEALED. PIPING IN AREAS WITHOUT CEILINGS MAY BE EXPOSED BUT KEPT AT A MINIMUM DISTANCE FROM THE DECK. ALL PIPING SHALL BE CLEAN AND FREE OF RUST. INSTALL SYSTEM SUCH THAT ALL PIPING IS RIGIDLY SECURED AND SUPPORTED. ALL DUCTWORK, LIGHTS, STRUCTURAL MEMBERS AND MAIN RUNS OF PIPING SHALL TAKE PRECEDENCE OVER SPRINKLER PIPING. CUTTING OF STRUCTURAL MEMBERS FOR PASSAGE OF SPRINKLER PIPES OR HANGERS WILL NOT BE PERMITTED. ALL HORIZONTAL PIPING IN CEILING SPACE SHALL BE AT AN ELEVATION ABOVE THE TOP OF LIGHT FIXTURES AND AIR OUTLETS TO ALLOW FOR ACCESS TO LIGHT FIXTURES AND AIR OUTLETS WITHOUT REMOVING HORIZONTAL PIPING. ROUTE ALL SPRINKLER PIPING AND PROVIDE ALL OFFSETS, BENDS, AND ELBOWS AROUND ALL MECHANICAL, ELECTRICAL, AND STRUCTURAL MEMBERS AS REQUIRED.

CONTRACTOR SHALL COORDINATE WITH THE FIRE ALARM CONTRACTOR AND/OR ELECTRICAL CONTRACTOR THE CONNECTION OF THE FIRE SPRINKLER ALARM DEVICES TO THE FIRE ALARM SYSTEM OR FIRE SPRINKLER MONITORING PANEL AS REQUIRED.

WHERE EXPOSED PIPING PASSES THROUGH FINISH WORK, CHROME PLATED (OR OTHER FINISH ACCEPTABLE TO THE ARCHITECT) SPLIT WALL PLATES OR ESCUTCHEONS SHALL BE INSTALLED TO FIT SNUGLY AROUND THE PIPING. WHERE PIPING IS CONCEALED OR INSTALLED IN UNFINISHED AREAS, SUITABLE PLATES SHALL BE PROVIDED AT EACH PENETRATION TO ASSURE EFFECTIVENESS OF CONSTRUCTION AS A FIRE STOP.

ALL OPENINGS FOR PIPING SHALL BE ANTICIPATED AND INDICATED ON THE APPROVED SHOP DRAWINGS. ANY ADDITIONAL CUTTING OF OPENINGS MUST HAVE THE WRITTEN APPROVAL OF THE ARCHITECT.

CONTRACTOR SHALL COMPLETE THE AUTOMATIC FIRE SPRINKLER SYSTEM, AS SOON AS POSSIBLE, WHEN BUILDING CONSTRUCTION ALLOWS. THEN THE CONTRACTOR SHALL ACTIVATE THE SYSTEM FOR ITS INTENDED USE. AFTER THE SYSTEM HAS BEEN ACTIVATED FOR CONTINUOUS USE, WATER CHARGES IF ANY WILL BE PAID BY OWNER.

PIPING SHALL BE ROUTED PARALLEL TO BUILDING LINES.

**15C 2-5 PENETRATIONS**

SEAL ALL FIRE PROTECTION FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND FIRE PROTECTION PENETRATIONS WITH 3M CP-25, OR APPROVED EQUAL FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE-RATED ASSEMBLIES.

END OF SECTION 15C

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FIRE SPRINKLER SPECIFICATIONS

REVISIONS

08-27-07	ISSUED FOR PRICING
10-29-07	REVISION NO. 1
11-28-07	REVISION NO. 2
11-29-07	REVISION NO. 3

PROJECT NO. 06100  
DATE 12-11-06  
SCALE AS NOTED  
DRAWN BY DIG  
APPROVED

DRAWING NUMBER  
**P301**